A PARTIAL SURVEY OF THE TREMATODES OF MANITOBA WATER AND SHORE BIRDS

A THESIS

Presented to

the Faculty of Graduate Studies and Research

University of Manitoba

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Nathan John Freedman

May 1956

ACKNOWLEDGMENTS

The writer wishes to express his sincere appreciation to his adviser, Professor R. A. Wardle, for his help and guidance and for the use of his private library.

Thanks are also due to Dr. J. A. McLeod for his advice and loan of personal material, and to Dr. A. Savage for the use of photographic equipment.

ABSTRACT

Thirty seven trematode species are described from twenty six separate bird hosts. Six new species as well as six undetermined species are included. A new genus, Xenisma, is proposed for a new species belonging to the isolated genera of the family Echinostomatidae. The six new species are: Parastrigea neorobusta, Cotylurus nelsoni, Stephanoprora lari, Xenisma wardlei, Echinostoma platyrhynchi, and Echinostoma penitolensis. The undetermined species are: Hypoderaeum sp., Plagiorchis sp. 1, Plagiorchis sp. 2, Astiotrema sp., Fibula sp., and Haematotrephus sp.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FIGURE PAGE

CHAPTER I

INTRODUCTION

This project was undertaken with a view to increasing our knowledge of the trematodes in the Province of Manitoba. Of necessity it was restricted to surveying a small segment of the animal life in the Province. Investigation of the water and shore birds was decided upon, as much material had already been collected from this group during a survey carried out to determine the varieties of cestodes in the Province by Neufeld (616).

The material examined was mainly that which was kindly given to the author by Mr. H. Neufeld, which had been collected by him along the Nelson and Hays Rivers in northern Manitoba, and at Whitewater Lake in southern Manitoba. Additional material was obtained by the author from the Netley marshes, south of Lake Winnipeg, and from Professor R. A. Wardle and Dr. J. A. McLeod from whom I was kindly loaned material which was already mounted. Birds brought in by hunters were examined for trematodes, and the trematode collection in the Zoology Department at the University of Manitoba was also employed in this survey.

Intensive work on schistosome dermatitis had been carried out in the Province by Wardle (475, 476), McLeod (306, 307,

309), McLeod and Little (310), and Svales (426), and much information, including life cycles on the schistosomes, was recorded. This information has been integrated into this work.

A resume on the helminthological work done in Manitoba has been included, as well as a summary of the research done across Canada on trematodes. It is hoped that this project will in some small way help to consolidate the work that has been done in Canada on the study of trematodes.

Twenty six bird hosts have been included in this survey, however due to the small number of birds examined, no definite conclusions can be made as to the host specificity of the parasites described.

CHAPTER II

HISTORICAL

The investigation of trematodes in Canada has been channeled towards the domesticated birds and animals, mainly from an economic point of view. However it has been realized for some time now, that to maintain our herds and flocks free of parasites, or to minimize them, we must know the life cycles of these parasites. Once this knowledge is gained, the weak link in the cycle can be determined, and we are then enabled to apply measures which can eliminate or reduce these parasites. Since these cycles include diverse types of life, we cannot limit our investigation to the domesticated animals, but must include the wild life as well.

In Canada, Allen (8, 9), Kennedy (251), Kingscote (254, 255), Knight (260), Law (282), Law and Kennedy (283) and Duff (153) have investigated the fur-bearing animals, however most of the investigation has centred on the parasitism of fishes. Lyster (292, 293, 294, 295), Ranghan (25, 26, 539), Ranghan and Vonard (27, 540), Cameron (98, 99, 100, 101, 102, 103), Choquette (117, 118, 553), MacLulich (602), and Miller (609, 612) have covered the eastern portions of Canada quite intensively. In the west, Ranghan and Adams (541) have checked the fresh water fish in British Columbia. Cooper (126) Keller (577), and McFarlane (290, 299) have checked the trem-

atode parasites of Canadian marine fishes, while Lyster (296), has done some investigating of Canadian sea mammals. One of the earliest workers in the field of Canadian parasitology was Stafford (649) who had investigated amphibians (412), fishes (413), marine vertebrates (415), and vertebrates in general (414). Cameron (550), Kingscote (256), Miller (611), and Parmel (369) also checked Canadian animals, the latter concentrating his study in the north eastern part of Canada. Miller (613) made a critical study of Stafford's early report on the parasites of Canadian animals. Ruminants have been investigated by Griffiths (673), Hadwen (184), Kingscote (256, 258) and Swales (424, 425), who reviewed the literature of Canadian helminthology up to 1933, restricting his study to the helminth parasites of domesticated and semi-domesticated mammals and economically important birds, (422, 423). Cannon (104, 105), investigated ducks, geese and starlings, Miller (610), pigeons, and Raynor (634) wild birds, in eastern Canada. In general, very little work has been done on the birds of Canada. In the Arctic areas, Brown et al (76) did some work at Igloolik in the North West Territories, while Cooper(127) investigated the trematodes and cestodes of the Canadian north as early as 1913. Cameron (97) looked into parasitism and public health in Canada. Hogarth (200) and Ross (391) reported bilharziasis in Canada, while Conklin and Baker (125) discovered the presence of the lancet fluke in 1930.

A break down of the helminthological investigations in Manitoba is as follows: (a)-Trematoda; Allen and Wardle (10) on a serious outbreak of infection of the dogs of northern Manitoba, McLeod (306, 307, 308, 309), McLeod and Little (310), Dvalos (426), and Wardle (475, 476), all of whom did quite extensive work on the schistosomes, with particular detail on schistosome dermatitis in the Province. Prosthogonimus was reported by Savage (395) in chickens. (b)-Cestoda; McLeod (305) investigated the genus Citellus, Kuitunen-Ikkaun (701), Nicholson (339, 340, 341, 342), Little (595), Newton (618), and Wardle (474) the fish, Doughton (545), the snow-shoe rabbit, Riddle (637), the cats of Winnipeg, and Neufeld (616) the birds of Manitoba. (c)-Nematoda; Marchant (605) on the nemas of Manitoba soils, Smedley (699) marine and fresh water fish, and Rempel (635) who investigated the importance, overwinter survival, and geographic distribution of the internal parasites in sheep. (d)-Physiological and Technique; Croom (572), Stewart-Hay (650), Harvey (576), and Wardle (671, 672, 673), all of whom confined their investigations to the cestoda. Hurst (504) investigated histological and toto-mount technique, using Dibothriocephalus latus and Echinorhynchus nodulosus in his work as the availability of this material was extremely good.

Other trends in helminthological studies are as follows:

Histology; Giordia (122), Konnig (333) and Willey (403). Corn cell cycles and embryology; Brook (72), Cort (134), Cort, Ansel, and Van der Woude (130, 131, 132, 561), Kingsley (343), Belling (44), Lunney (226), and Linton (207), as well as Willey and Godman (406). Leitt (69), Giordia (555), Short (697), and Short and Henzel (698) have done very interesting and important work on the chromosomes of the digenetic trematodes. Physiology; Goodchild (571), Senger (640), Ferguson (165, 166), and Wilmoth and Goldfischer (407, 408).

Relatively little is known of the role that insects may have in the life cycles of the trematodes. One of the earliest reports of trematodes parasitizing insects was reported by Sopariar in 1910. Since then occasional articles appear of other cases. Crawford (137), and Peters (493) reported water beetles of the family Dytiscidae as being parasitized by Allocreadium sp. of trematodes. Ono (361) discovered a plagiorchid which used dragon flies in their life cycle. Sopariar (640), Krupt (70), and van Thiel (663) investigated the role that mosquitoes play in the life cycles of trematodes, and Lakela discussed the role of dragon fly nymphs in this (688).

The taxonomy of the digenetic trematodes is in a state of constant change. It is very difficult to assign many trematodes to their proper niches, as their life cycles have not as yet been determined. It is hoped that as the mysteries of these life cycles are solved, that a workable scheme for classifi-

ation will evolve. In the field of taxonomy, the following have contributed valuable work; Byrd (87), Cort and Brackett (129), Faust (159, 162, 163), Lal (273), La Rue (281), Manter (324), McMullen and Beaver (542), Nicoll (344), Holland (615), Skrjabin (405, 406), Stunkard (417), Ulmer (661), Ward (670), Willey (481, 483), Chandler (552), Cort (128), Dubois (564, 568), Barker (20), Hunter (582), and Kuntz (590).

Recently, Manter has published important studies on the zoogeography of the trematodes (603). His study was restricted to the marine fishes, as this group is the only one in which a sufficient amount of literature has been published of the trematodes which parasitize them. He discussed the following regions; European North Atlantic, Mediterranean, Red Sea, Woods Hole area, Tortugas area, New Zealand and Japan, as well as the Indian coasts. The Japanese area has been extensively studied by Yamaguti (498-512), and many of the specimens he discovered have not been found elsewhere.

Of extreme importance is the compiling of Index Catalogues by Stiles and Hassall (651) and more recently Hassall et al (652). This catalogue covers all articles which have been written on any form of parasitism whether it be protozoan or helminth. The author here makes the suggestion that a similar catalogue restricted to trematodes, and arranged by families

would greatly facilitate all phases of research on the study of trematodes.

CHAPTER III

MATERIALS AND METHODS

A good portion of the material used in this study had been collected in 1949 and 1950, and had been preserved in 5% formalin. Portions of this material were then immersed in M.A.S. (Mercuric-Acetic-Sulfate) fixative and A.F.A. (Alcohol-Formol-Acetic) fixative to determine the benefits, if any, of the use or non use of these fixatives on this material. The material was repeatedly washed in distilled water over a period of 24 hours to remove all traces of the formalin and other fixatives before staining. It was found that this procedure was sufficient for most of the material, however difficulties were encountered with the larger and more muscular trematodes. It was found that staining of these muscular trematodes was uneven and that the stained portions did not agree with the internal organs of the trematode in question. It was assumed that this was due to insufficient washing of the material to remove the last traces of the formalin.

In the case of fresh material, the intestinal tract of the bird was cut up into convenient sections in order to keep track of the locality from which the parasite was recovered. The small intestine itself was divided into three portions being designated 'upper', 'middle', and 'lower' small intestine. The contents of each portion was scraped into individual

containers, and continually washed in lukewarm water to remove as much of the suspended and dissolved material as was possible. After a suitable elapse of time, this to allow the heavier trematodes to settle to the bottom, the major portion of the water in the container was poured out. The container was filled with lukewarm water again, and the process was repeated. Finally, when the supernatant liquid was clear enough to see through, portions of the residue on the bottom of the container containing the trematodes, were poured into shallow glass dishes. By the use of a binocular microscope, the trematodes were removed from this residue, and placed into vials containing various fixatives. The majority of the specimens were stained with carmine which appeared to give the most satisfactory results. Good results were also obtained in staining small specimens with haematin.

Several hundred small echinostomes and strigeids were recovered from a Lesser Scaup duck, and the major portion of this material was used to experiment with several varieties of stains. The stains were employed either singly, or in various combinations with one another. It was from this investigation that the carmine stains appeared to be superior to all others with this material. However, a startling and possibly useful stain revealed itself in the case of using Wright's Triple Stain. Several strigeids and echinostomes were immersed

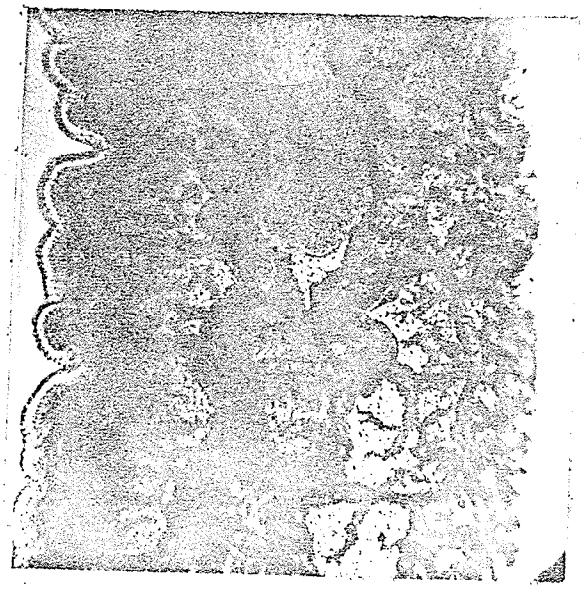
in this stain, and it was found that the vitelline follicles in the strigeid absorbed a brilliant green, leaving the rest of the specimen a light shade of pink. In the case of the echinostomes, they all assumed an overall lighter pink shade than the strigeids, and without the vitelline follicles absorbing any of the green as was noted in the case of the strigeids.

An unusual effect was noted in the case of removing a mounted specimen of Lyrodemum conoideum from the slide. The specimen was immersed in xylol to remove the mounting medium and then put into fresh xylol. Accidentally the xylol evaporated completely leaving the specimen dry. On putting the specimen into beechwood creosote to clear it, the excretory system of the specimen appeared to be brought out. The clearing agent did not perfuse the specimen completely but left dendritic shapes which were laterally symmetrical in appearance. On standing further, it was seen that the clearing agent was slowly beginning to fill into the dendritic tubules. Photomicrographs were taken before the clearing agent obliterated all signs of the excretory system. Fig.1, page 12 shows this.

A method was discovered whereby the ventral glands on the notocotylids could be observed and counted. By rowing the specimen under the binocular microscope, and applying a

PLATE I

Fig. 1. Excretory system of *Hypoderaeum conoideum* x48



1

corner of some absorbent substance, such as a blotter, to remove the excess clearing agent, the glands were then seen to stand out in relief, and could very easily be observed.

The formulae and procedures of the fixatives and stains used to best advantage in this study were as follows:

Mercuric-Acetic-Sulfate (M.A.S.) fixative.

Mercuric chloride (saturated aqueous soln.)---98 ml.
Glacial acetic acid---------- 2 ml.
Sodium sulfate---------- 1 gm.

(1)-Fix 1-24 hrs. depending upon size of specimen.

(2)-Before staining, wash specimen in .5% iodine in 70% alcohol until iodine begins to remain in the wash solution.

(3)-Specimen is ready for staining .

Alcohol-Formol-Acetic (A.F.A.) fixative.

Alcohol (50%)----------100 ml.
Formalin (100%)---------- 6.5 ml.
Glacial acetic acid---------- 2.5 ml.

(1)-Leave specimen in fixative until it is opaque.

(2)-No washing of specimen required prior to staining.

(3)-Fixative is replaced with two changes of 50% alcohol, allowing 20 min. to 1 hour each time.

(4)-Remove specimens to 70% alcohol, and they may remain here until ready to be stained.

Cronacher's Borax Carmine stain.

Carmine---------- 3 gms.
Borax (4% aqueous solution)----------100 ml.

(1)-Boil carmine for half an hour in borax solution.

(2)-Let stand at room temperature for 2 days, with occasional shaking.

(3)-Filter.

(4)-Mix filtrate with equal volume 70% alcohol.

(5)-Filter next day.

To stain

(a)-Leave specimen in stain from a few hours to a day depending upon size of the specimen.

(b)-Pass into acidified 70% alcohol (1 ml. acetic acid per 100 ml. of alcohol).

(c)-Leave specimen in for a day, or until tissue becomes translucent.

(d)-Pass up the alcohol series (30%-50%-70%-80%-90%-95%-absolute alcohols) and mount specimen.

Ehrlich's haematoxylin stain (original)

Glacial acetic acid	10 ml.
Haematoxylin	2 gms.
Potassium alum	in excess.
Distilled water	100 ml.
Absolute alcohol	100 ml.
Glycerol	100 ml.

(1)-Dissolve haematoxylin in acetic acid with 25 cc. of alcohol.

(2)-Add glycerol and remaining alcohol.

(3)-Dissolve alum in water with aid of heat.

(4)-Slowly pour warm solution into haematoxylin.

(5)-Expose solution to light and air for at least three weeks in order to ripen solution. When deep red color is aquired, stain is ready for use.

To stain

(a)-Leave specimen in stain for 20 min.

(b)-Wash in tap water until specimen appears blue.

(c)-If overstained, redden for few seconds in acid water (10 drops concentrated H Cl per 100 ml. water), then blue again in tap water.

(d)-Counterstain for 30-60 sec. in eosin (yellow)

(e)-Rinse with distilled water.

(f)-Pass rapidly up the alcohol series.

Hematin stain

A(Potassium alum---------- 50 gms) dissolve
A(Distilled water----------1000 cc) first.

B(Hematin---------- 1 gm.) mix in
B(95% alcohol---------- 10 cc.) mortar.

(1)-Add B to A slowly stirring.

(2)-Add one small crystal of thymol as a preservative.

(3)-Filter stain before using, each time.

To stain

(a)-Bring specimen to be stained down to water stage of the alcohol series.

(b)-Wash in distilled water, add stain, leave 1 hr.

(c)-Wash in 3 changes tap water, 5 min. each time.

(d)-Destain in 3% acid alcohol until blue changes to pink.

(e)-Intensify in NH_4OH (2 drops per 500 ml. water) for 20 min.

(f)-Wash several times in tap water.

(g)-Take specimen back up alcohol series .

(h)-Clear and mount.

Coelestin Blue B stain

Coelestin blue B	.5 gm.
Iron alum	5.0 gm.
Glycerol	14.0 ml.
Sulfuric acid (concentrated)	2.0 ml.
Distilled water	100.0 ml.

(1)-Boil water, coelestin blue B, and iron alum 20 min.

(2)-Allow to cool.

(3)-Add glycerol and sulfuric acid.

To stain

(a)-Stain specimen about 3 min.

(b)-Rinse in water several times.

(c)-Pass up the alcohol series, clear and mount.

Xylol based permount was the mounting medium used, while beechwood creosote was the clearing agent.

Literature consulted for this chapter was: (84), (173), (176), (179), (188), (311), (546), (638), (645, 646, 647, 648) and 667#).

CHAPTER IV

TAXONOMY AND DESCRIPTION

Classification of hosts

The classification used here is that of Wetmore (677). Identification of hosts was made by the use of Peterson's guides, (631, 632).

Class Aves-Birds

Subclass Neornithes-True birds

Superorder Neognathae-Typical birds

Order Gaviiformes-Loons

Family Gaviidae-Loons

Gavia immer-Common loon

Order Colymbiformes-Grebes

Family Colymbidae-Grebes

Colymbus holboelli-Holboell's grebe

Order Pelecaniformes-Tropic birds, Pelicans, allies

Suborder Pelecani-Pelecans, boobies, cormorants

Superfamily Suloidea-Boobies, cormorants & allies

Family Phalacrocoracidae-Cormorants

Phalacrocorax auritus-Double-crested cormorant

Order Anseriformes-Screamers, ducks, goose, swan

Suborder Anseres-Ducks, geese, and swans

Family Anatidae-Ducks, geese, and swans

Subfamily Anatinae-Surface feeding ducks

Anas platyrhynchos platyrhynchos-Mallard

Anas strepera-Gadwall

Anas acuta tzitzihoa-Pintail

Anas discors-Blue-winged teal

Spatula clypeata-Shoveller

Subfamily Aythyinae-Diving ducks

Aythya valisineria-Canvas-back duck

Aythya affinis-Lesser scaup duck

A. marila nearctica-Greater scaup duck

Glaucionetta albeola-Bufflehead

G. clangula americana-American golden-eye

Subfamily Merginae-Mergansers

Mergus serrator-Red-breasted merganser

Order Gruiformes-Cranes, rails and allies

Suborder Grues-Cranes, limpkins, trumpeter, rails

Superfamily Ralloidea-Rails

Family Rallidae-Rails, gallinules, coots

Fulica americana-Coot

Order Charadriformes-Shorebirds, gulls, auks

Suborder Charadrii-Shorebirds

Superfamily Charadrioidea-Plovers, sandpipers

Family Scolopacidae-Woodcock, snipe & allies

Erolea melanotos-Pectoral sandpiper

Micropalma himantopus-Stilt sandpiper

Totanus flavipes-Lesser yellow-legs

Limodromus griseus-Dowitcher

Limosa fedoa-Marbled godwit

Bartramia longicauda-Upland plover

Suborder Lari-Gulls, terns, skimmers

Family Laridae-Gulls, terns, skimmers

Subfamily Larinae-Gulls

Larus argentatus-Herring gull

Larus pipixcan-Franklin's gull

Larus delawarensis-Ring-billed gull

Subfamily Sterninae-Terns

Sterna hirundo hirundo-Common tern

Chlidonias niger surinamensis-Black tern

Classification of trematodes

Phylum Platyhelminthes Claus, 1880

Class Trematoda Rudolphi, 1808

Subclass Digenea Van Beneden, 1858

Order Fasciolata Nicoll, 1936

Superfamily Paramphistomoidea Stiles & Goldberger, 1910

Family Paramphistomidae Fischoeder, 1901

Subfamily Zygocotylinae Stunkard, 1916

Genus Zygocotyle Stunkard, 1916

Z. lunata (Diesing, 1836) Stunkard, 1916

Superfamily Notocotyloidea Nicoll, 1935

Family Notocotylidae Lühe, 1909

Subfamily Notocotylinae Kossack, 1911

Genus Notocotylus Diesing, 1839

Subgenus Notocotylus Dubois, 1951

N. (N.) trigonicollis Diesing, 1839

Subgenus Hindia Lal, 1935

Hindia species

Superfamily Cyclocoeloidea Henry, 1923

Family Cyclocoelidae Kossack, 1911

Subfamily Cyclocoelinae Stossich, 1902

Tribe Haematotrephea Witenberg, 1926

Genus Haematotrephus Stossich, 1902

Haematotrephus species

Superfamily Echinostomatoidea Faust, 1929

Family Echinostomatidae Poche, 1926

Subfamily Echinostominae (Looss, 1899)

Genus Echinostoma Rudolphi, 1809

E. revolutum (Fröhlich, 1802) Looss, 1899

E. platyrhynchi n. sp.

Genus Echinoparyphium Dietz, 1910

E. oloranum (Looss, 1899)

Subfamily Echinochasminae Odhner, 1910

Genus Echinochasmus Dietz, 1909

E. manitobensis n. sp.

Subfamily Echinochasminae (cont'd)

Genus Stephanoprora Odhner, 1902

Stephanoprora lari n. sp.

Isolated genera

Genus Hypoderaeum Dietz, 1909

Hypoderaeum conoideum (Bloch, 1782) Dietz, 1909

Genus Potasiger Dietz, 1909

Potasiger chandleri Abdel-Malek, 1952

Genus Drepanocephalus Dietz, 1909

Drepanocephalus spathans

Genus Xenisma nom. nov.

Xenisma wardlei n. sp.

Family Cathaemasiidae (Fuhrmann, 1928)

Subfamily Cathaemasiinae Dollfus, 1950

Genus Cathaemasia Looss, 1899

Cathaemasia mycteroncis Olsen, 1940

Superfamily Plagiorchioidea Dollfus, 1930

Family Plagiorchiidae Lühe, 1901

Subfamily Plagiorchiinae Pratt, 1902

Genus Plagiorchis Lühe, 1899

Plagiorchis sp. 1.

Plagiorchis sp. 2.

Genus Astiotrema Looss, 1900

Astiotrema sp.

*Family Brachylaemidae Joyeux and Foley, 1930

Subfamily Leucochloridiinae Pocho, 1907

Genus Leucochloridium Carus, 1835

L. cyanocittae McIntosh, 1932

Order Strigeata La Rue, 1926

Supersuperfamily Strigeida Pocho, 1925

Superfamily Strigeides Dubois, 1936

Subsuperfamily Strigeinos Dubois, 1936

Family Strigeidae Railliet, 1919

Subfamily Strigeinae Railliet, 1919

Subsubfamily Strigeini Dubois, 1936

Genus Parastrigea Szidat, 1928

Parastrigea neorobusta n. sp.

Subsubfamily Cotylurini Dubois, 1936

Genus Cotylurus Szidat, 1928

Cotylurus communis Hughes, 1928) La Rue, 1932

C. cornutus (Rudolphi, 1808) Szidat, 1928

C. brevis Dubois and Rausch, 1950

C. flexuilcus (Rudolphi, 1809) Szidat, 1928

C. nelsoni n. sp.

Subsuperfamily Diplostominos Dubois, 1936

Family Diplostomidae Poirier, 1886

Subfamily Diplostominae Monticelli, 1888

Subsubfamily Diplostomini Dubois, 1936

Genus Diplostomum v. Nordmann, 1832

D. [illegible] (La Rue, 1927) Hughes, 1929

D. [illegible] (Rudolphi, 1819) Braun, 1893

D. [illegible] Dubois, 1932

D. [illegible] Dubois, 1937

D. [illegible] (Cuberlet, 1922) Hughes, 1929

Genus Postbothriostomum Dubois, 1936

P. [illegible] Dubois and Rausch, 1948

Superfamily Cyathocotyloidea Dubois, 1936

Family Cyathocotylidae Poche, 1925

Supersubfamily Probenistomidi Dubois, 1938

Subfamily Probenistominae Lutz, 1935

Subsubfamily Probenistomini Dubois, 1938

Genus Mesostephanus Lutz, 1935

Mesostephanus sp.

*Family Schistosomatidae Looss, 1899, emend. Poche, 1907

Subfamily Schistosomatinae Stiles & Hassall, 1898

Genus Ornithobilharzia Odhner, 1912

O. [illegible] McLeod, 1940

O. [illegible] McLeod, 1940

Genus Austrobilharzia Johnston, 1917

A. [illegible] (McLeod, 1937) Penner, 1953

A. [illegible] (McLeod, 1936) Penner, 1953

A. [illegible] (McLeod, 1936) Penner, 1953

Subfamily Milharziellinae Price, 1929

Genus Trichobilharzia Skrjabin & Zakharow, 1920

T. <u>szidati</u> (Neiva, 1912) Wu, 1953

Families marked with an asterisk (*), are not meant to be included in the superfamilies appearing above them.

Detailed description

Family Paramphistomidae

<u>Zygocotyle lunata</u> (Diesing, 1836) Stunkard, 1916

Several specimens of <u>Z. lunata</u> were obtained from the lower small intestine of the Lesser scaup duck <u>Aythya affinis</u>, the intestinal caecae and small intestine of the Pintail <u>Anas acuta</u>, and the intestinal caecae of the Mallard <u>Anas</u> <u>A. platyrhynchos</u>. As far as can be ascertained, this is the first report of <u>Z. lunata</u> from the Lesser scaup and Pintail. It has been reported previously from the following hosts:

Baldpate-<u>Mareca americana</u> (149)
Blue-wing teal-<u>Anas discors</u> (532)
Domestic duck-<u>A. platyrhynchos</u> (139), (655), (149)
Black duck-<u>A. rubripes</u> (104), (149)
Green-wing teal-<u>A. carolinensis</u> (374)
<u>A. boschas</u> (617)
<u>A. melanetus</u> (680), (374)
<u>A. fregilard</u> (680), (374)
Domestic goose-<u>Anser A. domesticus</u> (374), (617), (139), (104)
Domestic chicken-<u>Gallus gallus</u> (90), (617)
Red-head duck-<u>Aythya americana</u> (149), (374)
Wild turkey-<u>Meleagris gallopavo intermedia</u> (641)
Curlew-<u>Numenius A. arquata</u> (139)
Wilsons snipe-<u>Capella gallinago gallinago</u> (374)
<u>Limnodromus griseus</u> (374), (680)
Ox-<u>Bos taurus</u> (139), (374), (387), (617)
Elk-<u>Cervus dichotomus</u> (374), (563), (617)

Many of the specimens recovered from the intestinal tract were still alive. This was very interesting due to the hosts having been dead for two days prior to the recovery of the worms. Unfortunately time did not permit the investigation of how long the worms could have survived under these abnormal conditions of temperature.

Figs. 10 and 11, page 44, show the aspects of two specimens varying greatly in size. Comparisons of the dimensions of these two specimens with those of specimens from various sources are shown in Table I, page 26. Fig. 15, page 45, shows the convolutions of the caeca in an immature specimen. Figs. 16 and 17, page 45, are photomicrographs of a specimen obtained from Pintail duck.

Willey (485) in his study of the life cycle and bionomics of _Z. lunata_, discovered that flukes of the same age vary in size according to the number within the host. They apparently continue growing long after attaining sexual maturity. Range in size is from 3.1 by 1.4-9.2 by 4.7 mm.

One other species of this genus has been reported by Dollfus (146) from the dugong, _Dugong dugong_. Hilmy (578) described four new Paramphistomes from the dungong under the names _Solenorchis travassosi_, _S. gohari_, _S. naguibmahfouzi_ and _S. baeri_. However Dollfus, stating that the pharyngeal pouches are difficult to see, and may have atrophied, trans-

TABLE I

COMPARISON OF MEASUREMENTS OF ZYGOCOTYLE LUNATA FROM VARIOUS SOURCES

	* Freedman Mallard Manitoba	** Freedman Mallard Manitoba	Caballero Chicken Mexico	*** Price Ox Panama	**** Price W. snipe Texas
Length	3.870	7.304	9.000	6.000	3.000
Width	1.260	2.573	2.900	3.000	1.500
Or. sucker	0.158 d.	0.225 d.	0.253 d.	0.650	0.286 d.
Ph. pouches	0.113 x 0.072	0.338 x 0.199	0.351 x 0.234	0.250 x 0.130	0.130 x 0.065
Esophagus	0.360	0.498	1.170	0.455	0.260
Esophageal bulb	0.144 x 0.135	0.485 x 0.291	0.390 x 0.292	0.416 x 0.260	0.169 x 0.156
Anterior testis	0.270 x 0.270	0.415 x 0.664	0.975 x 1.404	0.650 x 0.390	0.364 x 0.221
Posterior testis	0.265 x 0.270	0.341 x 0.747	0.994 x 1.267	0.650 x 0.520	0.390 x 0.234
Ovary	0.090 x 0.100	----------	0.409 x 0.624	0.156 x 0.260	0.143 x 0.091
Acetabulum	1.035 x 0.630	1.743 x 1.079	1.925 x 1.500	1.100 x 1.200	0.550 x 0.520
Gen. pore to anterior	0.793	1.700	2.200	------	------
Eggs	0.045 x 0.090	1.068 x 0.083	0.151 x 0.090	0.143 x 0.090	0.125 x 0.075

All measurements in mm.

* Specimen shown in Fig. 10, page 44.
** Specimen shown in Fig. 11, page 44.
*** Maximum dimensions given, Price (374).
**** Same as preceding line. (Wilsonâ€™s snipe).

ferred the four new species to the genus Zygocotyle, claiming that they were the same as the specimens which he obtained from the dugong, with slight individual differences. Hilmy had erected the new subfamily Solenorchinae, and new genus Solenorchis to contain the apparent new species. These are now invalidated by Dollfus naming the five supposed varieties Z. travassosi (Hilmy, 1949) Dollfus, 1950.

Other literature consulted was: (89), (142), (171), (264), (286), (337), (406), (410), (451, 452), (469), (482), (484, 486), (500), (604), (679), (680), (682), (687).

Family Notocotylidae Lühe, 1909

Notocotylus triserialis triserialis Diesing, 1839

Specimens were obtained from the small intestine, caeca, and rectum of the Mallard, Pintail, Shoveller, and Lesser scaup. Many species of Notocotylus have been reported, however it appears to the writer, after examining the literature, that many are synonymous. Dubois (149) has made a detailed study of this group, reducing N. intestinalis, N. stomicolae, and N. urbanensis to synonymy with N. t. triserialis. This species has been reported from the Blue goose (Chen caerulescens) (104), Wood duck (Aix sponsa) (169), Muskrat (Fiber zibethicus) (189), (260), (636).

Table II, page 28, compares a typical specimen collected

TABLE II

COMPARISON OF MEASUREMENTS OF NOTOCOTYLUS TRIGONOLABIS TRIGONOLABIS FROM VARIOUS SOURCES

	Freedman* Shoveller Manitoba	Wu** Experimental Ottawa	Dubois*** Mallard & Shov. Wisconsin
Length	4.750	4.38	2.64
Width	1.140	1.10	0.070
Esophagus	0.40	0.18	0.145
Oral sucker	0.19 x 0.19	0.15 x 0.19	0.115 x 0.140
Cirrus	0.75 x 0.03	----------	----------
Testes	0.60 x 0.28	0.69 x 0.33	0.360 x 0.210
Ovary	0.28 x 0.28	0.25 x 0.20	0.180 x 0.180
Ventral glands	14 15 14	16-19, 14-16, 16-19	14-16, 14-15, 14-16
Metraterm	0.180	0.125	0.566
Cirrus pouch	1.70	------	0.850 x 0.085
Egg	-------	0.023 x 0.013	0.021 x 0.013

All measurements in mm.

* Specimen shown in Fig. 3, page 31.

** Wu (497)

***Dubois (149)

by the writer, with several others reported in the literature. A typical specimen, Fig. 3, is pictured on page 31, while Figs. 6 and 7 on page 32show the anterior and posterior aspects respectively.

Literature consulted was: (30, 31), (45), (65), (139), (149), (19), (46, 48), (104), (175), (189), (192), (195), (196), 197), (134), (268), (270, 271), (283), (289), (291), (325), (331), (334), (345), (427), (434), (436, 437), (461), (497), (498), (500, 502, 508, 509), (513), (555), (418), (617), (655), (642), (644), (669, 670), (679), (681), (695), (649), (684).

Mindia species

Two specimens were recovered from the intestinal caeca of the Coot (Fulica americana). Due to the size and opacity of the specimens, it was extremely difficult to differentiate most of the internal organs. However, sufficient details were observed to place this species in the genus Mindia by the use of Dubois' key (149). The dimensions are as follows: Length-2.40, Width-1.40, Esophagus-0.25, Oral sucker-0.22 by 0.16, Cirrus-0.60 by 0.03, Bifurcation of caeca to first of the median glands-0.28, Distance of vitellaria from extreme anterior-1.30, Testes (not distinct)-0.30 by 0.20, Ovary-0.26 by 0.21, Ventral glands-lateral 11, median 8 or 9 ?. Distance of vitellaria to lateral border-0.25, Metraterm-

0.55, Distance between genital pore and bifurcation of the caecae-0.07, Cirrus pouch-0.55. The uterus appeared to be intracecal, while the vitellaria extended from the lower borders of the testes to about the middle of the length of the body of the specimen. No spines were seen on the cuticle.

Literature consulted was: (12), (33), (82), (272), (427), (548), and (348). These specimens are shown in Figs. 4 & 5, page 31.

Family Cyclocoelidae

Uncinatotrenhus angelos

Three specimens were found in the body cavity of the Upland plover (Bartramia longicauda). Witenberg's classification (490) is followed here. Dimensions in mm. of one specimen are as follows: Length-8.231, Width at oral sucker-0.660, Width at widest part-1.485, Oral sucker-0.165 by 0.221, Length of oesophagus-about 0.945, Ovary-0.429 by 0.264, Anterior testis-round 0.363 diam., Posterior testis-ovoid 0.495 by 0.363, Eggs-0.099 by 0.050. Vitellaria extend extracecally from about the level of the bifurcation almost to the excretory cavity at the extreme posterior.

Fig. 2 on page 31 shows the complete specimen, while Figs. 8 and 9 on page 33 show details of the anterior and posterior portions respectively.

Literature consulted here was: (19), (70, 80), (71), (93), (145), (168), (172), (180), (189), (244, 245), (253), (266),

PLATE II

Fig. 2. Haematotaenia species from the body cavity of the Upland plover Bartramia longicauda. Ventral view.

Fig. 3. Notocotylus triserialis triserialis from the Shoveller duck. Ventral view.

Fig. 4. Hindia species. Ventral view.

Fig. 5. Hindia species. Lateral view.

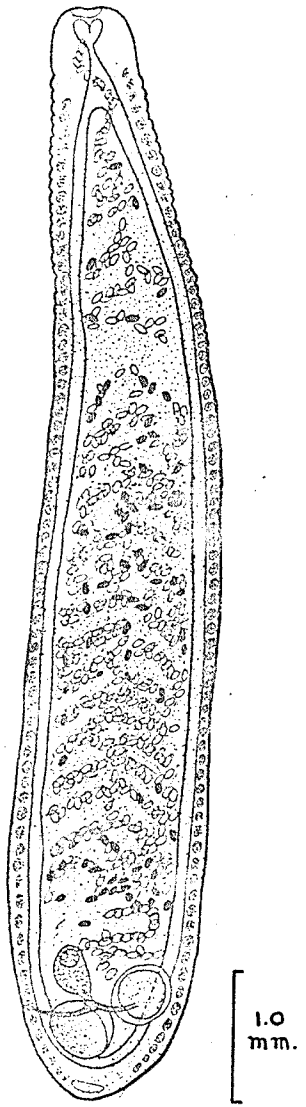


FIG. 2

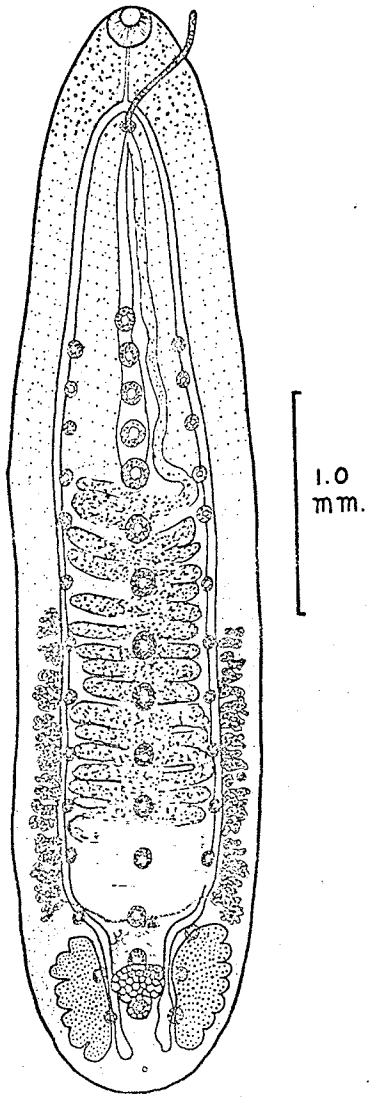


FIG. 3

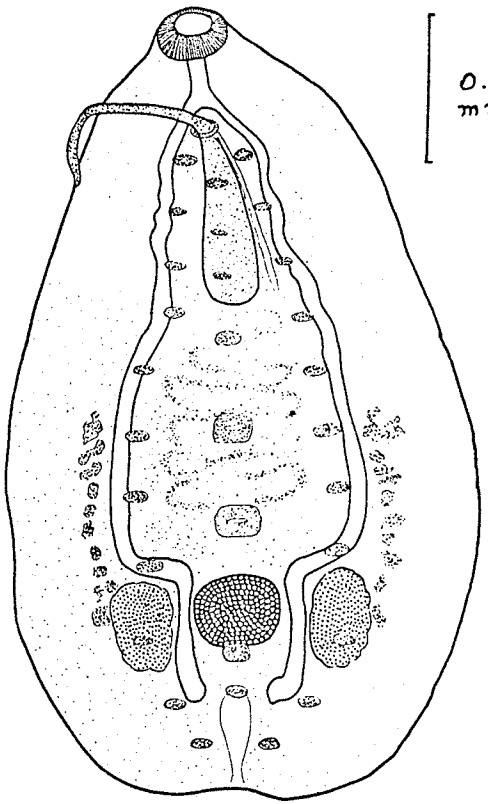


FIG. 4

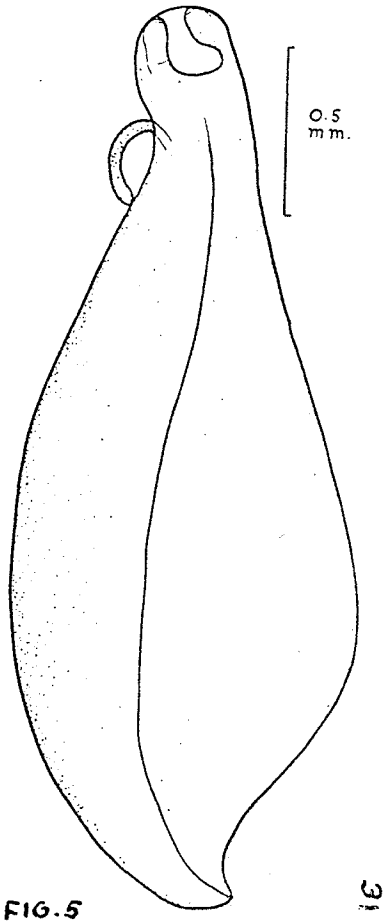


FIG. 5

PLATE III

Fig. 6. Photomicrograph anterio portion of *Notocotylus t. triserialis*.
Ventral view. x35.

Fig. 7. Photomicrograph posterior portion of *Notocotylus t. triserialis*.
Ventral view. x35.

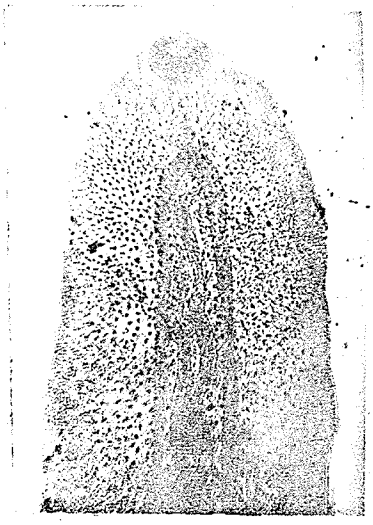


Fig. 6

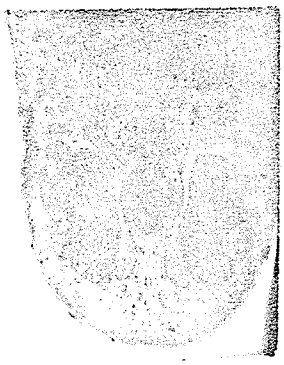


Fig. 7

PLATE IV

Fig. 8. Photomicrograph anterior portion of *Haematotrephus* species.
Ventral view. x45

Fig. 9. Photomicrograph posterior portion of Haematotrophus species.
Ventral view. x53.

Fig. 8

Fig. 9

(236), (325), (348), (443, 444), (447, 446, 450), (456), (491), (492), (498), (407), (461), (500), (509), (530), (617), (644), (654), (679), (687).

Family Echinostomatidae

Echinostoma revolutum (Fröhlich, 1802) Looss, 1899

Several specimens were recovered from the large intestine of the Canvas-back duck, and were found to agree quite closely to the descriptions given by various authors. Following are the dimensions in mm. of a typical specimen: Length-13.308, Width at level of ovary-1.578, Oral sucker-0.421 diam., Pharynx-0.526 by 0.316, Esophagus-0.894 by 0.263, Acetabulum-0.947 diam, Cirrus pouch-0.631 by 0.263, Cirrus-0.526 by 0.105, Ovary-0.421 diam., Shell gland complex-0.579 diam., Anterior testis-0.868 by 0.631 ovoid, Posterior testis-0.857 by 0.631 ovoid, Distance between Shell gland complex and anterior testis-0.158, Distance between testes-0.211, Eggs-numerous 0.079 by 0.052. Vitellaria extend from the level of the posterior margin of the acetabulum to within 0.316 of the posterior end of the worm. Two worms are shown on page 46, Figs. 18 and 19.

Literature consulted: (14), (34), (36), (51), (94), (113), (120), (121), (131), (140), (157), (234), (235), (240), (278), (332), (389), (394), (405), (457), (460), (461), (470),

(498), (500), (520), (521), (524), (607), (636), (640).

Echinostoma platyrhynchi n. sp.

A single specimen was recovered from the intestinal ceca of a Mallard. It has very close affinities to E. robustum as pictured by Yamaguti (502). The main differences are to be noted in the greater lobulation of the testes, and the lower situation of the genital organs in E. robustum. The eggs in E. platyrhynchi are only about half as large as those in E. robustum. The dimensions in mm. of E. platyrhynchi are as follows: Length-6.656, Width at acetabulum-0.845, Width at ovary-1.152, Collar-0.410, Oral sucker-0.166 diam. subterminal, Pharynx-0.205 by 0.128, Esophagus-0.435, Genital pore-0.094 by 0.128, Cirrus pouch-0.358 by 0.230, Acetabulum-0.538 diam., Distance between acetabulum and anterior end-1.024, Distance between acetabulum and ovary-1.536, Ovary-0.256 diam., Shell gland complex-0.128 by 0.358, Anterior testis-.358 by 0.259, Posterior testis-0.512 by 0.256, Distance between testes-0.044, Distance between testes and posterior end-2.202, Spines-0.051 by 0.248 approximately 36, 2 rows, with 6 corner spines, Vitelline follicles-0.065 diam, Vitellaria extend from about 0.15 below acetabulum to within 0.205 of the posterior end. Eggs-0.054 by 0.031 numerous. Fig. 21, page 46.

Literature consulted here:(502), (534).

Echinoparyphium elegans (Looss, 1899)

Over 460 specimens were recovered from the upper third portion of the small intestine of a Lesser scaup. At the same time over 193 specimens of Cotylurus brevis were obtained from the same location, as well as 4 specimens of Xenisma yardlei n.g., n.sp. Several views are depicted on page 47, Figs. 23 to 25. Figs. 39 to 43 page 66, show the crown spines in greater detail, while Fig. 95, page 88, shows 6 specimens arranged according to the maturity of the specimen. They were picked at random, and after arranging them it became apparent that the distance between the oral sucker and the anterior border of the acetabulum remained virtually constant. It was thought that this was an indication that growth in the species took place posterior to the acetabulum. Thirty eight specimens were then projected and enlarged by means of a photographic micro enlarger, and the following dimensions were scaled off in centimeters for convenience: Length, width, distance between posterior border of posterior testis to posterior end of worm, and distance between the oral sucker and the anterior border of the acetabulum. The specimens ranged in length from 1.65 mm. to 3.16 mm. The graph on page 37 shows a scatter diagram of all the above mentioned dimensions plotted against the length of the specimen. In studying this scatter diagram it is seen at once that the relationship is

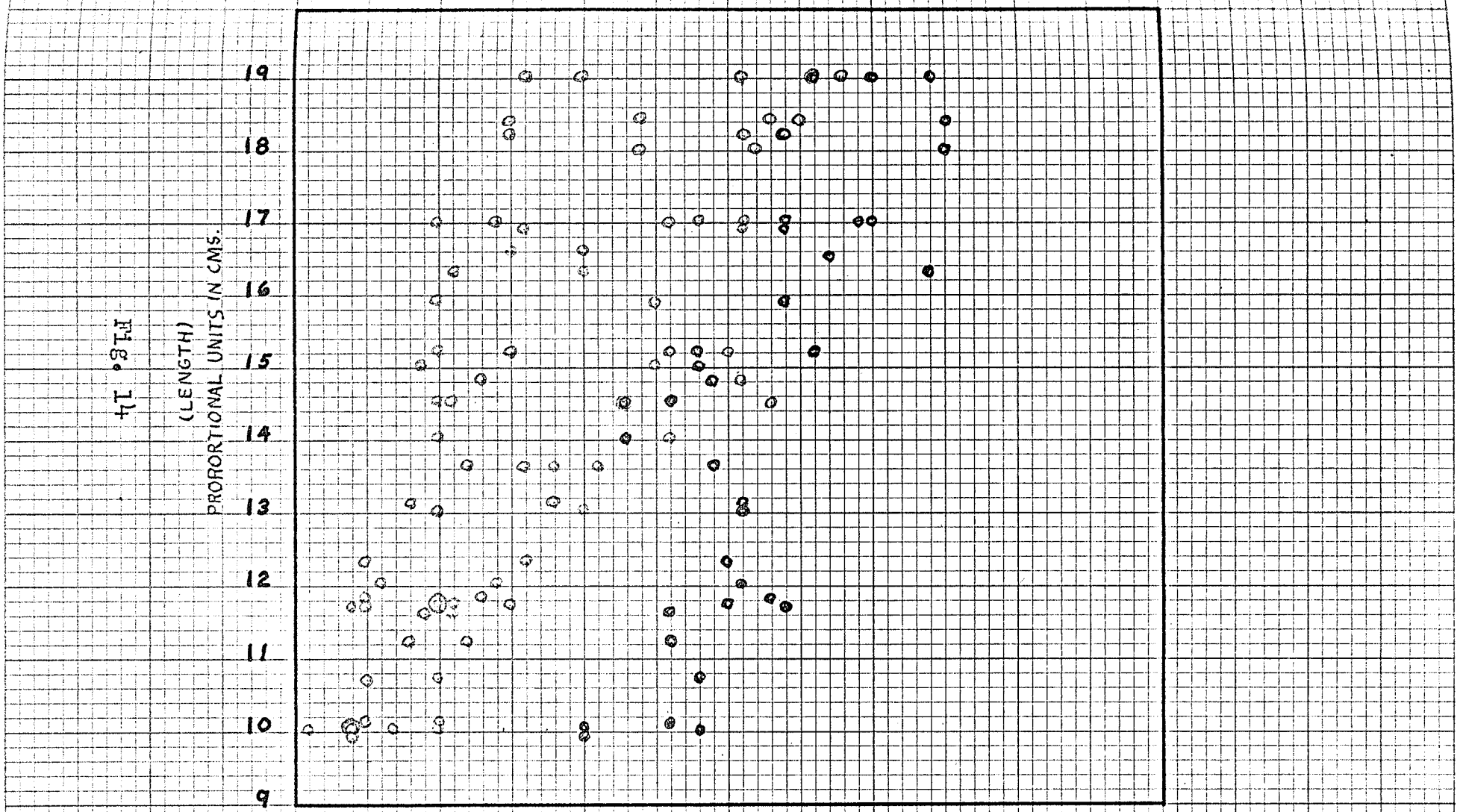


FIG. 14
(LENGTH)
PROPORTIONAL UNITS IN CMS.
19
18
17
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
PROPORTIONAL UNITS IN CMS. (WIDTH, POST. TESTIS – POST. END, ORAL SUCK – ACET.)
⊙ - LENGTH PLOTTED AGAINST WIDTH
⊙ - LENGTH PLOTTED AGAINST DISTANCE BETWEEN POST. TESTIS & POST. END.
⊙ - LENGTH PLOTTED AGAINST DISTANCE BETWEEN ORAL SUCKER & ACETABULUM.

not simple as was supposed originally when studying the specimens arranged in Fig. 95, page 88. Magnification of the projected specimens was 60 times, and as mentioned above, the dimensions were scaled off in centimeters and plotted on the graph in proportional units. Broad trends can be observed.

Following are the dimensions of E. elegans obtained by the writer: Length-3.375 to 3.537, Width-0.473 to 0.540, Crown spines-upto 45 in two unequal rows, with 4 corner spines, marginal spines 0.054 by 0.014 to 0.068 by 0.014, corner sp. 0.074 by 0.020. Some specimens had spines with obvious kinks in them as indicated in Fig. 43, page 66. Cirrus pouch-0.243 by 0.135, Cirrus-0.202 by 0.047 to 0.258 by 0.041, Acetabulum-0.270 diam. to 0.311 diam. by 0.338 in depth, Distance between acetabulum and oral sucker-0.837 to 1.040, Ovary-0.135 diam. to 0.149 diam., Distance between acetabulum and ovary-0.270 to 0.392, Shell gland complex-0.135 diam. to 0.162 diam., Anterior testis-0.243 by 0.149 to 0.338 by 0.229, Posterior testis-0.284 by 0.176 to 0.351 by 0.203, Distance between posterior border of posterior testis to posterior end of worm-0.810 to 0.959, Vitelline follicles-0.068 diam to 0.108 diam., Extent of vitellaria quite variable from specimen to specimen, and even within a single specimen, the vitellaria need not reach to the same extent on both sides of the specimen as Fig. 23 page 47, indicated. Oral sucker-0.041 diam. to 0.068

diam., Propharynx-0.057 by 0.016 to 0.095 by 0.014, Pharynx-0.068 by 0.054 to 0.096 by 0.054, Esophagus-0.675 by 0.673 by 0.054, Eggs-0.068 by 0.057 to 0.081 by 0.047 (15-20 eggs).

All measurements are in mm., and all specimens measured were adults.

Literature consulted: (1), (15), (21), (38, 42), (50), (52), (142), (198), (202), (201), (217), (236), (249), (250), (139), (260), (263), (276), (330), (352, 353), (389), (393), (394), (420), (441), (463), (461), (465), (480), (498), (500), (509), (515), (522), (523), (525, 526), (614), (633), (657), (641), (679), (687).

Echinochasmus manitobensis n. sp.

This was obtained from the intestinal ceca of the Pintail duck, and is depicted in Figs. 20, and 38 pages 46 and 65, respectively. The dimensions in mm. are as follows: Length-1.951, Width at level of acetabulum-0.405, Width at level of ovary-0.474, Width at level of posterior testis-0.405, Width near posterior end of worm-0.284, Collar-0.221, Oral sucker-0.079 by 0.075, Propharynx-absent, Pharynx-0.095, Esophagus, 0.237 by 0.008, Crown spines-0.039 by 0.016 (19), Body spines-0.015 by 0.010, Acetabulum-0.269 diam., Ovary-0.095 diam., Shell gland complex-0.032 by 0.071, Anterior testis-0.158 by 0.229, Posterior testis-0.219 by 0.198,

Distance between posterior border of acetabulum and anterior border of ovary-0.024, Distance between testes-0.008, Eggs-approximately 10, 0.074 by 0.050. This species shows very close affinities to E. perfoliatus the chief differences being no prepharynx, and eggs about ½ the size found in E. perfoliatus, in E. manitobensis.

Literature consulted: (22, 23, 24), (41), (199), (252), (139), (246), (263), (323), (232), (277), (232), (335), (377), (338), (265), (321), (404), (407), (461), (439), (440), (445), (458), (461), (465), (468), (493), (498), (509), (514), (633), (679) and (687).

Stephanoprora lari n. sp.

Twenty three specimens were obtained from the intestinal tract of several Herring gulls. Fig. 22, page 47, shows the morphology of this species. Dimensions in mm. are as follow: Length-6.327, Width-0.444, Oral sucker-0.088 by 0.085, Prepharynx-0.133 by 0.022, Pharynx-0.068 diam., Esophagus-0.488 by 0.067, Genital pore-0.065 diam. and 0.065 from acetabulum, Cirrus pouch-0.155 by 0.089, Acetabulum- 0.266 diam. and 0.599 from anterior border of ovary, Ovary-0.167 diam. and 0.266 from shell gland complex, Shell gland complex-0.155 diam., and 0.044 from anterior testis, Anterior testis-0.466 by 0.222, Posterior testis-0.511 by 0.225, Distance

between testes-0.178, Distance between posterior border of posterior testis to posterior end of worm-2.442, Vitellaria extend to within 0.222 of posterior end, Vitelline follicles-0.18 by 0.062, Crown spines-at least 16 (most of the specimens were deficient in spines) 0.044 by 0.020, Eggs-6 to 8, 0.067 by 0.040.

Following, is a key to the genus Stephanoprora Odhner, 1910, modified after the key given by Beaver (35) to contain the new species S. larii:

1. (2) Cephalic spines 26 in number-ornata Odhner, 1902
2. (3) Cephalic spines 24 in number-ozakii (Asada, 1926)
3. (1,2) Cephalic spines 22 or less in number----------4
4. (11) Vitellaria distinctly post. to junct. of testes-5
5. (6) Acetabulum wider than body-singularis (Lutz, 1924)
6. (5) Acetabulum not wider than body proper----------7
7. (10) Angle spines distinct from border spines----------8
8. (9) Vitellaria extend to middle of posterior testis---denticulatus (Rud., 1802)
9. (7) Vitellaria confined to post-testicular region-microcestus (Kurova, 1927)
10. (4) Angle spines not distinct from border spines-----pendula (Looss, 1899)
11. (3) Vitellaria at junction of testes or more ant.---12
12. (15) Uterus very short, being less than length of region of body anterior to genital pore----------13
13. (14) Body stout; testes large occupying 1/4 to 1/2 of hind-body---------spinosa Odhner, 1911

14. (12) Body slender; testes occupying less than 1/4 of hind body---conciliata (Dietz, 1909)

15. (11) Uterus of medium length, being greater in length than the region of body anterior to genital pore----------16

16. (17) Eggs greater than 0.080 mm.-nanniovata Yamag.,1933

17. (16) Eggs less than 0.080 mm. in length----------18

18. (17) Ovary in close proximity to shell gland complex-------polycestus (Dietz, 1909)

19. (18) Ovary relatively far removed from shell gland complex----------lari n. sp.

Literature consulted: (29), (35), (7), (104), (170), (140, 142), (139), (230), (236), (288), (289), (269), (360), (366), (457), (453), (498), (509), (549), (607), (670), (679), (687).

Hypoderaeum conoideum (Block, 1782) Dietz, 1909

Several specimens were recovered from the small intestine of four Pintail ducks. The dimensions are compared in mm., with those from various sources, in Table III, page 43. Figs. 12 and 13, page 44, show the variations found in the species. The crown spines and cirrus extruding are shown in Figs. (34, 35) and 36 respectively, on page 64.

Literature consulted: (104), (139), (140, 141, 142), (146), (178), (328), (334), (350), (385), (418), (421), (438), (469), (470), (498), (500), (617), (679), (687).

TABLE III

COMPARISON OF MEASUREMENTS OF HYPODERAEUM CONOIDEUM FROM VARIOUS SOURCES

	Freedman* Pintail Manitoba	Zorecoro ** Bl.w.teal Mexico	Freedman *** Pintail Freedman	Rees Experim. England	Singh **** Pintail India
Length	8.866	8.399	6.575	10.200	7.84
Width	1.117	1.350	1.284	1.570	0.87
Collar	0.377	-----	-----	0.600	0.390
Marginal spines	0.014 x 0.003	0.019 x 0.006	-----	------	0.021
No. spines	upto 33 double	-------	-----	(43 to 45)	(47) single row
Corner spines	-------	-------	-----	-------	0.025
Cr. sucker	0.180 x 0.131	0.148 x 0.230	0.184 x 0.184	0.28 x 0.210	0.185 x 0.185
Pharynx	0.131 x 0.129	0.185 x 0.157	0.104 x 0.131	-----	0.15 x 0.105
Acetabulum	0.873 dm. x.698 dp.	0.897 x 1.036	0.710 x 0.710	-----	0.703
Ovary	0.349 x 0.349	-----	0.342 x 0.342	0.41 x 0.26	0.26 x 0.26
Shell gland complex	0.384 x 0.384	-----	0.316 x 0.316	---- x 0.45	0.15 x 0.15
Anterior testis	0.803 x 0.349	0.777 x 0.388	0.710 x 0.263	0.98 x ----	0.722 x 0.333
Posterior	0.942 x 0.316	0.898 x 0.324	0.684 x 0.316	0.90 x ----	0.796 x 0.32
Eggs	0.052 x 0.931	0.101 x 0.065	0.068 x 0.042	0.11 x 0.06	0.092x 0.053

All measurements in mm.

* Specimen shown in Fig. 13, page 44.

** All measurements maximum values given (532)

*** Specimen shown in Fig. 12, page 44.

**** *Echinostoma micracanthum* n. sp. It is the writer's opinion that this is synonymous with *H. conoideum*.

PLATE V

Fig. 10. Zygocotyle lunata from the intestinal ceca of the Mallard. Ventral view.

Fig. 11. Zygocotyle lunata from the intestinal ceca of the Mallard. Ventral view.

Fig. 12. Hypoderaeum conoideum from the small intestine of the Pintail. Ventral view.

Fig. 13. Hypoderaeum conoideum from the small intestine of the Pintail. Ventral view.

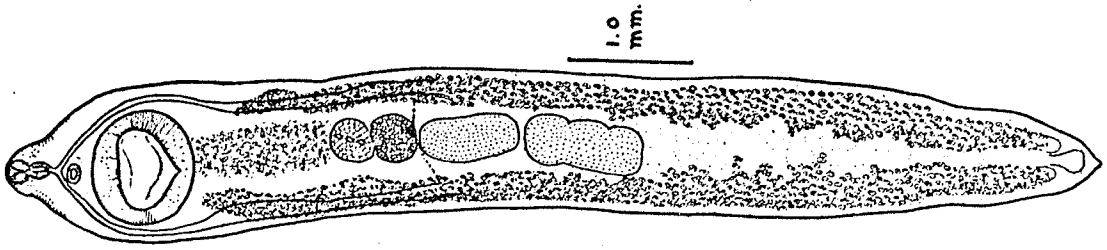


FIG. 13

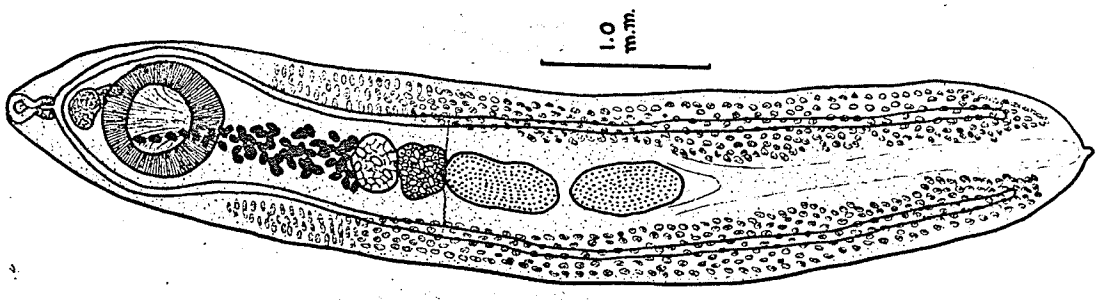


FIG. 12

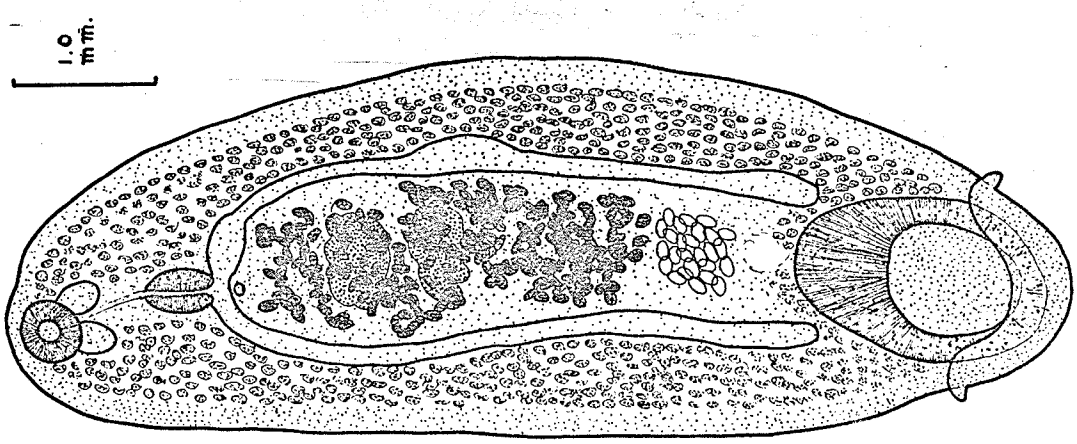


FIG. 11

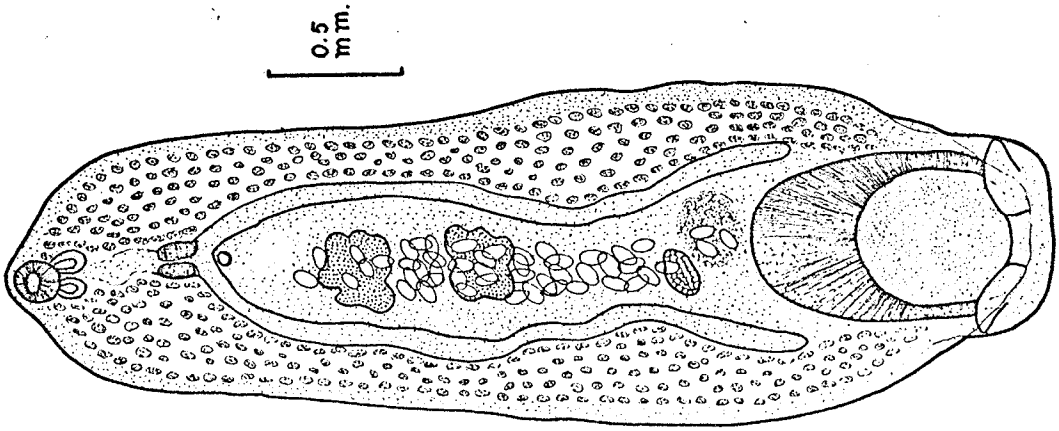


FIG. 10

PLATE VI

Fig. 15. Zygocotyle lunata from caeca Lesser scaup duck. Immature specimen with convolutions of caecae.

Fig. 16. Z. lunata from Pintail. x12

Fig. 17. Same specimen showing anterior portion. x44

r

ion.

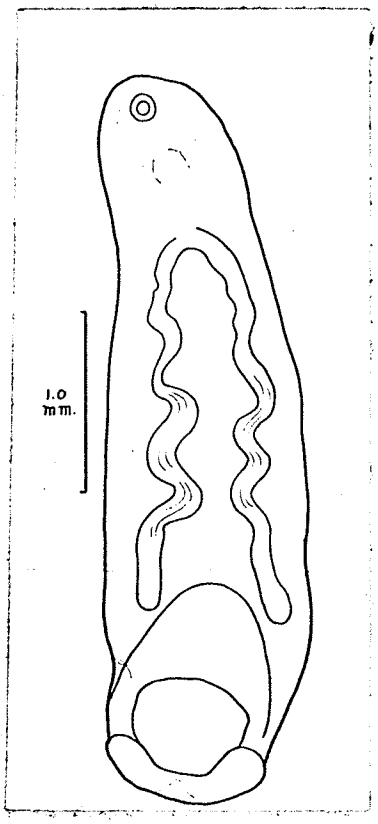


Fig. 15

Fig. 16

Fig. 17

PLATE VII

Fig. 18. Echinostoma revolutum. Ventral view.

Fig. 19. Echinostoma revolutum. Ventral view.

Fig. 20. Echinochasmus manitobensis n. sp. Ventral view. From intestinal ceca of the Pintail.

Fig. 21. Echinostoma platyrhynchi n. sp. Ventral view. From the intestinal ceca of the Mallard.

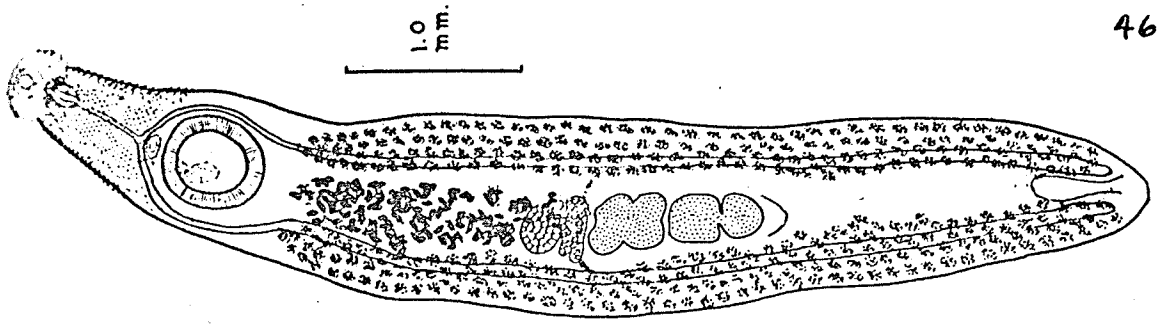


FIG. 21

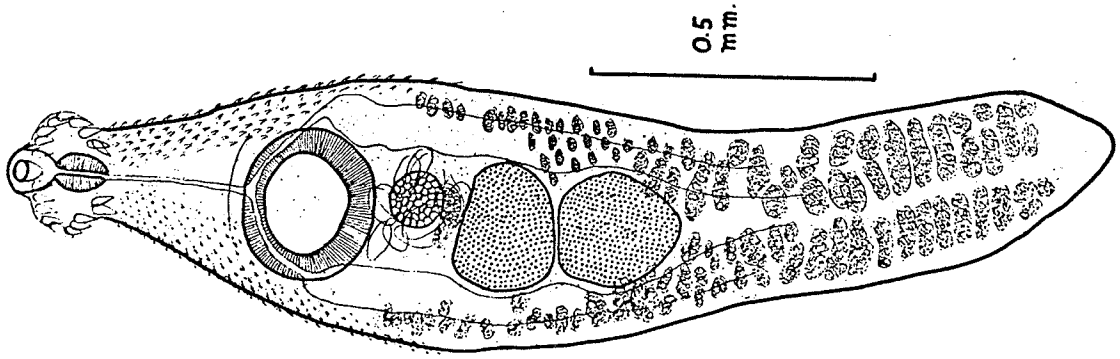


FIG. 20

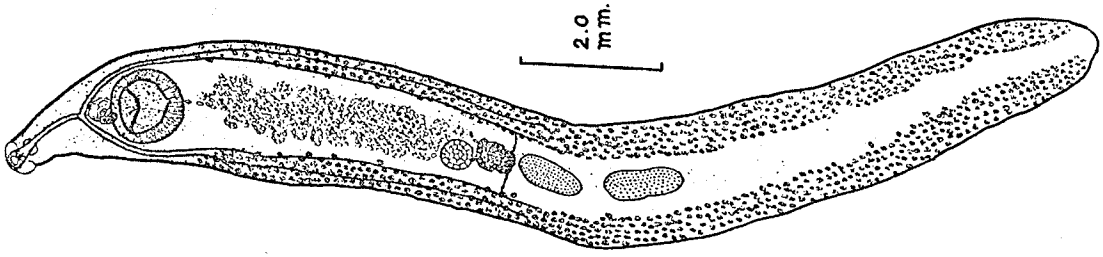


FIG. 19

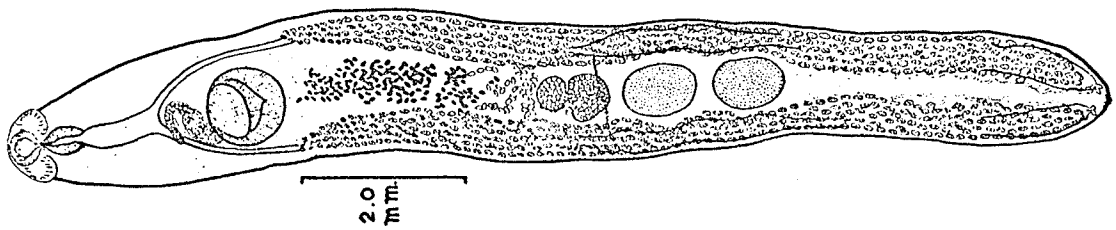


FIG. 18

PLATE VIII

Fig. 22. Stephanoprora larii n. sp. from Herring gull. Ventral view.

Fig. 23. Echinoparyphium elegans from the small intestine of the Lesser scaup. Ventral view.

Fig. 24. Echinoparyphium elegans from the Lesser scaup. Ventral view.

Fig. 25. Echinoparyphium elegans from the Lesser scaup. Semi lateral view.

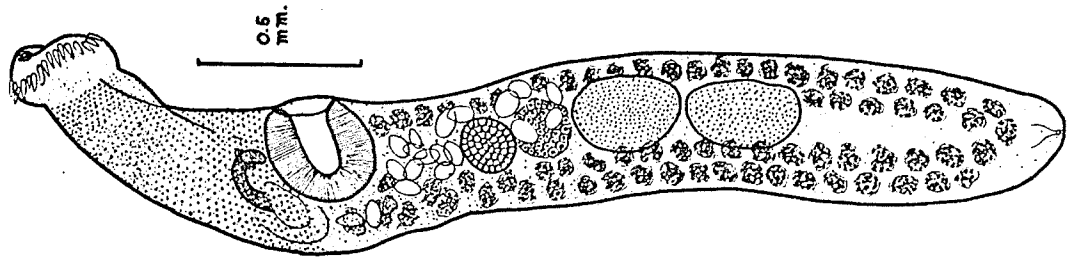


FIG. 25

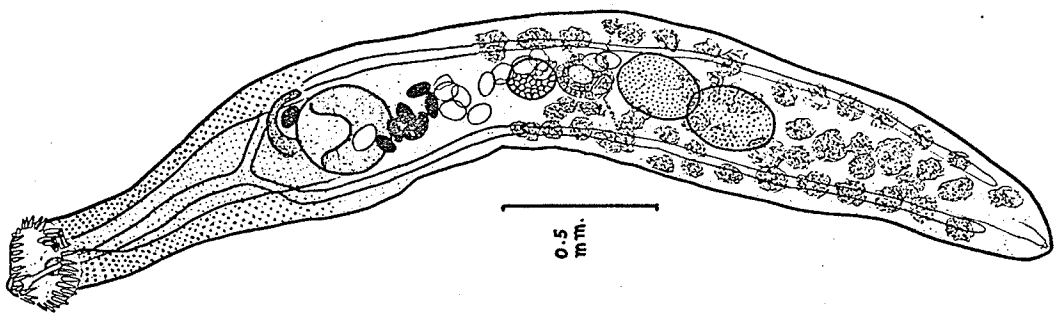


FIG. 24

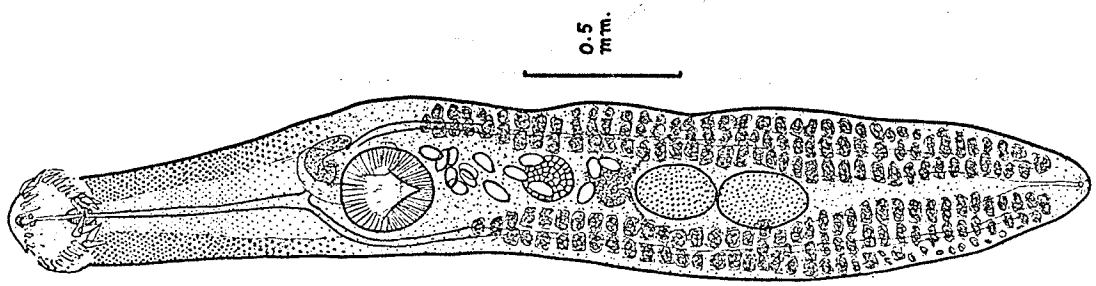


FIG. 23

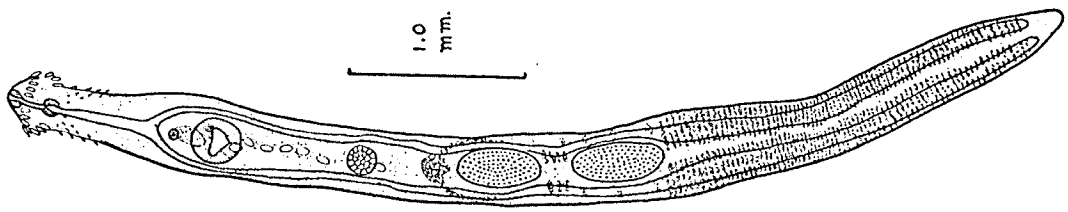


FIG. 22

Petasiger chandleri Abdel-Malek, 1952

Twenty three specimens were recovered from the duodenum of Hoelbeel's grebe. They agree quite closely to the specimens that Abdel-Malek recovered from the pied-billed grebe. A comparison of the two is shown in Table IV, page 49. Figs. 26 and 27, page 55, show two views of P. chandleri. One of the specimens in the material collected had several spines in the crown missing. The unusual aspect was in the symmetrical manner in which they were missing. There was no sign that the spines had ever been in place, and it was assumed that this may have been a genetic defect.

Literature consulted: (2, 3, 4), (37), (39), (134), (138), (139), (141, 142), (169), (181), (232), (241), (288), (345), (382), (498), (509), (522), (607), (679), (687).

Drepanocephalus spathans Dietz, 1909

Several specimens were recovered from the Double-crested cormorant. It has previously been reported by Dietz (140, 141, 142) from Phalacrocorax brasilianus and P. carbo from South America. Fig. 28, page 55, shows a typical specimen from the Canadian material. As far as can be ascertained, this is the first report of D. spathans from the Northern Hemisphere. Table V, page 50 compares the material obtained here with that collected by Dietz in South America.

TABLE IV

COMPARISON OF MEASUREMENTS OF PEHASICHA CHANDLERI WITH THAT COLLECTED BY ABDEL-MALEK

	Freedman Holboell's probe 1.500	Abdel-Malek Mid-bilod C. 1.382
Length		
Pre-acetabular dist.	0.600	0.651
Post-acetabular dist.	0.428	0.496
Width at crown	0.228	0.222
Width at neck	0.210	0.185
Width at acetabulum	0.485	0.414
Oral sucker	0.056 diam.	0.071 x 0.077
Acetabulum	0.245 x 0.260	0.235 x 0.252
Pharynx	0.051 x 0.070	0.041 x 0.050
Esophagus	0.266	0.311
Anterior testis	0.195 x 0.150	0.222 x 0. 126
Posterior testis	0.190 x 0.144	0.244 x 0.118
Cirrus sac	----------	0.192 x 0.069
Ovary	0.078 x 0.087	0.125 x 0.193
Vitelline reservoir	----------	0.052 x 0.096
Prepharynx	0.104	----------
Marginal spines (crown)	0.051 x 0.017	0.051 x 0.007
Corner spines (crown)	0.070 x 0.019	0.074 x 0.011
Body spines (dorsal)	0.013 x 0.004	----------
Eggs	0.080 x 0.056	0.074 x 0.059

All measurements in mm.

TABLE V

COMPARISON OF MEASUREMENTS OF DREPANOCEPHALUS SPATHANS WITH THAT COLLECTED BY DIETZ

	Freedman Ormorant Manitoba	Dietz Cormorant South America
Length	8.954	7.250
Width at neck	1.147	1.400
Width at testes	0.962	
Oral sucker	0.222 diam.	0.350 diam.
Prepharynx	0.074	0.046
Pharynx	0.444 x 0.212	0.354 x 0.261
Esophagus	0.925 x 0.029	0.430 x -----
Acetabulum	1.036 x 0.740	0.950 x 0.770
Cirrus	1.480 x 0.074	----------
Cirrus pouch	0.555 x 0.333	----------
Acetabulum to anterior end	1.776	-----
Ceca	0.074 to 0.22	----------
Ovary	0.259 x 0.222	----------
Shell gland complex	0.333 x 0.185	----------
Anterior testis	0.703 x 0.555	0.740 x 0.690
Posterior testis	0.777 x 0.555	
Marginal spines (19)	0.148 x 0.037	0.242 x 0.054
Corner spines (2 x 4)	0.296 x 0.055	0.279 x 0.061
Eggs	0.111 x 0.074	0.062 x 0.050

All measurements in mm.

Fig. 37, page 65, shows the spines of the crown in a typical specimen.

Xenisma wardlei n.g., n. sp.

Four specimens were recovered from the small intestine of the Lesser scaup duck. In following the key in Dawes' (139), it appeared that this species belonged to the family Psilostomidae. It also had certain characteristics which seemed to ally it with the family Opecoelidae. However, the species seemed to fit in easier with the isolated genera in the family Echinostomatidae. The generic name Xenisma was decided upon due to the surprise which the author received when he first noticed these specimens mixed in with over 400 specimens of Echinoparyphium elegans. They were very nearly overlooked. This genus has very close affinities to the genus Acquistoma as proposed by Beaver (678), also in the unclassified genera of the family Echinostomatidae. The main differences being in the larger size of the vitelline follicles in X. wardlei, and also their arrangement in an antero-posterio linear way. Acquistoma parasitizes seals in the Caspian Sea, and this is another reason for differentiation of the two.

Figs. 30 and 31, page 59, show two full length views of X. wardlei. A lateral view of a third specimen, of the ant-

erior portion is shown in Fig. 44, page 67. Photomicrographs of various views are shown in Figs. 45 to 48, page 67.

The dimensions in mm. are as follows: Length-1.225 to 1.692, Width at testis-0.255 to 0.396, Oral sucker-0.085 by 0.070 to 0.123 by 0.097 by 0.089 in depth, Pharynx, not visible, Pharynx-0.060 by 0.057 to 0.072 by 0.058, No esophagus, Ceca-0.025 in width, Distance between acetabulum and anterior end of worm-0.240 to 0.259, Acetabulum-0.20 diam. to 0.223 diam. by 0.346 in depth, Distance between acetabulum and anterior testis-0.030 to 0.072, Distance between testes is variable, overlapping in some cases, Ovary-0.090 by 0.075 to 0.122 by 0.072, Anterior testis-0.115 diam. to 0.144 diam., Posterior testis-0.090 by 0.110 to 0.137 diam., Distance between posterior testis and posterior end of the worm-0.545 to 0.720, Vitelline follicles-0.060 to 0.101 diam., Shell gland complex-0.066 to 0.086 diam., Cirrus pouch-0.137 by 0.079, Eggs-0.064 by 0.040 to 0.100 by 0.068 (5 to 14 eggs).

Literature consulted: (28), (32), (37), (40), (43), (66), (74), (68), (71), (136), (144), (139), (164), (134), (191), (218), (229), (259), (262), (275), (284), (283), (329), (363), (378), (489), (499), (498), (512), (594), (629), (679), (668), (659), (687), (608).

Family Cathaemasiidae

Cathaemasia nycticoracis Olsen, 1940

One specimen was recovered from the Common loon (Gavia immer). In appearance and dimensions it most closely resembles C. nycticoracis as reported by Olsen (359) from the Black-crowned night heron (N. nycticorax hoactli). The two are compared in Table VI, page 54, and the specimen from the loon is shown in Fig. 29, page 55. The other species of the genus Cathaemasia are: C. hians (Rudolphi, 1809) Looss, 1899-(139), (146), (66, 67), (359), (432), (527), (529), (575), (653), (676). C. spectabilis Odhner, 1926--(139), (146), (359), (432), (527), (529), (575).

C. famelica Odhner, 1926--(139), (146), (359), (432), (527), (529), (575).

C. dollfusi Travassos, 1951--(455).

Other literature consulted: (92), (95), (108), (146), (155), (231), (233), (373), (449), (607), (679), (659), (683), (687), (690), (692).

Family Plagiorchidae

Plagiorchis sp. 1.

Several specimens were obtained from the Herring gull, and the dimensions in mm. are as follows: Length-2.236, Width at testes-0.430, Oral sucker-0.172 by 0.163, Propharynx-

TABLE VI

COMPARISON OF MEASUREMENTS OF CATHAEMASIA HYCTICORACIS WITH THAT COLLECTED BY OLSEN

	Freedman Common loon Manitoba	Olsen Blk. Cr.N.heron Minnesota
Length	6.250	5.4
Width at pharynx	0.675	1.05
Width at ovary	1.500	
Oral sucker	0.450 x 0.600	0.440 x 0.416
Prepharynx	0.088 x 0.087	none
Pharynx	0.300 x 0.350	0.280 x 0.212
Esophagus	0.875 x 0.300	0.466
Cirrus pouch	0.250 x 0.125	----------
Acetabulum	0.625 diam.	0.644 x 0.700
Ovary	0.250 x 0.200	to.200 x to.433
Shell gland complex	0.300 x 0.125	----------
Anterior testis	0.225 x 0.300	0.433 x 0.450
Posterior testis	0.500 x 0.308	0.483 x 0.450
Acetabulum to ovary (distance)	0.575	0.666
Post. testis to posterior end	1.950	1.500
Acetabulum to anterior end	1.750	1.450
Eggs	0.075 x 0.028	0.095 x 0.053

All measurements in mm.

PLATE IX

Fig. 26. Petasiger chandleri from Holbool's grebe. Ventral view.

Fig. 27. Petasiger chandleri. Lateral view.

Fig. 28. Prosthogonimus cuneatus from the Red-breasted merganser. Ventral view.

Fig. 29. Cathaemasia hyaticoracis from the Common loon. Ventral view.

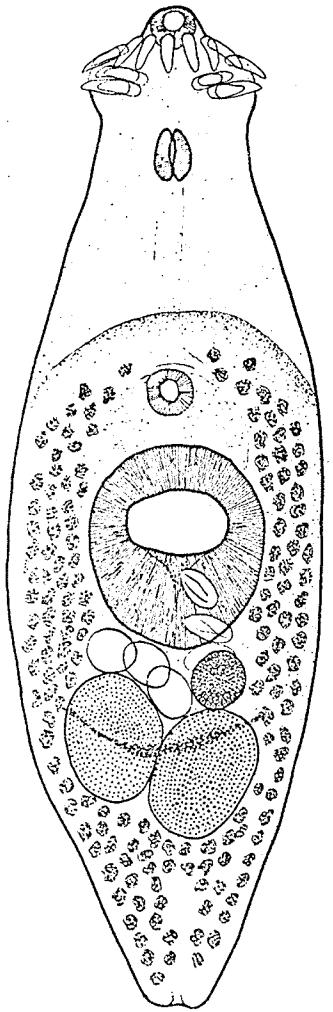


FIG. 26

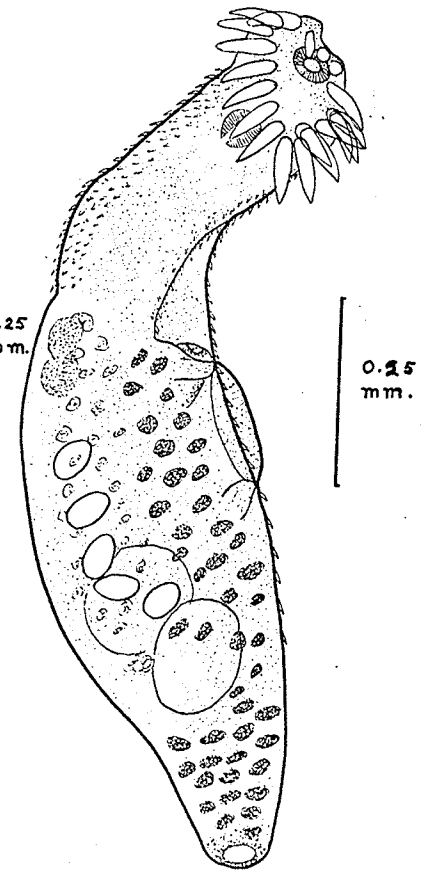


FIG. 27

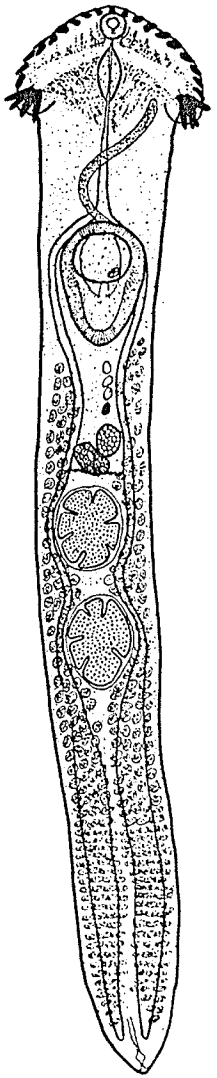


FIG. 28

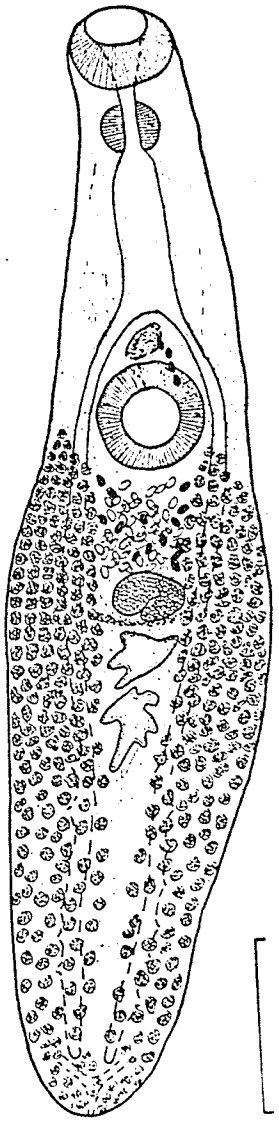


FIG. 29

0.013 by 0.012, Pharynx-0.056 by 0.071, No esophagus, Distance between acetabulum and anterior end of worm-0.559, Acetabulum-0.116 diam, Ovary-0.112 diam., Shell gland complex not discernible, Anterior testis-0.198 by 0.172, Posterior testis-0.215 by 0.189, Distance between testes-0.047, Post. testis to posterior end of worm-0.722, Vitelline follicles-about 0.034 diam., Cirrus-0.344 by 0.022, Cirrus pouch-0.559 by 0.060, Eggs-0.043 by 0.021. Fig. 97, page 93, shows a specimen.

Plagiorchis sp. 2.

One specimen was recovered from the small intestine of the common tern, and the dimensions in mm. are as follows: Length-1.138, Width at anterior testis-0.480, Oral sucker-0.221 by 0.204, No prepharynx, Pharynx-0.091 by 0.106, Esophagus-not discernible, Distance between acetabulum and anterior end of worm-0.293, Acetabulum-0.125 diam., Ovary-0.120 diam., Shell gland complex not discernible, Anterior testis-0.118 by 0.158, Posterior testis-0.120 by 0.163, Distance between testes-0.024, Distance between posterior testis and posterior end of worm-0.355, Vitelline follicles-about 0.043 by 0.014, Eggs-0.024 by 0.012. Specimen depicted in Fig. 98, page 93.

Astiotrema sp.

Several specimens were obtained from the small intestine of the Marbled godwit, and Franklin's gull, and a typical

specimen is shown in Fig. 96, page 93. Fig. 94, page 88, shows the variation in shape and size of 12 specimens. The dimensions in mm. of the specimen shown in Fig. 96, is as follows: 1.441, Width at ovary-0.363, Oral sucker-0.215 by 0.192, Pharynx-0.066 by 0.083, Esophagus-0.014 by 0.025, Cecum-0.017 wide, Distance between acetabulum and anterior end of worm-0.451, Acetabulum-0.110 diam., Ovary-0.083 diam., Shell gland complex-0.033 diam., Anterior testis-0.143 diam., Posterior testis-0.171 by 0.128, Distance between testes-0.008, Distance between posterior testis and posterior end of worm-0.358, Ceca extend to within 0.128 of the posterior end, Vitelline follicles-0.022 diam. approx., Cirrus-0.099 by 0.017, Cirrus pouch-0.347 by 0.028, Seminal receptacle-0.143 by 0.025, Eggs-0.035 by 0.022.

Literature consulted for the three specimens described above: (6), (47), (66, 67), (83), (227), (228), (139), (236), (261), (267), (247), (283), (260), (297), (312), (313), (314), (326), (336), (344), (357), (358), (361), (364), (365), (367), (368), (372), (392), (398), (399), (400), (402), (403), (408), (416), (429), (442), (448), (450), (498), (501), (509), (519), (533), (547), (606), (644), (649), (679), (687).

Family Brachylaemidae

Loucochloridium cyanocittae McIntosh, 1932

One specimen was found in the small intestine of a Lesser yellow-legs, and is shown in Fig. 32, page 59. The bird was shot at Whitewater Lake in south western Manitoba in August, 1950, and the worm specimen was preserved in 4% formalin. The specimen was stained with carmine and haematin, but due to the gravid condition of the worm, very little of the internal organs was discernible. The extent of the vitellaria and the uterus (as indicated by the presence of eggs) was sufficient to place the specimen into the genus Loucochloridium with the aid of Kagan's diagrams (588).

In appearance, it most closely resembles L. bonnforti (225) from the Bursa of Fabricius and the rectum of Ammospiza maritima macgillivrayi, and L. melospizae from the cloaca of Melospiza melodia-beata. Only one other species of the genus, L. cyanocittae, has been found in the Lesser yellow-legs, making this the second report from this host. The specimen is compared with several others in Table VII, page 60, measurement being in mm.

Other species in the genus are: bonnforti (225) varians (303), (538), (588), cyanocittae (248), (304), (588), davisoniae (615), melospizae (303), (588), musculosum (588), paradoxum (5), (106), (107), (156), (186), (193), (290), (333), (390), (397), passeri (495), (588), australiense (242), (243),

PLATE X

Fig. 30. *Xenisma wardlei* n. sp. from the small intestine of the Lesser scaup duck. Ventral view.

Fig. 31. *Xenisma wardlei*. Three quarters ventral view.

Fig. 32. *Leucochloridium cyanocittae* from the small intestine of the Lesser yellow-legs. Ventral view.

Fig. 33. *Mesostephanus* sp. from the Red-breasted merganser. Ventral view.

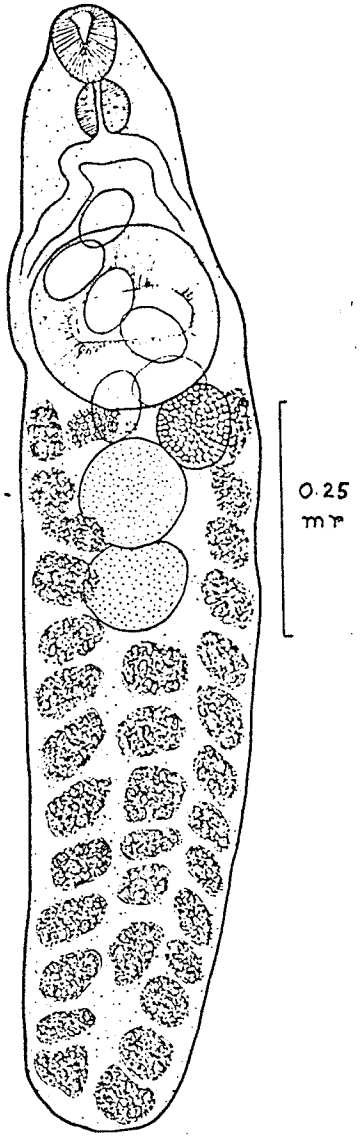


FIG 30

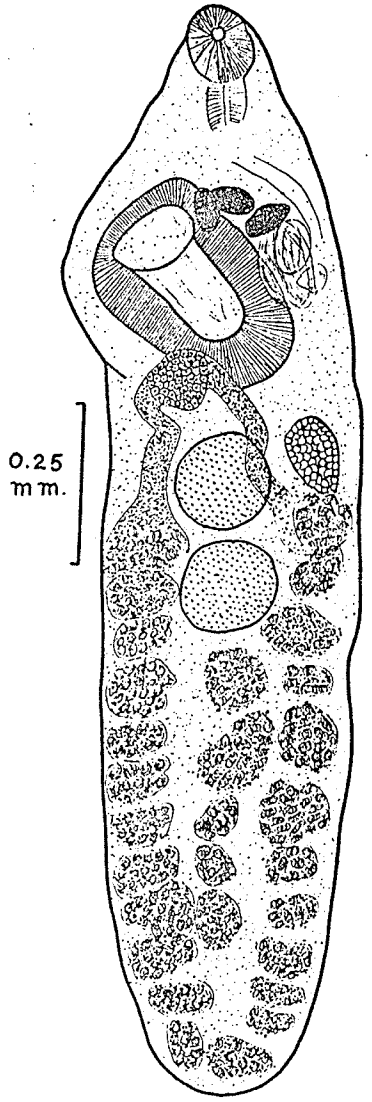


FIG. 31

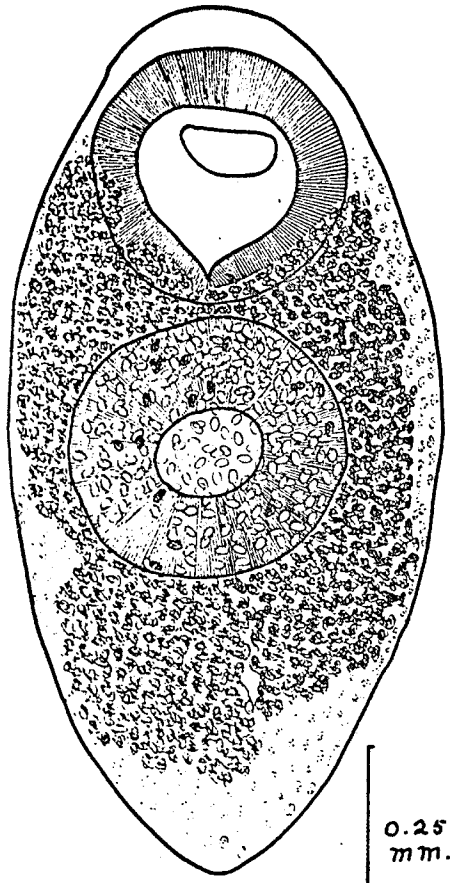


FIG. 32

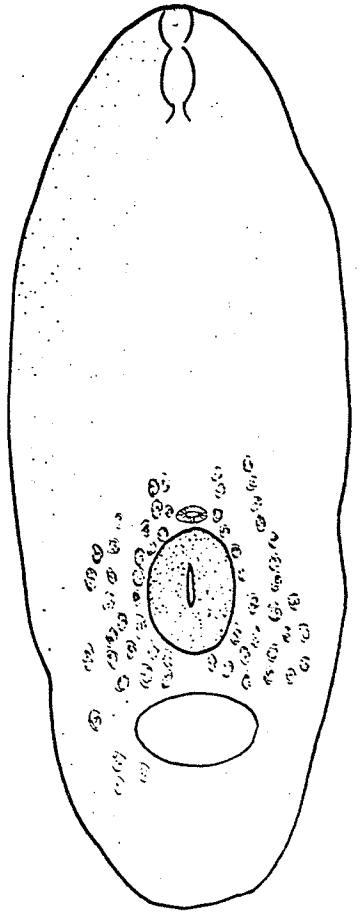


FIG. 33

TABLE VII

COMPARISON OF MEASUREMENTS OF LEUCOCHLORIDIUM CYANOCITTAE FROM VARIOUS SOURCES

	Freedman* L.y.-legs Manitoba	McIntosh** Bluejay Michigan	Kagan*** Starling Experim.	Kagan*** Sparrow Experim.	Kagan*** Canary Experim.
Length	0.955	2.100	1.357	1.200	1.456
Width	0.473	1.33	0.739	0.584	0.776
Or. sucker	0.291 x 0.291	0.560 x 0.630	0.380 x 0.408	0.312 x 0.360	0.335 0.382
Acetabulum	0.290 x 0.290	0.540 x 0.575	0.312 x 0.334	0.295 x 0.277	0.338 x 0.338
Pharynx	-------	0.140 x 0.210	0.123 x 0.182	0.100 x 0.140	0.112 x 0.151
Ovary	-------	0.130 x 0.250	0.123 x 0.132	0.118 x 0.125	0.151 x 0.173
Anterior testis	-------	0.130 x 0.200	0.148 x 0.142	0.140 x 0.129	0.151 x 0.166
Posterior testis	-------	0.140 x 0.180	0.134 x 0.147	0.115 x 0.118	0.155 x 0.176
Cirrus sac	-------	0.150 x 0.180	-------	-------	-------
Eggs	0.013 x 0.009	0.024 x 0.018	-------	-------	-------

All measurements in mm.

* Specimen shown in Fig. 32, page 59. L.y.-legs = Lesser yellow-legs.

** McIntosh (303)

*** Kagan (248)

(588), fuscostriatus (588), heckerti (193), (430), (588), (700), sima (502), (588), sp. dubina (700).

Other literature consulted: (11), (44), (70), (85), (86), (139), (168), (174), (177), (230), (301), (302), (322), (346), (388), (401), (449), (461), (466), (473), (478), (430), (494), (509), (531), (543), (586), (587), (588), (639), (643), (658), (666), (679), (686), (687).

Family Strigeidae

Parastrigea neorobusta n. sp.

One specimen was recovered from the small intestine of the Lesser scaup duck. Two views are shown in Figs. 59 and 60, page 76. Dimensions in mm. are as follows: Length-1.920, Anterior segment-0.768 by 0.064 by 0.775, Posterior segment-1.152 by 0.608 by 0.800, Ovary-0.096 diam., Anterior testis-0.205 by 0.320, Posterior testis-0.256 by 0.224, Distance of ovary to anterior end- 0.832, Distance of posterior testis to posterior end-0.288, Eggs-0.109 by 0.064. Has very close affinities to P. robusta as described by Dubois (147). It differs from robusta in that there is no sign of vitellaria in the anterior segment, and the addition of a peculiar looking lip protruding from the anterior of neorobusta.

Other literature consulted: (139), (564), (568), (687).

Cotylurus communis (Hughes, 1928), La Rue, 1932

Four specimens were recovered from the Bursa of Fabricius of an immature Herring gull. A specimen is shown in Figs. 72 and 73, page 81, and the dimensions in mm. are as follows: Length-6.094, Anterior segment-1.801 by 1.856 in depth, Posterior segment-4.709 by 1.884 in depth, Ovary-0.360 by 0.222 in depth, Anterior testis-0.416 by 0.904 in depth, Posterior testis-1.773 by 0.831 in depth, Eggs-0.097 by 0.055.

Literature consulted: (139), (147), (280), (285), (343), (356), (564), (679), (687).

Cotylurus cornutus (Rudolphi, 1808) Szidat, 1928

One specimen was recovered from the small intestine of the Marbled godwit (Limosa fedoa), and is pictured in Fig. 52, page 69. The dimensions in mm. are are follows: Length-2.040, Anterior segment-0.520 by 0.576 in depth, Posterior segment-1.520 by 0.612 in depth, Oral sucker-0.088 by 0.085, Acetabulum-0.112 by 0.132, Ovary-0.184 by 0.172, Anterior testis-0.264 by 0.280 in depth, Posterior testis-0.360 by 0.400 in depth, Distance of ovary from anterior end-0.800, Distance of posterior testis from posterior end-0.416, Eggs-0.120 by 0.056.

Literature consulted: (49), (123), (147), (148), (150), (152), (386), (477), (544), (564), (568), (667), (679), (687).

Cotylurus brevis Dubois and Rausch, 1950

Over 100 specimens were recovered from the small intestine of a single Lesser scaup duck. Many were also recovered from the duodenum of the Pintail, and the small intestines of the Mallard, and Greater scaup ducks. Typical specimens are shown in Figs. 53 and 54, page 70 and one of four abnormal specimens recovered from the Lesser scaup is shown in Fig. 51, page 69, and Fig. 90, page 86. Other views are shown in Figs. 83 to 85, page 84, Figs. 88, and 89 page 86, and Figs. 91 to 93 page 87. The dimensions in mm. are as follows: Length-2.228 to 2.650, Anterior segment-0.818 to 1.027 by 0.763 by 0.489 in depth, Posterior segment-0.141 to 1.622 by 0.742 by 0.517 in depth, Oral sucker-0.103 diam. to 0.138 by 0.143, Acetabulum-0.094 to 0.254 by 0.281 by 0.132 in depth, Distance between acetabulum and oral sucker-0.283 to 0.470, Ovary-0.122 to 0.223 by 0.180 by 0.207 in depth, Anterior testis-0.282 to 0.318 by 0.424 by 0.376, Posterior testis, 0.312 to 0.371 by 0.384 by 0.395 in depth, Distance between testes-about 0.053, Distance from posterior testis to posterior end-0.318 to 0.423, Distance from ovary to anterior end-1.034 to 1.272, Eggs-0.108 by 0.053 to 0.117 by 0.069.

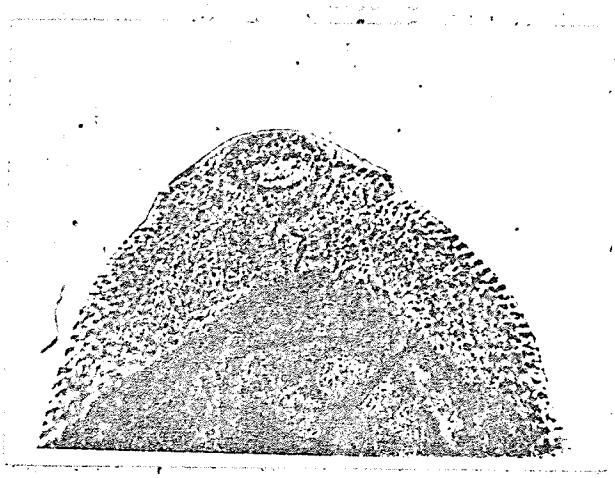
Literature consulted: (104), (147), (151), (380), (419), (498), (568), (564), (679), (687).

PLATE XI

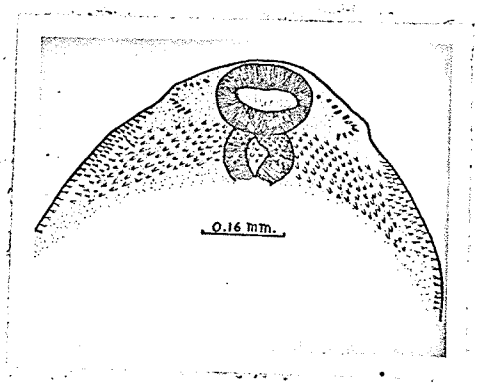
Fig. 34. Photomicrograph of anterior portion of Hynoderaeum conoideum, ventral view. x79

Fig. 35. Camera lucida drawing of anterior portion of H. conoideum.

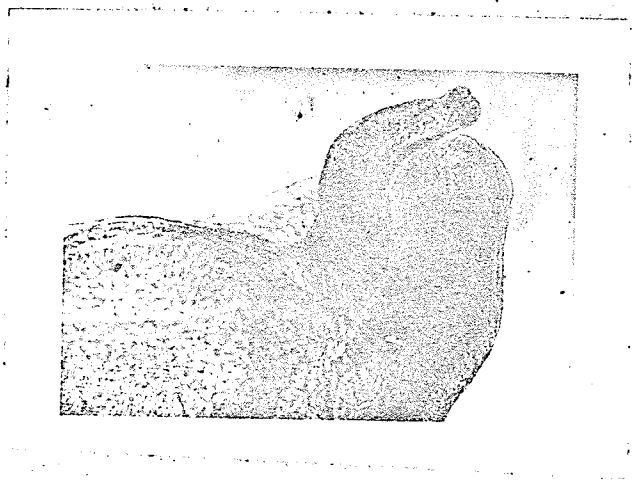
Fig. 36. Photomicrograph of anterior portion of Hynoderaeum conoideum showing cirrus extruding. x55



34



35



36

PLATE XII

Fig. 37. Anterior portion of *Brennocephalus spathans* showing detail of crown spines. x48

Fig. 38. Photomicrograph of anterior portion of *Echinochasmus manitobensis* n.sp. x55

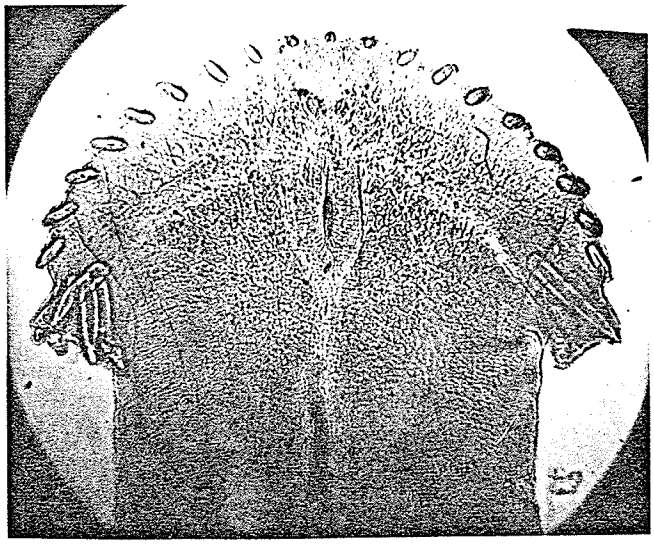


Fig. 37

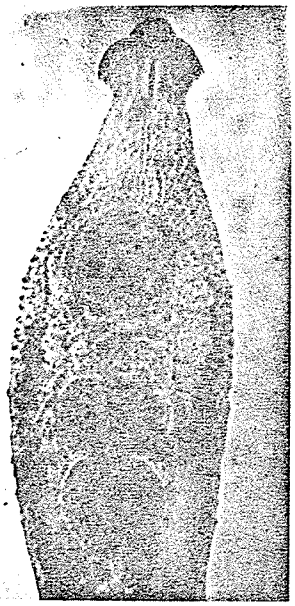


Fig. 38

PLATE XIII

Fig. 39. Photomicrograph of anterior portion of Echinonarvphium elegans, ventral view. x62

Fig. 40. Photomicrograph of anterior portion of E. elegans, ventral view. x62

Fig. 41. Photomicrograph of anterior portion of E. elegans, ventral view. x62

Fig. 42. Camera lucida drawing to show the crown spines more clearly, of E. elegans.

Fig. 43. a-lateral view of corner spine.
b-frontal view of corner spine.
c-frontal view of border spine.
d-lateral view of border spine.
Scale drawn is equal to 0.025 mm.

Fig. 39.

Fig. 40.

Fig. 41.

x62

x62

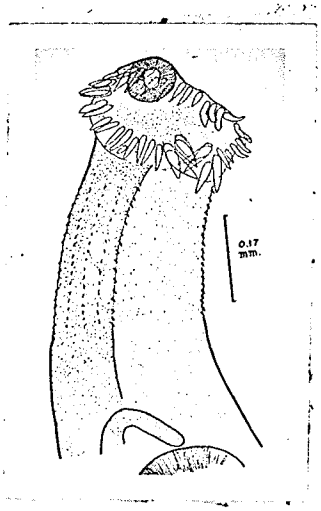


Fig. 42.

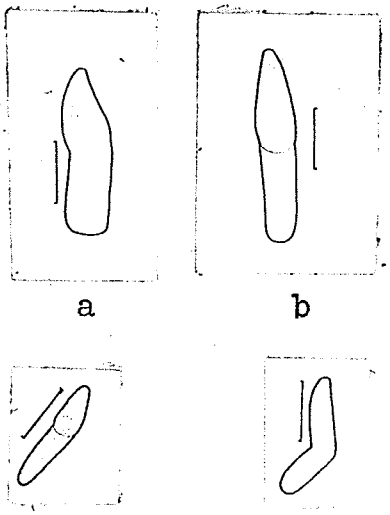


Fig. 43

PLATE XIV

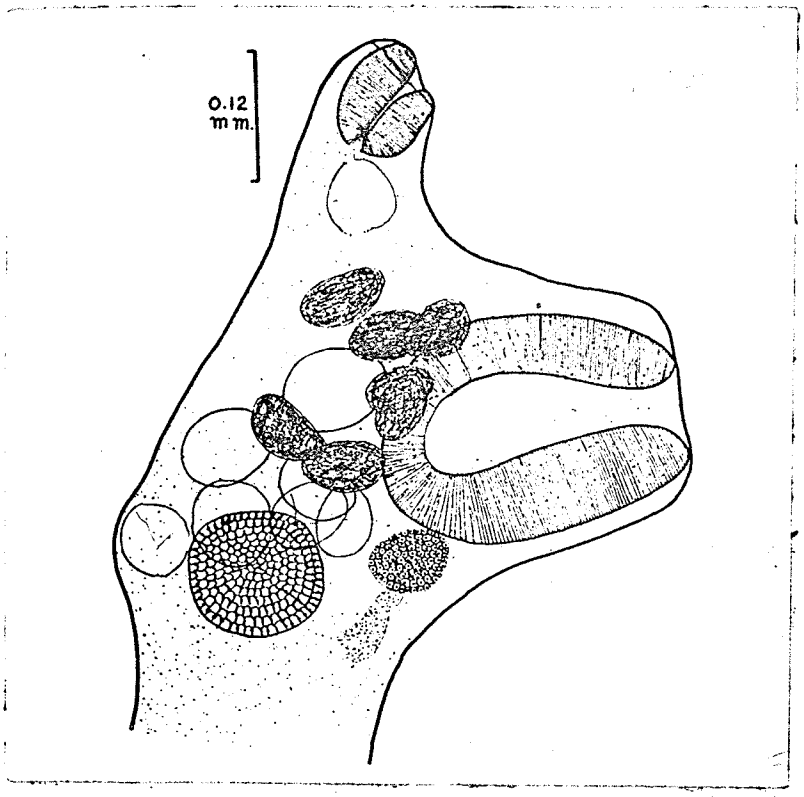
Fig. 44. Camera lucida drawing of lateral anterior view of Xenisma wardloi n. sp.

Fig. 45. Photomicrograph of drawing shown in Fig. 44. x61

Fig. 46. Photomicrograph of lateral anterior view of Xenisma wardloi n. sp. x61

Fig. 47. Ventral view, photomicrograph of Xenisma wardloi n. sp. shown in Fig. 30. x61

Fig. 48. Ventral view, partly lateral, photomicrograph of Xenisma wardloi n. sp. shown in Fig. 31. x61



x61

Fig. 44.

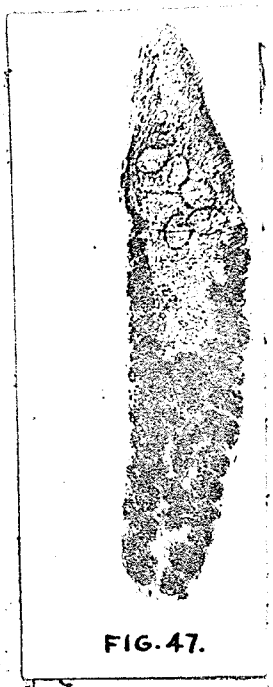


FIG. 47.

Fig. 45.

Fig. 46.

Fig. 48.

Cotylurus erraticus (Rudolphi, 1809) Szidat, 1928

Several specimens were recovered from the intestinal cecae of the Red-breasted merganser, and the American golden-eye duck, and a typical specimen is shown in Figs. 49 and 50 page 69. All specimens were immature. The dimensions in mm. are as follows: Length-1.86, Anterior segment-0.630 by 0.380 by 0.40 in depth, Posterior segment-1.250 by 0.34 by 0.27 in depth, Oral sucker-0.12 diam., Acetabulum-0.15 by 0.16 diam., Ovary-0.09 by 0.12 by .09 in depth, Adhesive gland-2 distinct masses, 0.09 by 0.12 by 0.09, Posterior testis-0.36 by 0.18 by 0.33 in depth, Anterior testis-0.18 by 0.24 by 0.33 in depth. Literature consulted: (147), (152), (380), (498), (239), (564), (568), (667), (679), (687),

Cotylurus nelsoni n. sp.

Several specimens were recovered from the small intestine of the Herring gull, and a typical specimen is shown in Figs. 55 and 56, page 70. The most unusual feature of this species is the extreme length of the posterior segment. In this respect it is similar to Strigea elongatus as figured by Dubois (147), however, the vitellaria did not extend into the anterior segment, therefore a new species was created. The dimensions in mm. are as follows: Length-4.426, Anterior segment-0.797 by 0.840 by 0.938 in depth, Posterior segment-3.629 by 0.630 by 0.708 in depth, Acetabulum-0.212 by 0.248, Ovary-0.177 diam.,

PLATE XV

Fig. 49. Cotylurus erraticus. Lateral view.

Fig. 50. C. erraticus. Ventral view.

Fig. 51. Aberrant form of C. brevis from the small intestine of a Lesser scaup duck.

Fig. 52. C. cornutus from the small intestine of the Marbled godwit.

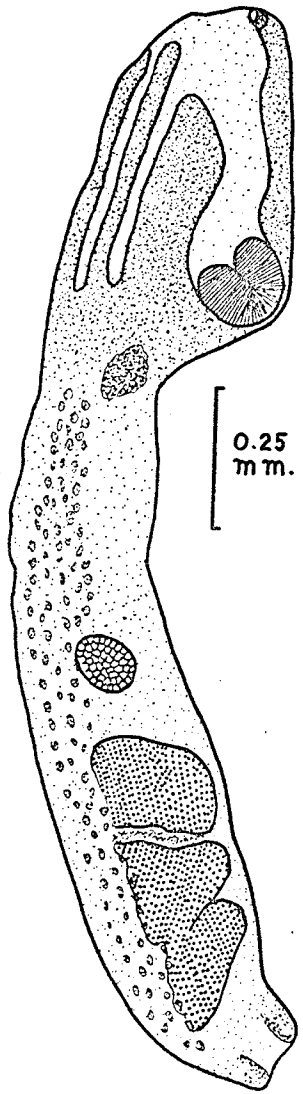


FIG. 49

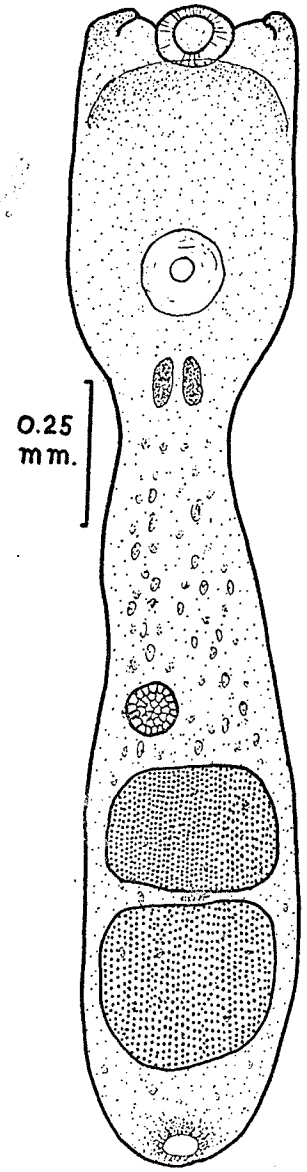


FIG. 50

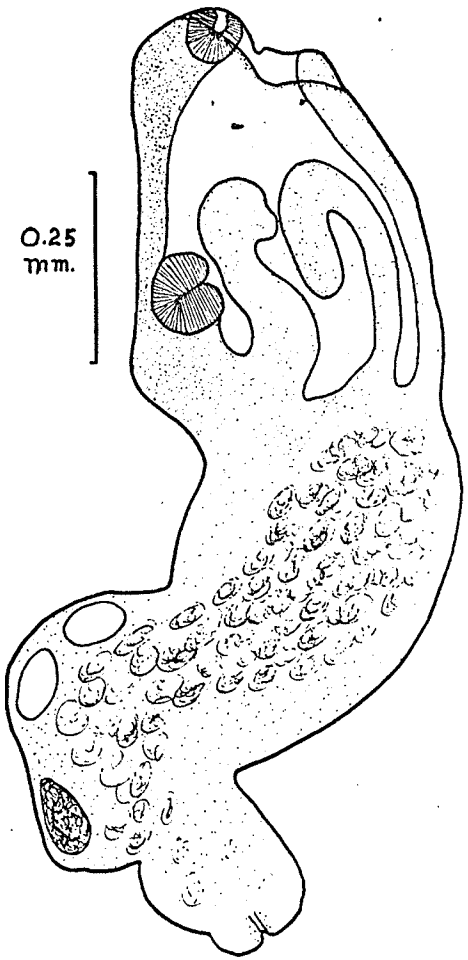


FIG. 51

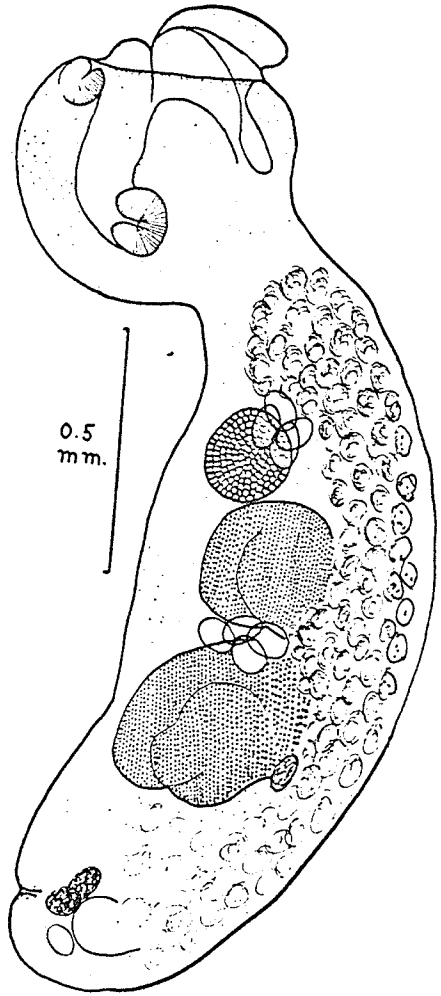


FIG. 52

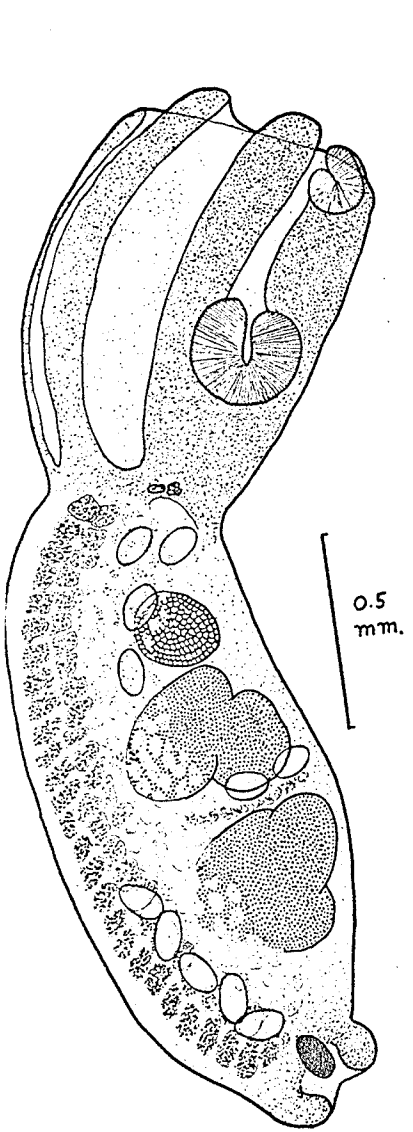
PLATE XVI

Fig. 53. Lateral view of Cotylurus brevis.

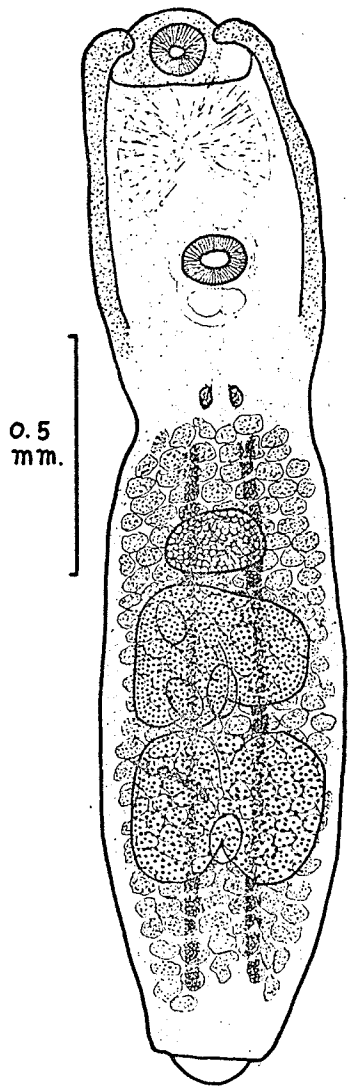
Fig. 54. Ventral view of C. brevis showing bursa copulatrix protruding from the genital atrium.

Fig. 55. Lateral view of C. mcleodi n. sp. from the small intestine of the Herring gull.

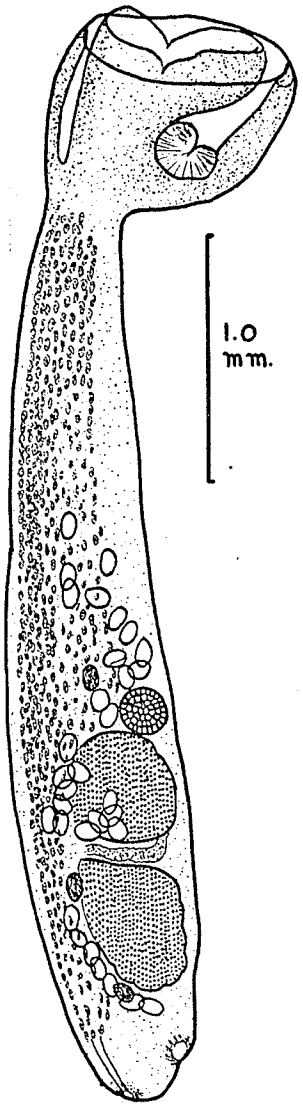
Fig. 56. Ventral view of C. mcleodi n. sp.



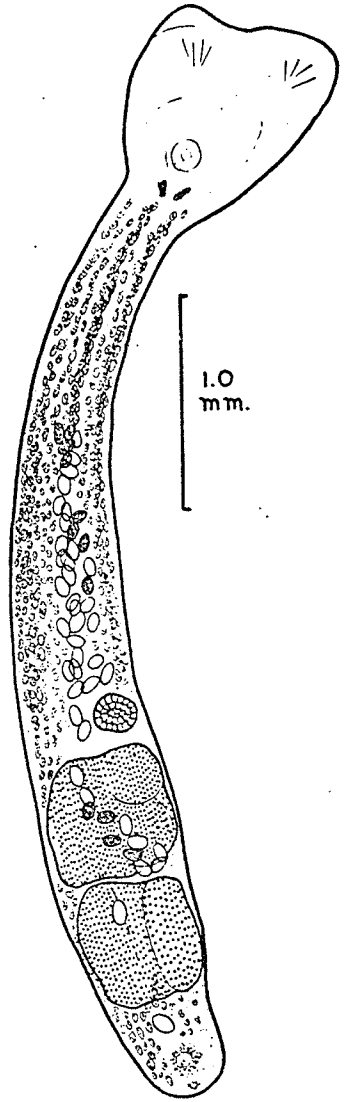
53



54



55



56

Distance between ovary and anterior end-2.744, Anterior testis-0.442 by 0.600 by 0.460 in depth, Posterior testis-0.531 by 0.540 by 0.407 in depth, Distance between posterior testis and posterior end-0.442, Eggs-(35 to 52) 0.106 by 0.057. Literature consulted: (17), (88), (147), (238), (396), (469), (509), (564), (568), (667), (679), (687), (139).

Family Diplostomidae

Diplostomum huronense (La Rue, 1927) Hughes, 1929

One specimen was recovered from the small intestine of an immature Herring gull, and is shown in Figs. 61 and 62, page 77. The dimensions in mm. are as follows: Length-3.050, Anterior segment-1.506 by 0.793 by 0.305 in depth, Posterior testis-1.464 by 0.525 by 0.525 in depth, Oral sucker-0.085 by 0.110, Prepharynx-0.024, Pharynx-0.085 by 0.061, Esophagus-0.085 by 0.012, Distance between acetabulum and anterior end-0.617, Distance between tribocytic organ and anterior end-1.159, Acetabulum-0.092 by 0.110, Distance between tribocytic organ and acetabulum-0.244, Tribocytic organ-0.488 diam., Ovary-0.122 diam., Anterior testis-0.305 by 0.451, Posterior testis-0.305 by 0.427, Distance between posterior testis and posterior end-0.305, Genital atrium-0.183 by 0.085, Eggs-0.110 by 0.061. Literature consulted: (124), (139), (147), (209), (354), (384), (411), (462), (471), (472), (509), (517), (522), (537), (564), (566), (568), (591), (619), (628), 6679).

Diplostomum spathaceum (Rudolphi, 1819) Braun, 1893

Several specimens were recovered from the small intestine of a Herring gull, and a typical specimen is shown in Figs. 64 and 63, page 77, and a photomicrograph of the anterior segment is shown in Fig. 75, page 82. The dimensions in mms are as follows: Length-6.218, Anterior segment-2.668 by 1.508 by 0.290 in depth, Posterior segment-3.550 by 0.951 by 0.835, Oral sucker-0.139 by 0.209, No prepharynx, Pharynx-0.116 by 0.112, Esophagus-0.162, Acetabulum-0.151 by 0.186, Distance from acetabulum to anterior end-1.199, Distance between tribocytic organ and acetabulum-0.231, Tribocytic organ-0.626 by 0.325, Distance between ovary and anterior end-3.851, Ovary-0.311 diam., Anterior testis-0.626 by 0.835, Posterior testis-0.673 by 0.766, Distance between posterior testis and posterior end-0.603, Genital atrium-0.116 by 0.162, Pseudosuckers-0.070 by 0.162, Eggs-0.174 by 0.116.

Literature consulted: (73), (139), (147), (183), (232), (209), (346), (370), (411), (464), (502), (518), (563), (564), (568), (679), (687).

Diplostomum pelmatoides Dubois, 1932

Several specimens were recovered from the duodenum and small intestine of the Red-breasted merganser, and the small intestine of the Lesser scaup. Views are shown in Figs. 70, page 80, and Figs. 86 and 87 page 85. The dimensions of a

typical specimen are as follows: Anterior segment-0.522 by 0.363, Posterior segment-0.247 by 0.212, Oral sucker-0.073 by 0.061, Pharynx-0.044 by 0.026, Acetabulum-0.038 by 0.073, Tribocytic organ-0.110 by 0.125, Bursa copulatrix-0.064 by 0.087 by 0.060 deep, Eggs-0.070 by 0.035. This is the first report, as far as can be ascertained, of this species in North America.

Literature consulted:(54), (91), (112), (139), (147), (158), (204), (208), (209), (210), (211), (212), (213), (214), (225), (216), (219), (223), (224), (347), (509), (551), (564), (568), (574), (580), (581), (664), (679), (687).

Diplostomum baeri Dubois, 1937

Several specimens were recovered from the intestinal coca and small intestine of the Red-breasted merganser, and a typical specimen is shown in Figs. 67 and 68, page 78. The dimensions in mm. are as follows: Length-0.666, Anterior segment-0.426 by 0.241 by 0.109 in depth, Posterior segment-0.240 by 0.192 by 0.176 in depth, Pseudosuckers-0.048 by 0.026, Acetabulum-0.032 diam., Tribocytic organ-0.106 by 0.090, Genital atrium-0.021 by 0.040, Eggs-(one) 0.043 by 0.032.

Literature consulted: (139), (147), (559), (568), (564), (679), (687), (685).

Diplostomum gavium (Guberlet, 1922), Hughes, 1929

One specimen was recovered from the small intestine of a Red-breasted merganser, and is shown in Figs. 66 and 78, pages 78, and 83 respectively. The dimensions in mm. are as follows: Length-0.636, Width at widest part-0.295, Width at level of tribocytic organ-0.257, Oral sucker-0.043 by 0.037, Pharynx-0.034 by 0.023, Pseudosuckers-0.053 by 0.028, Distance between acetabulum and anterior end-0.226, Acetabulum-0.023 diam., Tribocytic organ-0.109 diam., Distance between tribocytic organ and posterior end-0.279.

Literature consulted: (110), (139), (147), (182), (183), (203), (205), (206), (207), (209), (346), (564), (568), (687).

Posthodiplostomum minimum Dubois and Rausch, 1948

One specimen was recovered from a Herring gull, and is shown in Figs. 57 and 58, page 76, and a photomicrograph of the anterior segment is shown in Fig. 74, page 82. The dimensions in mm. are as follows: Length-2.256, Anterior segment-1.1440 by 0.461 by 0.230 in depth, Posterior segment-0.816 by 0.336 by 0.307 in depth, Oral sucker-0.038 diam., Pharynx-0.067 by 0.038, Acetabulum-0.077 diam., Distance of acetabulum from anterior end-0.850, Distance between tribocytic organ and acetabulum 0.163, Tribocytic organ-0.221 by 0.125, Ovary-0.067 by 0.144 by 0.154 in depth, Anterior testis-0.163 by

0.163 by 0.115 in depth, Posterior testis-0.230 by 0.154 by 0.106 in depth, Bursa copulatrix-0.221 diam., Eggs-0.106 by 0.058. Literature consulted: (111), (114), (115), (139), (147), (165), (166), (232), (349), (564), (567), (570), (568).

Family Cyathocotylidae

Mesostephanus sp.

Thirty specimens were recovered from the duodenum, intestinal ceca, and small intestine of three Red-breasted mergansers. Various specimens are shown in Figs. 33, page 59, 65 page 78, 69 page 79, and photomicrographs are shown on page 83, Figs. 76, 77, and 79 to 82. The dimensions in mm. are as follows: Length-0.631 to 1.079, Width- 0.151 to 0.358, Thickness-0.111, Distance of acetabulum to anterior end-0.260 to 0.663, Acetabulum-0.011 by 0.024 to 0.020 to 0.023, Oral sucker-0.028 by 0.023, Pharynx-0.042 by 0.025, Tribocytic organ-0.084 by 0.055 to 0.091 by 0.065, Distance of tribocytic organ to posterior end-0.169 to 0.293, Eggs-not more than 3 seen in any specimen-0.058 by 0.046 to 0.104 by 0.059.

Literature consulted: (7), (64), (109), (139), (147), (294), (508), (509), (536), (549), (556), (564), (565), (568), (579), (580), (581), (630), (660), (665), (679), (687).

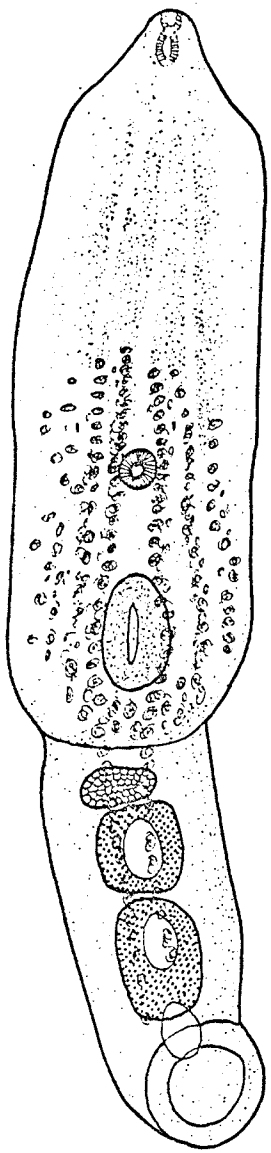
PLATE XVII

Fig. 57. Posthodiplostomum prosostomum from Herring gull. Ventral view.

Fig. 58. P. prosostomum. Lateral view.

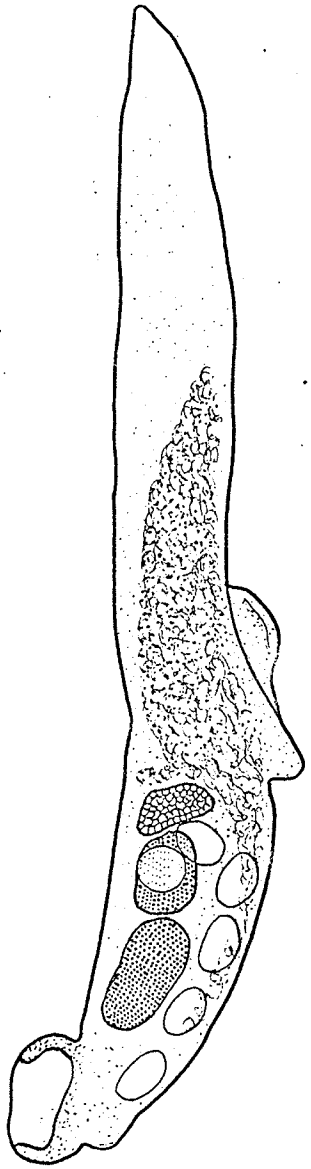
Fig. 59. Parastrigea necrobusta n. sp. from the small intestine of Lesser scaup. Ventral view.

Fig. 60. P. necrobusta n. sp. Lateral view.



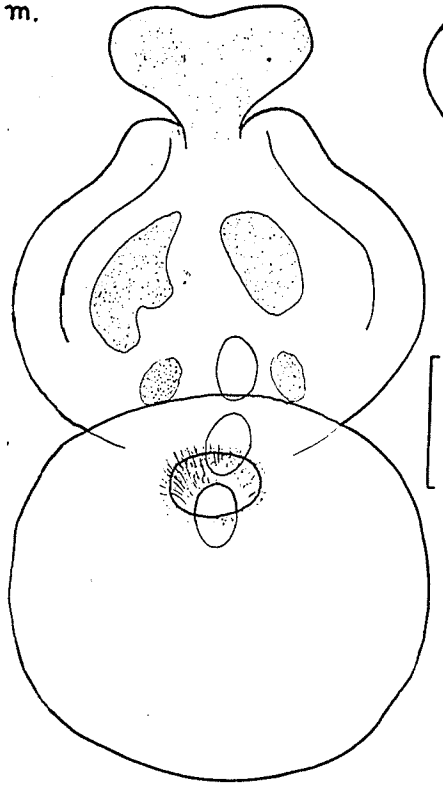
0.5 mm.

FIG. 57



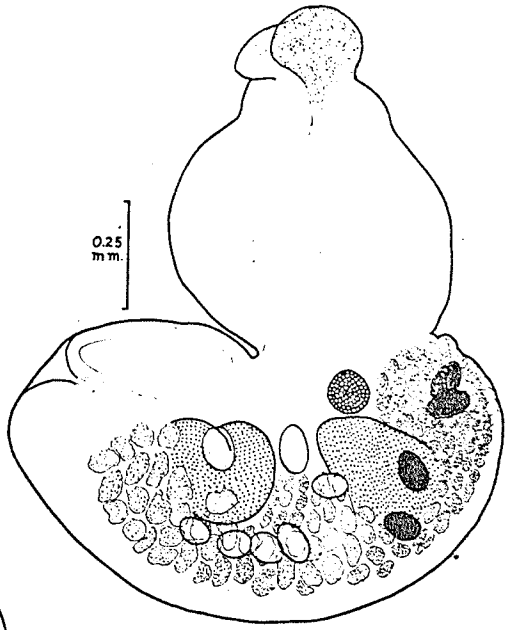
0.5 mm.

FIG. 58



0.25 mm.

FIG. 59



0.25 mm.

FIG. 60

PLATE XVIII

Fig. 61. Diplostomum huronense from the small intestine of an immature Herring gull. Lateral view.

Fig. 62. D. huronense. Ventral view.

Fig. 63. D. spathaceum from the intestine of Herring gull. Lateral view.

Fig. 64. D. spathaceum. Dorsal view.

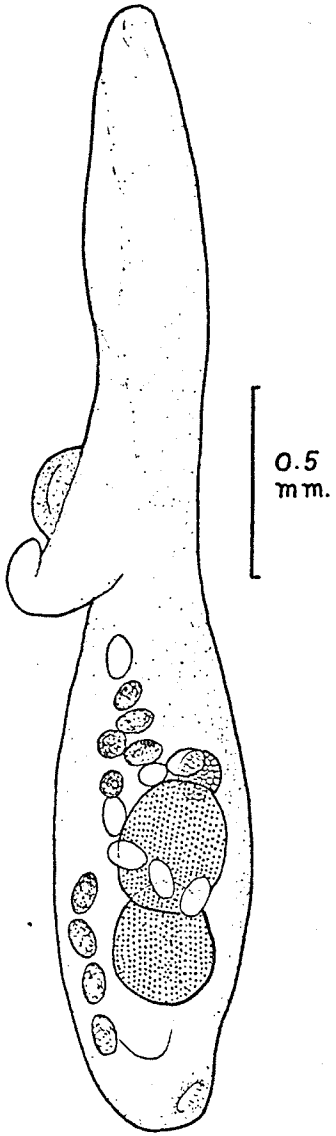


FIG. 61

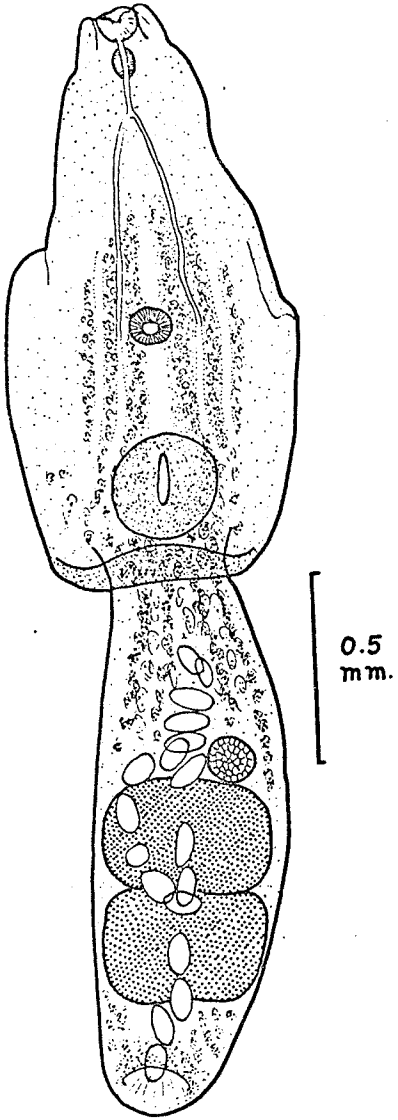


FIG. 62

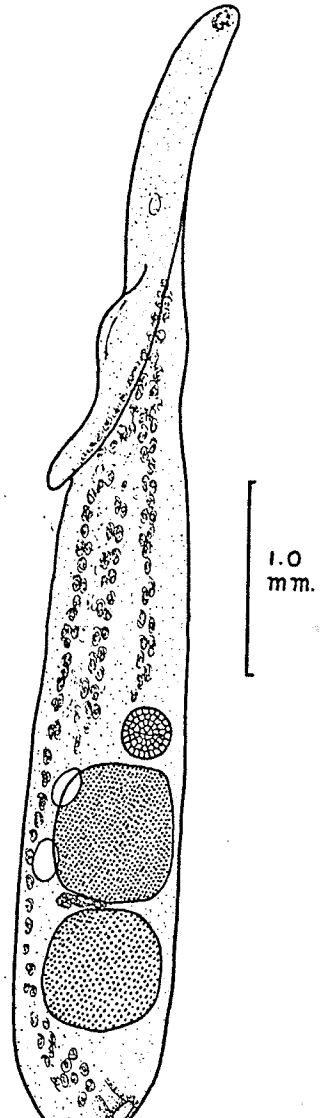


FIG. 63

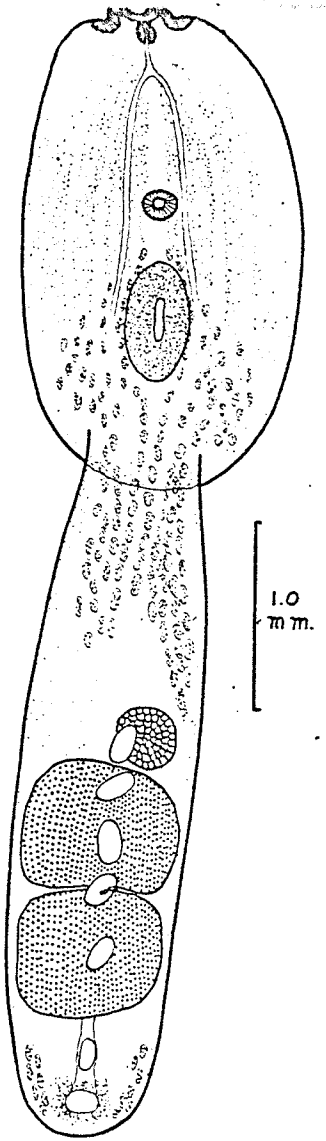


FIG. 64

PLATE XIX

Fig. 65. Mesostephanus sp. from the Red-breasted merganser. Ventral view.

Fig. 66. Diplostomum gavium from the small intestine of the Red-breasted merganser. Ventral view.

Fig. 67. D. baeri from the intestinal ceca of the Red-breasted merganser. Ventral view.

Fig. 68. D. baeri. Lateral view.

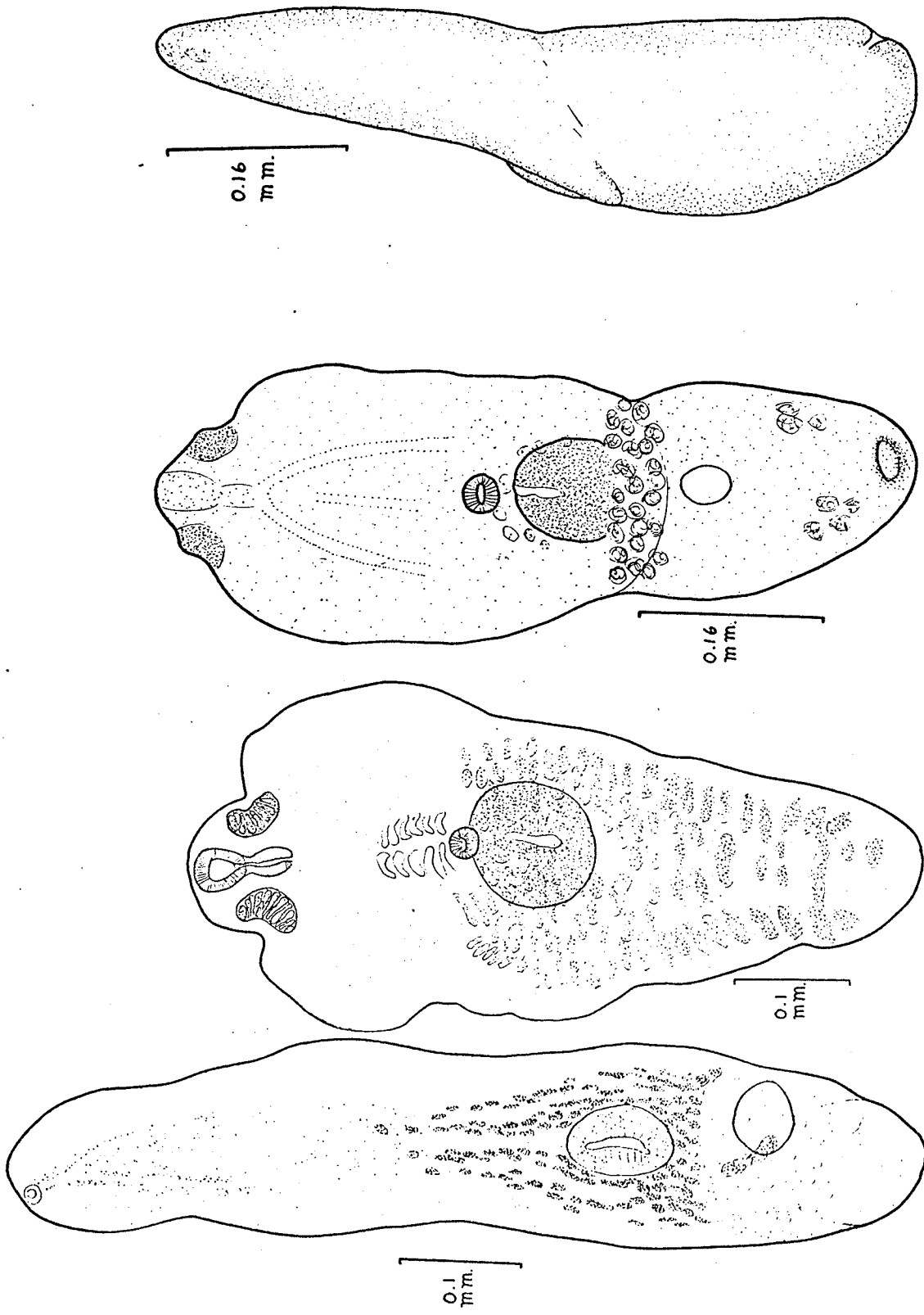


FIG. 68

FIG. 67

FIG. 66

FIG. 65

PLATE XX

Fig. 69. Various specimens of Mesostephanus sp. from the duodenum, small intestine and intestinal ceca of Red-breasted mergansers.

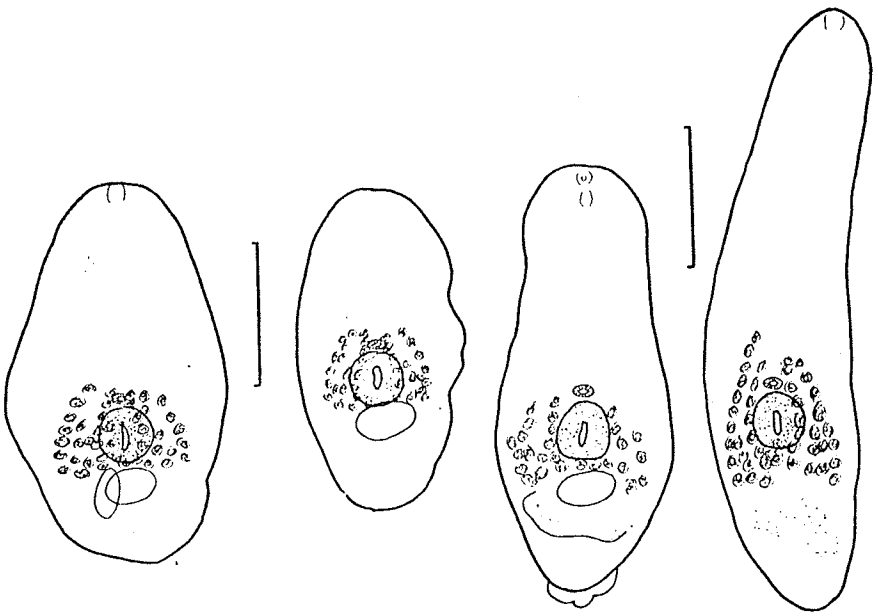


FIG. 69

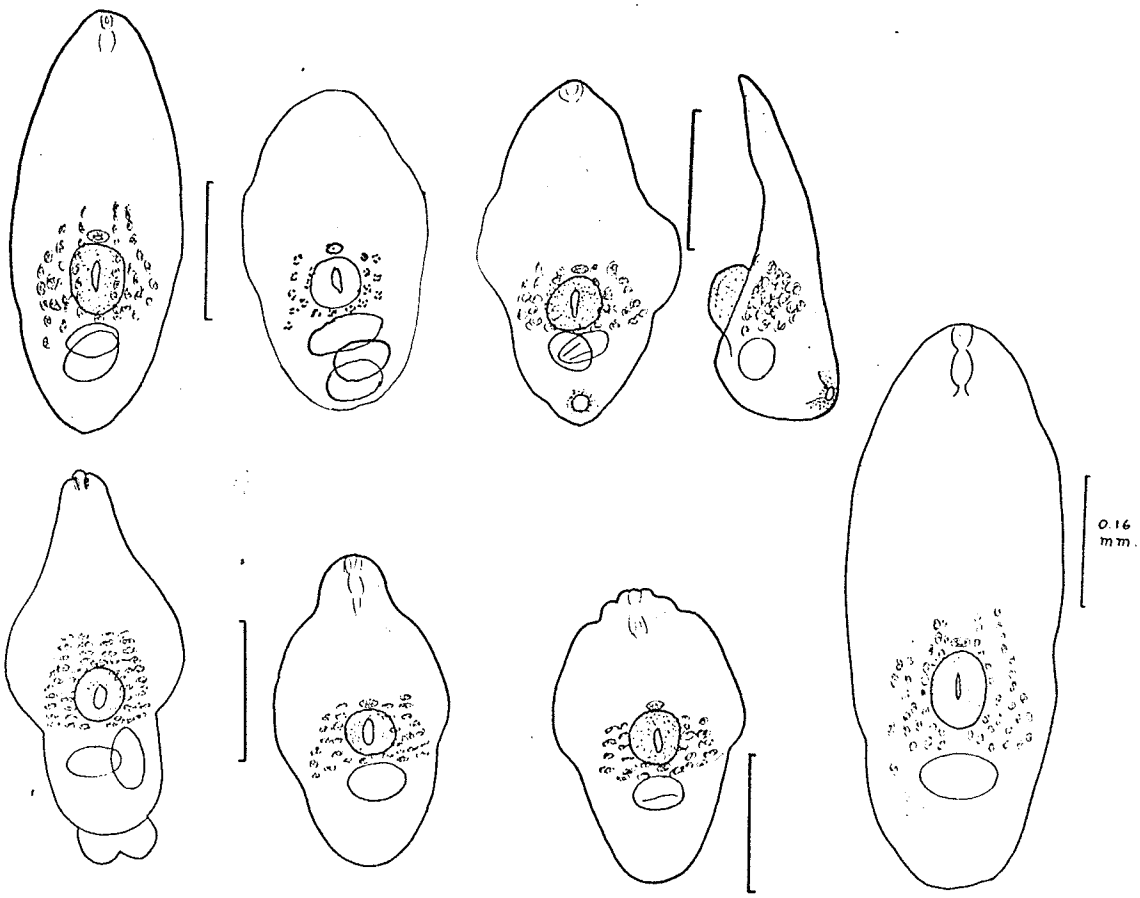


PLATE XXI

Fig. 70. a-Diplostomum pelmatoides from Red-breasted merganser. Lateral view.

b-D. pelmatoides. Ventral view, specimen mounted.

c-D. pelmatoides. Lateral view of posterior segment.

d-D. pelmatoides. Dorsal view.

Fig. 71. Austrobilharzia lari, male and female in copuli. From intestinal vein of Herring gull.

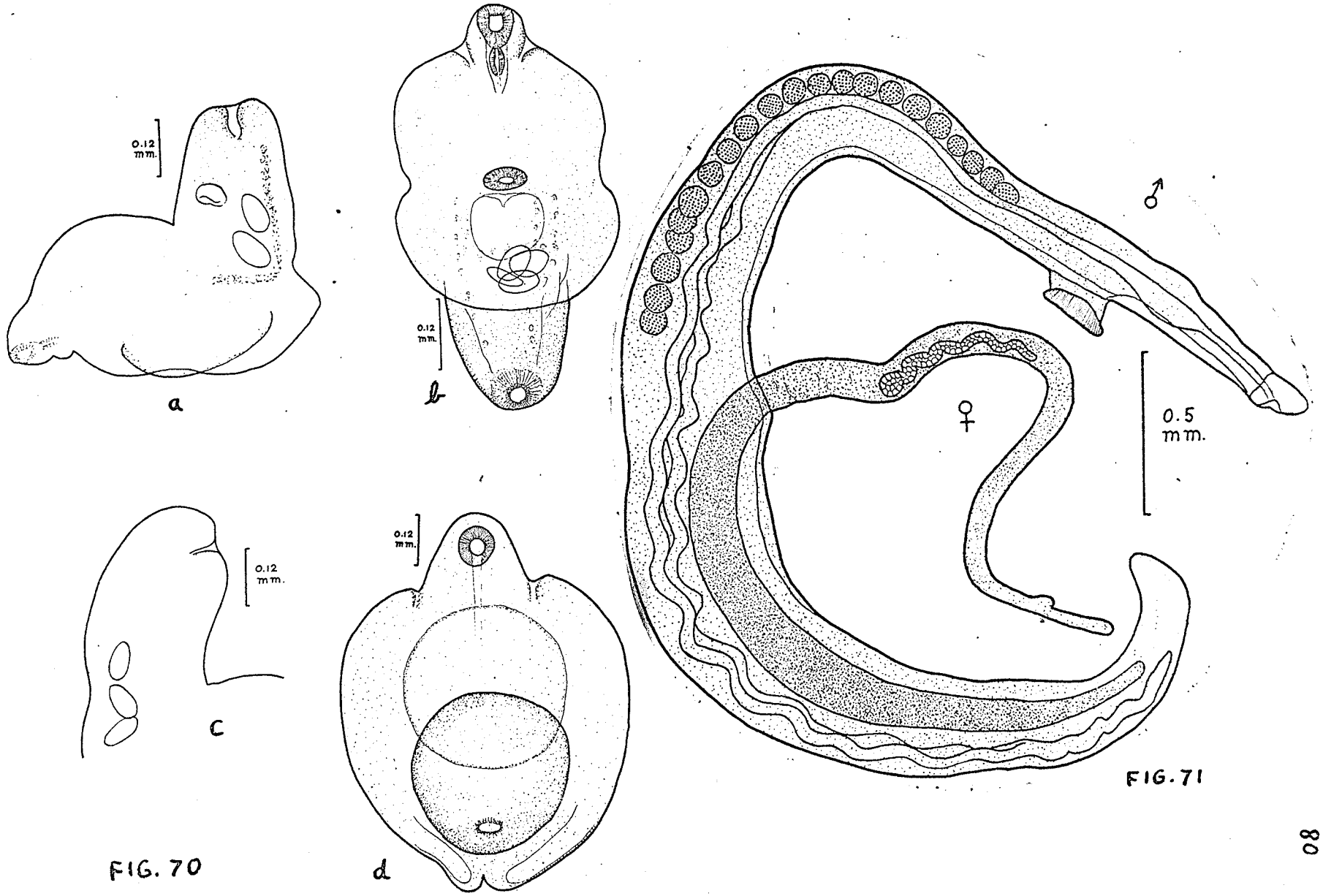


FIG. 70

FIG. 71

PLATE XXII

Fig. 72. Cotylurus communis from the Bursa of Fabricius of an immature Herring gull. Lateral view, cross section.

Fig. 73. C. communis specimen before processing.

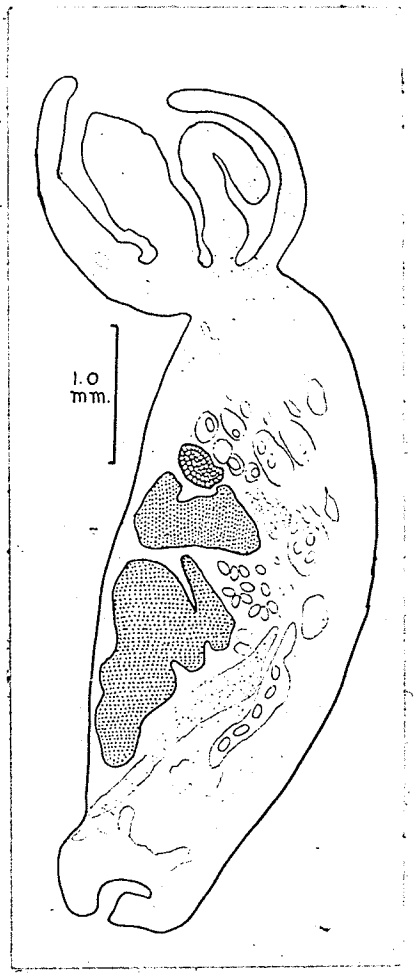


Fig. 72.

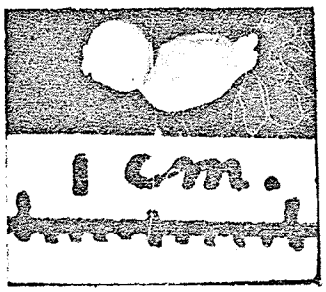


Fig. 73

PLATE XXIII

Fig. 74. Photomicrograph of anterior segment of *Posthodiplostomum pronostomum*, ventral view, x54

Fig. 75. Photomicrograph of anterior segment of *Diplostomum spathaceum* shown in Fig. 64. x28

Fig. 74.

Fig. 75.

PLATE XXIV

Fig. 76. Mesostephanus sp. from Red-breasted merganser. x75 Photomicrograph.

Fig. 77. Mesostephanus sp. x75 Photomicrograph.

Fig. 78. Diplostomum spatium x67 Photomicrograph

Fig. 79. Mesostephanus sp. x75 Photomicrograph

Fig. 80. Mesostephanus sp. x75 Photomicrograph

Fig. 81. Mesostephanus sp. x75 Photomicrograph

Fig. 82. Mesostephanus sp. x75 Photomicrograph lateral view.

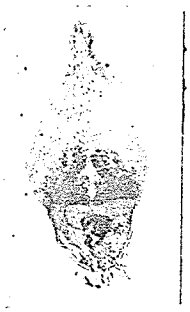


Fig. 76.

Fig. 77.

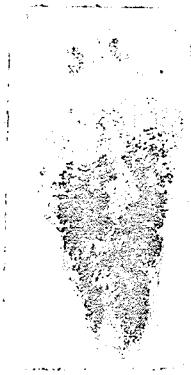


Fig. 78.

Fig. 79.

Fig. 80.

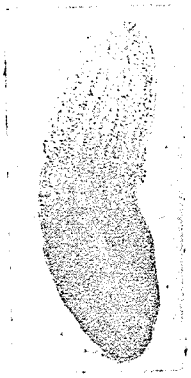


Fig. 81.

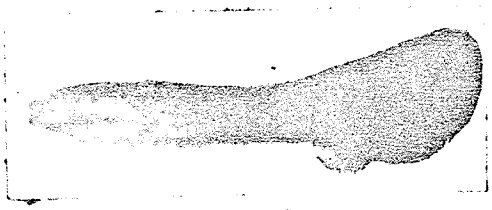


Fig. 82.

PLATE XXV

Fig. 83. Photomicrograph. Posterior end of *Cotylurus brevis*. x68

Fig. 84. Photomicrograph. Posterior end of *C. brevis*. x68

Fig. 85. Photomicrograph. Posterior end of *C. brevis*. x68

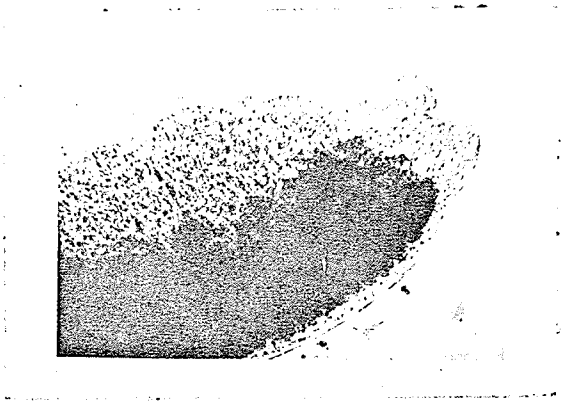


Fig. 83.

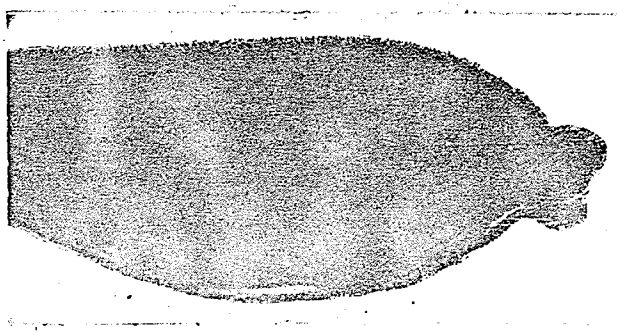


Fig. 84.

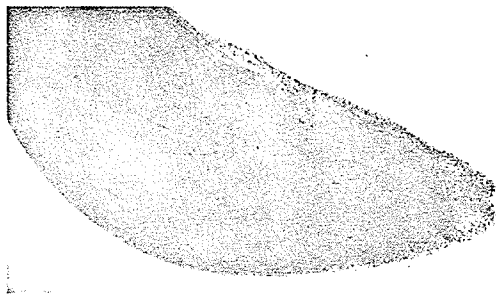


Fig. 85.

PLATE XXVI

Fig. 86. Photomicrograph of Diplostomum pelmatoides shown in Fig. 70.b. Dorsal view. x74

Fig. 87. Photomicrograph of unmounted D. pelmatoides. Lateral view. x74

Fig. 86.

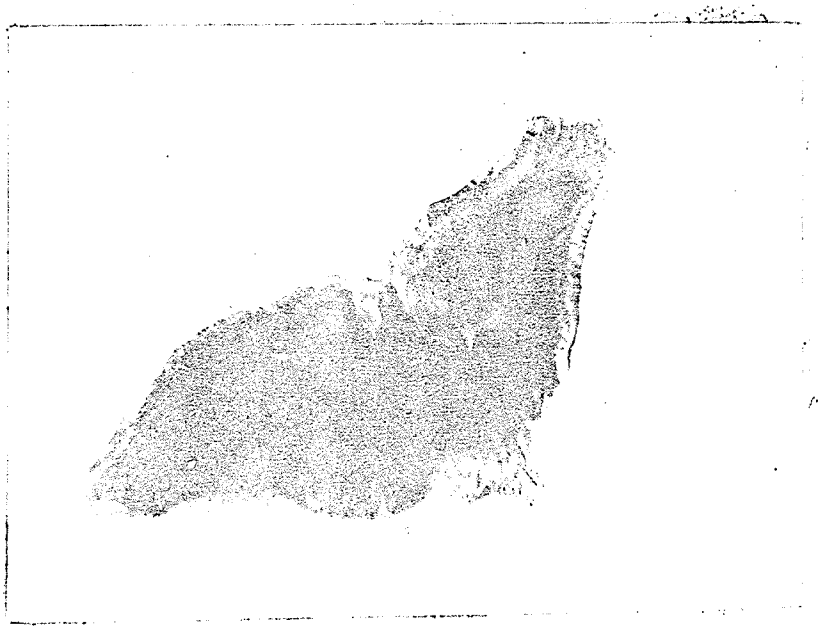


Fig. 87.

PLATE XXVII

Fig. 88. Photomicrograph of posterior end of Cotylurus brevis shown in Fig. 54. x68

Fig. 89. Photomicrograph of portion of posterior segment of C. brevis showing vitelline reservoir extending perpendicularly from the vitelline glands towards the ventral surface. Lateral view. x68

Fig. 90. Photomicrograph of aberrant form of C. brevis shown in Fig. 51. x68

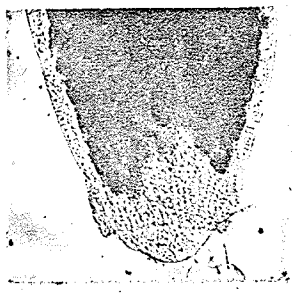


Fig. 88.

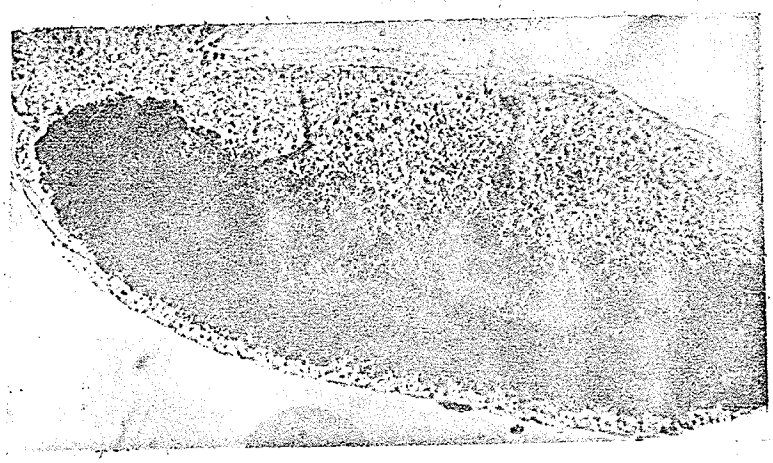


Fig. 89.

Fig. 90.

PLATE XXVIII

Fig. 91. Photomicrograph of anterior, lateral, segment of Cotylurus brevis. x68

Fig. 92. Photomicrograph of anterior segment of C. brevis. Ventral view. x68

Fig. 93. Photomicrograph of anterior segment of C. brevis shown in Fig. 54. x68

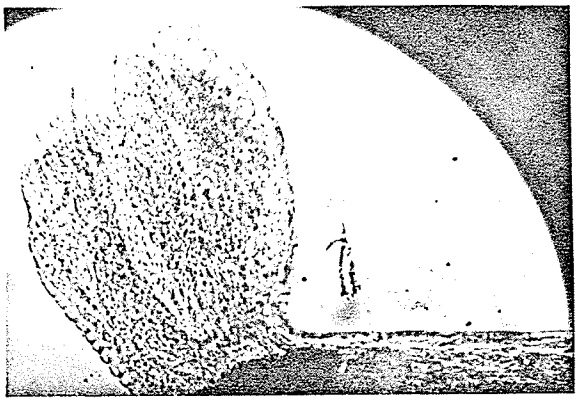


Fig. 91.

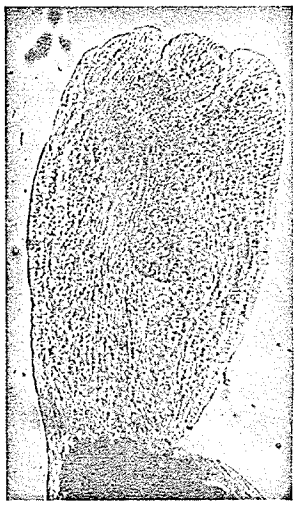


Fig. 92.

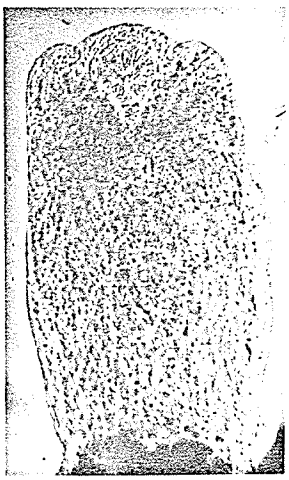


Fig. 93.

PLATE XXIX

Fig. 94. *Astiotrema* sp. Variations in size and features.

Fig. 95. *Echinoparyphium elegans*. Aspects of growth in the species.

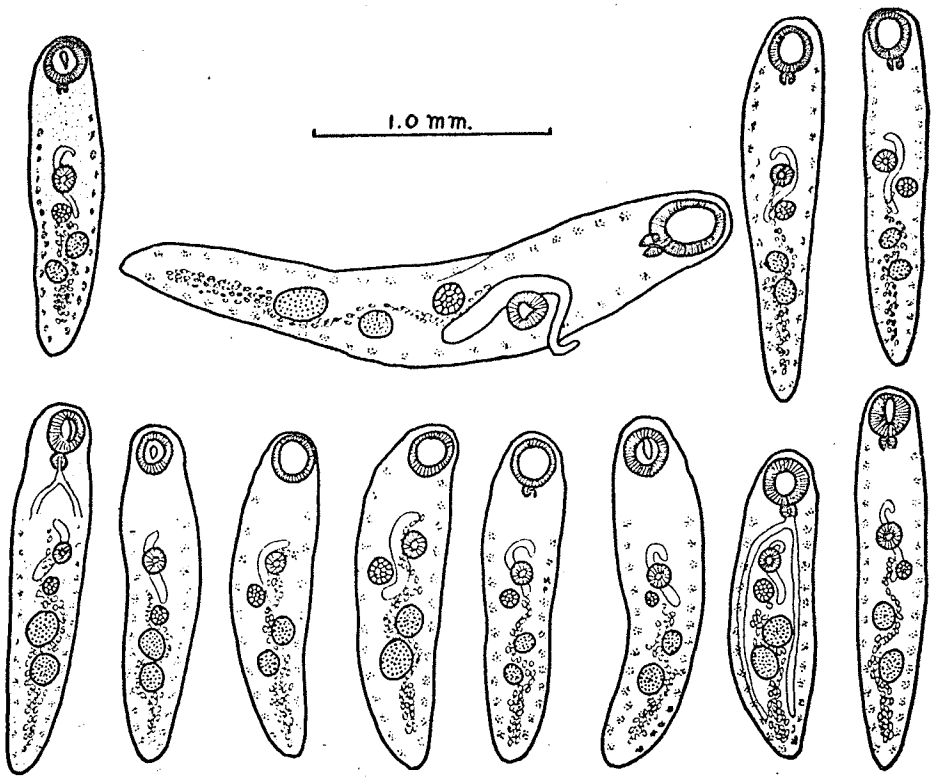


FIG. 94

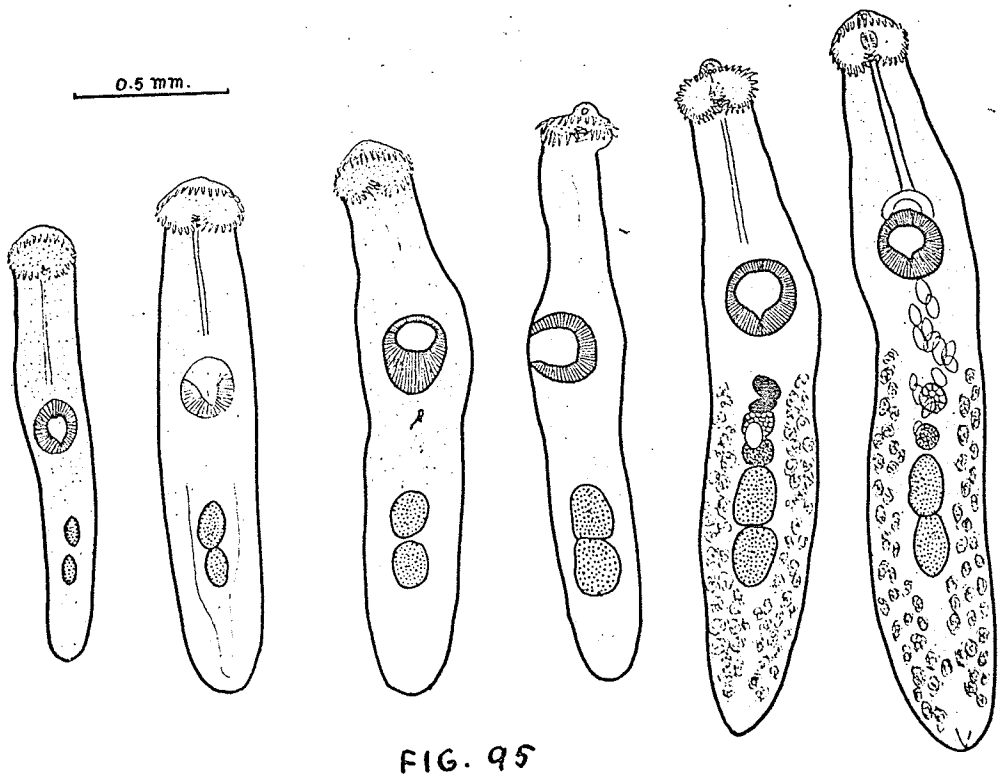


FIG. 95

Family Schistosomatidae

Six adult species of the Family Schistosomatidae have been discovered and reported by McLeod from Manitoba, and these are included in this work. They are as follows:

Ornithobilharzia filamenta McLeod, 1940---From the coccygeomesenteric and mesenteric veins and lymphatics of the Herring gull and Ring-billed gull, (309). Fig. 103, page 95.

O. avierni McLeod, 1940---From the portal and hepatic veins of the Herring gull, (309). Fig. 104 (a to c), page 95.

Austrobilharzia lari (McLeod, 1937) Penner, 1953---This was originally reported by McLeod as Microbilharzia lari (308), (309), from the portal and intestinal veins of a Herring gull. Penner suppressed the genus Microbilharzia, allocating all the species to the genus Austrobilharzia, (625). Fig. 100, page 94.

A. canadensis (McLeod, 1936) Penner, 1953---Originally M. canadensis from the portal and hepatic veins of the Canvasback, (307), (309), (625). Fig. 105 (a to b), page 95.

A. manitobensis (McLeod, 1936) Penner, 1953---Originally M. manitobensis from the hepatic portal veins of the Canvasback, (307), (309), (625). Fig. 106 , page 95.

Trichobilharzia querquedulae (McLeod, 1937) Wu, 1953---Originally Pseudobilharziella querquedulae (308), (309), (310), from the portal and intestinal veins of the Blue-wing teal. McMullen and Beaver (318) reduced the genus Pseudobilharziella

to synonymy with the genus Trichobilharzia and stated that T. querquedulae was synonymous with T. physellae. Hu (496) does not agree that the two species are synonymous as there were a number of differences, and accordingly left the species described by McLeod, separately under the name T. querquedulae.

McLeod mentions twelve species of cercariae as being found in Manitoba, only three of them (Cercaria elvae (Miller, 1923) Talbot, 1936 (309), C. stagnicolae Talbot, 1936 (309), and C. dermolestes McLeod, 1940 (309), the latter being the cercarial stage of "Pseudobilharziella sp." found in the Lesser yellow-legs and Pectoral sandpiper (310) being linked with schistosome dermatitis in the Province of Manitoba. The other nine species were: Cercaria of Diplostomum flavicaudum Van Haitsma, 1931 (309), Cercaria of Cotylurus flabelliformis Van Haitsma, 1931 (309), (467), C. vaucha Cort and Brackett, 1937 (309), C. dehoma Cort and Brackett, 1937 (129), (309), C. bassi-ing Cort and Brooks, 1928, the cercaria of Crassiphiala ambloplitis Hunter, 1937 (219), (309), C. hurti Miller, 1923 (309), C. wardlei McLeod, 1934 (306), (309), C. multicellulata Miller (possibly) (309), and C. physellae (309)

Schistosome Dermatitis.

Schistosome dermatitis is world wide in extent, and has been encountered by the writer as far north as the 55 th parallel of latitude in the marshes in the vicinity of Snow Lake, Manitoba. Extensive work has been carried out by Wardle

and McLeod on schistosome dermatitis in the Province, as mentioned previously in Chapter II. (306), (307), (309), (310), (426), (476), Alberta (185). Other fresh water dermatitis outbreaks have been reported from the following localities: Seattle-(221), (596), (600), (601). Cultus Lake, B.C.-(569). Eastern Massachusetts-(371). Wisconsin-(57), (59), (315), (319). Michigan-(316), (319), (320), (558). Wales-(327). Europe-(433). New Zealand-(300), (597), (598). Australia-(237), (599). South Africa-694). Burma-(letter to Cort by Meggitt). Japan-(220). Malaya-(81). Marine reports:Florida-(592), (593), (627). Mexico & California-(624). Rhode Island-(656). Other literature consulted: (53), (55), (58), (61), (62), (75), (77), (135), (194), (317), (318), (355), (475), (557), (559), (583), (585), (621), (622), (623), (625), (626), (119).

Other literature consulted on the schistosomes: (13), (56), (59), (60), (63), (116), (139), (154), (159), (160), (161), (274), (350), (362), (375), (376), (379), (381), (428), (431), (435), (454), (479), (518), (528), (542), (554), (590), (593), (620), (621), (623), (669), (679), (687), (689), (626), (513), (656).

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

Thirty seven trematode species are described from twenty six separate hosts. Six new species as well as six undetermined species are included. A new genus, Xenisma, is proposed for a new species that belongs to the isolated genera of the Echinostomatidae. The six new species are: Parastrigea necrobiusta, Cotylurus nelsoni, Stephanoprora lari, Xenisma wardlei, Echinostoma platyrhynchi, and Echinostoma manitobensis. The undetermined species are: Neostenhamus sp., Plagiorchis sp. 1, Plagiorchis sp. 2, Astiotrema sp., Hindia sp., and Haematotrephus sp.

Conclusions

The provinces of Manitoba and Saskatchewan are in unique positions with respect to the four main waterfowl flyways in North America (562). It can readily be seen that the researcher in helminthology would have very fertile fields of exploration in these areas, where intermingling of the birds would occur.

ADDENDA

To the families Strigeidae and Diplostomidae may be added the following specimens collected by Dubois & Rausch in Manitoba. Cotylurus erraticus from the Ring-billed gull, and C. communis from the Bairds sandpiper and Dowitcher. Diplostomum spathaceum from the Franklin's gull, and D. commutatum from the Black tern. (152).

PLATE XXX

Fig. 96. Astiotrema sp. from the small intestine of Franklin's gull. Ventral view.

Fig. 97. Plagiorchis sp. 1 from Herring gull. Ventral view.

Fig. 98. Plagiorchis sp. 2 from the small intestine of a Common tern. Ventral view.

Fig. 99.--a-Trichobilharzia querquedulae posterior segment of female, from the portal veins of Blue-wing teal. (After McLeod).

b-T. querquedulae. Anterior segment of female. (After McLeod).

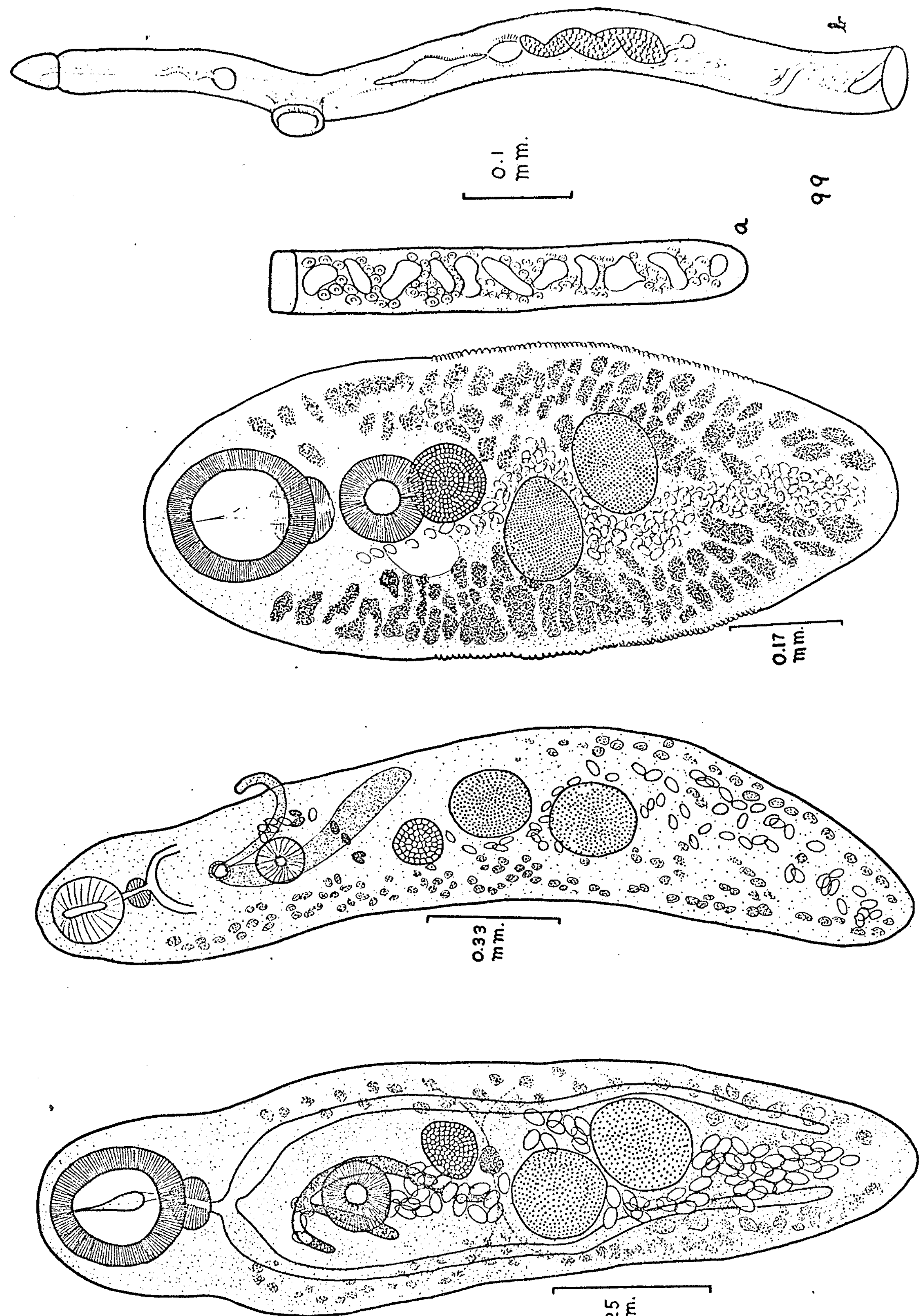

b
0.1 mm.
99
a
0.17 mm.
98
0.33 mm.
97
0.25 mm.
96

PLATE XXXI

Fig. 100. Austrobilharzia lari, from the intestinal veins of a Herring gull. Lateral view. (After McLeod). (male).

Fig. 101. A. lari, female, from the portal veins of a Herring gull. Ventral view. (After McLeod).

Fig. 102. a-Trichobilharzia querquedulae, posterior segment of male, ventral view, from the intestinal veins of a Blue-wing teal. (After McLeod).

b-T. querquedulae, anterior segment of male. (After McLeod).

c-T. querquedulae, anterior segment of immature male. (After McLeod).

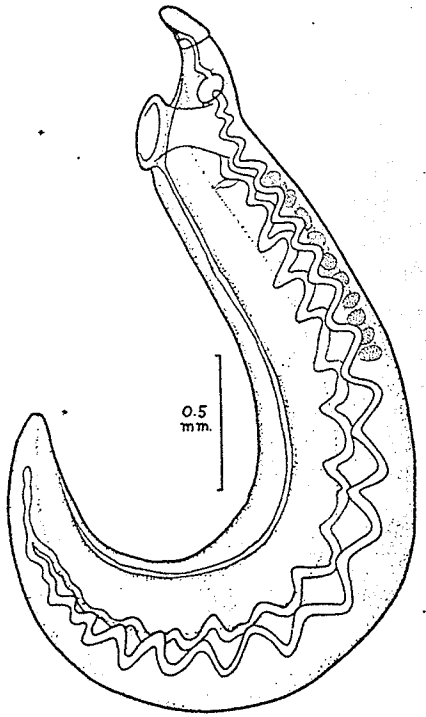


FIG. 100.

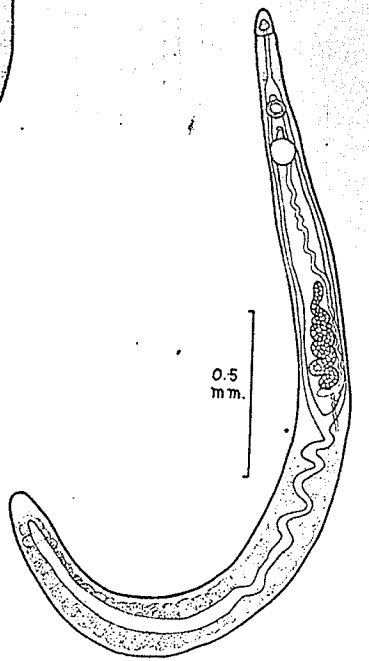
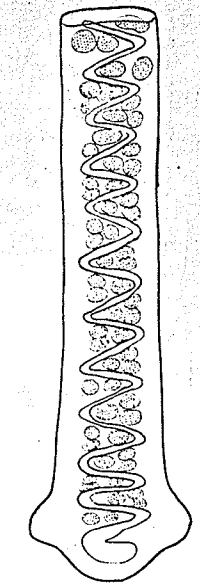


FIG. 101



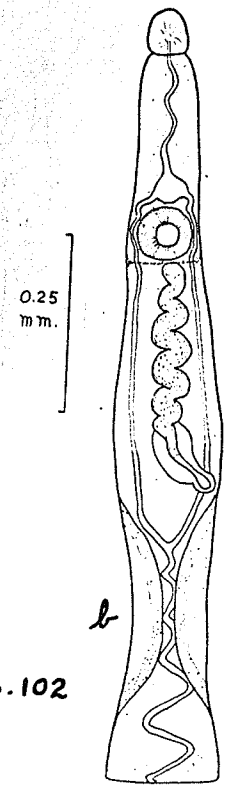


FIG. 102

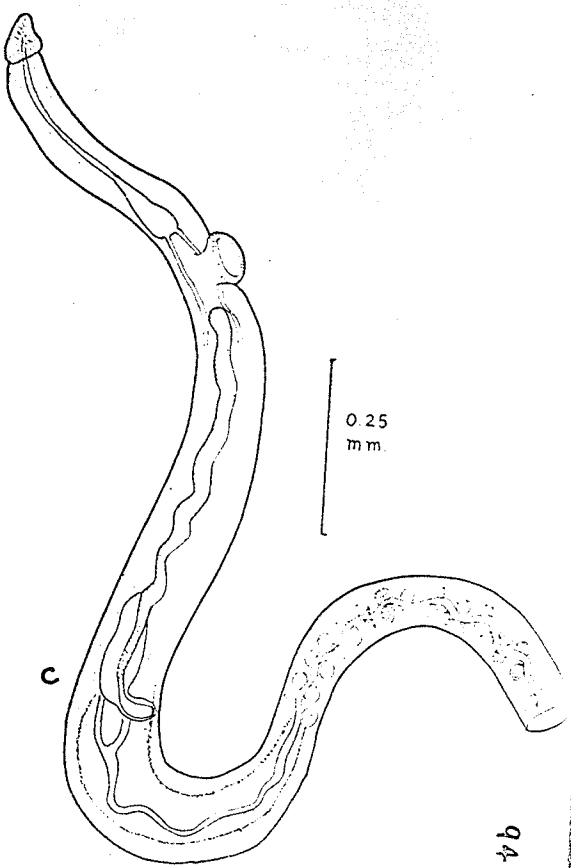


PLATE XXXII

Fig. 103. Ornithobilharzia filamenta.
a-Anterior segment of female, ventral view, from the mesenteric veins of a Herring gull. (After McLeod).
b-O. filamenta, female, entire specimen from the lymphatics of a Ring-billed gull. (After McLeod).

Fig. 104. O. ayloni from the portal and hepatic veins of the Herring gull.
a-Posterior segment of male. (After McLeod).
b-Anterior segment of male. (After McLeod).
c-Anterior segment of female. (After McLeod).

Fig. 105. Austrobilharzia canadensis, male, & female.
a-Male, from the portal veins of the Canvasback duck. (Modified after McLeod).
b-Female, from the hepatic and portal veins. (Modified after McLeod).

Fig. 106. Austrobilharzia manitobensis., male, from the hepatic portal veins of the Canvasback duck. (Modified after McLeod).

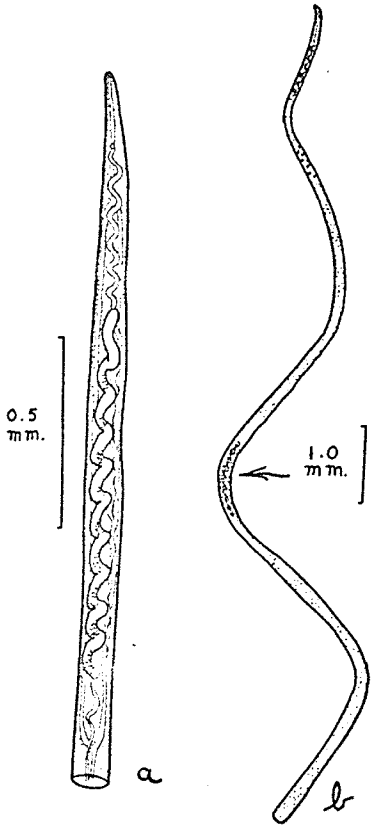


FIG. 103.

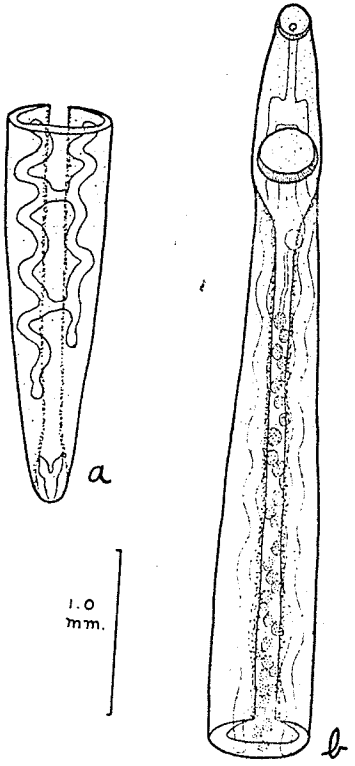


FIG. 104.

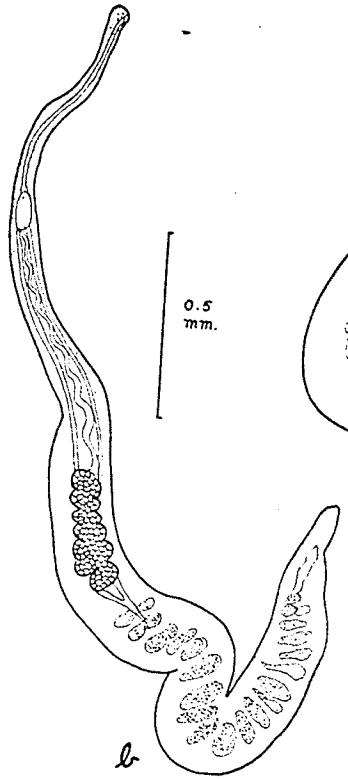


FIG. 105

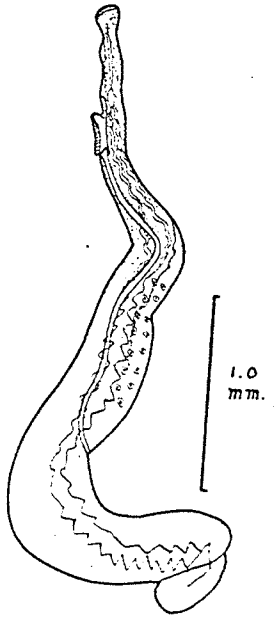


FIG. 106.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Abdel Azim, M. 1930b. On the identification and life history of Echinostomum recurvatum von Linstow, 1873 Ann. Trop. Med. and Parasitol. 24 (2):189-192

2. Abdel-Malek, Emile T. 1952a. Corcaria chandleri, a new echinostome species from the snail Helisoma corpulentum in Lake Itaska, Minnesota. Tr. Am. Micr. Soc. 71 (3):277-281.

3. _____ 1952b. Life history of Petasiger chandleri n. sp. (Trematoda: Echinostomatidae) from the pied-billed grebe Podilymbus podiceps podiceps. Progrm and Abstr. 27. Ann. Meet., Am. Soc. Parasitol., Ithaca, N. York, Sept. 8-10. J. Parasitol., 38 (4) Sect. 2, Suppl., p. 39.

4. _____ 1953a. Life history of Petasiger chandleri (Trematoda: Echinostomatidae) from the pied billed grebe, Podilymbus podiceps podiceps, with some comments on other species of Petasiger. J. Parasitol. 39 (2):152-158.

5. Adam, William; and Leloup, E. 1940a. La distribution en Belgique de Leucochloridium paradoxum, Rhynchodemus terrestris, Arion intermedius, Platyarthrus hoffmannseggi et Atyaephyra desmaresti. Bull. Mus. Roy. Hist. Nat. Belgique. 16 (21):1-8.

6. Africa, Candido; and Garcia, Eusebio Yatco. 1937b. Plagiorchis sp. a new trematode parasite of the human intestine. (Russian summary) Rabot. Gel'mint. (Skrjabin), pp. 9-10.

7. Alegret, Maria J. 1941a. Contribucion al conocimiento de los vermes parasitos de Phalacrocorax auritus floridanus. Tesis. (Univ. Habana). 32 pp.

8. Allen, Joseph Alexander. 1934a. Parasites of fur-bearing animals. Proc. 5 Pacific Sc. Cong. (Canada, 1933), 4:2981-2989.

9. _____ 1936a. Control of parasitism of the fur ranch. Canad. Silver Fox and Fur. 2 (12):6.

10. Allen, Joseph Alexander; and Wardle, Robert Arnold. 1934g. Fluke disease in northern Manitoba sledge dogs. Canad. J. Research. 10 (4):404-408

11. Allison, L. N. 1943g. Leucochloridiomorpha constantiae Mueller (Brachylaemidae), its life cycle and taxonomic relationships among digenetic trematodes. Tr. Am. Micr. Soc. 62 (2):127-168.

12. Ameel, D. J. 1944g. The life history of Hudacotyle novicia Barker, 1916 (Trematoda: Notocotylidae). J. Parasitol. 30 (4):257-263.

13. _____; Van der Woude, A.; and Cort, W. W. 1953g. Studies on the miracidium of the genus Trichobilharzia with special reference to the germinal cells. Proc. Helminth. Soc. Washington. 20 (1):40-42.

14. Anazawa, Kenji. 1929g. First instance of Echinostomum revolutum found in man and its course of infection. (Japanese text). Taiwan Igakkwai Zasshi, Taikoku (288) pp. 221-241, English summary, pp. 10-13.

15. Amoreaux, R. F. 1940g. A note on Echinoparyphium recurvatum (Von Linstow) parasitic in California turkeys. J. Am. Vet. Med. Ass. (754) 96:62-64.

16. Babero, B. B.; and Rausch, R. 1958g. Notes on some trematodes parasitic in Alaskan Canidae. Proc. Helm. Soc. Washington. 19:15-17

17. Baer, J. G.; and Dubois, G. 1951g. Note sur le genre Pharyngostomum Ciurea, 1922 (Trematoda: Strigeida). Bull. Soc. Neuchatel. Sc. Nat., 3.s., 74:77-82.

18. Baer, J. G. 1924g. Description of a new genus of Lopodermatidae (Trematoda) with a systematic essay on the family. Parasitology. 16:22-31.

19. Ballowitz, E. 1900g. Trematoden. Real-Encycl. Ges. Heilk., 3. Aufl., 24:442-448.

20. Barker, F. D. 1907g. Variations in the vitellaria and vitelline ducts of three distomes of the genus Opisthorchis . Tr. Am. Micr. Soc. 27:99-110.

21. Barker, F. D.; and Bastron, C. 1915a. (Echinoparyphium continuum Barker and Bastron, sp. nov.) In Barker, F. D. Parasites of the American muskrat, Fiber zibethicus.) J. Parasitol. 1:187-188.

22. _____ and Beaver, C. A. 1915a. (Echinostomum coalitum Barker and Beaver, sp. nov.) (In Barker, F. D. Parasites of the American muskrat, Fiber zibethicus). J. Parasitol. 1:185-187.

23. _____ and Irvine, R. S. 1915a. (Echinostomum amplicum Barker and Irvine, sp. nov.) (In Barker, F. D. Parasites of the American muskrat, Fiber zibethicus). J. Parasitol. 1:189-190.

24. _____ and Noll, W. C. 1915a. (Echinostomum callawayensis Barker and Noll, sp. nov.) (In Barker, F. D. Parasites of the American muskrat, Fiber zibethicus.) J. Parasitol. 1:188.

25. Bangham, R. V. 1940a. Parasites of fish of Algonquin Park Lakes. Progressive Fish. Cult., Memo. I-131 (52):37.

26. _____ 1941c. Parasites of fish of Algonquin Park Lakes. Tr. Am. Fish. Soc., 70:161-171.

27. _____ and Venard, C. E. 1946a. Parasites of fish of Algonquin Park Lakes. Univ. Toronto Studies, Biol. Ser. (53), pp. 31-36.

28. Baugh, S. C. 1949a. On a new avian trematode, Psilorchis thapari, (fam. Psilostomidae) with a record of Psilochasmus oxyurus (Crep.) from India. Indian J. Helminth. 1:79-84.

29. _____ 1950a. On Parvyhostomum horai sp. nov. (Trematoda: Echinostomatidae), with a note on the systematic position of Parvyhostomum novum Verma, 1936. Rec. Indian Mus. 47:99-106.

30. Baylis, H. A. 1928b. A new species of Notocotylus (Trematoda), with some remarks on the genus. Ann. and Mag. Nat. Hist., 10. s. (12), 2:582-585.

31. _____ 1931a. Corrections to the descriptions of two species of Notocotylus (Trematoda). Ann. and Mag. Nat. Hist., 10. s. (41), 2:507.

32. Baylis, H. A. 1932h. What is Psilochasmus lecithogus Otto? Ann. and Mag. Nat. Hist., 10. s. 9:124-125.

33. _____ 1936d. A new species of Notocotylus (Trematoda), from the water-rail. Ann. and Mag. Nat. Hist., 10. s. 17:474-477.

34. Beaver, P. C. 1935g. Experimental studies on Echinostoma revolutum (Froelich), a fluke from birds and mammals. Abstract of thesis (Ph. D. Illinois). 10 pp.

35. _____ 1936g. Notes on a species of Stephanopr-ora (Echinostomidae) from American crows that were fed freshwater fish. Tr. Illinois State Acad. Sc. 28:9

36. _____ 1937g. Experimental studies on Echinostoma revolutum (Froelich), a fluke from birds and mammals. Illinois Biol. Monogr. v.15, 96 pp.

37. _____ 1938g. Life history studies on Psilostomum ondatrae Price and Petasiger nitidus Linton (Trematoda). J. Parasitol. 24: Dec. Suppl. p. 28.

38. _____ 1939g. The life cycle of Euparyphium melis (Trematoda: Echinostomidae). J. Parasitol. 25: Dec. Suppl. p. 19.

39. _____ 1939h. The morphology and life history of Petasiger nitidus Linton (Trematoda: Echinostomidae) J. Parasitol. 25:269-276.

40. _____ 1939i. The morphology and life history of Psilostomum ondatrae Price, 1931 (Trematoda: Psilostomidae). J. Parasitol. 25:383-393.

41. _____ 1941g. The life history of Echinochasmus roraldsoni n. sp., a trematode (Echinostomidae) from the pied-billed grebe. J. Parasitol. 27:347-355.

42. _____ 1941h. Studies on the life history of Euparyphium melis (Trematoda: Echinostomidae). J. Parasitol. 27:35-44.

43. _____ 1943g. Studies on Protoechinostoma mucronulatum, n. g., n.n. (Psilostomum retusum Faldman, 1941), a trematode (Echinostomidae) from the sora rail. J. Parasitol. 29:65-70.

44. Bennett, H. J. 1942a. Observations on the experimentally determined life cycle of Leucochloridium zenkia McIntosh. Proc. Louisiana Acad. Sc., 5:79-80.

45. Chaleroo, C. 1935f. On two new monostomes (Trematoda) from avian hosts in British India. Indian J. Vet. Sc. and Animal Husb., 5:49-63.

46. _____ 1936b. Studies on the helminths of India. Trematoda I. J. Helminth. 14:163-180.

47. _____ 1936c. Studies on the helminths of India. Trematoda II. J. Helminth. 14:181-206.

48. _____ 1936d. Studies on the helminths of India. Trematoda III. J. Helminth. 14:207-228.

49. _____ 1942f. On Strigeida (Trematoda) from India. Rec. Indian Mus., 44:207-216.

50. Bittner, H. 1925a. Ein Beitrag zur Uebertragung und zur Morphologie von Echinoparyphium recurvatum. Berl. Tierärtzl. Wchnschr., 41:82-86.

51. Bonne, C.; Deas, C.; and Lie Kan Joe. 1947b. Echinostoma revolutum (Froelich, 1802). Een nieuwe echinostoom van den mensch op Java. Ned. Maandblad (11), pp. 207-209.

52. Bowen, W. K. 1920a. The occurrence of a species of Echinostomidae in Larus argentatus. 21. Ann. Rep. Michigan Acad. Sc. p. 118.

53. Brackett, S. 1939a. Methods for controlling schistosomo dermatitis. J. Am. Med. Ass. 113:117-121.

54. _____ 1939b. Two new species of strigeid cercariae in Lymnaeid snails from the United States. J. Parasitol. 25:263-268.

55. _____ 1940a. Pathology of schistosome dermatitis. Arch. Dermat. and Syph., Chicago, 42:410-418.

56. _____ 1940b. Six new species of avian schistosomes from Wisconsin and Michigan with a description of the life cycle of one of them, Gigantobilharzia sturtoni (Brackett) J. Parasitol. 26: Doc. Suppl. pp. 37-38.

57. Brackett, S. 1940g. Studies on schistosome dermatitis. V. Prevalence in Wisconsin. Am. J. Hyg. 31 Sect. D, pp. 49-63.

58. _____ 1940d. Studies on schistosome dermatitis. VI. Notes on the behaviour of schistosome cercariae. Am. J. Hyg. 31 Sect. D, pp. 64-73.

59. _____ 1940e. Studies on schistosome dermatitis. VIII. Notes on the biology of the snail hosts of schistosome cercariae in Wisconsin and epidemiological evidence for the life cycles of some avian schistosomes. Am. J. Hyg. 32 Sect. D. pp. 85-104.

60. _____ 1940f. Two new species of schistosome cercariae from Wisconsin. J. Parasitol. 26:195-200.

61. _____ 1941g. Schistosome dermatitis and its distribution. Symposium Hydrobiol., Madison. pp. 360-378.

62. _____ 1942a. Epidemiology of a schistosome dermatitis. J. Elisha Mitchell Scient. Soc. 58:145.

63. _____ 1942b. Five new species of avian schistosomes from Wisconsin and Michigan with the life cycle of Gigantobilharzia wyrauli (Brackett, 1940). J. Parasitol. 28:25-42.

64. van den Brandon, P. 1890a. Die Familie der Holostomiden. Zool. Jahrb., Jena. Abt. Syst., 5:549-604.

65. _____ 1892b. Revision der Monostomiden. Centralbl. Bakteriol. 12:504-511.

66. Braun, M. C. C. C. 1901f. Zur revision der Trematoden der Vögel. I Centralabl. Bakteriol., 1. Abt., 29:560-568.

67. _____ 1901f. Zur revision der Trematoden der Vögel. II Centralabl. Bakteriol., 1. Abt., 29:895-897, 941-946.

68. Brinkmann, A. Jr. 1942a. A new trematode, Pachytrema pentagon n. sp., from the gall-bladder of the lesser black-backed gull Larus fuscus L. Göteborgs K. Vetensk.-o. Vitterhets-Samh. Handl., 6 F., s. B, v. 2, 19 pp.

69. Britt, N. C. 1947a. Chromosomes of digenetic trematodes. Am. Naturalist. 81:276-296.

70. Brock, W. E.; and Bennett, H. J. 1938a. Notes on the life history of Loucochloridium. Proc. Louisiana Acad. Sc., 4:250.

71. Brongniart, C. (1880a.) Les Trematodes. Bull. Soc. Scient. Jeunesse (1879-80)., 2:149-157.

72. Brooks, F. C. 1929a. A study of the germ cell cycle of the digenetic trematodes. J. Parasitol. 16:96-97.

73. _____ 1943b. Larval trematodes of Northwest Iowa. II. Four new strigoids. J. Parasitol. 29:340-347.

74. _____ 1943c. Larval trematodes of Northwest Iowa. III. A new collarless echinostome cercaria. J. Parasitol. 29:347-349.

75. _____ 1946b. Two new species of dermatitis-producing schistosome cercariae of the elvae group. J. Parasitol. 32; Sect. 2, Dec. Suppl. p. 16.

76. Brown, M.; Green, J. E.; Boag, T. J.; and Kuitunen-Ekbaum, E. 1950a. Parasitic infections in the Eskimos at Igloolik, N. W. T. Canad. J. Pub. Health. 41:508-512.

77. Brumpt, E. J. A. 1931a. Cercaria ocellata, determinant la dermatite des nageurs, provient d'une bilharzie des canards. Compt. Rend. Acad. Sc., Paris. 193:612-614.

78. _____ 1936b. Precis de parasitologie. 5. ed. 2 V., Paris.

79. _____ 1949b. Etude morphologique et biologique de Allocercaria polymega n. sp. produisant des infections mortelles chez les larves de culicides. Ann. Parasitol. 20:97-117.

80. _____ 1949a. Precis de parasitologie. 6. ed. 1042 pp. Paris.

81. Buckley, J. J. C. 1938a. On a dermatitis in Malays caused by the cercariae Schistosoma mindalae Montgomery, 1906. J. Helminth. 16:117-120.

82. Bullock, W. L. 1952a. Two new species of monostomes from the Canada goose with a review of *Paramonostomum alveatum* (Mehlis in Creplin, 1846). J. Parasitol. 38:371-378.

83. Buttner, Alice. 1950c. Premiere demonstration experimentale d'un cycle abrege chez les trematodes digenetiques. Cas du *Plagiorchis brumpti* A. Buttner, 1950. Ann. Parasitol. 25:21-26.

84. ______________ 1951b. La progenese chez les trematodes digenetiques. Technique et recherches personnelles. III. Technique. Ann. Parasitol. 26:19-66.

85. Bykhovskaia, Irena E. (Pavlovskaia); and Dubinina, M. N. (*Leucochloridium phragmitophila* sp. nov. from sparrows 1952a. Helminth. Abstr. 20:89.

86. Byrd, E. E. 1940b. Larval flukes from Tennessee. I. A new mother sporocyst of a *Leucochloridium*. J. Tennessee Acad. Sc. 15:117-123.

87. ______________ 1940f. The morphology of the excretory system as an aid in the classification of digenetic trematodes. J. Tennessee Acad. Sc. 15:417.

88. ______________ 1943a. Notes on the genital system of the bird fluke, *Apharyngostrigea cornu* (Zeder). J. Parasitol. 29:270-274.

89. Caballero y C., Eduardo. 1940a. *Zygocotyle lunatum* (Diesing, 1835) (Trematoda: Paramphistomidae) en el ganado vacuno de Mexico. I. An. Inst. Biol., Univ. Nac. Mexico. 11:209-214.

90. ______________ 1941d. Parasitismo en *Gallus gallus* L. originado por *Zygocotyle lunatum* en la region de Lerma. III. An. Inst. Biol., Univ. Nac. Mexico. 12:123-225.

91. ______________ 1944f. *Neodiplostomum paraspathula* Noble, 1936 Trematoda: Diplostomidae en un aguila de Mexico. An. Inst. Biol., Univ. Nac. Mexico. 15:47-52.

92. ______________; and Flores Barroeta, Luis 1948a. Parasitismo de *Streptoceryle torquata torquata* por *Cathaemasia reticulata* (Wright, 1879) Harwood, 1936 (Trematoda: Echinostomatidae). An. Escuela Nac. Cien. Biol., Mexico. 5:223-227.

93. Caballero y C., Eduardo; and Flores Barroeta, Luis. 1952a. Presencia de Nicholsiella mutabilis (Loder, 1880) Stossich, 1902 en los aves acuaticas de Mexico. Rev. Iber. Parasitol. 12:297-300.

94. _____; and Larios Rodriguez, I. 1940a. Las formas evolutivas de Echinostoma revolutum (Froelich, 1802) en dos moluscos pulmonados de la Laguna de Lerma. II. An. Inst. Biol., Univ. Nac. Mexico. 11:231-238.

95. _____; and Vogelsang, E. G. 1949a. Fauna helmintologica venezolana. II. Algunos trematodos de aves y mamiferos. Rev. Med. Vet. y Parasitol. Caracas. 8:43-65.

96. Cable, R. M.; and Sturkard, H. W. 1931a. A trematode from the cloaca of the gull. Science, n. s. (1922) 74:438.

97. Cameron, T. W. M. 1935a. Parasitology and its relation to public health in Canada. Canad. Pub. Health J. 26:541-547.

98. _____ 1936b. On the life history of Anophallus Ransomi, with observations on the life history of Paramonorchis in Canada. J. Parasitol. 22:526-542.

99. _____ 1936d. Studies on the heterophyid trematode, Anophallus ransomi (Ransom, 1920) in Canada. Part I. Morphology and taxonomy. Canad. J. Research. Sect. D. 14:59-69.

100. _____ 1937a. Studies on the heterophid trematode, Anophallus ransomi (Ransom, 1920) in Canada. Part II. Life history and bionomics. Canadan J. Research. Sect. D. 15:38-51.

101. _____ 1937f. Studies on the heterophyid trematode, Anophallus ransomi (Ransom, 1920) in Canada. Part III. Further hosts. Canad. J. Research Sect. D. 15:275.

102. _____ 1938f. Some fish-carried trematodes in Canada. Rep. Brit. Ass. Adv. Sc. (108. Meet., Cambridge, (Eng.,) Aug. 27-24, 1938), pp. 426-427.

103. Cameron, T. W. M. 1945a. Fish-carried parasites in Canada. (1) Parasites carried by fresh-water fish. Canad. J. Comp. Med. 9:245-254, 283-286, 302-311.

104. Cannon, D. G. 1938a. Some trematode parasites of ducks and geese in eastern Canada. Canad. J. Research. Sect. D. 16:268-280.

105. _____ 1939a. On the parasites of the small intestine of the European starling, Sturnus vulgaris, in Quebec. Canad. Field-Naturalist. 53:40-42.

106. Carus, C. G. (1833a.) Ueber Leucochloridium paradoxum, einen merkwürdigen Eingeweidewurm. Wien.

107. _____ 1835a. Beobachtung über einen merkwürdigen schöngefärbten Eingeweidewurm, Leucochloridium paradoxum mihi, und dessen parasitische Erzeugung in einer Landschnecke, Succinea amphibia Drap. Helix putris Linn. Nova Acta Phys.-Med. Acad. Nat. Curios., v.17, 2.s., v.7., pt.1, pp.65-100.

108. Cassamagnaghi, A. (Hijo); and Bianchi Bazerque, A.; and 1951b. H. Sobre los trematodos (Trematoda Rudolphi, 1808) que parasitan a los animales domesticos y silvestres del pais. (1.ª parte) Rol. Mens Dir. Ganad. Uruguay. 32:26-37.

109. Chandler, A. C. 1950b. Mesostephanus londinensis, a new cyathocotylid trematode from a dog. J. Parasitol. 36:90.

110. _____; and Rausch, R. L. 1946a. A study of strigeids from Michigan mammals, with comments on the classification of mammalian strigeids. Tr. Am. Micr. Soc. 65:320-337.

111. _____ _____ 1947a. A study of strigeids from owls in north central United States. Tr. Am. Micr. Soc. 66:283-292.

112. _____ _____ 1948a. A contribution to the study of certain avian strigeids. (Trematoda). J. Parasitol. 34:207-220.

113. Chatterji, Ram Chandra. 1938a. Studies on the life-history of an echinostome. (Abstract) Proc. 17. Indian Sc. Cong. (Allahabad. Jan. 2-8), p. 247, (p.3)

114. Chatterji, P. N. 1942a. Studies on the six new species of the genus Neodiplostomum Railliet, 1919 (family Diplostomidae Poirier, 1886). Part I. New species of the subgenus Neodiplostomum Dubois, 1937. Proc. Nat. Acad. Sc. India. 12:14-22.

115. _____ 1942b. Studies on the six new species of the genus Neodiplostomum Railliet, 1919 (family Diplostomidae Poirier, 1886). Part II. New species of the subgenus Conodiplostomum Dubois, 1937. Proc. Nat. Acad. Sc. India. 12:23-31.

116. Cheatum, E. L. 1941a. Dendritobilharzia anatinarum n. sp., a blood fluke from the mallard. J. Parasitol. 27:165-170.

117. Choquette, L. P. E. 1947a. Phyllodistomum lachancoi sp. nov., a trematode from the ureters of Salvelinus fontinalis (Mitchill) with a note on its pathogenicity. Canad. J. Research. Sect. D. 25:131-134.

118. _____ 1948a. Parasites of freshwater fish IV. Internal helminths parasitic in speckled trout Salvelinus fontinalis Mitchill in rivers and lakes of the Laurentide Park, Quebec, Canada. Canad. J. Res. Sect. D. 26:204-211.

119. Chu, G. W. T. C. 1952a. First report of the presence of a dermatitis-producing marine larval schistosome in Hawaii. Science (2980) 115:151-153.

120. Churchill, Helen M. 1950a. Corm cell cycle of Echinostoma revolutum (Froelich, 1802). J. Parasitol. Sect. 2, Dec. 36:15.

121. _____ 1950b. Sporocyst of Echinostoma revolutum (Froelich, 1802) J. Parasitol. Sec.2, Dec. 36:27-28.

122. Ciordia, H. 1949a. Cytological study of Rhopalias macranthus Chandler, 1932, a trematode from the opossum, Didelphis virginiana. J. Parasitol. 35:417-422.

123. Ciurea, Ioan. 1927a. Contributions a l'etude morphologique de Strigea cornu (Rud.) Dull. Sect. Scient. Acad. Roumaine, Bucarest. 11:12-16.

124. Ciurea, Ioan. 1928a. Diplostomum spathula Brandes (1890) n'est pas identique avec Tetristomum spathula (Crep., 1829) Diesing, 1850. Bull. Soct. Scient. Acad. Roumaine, Bucarest. 11:204-208.

125. Conklin, R. L.; and Baker, E. D. 1930a. Presence of the lancet fluke, Dicrocoelium dendriticum (Rudolphi, 1819) in Canada. J. Parasitol. 17:18-19.

126. Cooper, A. R. 1915d. Trematodes from marine and fresh-water fishes, including one species of ectoparasitic turbellarian. Tr. Roy. Soc. Canada. Sect.4, 9:181-205.

127. _____ 1921a. Trematodes and cestodes of the Canadian Arctic Expedition 1913-18. 2:(3)-27.

128. Cort, W.W. 1915a. Egg variation in a trematode species. J. Parasitol. 2:25-26.

129. _____; and Brackett, S. 1937a. Identification of strigoid cercariae by differences in their behaviour during free life. J. Parasitol. 23:297-299.

130. _____; Ameel, D. J.; and Van der Woude, Anne. 1947a. Germinal masses in the rediae of the trematode order Fasciolatoidea Szidat, 1936. J. Parasitol. Sect. 2 Dec. Suppl. 33:17-18.

131. _____ _____ and _____ 1949a. Germinal masses in redial embryos of an echinostome and a psilostome. J. Parasitol. Sect.1, 35:579-582.

132. _____ _____ and _____ 1949c. Studies on germinal development in rediae of the trematode order Fasciolatoidea Szidat, 1936. J. Parasitol. 34:428-451.

133. _____ Brackett, S.; Olivier, L. J. Lymnaeid snails as second intermediate hosts of the strigoid trematode Cotylurus flabelliformis (Faust, 1917) J. Parasitol. 30:309-321.

134. _____ 1944a. The germ cell cycle in the digenetic trematodes. Quart. Rev. Biol. 19:275-284.

135. _____ 1950a. Studies on schistosome dermatitis. XI. Status of knowledge after more than twenty years. Am. J. Hyg. 52:251-307.

136. Crowcroft, P. W. 1951a. Notes on the taxonomy of the genus Coitocaecum Nicoll, 1915 (Digenea:Opecoelidae). J. Parasitol. 37:251-256.

137. Crawford, W. W. 1940b. An unusual case of a sexually mature trematode from the body cavity of a diving beetle. J. Parasitol. Soc. Suppl. 26:32.

138. Davies, E. 1934a. On the anatomy of the trematode Potaniser emaceratus Dietz, 1909 from the intestine of Phalacrocorax carbo. Parasitology. 26:133-137.

139. Dawes, B. 1946a. The Trematoda. 664 pp.

140. Dietz, E. 1909a. Die Echinostomiden der Vögel. Zool. Anz., Leipsig. 34:180-192.

141. _____ 1909b. Die Echinostomiden der Vögel. Diss. 37 & (3) pp. Königsberg i. Pr.

142. _____ 1910a. Die Echinostomiden der Vögel. Zool. Jahrb., Jena, Suppl. 12. Heft. 3, pp. 265-512.

143. Dingler, M. 1910a. Ueber die Spermatogenese des Dicrocoelium lanceatum Stil. et Hass. (Digtomum lanceolatum). Arch Zellforsch. 4:672-712.

144. Dollfus, R. Ph. 1938b. Cycle evolutif d'un trematode du genre Coitocaecum (sic) -W. Nicoll. Progenese de la larve metacercaire chez les amphipods. Comp. Rend. Acad. Sc., Paris. 207:431-433. errata p. 480.

145. _____ 1948b. Sur deux monostomes (Cyclocoelidae) pourvus d'une ventouse ventrale. Observations sur la classification de Cyclocoeloidea Albert Henry, 1923, liste de leur hotes, repartition geographique. Ann. Parasitol. 23:189-199.

146. _____ 1950a. Trematodes recoltes au Congo Belge par le Professeur Paul Brien (mai-aout 1937) Ann. Mus. Belg. Congo, C-Biosk., R.5 V.1, (1) 136 pp.

147. Dubois, G. 1938b. Monographie des Strigeida (Trematoda) Mem. Soc. Neuchatel. Sc. Nat., V.6, 535 pp.

148. _____ (1938c.) Contribution a l'etude des diplostomes d'oiseaux (Trematoda; Diplostomidae Poirier, 1886) Bull. Soc. Neuchatel Sc. Nat., 62:99-128.

149. Dubois, G. 1951a. Etude des trematodes nord-americains de la collection E. L. Mühling et revision du genre Metorchis Lösing, 1899. Bull. Soc. Neuchatel. Sc. Nat. 74:41-76.

150. _____; and Rausch, R. L. 1948a. Second contribution a l'etude des "strigeides" (Trematoda) nord-americains. Bull. Soc. Neuchatel. Sc. Nat. 71:29-61.

151. _____; and _____. 1950d. A contribution to the study of North American strigeids. (Trematoda) Am. Midland Naturalist. 43:1-31.

152. _____; and _____. 1950h. Troisieme contribution a l'etude des strigeides. (Trematoda) nord-americains. Bull. Soc. Neuchatel. Sc. Nat. 73:19-50.

153. Duff, Dorothy. 1941g. The beaver fluke, Amphistomum subtriquetrum, Rudolphi. Tr. Roy. Soc. Canada. Sect. 4, 5:87-93.

154. Dutt, B. C.; and Srivastava, Har D. 1952a. On the morphology and life history of a new mammalian blood-fluke--Ornithobilharzia dattai n. sp. Parasitology. 42:144-150.

155. Edney, J. M. 1941b. The miracidium and adult of Cathaemasia reticulata, a trematode of the kingfisher. 4) Ann. Rep. Michigan Acad. Sc. p. 33.

156. Enigk, K. 1931b. Leucochloridium paradoxum in Succinea oblonga. Sitzungsb. Gesellsch. Naturf. Fr. Berlin pp. 3 (8-10) pp. 442-444.

157. Fallis, A. M. 1934a. A note on some intermediate hosts of Echinostoma revolutum (Froelich). Proc. Helminth. Soc. Washington. 1:4-5.

158. Faust, E. C. (1919a). The anatomy of Tetracotyle letzschi Faust, with a synopsis of described tetracotyliform larvae. J. Parasitol. 5:67-79.

159. _____ 1920a. Criteria for the differentiation of schistosome larvae. J. Parasitol. 6:192-194.

160. _____. 1923a. Notes on Ornithobilharzia odhneri n. sp., from the Asiatic cuckoo. Anat. Rec. 26:367.

161. Faust, E. C. 1924f. Notes on Ornithobilharzia odhneri n. sp. from the Asiatic curlew. J. Parasit. 11:50-54.

162. ______________ 1924g. What constitutes a justifiable basis for systematic grouping of larval trematodes? J. Parasitol. 11:112-115.

163. ______________ 1932d. The excretory system as a method of classification of digenetic trematodes. Quart. Rev. Biol. 7:458-468.

164. Feldman, 1941a. Studies on the morphology and biology of a psilostome fluke. J. Parasitol. 27:525-533.

165. Ferguson, M. S. 1940a. Excystment and sterilization of metacercariae of the avian strigeid trematode, Posthodiplostomum minimum and their development into adult worms in sterile cultures. J. Parasit. 26:359-372.

166. ______________ 1943c. Experimental studies on the fish hosts of Posthodiplostomum minimum (Trematoda: Strigeida). J. Parasitol. 29:350-353.

167. Fernando, R. P. W. 1952a. Leucochloridium ceylonicum sp. nov. provis., a trematode from the Ceylon jungle fowl. Ceylon J. Sc., Sect. B. Zool. 25:55-58.

168. Fernando, W. 1950a. Cyclocoelum (Pseudhyptiasmus) sin-halidina, sp. nov., a parasite from the nasal sinus of the Ceylon jungle fowl. (Gallus lafayetti). Ceylon J. Sc., Sect. B. Zool. 24:127-129.

169. Fuhrmann, O. 1928a. Petasiger neocomense nov. sp., une nouvelle espece d'echinostomides. Bull. Soc. Neuchatel. Sc. Nat. 52:3-6. n.s.

170. ______________ 1928b. Zweite Klasse des Cladus Plathelminthes: Trematoda. Handbuch. Zool. (Kükenthal u Krumbach). v.2, 3 Lief., Teil 2. Bogen 1-8, pp.1-120.

171. Fukui, Tamao 1929b. Studies on Japanese amphistomatous parasites, with revision of the group. Japan. J. Zool. 2:219-351.

172. Ginetsinskaia, T. A. 1949a. Cyclocoelum microstomum (Creplin, 1829), cycle of development of the trematode. (Russian text). Dokl. Akad. Nauk. SSSR, n.s. 66:1219-1222.

273. Ginetsinskaia, T. A. 1952b. (Importance of staining the sporocyst of trematodes of the genus *Leucochloridium* in the determination of the species). Helminth. Abstr. 22:13.

174. Gislen, T. 1933a. (Om *Leucochloridium* och dess förekomst i Sverige). On *Leucochloridium* and its occurrence in Sweden. Fauna och Flora, Pop. Tidskr. Biol., 28:151-155.

175. Gonzales Castro, J. 1945a. *Notocotylus neyrai* n. sp., parasito cecal del *Arvicola sapidus*. Rev. Ibér. Parasitol., tomo extraordinario, Mar., pp. 127-149.

176. Gorirossi, Flora E.; and DeGiusti, D. L. 1950a. A modified gold chloride impregnation method for trematode nerve tissue. Tr. Am. Micr. Soc. 69:183-185.

177. Gower, W. C. 1936a. New sporocyst of *Leucochloridium* from Louisiana. J. Parasitol. 22:375-378.

178. ——— 1939a. Host-parasite catalogue of the helminths of ducks. Am. Midland Naturalist. 22:580-628.

179. ——— 1939c. A modified stain and procedure for trematodes. Stain Tech. 14:31-32.

180. ——— 1939d. A new trematode from the loon, *Gavia immer*, and its relationship to *Haematotrephus fodiens* Linton, 1928. Proc. U. S. Nat. Mus. (3071) 87:139-143.

181. Green, R. G. et al. 1938a. Identification of a trematode parasite of the pied-billed grebe (*Podilymbus podiceps podiceps*). Minnesota Wildlife Dis. Invest. 3:124.

182. Guberlet, J. E. 1922a. Notes on two species of Holostomidae. Anat. Rec. 23:121-122.

183. ——— 1922b. Three new species of Holostomidae. J. Parasitol. 9:6-14.

184. Hadwen, I. A. S. 1916a. A new host for *Fasciola magna* Bassi, together with observations on the distribution of *Fasciola hepatica* L. in Canada. J. Am. Vet. Med. Ass. n.s. 49:511-515.

185. Hadwen, I. A. S.; and Fallis, A. M. 1939a. Some notes on schistosome dermatitis. Canad. Pub. Health J. 30:604.

186. Halik, L. 1931a. Ueber die rhythmischen Bewegungen der in Bernsteinschnecken parasitierenden Sporozystenschläuche von Leucochloridium macrostomum Rud. (=paradoxum Carus). Ztschr. Vergleich. Physiol., 14:462-478.

187. Hall, M. C. 1922a. Alaria americana from the cat. J. Parasitol. 9:43-44.

188. Hargis, W. J. 1953a. Chlorotone as a trematode relaxer, and its use in mass-collecting techniques. J. Parasit. 39:224-225.

189. Harrah, E. C. 1922a. North American monostomes primarily from fresh water hosts. Illinois Biol. Monogr. 7:225-324.

190. Harrington, R. W. (jr) 1939a. Parasites of the herring gull Larus argentatus smithsonianus. 4. Ann. Rep. Bowdoin Scient. Station (1938) pp. 14-17.

191. Hareshoy, K. R. 1937a. On two new trematodes of the genus Opegaster Ozaki, with a systematic discussion of the families Opecoelidae Ozaki, 1925 and Goitocaecidae Ozaki, 1928. Proc. Indian Acad. Sc. 5:64-75.

192. Harwood, P. D. 1939a. Notes on Tennessee helminths. IV. North American trematodes of the subfamily Notocotylinae. J. Tennessee Acad. Sc. 14:332-340, 421-427.

193. Heckert, C. A. 1907a. Zur Naturgeschichte des Leucochloridium paradoxum. (Vorläufige Mitteilung) Zool. Anz., Leipzig (259) 10:456-461.

194. Herber, E. C. 1938b. Schistosome dermatitis in dogs. J. Parasitol. 24:474-475.

195. _____ 1939c. Life history studies on monostomes of the genus Notocotylus (Trematoda). J. Parasitol. 25:18-19, Dec. Suppl.

196. _____ 1942a. Life history studies of two trematodes of the subfamily Notocotylinae. J. Parasitol. 28:179-196.

197. Herber, E. C. 1950a. Studies on the biochemistry of cyst envelopes of the fluke, Notocotylus urbanensis. Proc. Pennsylvania Acad. Sc. 24:140-142.

198. Hilario, J. S. 1917a. Echinostoma ilocanum (Garrison): A report of five cases and a contribution to the anatomy of the fluke. Philippine J. Sc., 12:203-213.

199. Hirasawa, Ichizo. 1928a. (Abstract) On a trematode of the genus Echinochasmus, E. perfoliatus (Ratz), parasitic in man, with further notes on its natural final host. Japan. J. Zool. 2:1

200. Hogarth, W. P. 1944a. Bilharziasis in Canada. Canad. Med. Ass. J., 50:253-254.

201. Hsü, Hsi-Fan. 1940a. Dupuytrenium lassyense Leon and Clurea (=D. melis (Schrank) found at the autopsy of a Chinese. Chinese Med. J. 58:552-555.

202. Hübner, Friedrich. 1939b. Ueber Echinostomum anceps (Molin, 1859?) Dietz, 1909. Zool. Anz., 128:176-187.

203. Hughes, R. C. 1927a. Studies on the trematode family Strigeidae (Holostomidae). No.VI. A new notocercaria Neascus amblophis, sp. nov. representing a new larval group. Tr. Am. Micr. Soc. 46:248-267.

204. _____ 1928a. Studies on the trematode family Strigeidae (Holostomidae) No.VII. Tetracotyle pipientis Faust. Tr. Am. Micr. Soc. 47:42-53.

205. _____ 1928b. Studies on the trematode family Strigeidae (Holostomidae) No. IX. Neascus van-cleavei (Agersborg). Tr. Am. Micr. Soc. 47:320-341.

206. _____ 1928c. Studies on the trematode family Strigeidae (Holostomidae). No. X. Neascus bulboglossa (van Haitsma). J. Parasitol. 15:52-57.

207. _____ 1928d. Studies on the trematode family Strigeidae (Holostomidae). No. XII. Apatemon-distomum le-ruoi sp. nov. Parasitology. 20:413-420.

208. _____ 1928e. Studies on the trematode family Strigeidae (Holostomidae). No. XIII. Three new species of Tetracotyle. Tr. Am. Micr. Soc. 47:414-433.

209. Hughes, R. C. 1929a. Studies on the trematode family Strigeidae (Holostomidae). No. XIV. Two new species of Diplostomula. Occas. Papers Mus. Zool. Univ. Michigan (202) pp. 1-29.

210. _____ 1929b. Studies on the trematode family Strigeidae (Holostomidae). No. XVII. Tetracotyle fiaboliformis Faust. Papers Michigan Acad. Sc., Arts and Letters. 10:495-508.

211. _____ 1929c. Studies on the trematode family Strigeidae (Holostomidae). No. XVIII. Tetracotyle serpentis, sp. nov. Tr. Am. Micr. Soc. 48:12-19.

212. _____ 1929d. Studies on the trematode family Strigeidae (Holostomidae). No. XIX. Diplostomulum schouringi sp. nov. and D. venzuelis (La Rue) J. Parasitol. 15:267-271.

213. _____ (1929e). Studies on the trematode family Strigeidae (Holostomidae). Thesis (Ph.D.) U. Michigan

214. _____, and Berkhout, P. G. 1929a. Studies on the trematode family Strigeidae (Holostomidae). No. XV. Diplostomulum gigas sp. nov. Papers Michigan Acad. Sc., Arts and Letters, (1928) 10:483-488.

215. _____, and Hall, Lucille J. 1929a. Studies on the trematode family Strigeidae (Holostomidae). No. XVI. Diplostomulum mexicanum (La Rue) Papers Michigan Acad. Sc., Arts and Letters, (1928) 10:489-494.

216. _____, and Piszczek, F. R. 1929a. Studies on the trematode family Strigeidae (Holostomidae). No. XI. Neascus ptychocheilus (Faust). J. Parasitol. 15:50-62.

217. Humes, A. G. 1940a. Trematode parasites from birds in Louisiana. Abst. Thesis, Louisiana State Univ. (1938-39) Univ. Bull. n.s. 32:87-88.

218. Hunninen, A. V., and Cable, R. M. 1943b. The life history of Holocotyle ictaluri (Rudolphi) (Trematoda; Opecoelidae). Tr. Am. Micr. Soc. 62:57-68.

219. Hunter, G. W. III. 1933a. The strigoid trematode, Crassiphiala ambloplitis (Hughes, 1927) Parasitology. 25:510-517.

220. Hunter, G. W. III.; and Ritchie, L. S.; and Tanabe, H. 1951g. The epidemiology of schistosome dermatitis (koganbyo) in Japan. Tr. Roy. Soc. Trop. Med. and Hygeine. 45:103-112.

221. _____; and Shillan, D. S.; Trott, O. T.; and Rowell, E. V. (jr). 1949a. Schistosome dermatitis in Seattle, Washington. J. Parasitol. 35:250-254.

222. _____; and Hunter, Wanda S. 1940g. Studies on the development of the notocercaria and the nature of the cyst of Posthodiplostomum minimum (MacCallum, 1921) (Trematoda: Strigeata). Tr. Am. Micr. Soc. 59:52-63.

223. Hunter, Wanda S. 1928g. A new strigoid larva, Neascus vaudi. J. Parasitol. 15:104-114.

224. _____ 1933g. A new strigoid notocercaria, Neascus ictalurivorus, n. sp. Tr. Am. Micr. Soc. 52:255-256.

225. _____; and Vernberg, Winona B. 1952g. Leucochloridium bonaparti n. sp. (Trematoda; Brachylaemidae) from the seaside sparrow, Ammospiza maritima macgillivrayi (Audubon). J. Parasitol. 38:215-217.

226. Hussey, Kathleen L. 1943a. Further studies on the comparative embryological development of the excretory system in digenetic trematodes. Tr. Am. Micr. Soc. 62:271-279.

227. Isaichikov, I. M. 1929d. (A new trematode from the green sandpiper (Helodromas (Totanus) ochropus L.) of the genus Plagiorchis Lühe, 1899) Russian text. Trudy Sibirsk. Vet. Inst. 10:265-268.

228. _____ 1930e. (A new trematode of the genus Plagiorchis found in wood grouse, 1899) Abstr. of 1929d. Biol. Abstr. 4:2022.

229. Inamdar, N. D.; and Khalerao, Govind D. 1944b. Psilochasmus longicirratus Skrjabin, 1913, in Hypsa fordina in India. Proc. Ind. Acad. Sc. Sect. B. 20:48-50.

230. Ishii, Kobutaro. (1933b). Studies on bird trematodes. Report I. Japanese text. Jikken Igaku Zasshi, Tokyo. 16:1205-1231.

231. Ishii, Nobutaro. 1933c. Studies on bird trematodes. I. Bird trematodes in Japan. II. Four new bird trematodes. Japan. J. Exper. Med., Govt. Inst. Infect. Dis., Tokyo Imp. Univ. 11:91-100.

232. _____ 1935a. Studies on bird trematodes. III. Bird trematodes in Japan. IV. Seven new bird trematodes. Japan. J. Exper. Med., Govt. Inst. Infect. Dis., Tokyo Imp. Univ. 13:275-284.

233. _____; and Matsuoka, Fumio. 1935b. Studies on bird trematodes. V. Intermediate host and a new species of bird trematode. Japan. J. Exper. Med., Govt. Inst. Infect. Dis., Tokyo Imp. Univ. 13:751-756.

234. Isshiki, Otoshiro. 1934b. On a trematode parasite (Echinostoma revolutum Fröhlich, 1802) from a Corean wild duck. 9e. Rep. Govt. Inst. Vet. Research, Fusan, Chosen. pp. 126-131.

235. Johnson, John C. 1920a. The life cycle of Echinostoma revolutum (Froelich). Univ. Calif. Publications Zool. 19:335-388.

236. Johnston, S. J. 1917a. On the trematodes of Australian birds. J. and Proc. Roy. Soc. N. South Wales. (1916) 50:187-261.

237. Johnston, Thomas H. 1941a. Bathors' itch (schistosome dermatitis) in the Murray swamps, South Australia. Tr. Roy. Soc. South Australia. 65:276-284.

238. _____ 1942a. Trematodes from Australian birds, No. 1: Cormorants and darters. Austral. J. Sc. 5:71.

239. _____ 1943a. Trematodes from Australian birds. I. Cormorants and darters. Tr. Roy. Soc. South Australia. 66:226-242.

240. _____; and Angel, L. Madeline. 1941b. The life history of Echinostoma revolutum in South Australia. Tr. Roy. Soc. South Australia. 65:317-322.

241. _____; and _____ 1941c. Life history of the trematode, Notocotylus australis n. sp. Tr. Roy. Soc. South Australia. 65:285-291.

242. Johnston, Thomas H.; and Cleland, E. R. 1938g. Larval trematodes from Australian terrestrial and freshwater molluscs. Part III. Leucochloridium australiense n.sp. Tr. Roy. Soc. South Australia. 62:25-33.

243. _____; and Simpson, E. R. 1940a. The adult stage of the trematode Leucochloridium australiense. Tr. Roy. Soc. South Australia. 64:119-124.

244. _____; and _____ 1940b. The anatomy and life history of the trematode Cyclocoelium jaenschi. Austral. J. Sc. 3:24.

245. _____; and _____ 1940c. The anatomy and life history of the trematode Cyclocoelium jaenschi n. sp. Tr. Roy. Soc. South Australia. 64:273-278.

246. _____; and _____ 1944b. Life history of the trematode, Echinochasmus polecani n.sp. Tr. Roy. Soc. South Australia. 68:113-119.

247. Jordan, F. T. W. 1953a. Intestinal infestation of turkey poults with Plagiorchis (Multiglandularis) neroiorchis, Rees, 1952 and an experimental study of its life cycle. J. Helminth. 27:75-80.

248. Kagan, Irving G. 1951b. Aspects in the life history of Neoleucochloridium problematicum (Nagath, 1920) new comb. and Leucochloridium cyanocittae McIntosh, 1932 (Trematoda: Brachylaemidae) Tr. Am. Micr. Soc. 70:281-318.

249. Kalantarian, E. V. 1924c. (Contribution a l'etude des trematodes des oiseaux des environs d'Erivan). Trudy Trop. Inst. Armenii. 1:74-75.

250. Kaw, B. L. 1950a. Studies in helminthology: Helminth parasites of Kashmir. Part I. Trematoda. Indian J. Helminth. 2:67-126.

251. Kennedy, Arnold H. 1950b. Paragonimus infection in a ranch-raised fox. Rep. Ontario Vet. Coll.(1949) pp. 132-137.

252. Khalil, Mohamed (bey); and Abaza, M. S. 1925a. A new trematode parasite of the rat, Echinostoma aegyptiaca nov. sp. J. Trop. Med. and Hyg., London, v. 28, Select. Colon. Med. Rep. (179),(Cairo), pp. 66-67.

253. Khan, Mohammad Hamid. 1935a. On eight new species of the genus Cyclocoelum Brandes from North Indian snipes (Thesis (M. Sc. Zool., Univ. Allahabad). Proc. Acad. Sc. U. P. Agra and Oudh (1934-35) 4:342-370.

254. Kingscote, Anthony A. 1931b. A case of Paragoniniasis in an Ontario domestic fox. Rep. Ontario Vet. Coll. (1930) p. 40.

255. _____ 1931d. A note on Paramatorchis canadensis (Law) from Ontario mink. Rep. Ontario Vet. Coll. (1930) p. 39.

256. _____ 1938a. Common parasites of Canadian animals. Canad. J. Comp. Med. 2:47-55.

257. _____ 1950b. Fascioloides magna in Ontario. Canad. J. Pub. Health. 41:39.

258. _____ 1950c. Large liver flukes found in Ontario. Family Herald and Weekly Star. 81:10.

259. _____ 1951b. A note of Riboiroia ondatrae Price, 1931 (Trematoda). J. Parasitol. 37:324.

260. Knight, Iola M. 1951a. Diseases and parasites of the muskrat (Ondatra zibethica) in British Columbia. Canad. J. Zool. 29:188-214.

261. Kobayashi, Harujiro. 1921a. On some digenetic trematodes in Japan. Parasitology. 12:380-410.

262. Komarova, M. S. 1951c. (On the life cycle of the trematode, Coitocoecum skrjabini Iwanicky) Russian text. Dokl. Akad. Nauk SSSR, n.s. 77:1127-1128.

263. Krishna Rao, N. S. 1951b. Echinochasmus cohensi n. sp. (family Echinostomidae, subfamily Echinochasminae) from the sea gull, Larus arrentatus. Canad. J. Zool. 29:215-218.

264. Kruidenier, Francis J. 1952a. Mucoid glands in the cercaria of Zygocotyle lunata (Paramphistomidae). J. Parasitol. Sect. 2, Suppl. 38:29.

265. Krull, Wendel H. 1935a. A note on the life history of Echinostoma coalitum Barker and Beaver, 1915 (Trematoda: Echinostomatidae) Proc. Helminth. Soc. Washington 2:76.

266. Krull, Wendel H. 1940c. Notes on Typhlocoelum cymbium (Diesing, 1850); Cyclocoelidae. Tr. Am. Micr. Soc. 59:290-293.

267. Ku, Chang-Tung. 1937a. On a new trematode parasite from the Peking duck. Peking Nat. Hist. Bull. 12:39-41.

268. _____ 1937b. Two new trematodes of the genus Notocotylus, with a key to the species of the genus. Peking Nat. Hist. Bull. (1937-38). 12:113-122.

269. Kurova, O. A. 1927a. (Contribution a la connaissance des trematodes (fam. Echinostomidae) des oiseaux du Turkestan). Ezhegodnik Zool. Muz. Akad. Nauk SSSR. (1926). 27:113-130.

270. Lal, Makund Behari. 1935b. A review of the genus Notocotylus, with description of a new trematode parasite of Mareca penelope from Lucknow. Proc. Indian Acad. Sc. Sect. B. 2:457-466.

271. _____ 1936d. On a new trematode from the intestinal caeca of a widgeon, Mareca penelope. Proc. 23 Indian Sc. Cong. (Indore) p. 347.

272. _____ 1936g. A review of the genus Paramonostomum Lühe; with descriptions of two new species and remarks on the genera of the subfamily Notocotylinae. Proc. Indian Acad. Sc. Sect. B. 3:25-34.

273. _____ 1937e. Studies on the trematode parasites of birds. Part. I. Value of different characters in the classification of avian trematodes. Proc. Indian Acad. Sc. Sect. B. 5:33-44.

274. _____ 1937f. Studies on the trematode parasites of birds. Part II. Morphology and systematic position of some new blood flukes of the family Schistosomidae. Proc. Indian Acad. Sc. Sect. B. 6:274-283.

275. _____ 1938a. On a new species of Psilorchis from the intestine of the common teal Nettion crecca. Livro Jub. Travassos. pp. 259-262.

276. _____ 1939b. On a new trematode of the family Echinostomidae from the spotted red-shank. Proc. 25. Indian Sc. Cong. (Calcutta) Sect. 11, Vet. Research, p. 273.

277. Lal, Makund Behari. 1939g. Studies in helminthology. Trematode parasites of birds. Proc. Indian Acad. Sc. Sect. B. 10:111-200.

278. Larios Rodriguez, Ignacio. 1940a. Echinostoma revolutum (Froelich, 1802) (Trematoda; Echinostomidae) estudiado por primera vez en Mexico como parasito del hombre. Tesis. 82 pp. Mexico, D.F.

279. _____ 1943a. Dos especies trematodos encontrados en el aparato digestivo de aves acuaticas migratorias. An. Inst. Biol. Univ. Nac. Mexico. 14:499-506.

280. La Rue, George R. 1938a. Morphology of Cotylurus communis Hughes. (Trematoda: Strigeidae). Tr. Am. Micr. Soc. 51:28-74.

281. _____ 1938a. Life history studies and their relation to problems in taxonomy of digenetic trematodes. J. Parasitol. 24:1-11.

282. Law, Ronald G. 1928b. Muskrat flukes; Report from Ontario Experimental Fur Farm. Am. Fur Breeder. 1:22-23.

283. _____; and Kennedy, Arnold H. 1932b. Parasites of fur-bearing animals. Bull. 4. Ontario Dept. Game and Fish. 30 pp.

284. Lebour, Marie V.; and Kimhirst, Richard. 1928a. A contribution towards the life history of Parorchis acanthus Nicoll, a trematode in the herring gull. J. Marine Biol. Ass. United Kingdom. n.s. 12:629-632.

285. Leidy, Joseph. 1905a. Researches in helminthology and parasitology. With a bibliography of his contributions to science arranged and edited by Joseph Leidy, Jr. Smithsonian Misc. Collect. (1477) 46:1-261.

286. Lent, Herman.; and Teixeira de Freitas, J. F. 1939b. Pesquisas helmintologicas realisadas no Estado do Para. VII. Trematoda. Paramphistomoidea. Fol. Biol. S. Paulo, n.s. 1;63-66.

287. Linton, Edwin. 1908d. The process of egg-making in a trematode. Biol. Bull. 15:1926.

288. Linton, Edwin. 1928b. Notes on trematode parasites of birds. Proc. U. S. Nat. Mus. (2722). 73:1-36.

289. Lucho, Maximilian Friedrich L. 1909b. Parasitische Plattwürmer. 1: Trematodea. Süsswasserfauna Deutschlands (Brauer), Heft 17, IV & 217 pp.

290. Lutta, A. S. 1939a. On Biology of Leucochloridium paradoxum (Carus). Trudy Petergofsk. Biol. Inst. 17:96-102.

291. Luttermoser, George W. 1935a. A note on the life history of the monostome, Notocotylus urbanensis. J. Parasitol. 21:456.

292. Lyster, L. L. 1939a. Parasites of freshwater fish. I. Internal trematodes of commercial fish in the central St. Laurence watershed. Canad. J. Research. Sect. D. 17:154-168.

293. _____ 1940a. Apophallus imperator sp. nov., a heterophyid encysted in trout, with a contribution to its life history. Canad. J. Research. Sect. D. 18:106-121.

294. _____ 1940c. Paracoenogonimus katsuradi sp. nov. (Trematoda: Strigeidae) from Lophoytes cucullatus in Quebec. Canad. J. Research. Sect. D. 18:79-82.

295. _____ 1940d. Parasites of freshwater fish. II. Parasitism of speckled and lake trout and the fish found associated with them in Lake Commandant, Que. Canad. J. Research. Sect. D. 18:66-78.

296. _____ 1940g. Parasites of some Canadian sea mammals. Canad. J. Research. Sect. D. 18:395-409.

297. McCoy, Oliver R. 1926b. Life history studies on trematodes from Missouri. J. Parasitol. 14:207-220.

298. McFarlane, Samuel H. 1935a. A study of the endoparasitic trematodes from marine fishes of Departure Bay B.C. J. Parasitol. 21:434-435.

299. _____ 1936a. A study of the endoparasitic trematodes from marine fishes of Departure Bay B.C. (Abstr. of Ph. D. thesis, U. of Illinois) J. Biol. Bd. Canada. 2:335-347.

300. MacFarlane, W. V. 1944g. Schistosome dermatitis in the southern lakes; an investigation of swimmers itch. N. Zealand Med. J. (234) 43:136-140.

301. McIntosh, Allen. 1926f. Some notes on the genus Leucochloridium. Program Am. Soc. Parasitol. 2 Ann. Meet., Phila., Dec. 28-30, p. 16.

302. _____ 1927b. Notes on the genus Leucochloridium Carus (Trematoda). Parasitology. 19:353-364.

303. _____ 1932d. Some new species of trematode worms of the genus Leucochloridium Carus, parasitic in birds from Northern Michigan, with a key and notes on other species of the genus. J. Parasitol. 19:32-53.

304. _____; and McIntosh, Gertrude E. 1939a. Experimental infection of European starling with Leucochloridium Carus. J. Parasitol. Suppl. 25:25-26.

305. McLeod, James A. 1933a. A parasitological survey of the genus Citellus in Manitoba. Canad. J. Research. 2:108-127.

306. _____ 1934g. Notes on corcarial dermatitis with descriptions of the causative organisms, Cercaria wardlei n. sp., Cercaria baikovi n. sp., and the parthenogenic stage of Cercaria stagnicolae Miller. Canad. J. Research. 10:394-403.

307. _____ 1936g. Further notes on corcarial dermatitis. Tr. Roy. Soc. Canada. Sect. V 3.s. 30:39-48.

308. _____ 1937g. Two new schistosomid trematodes from water-birds. J. Parasitol. 23:456-466

309. _____ 1940g. Studies on corcarial dermatitis and the trematode family Schistosomatidae in Manitoba. Canad. J. Research. Sect. D. 18:1-20.

310. _____; and Little, G. E. 1942a. Continued studies on corcarial dermatitis and the trematode family Schistosomatidae in Manitoba. Canad. J. Research. Sect. D. 20:170-181.

311. McMullen, Donald B. 1936k. A note on the staining of the excretory system of trematodes. Tr. Am. Micr. Soc. 55:513-515.

312. McMullen, Donald B. 1937a. A discussion of the taxonomy of the family Plagiorchiidae Lühe, 1901, and related trematodes. J. Parasitol. 23:244-258.

313. _____ 1937b. An experimental infection of Plagiorchis muris in man. J. Parasitol. 23:113-115.

314. _____ 1937c. The life histories of three trematodes, parasitic in birds and mammals, belonging to the genus Plagiorchis. J. Parasitol. 23:235-243.

315. _____ 1941a. The distribution and control of schistosome dermatitis in Wisconsin and Michigan. Am. J. Trop. Med. 21:357.

316. _____ 1942a. Annual campaign against summer's itch begins in northern counties. Mich. Pub. Health Official Bull. 20:109.

317. _____ 1942b. Swimmer's itch. Trained Nurse. 108:422-424.

318. _____; and Beaver, Paul C. 1942a. The life cycles of three dermatitis producing cercariae (Trematoda: Schistosomatidae). J. Parasitol. 28:12-13.

319. _____; and Brackett, Sterling. 1941a. The distribution and control of schistosome dermatitis in Wisconsin and Michigan. Am. J. Trop. Med. 21:725-729.

320. _____; and Rosin, Paul F.; and Allison, L. 1939a. Schistosome dermatitis; Distribution and epidemiology in Michigan. J. Parasitol. Suppl. 25:24.

321. Macy, Ralph W. 1942a. The life cycle of the trematode Echinostomum callawayensis Barker. J. Parasitol. 28:431-432.

322. Magath, Thomas B. 1920b. Leucochloridium problematicum n. sp. 6:105-114.

323. Majima, Mitsuo. 1928a. On Echinostoma macrorchis found parasitic in human body. Japan Med. World. 8:70.

324. Manter, Harold W. 1937a. Modifications of the acetabulum in trematodes. J. Parasitol. 23:566.

325. _____; and Williams, O. L. 1928a. Some monostomes from North American birds. Tr. Am. Micr. Soc. 47:90-93.

326. Mascino, Doris G. 1929a. Die Trematoden der Gattung Plagiorchis Lühe, 1899 der Vögel Russlands. Beitrag zur Kenntnis der Helminthenfauna Russlands. Zentralbl. Bakteriol., 2 Abt., 79:125-142.

327. Matheson, Colin. 1930a. Notes on Cercaria elvae Miller as the cause of a probable outbreak of dermatitis at Cardiff. Tr. Roy. Soc. Trop. Med. & Hyg. 23:421-424.

328. Mathias, Paul. 1924b. Cycle evolutif d'un trematode echinostome (Hypoderaeum conoideum Bloch). Compt. Rend. Soc. Biol., Paris. 90:13-15.

329. _____ 1924c. Cycle evolutif d'un trematode de la Famille des Psilostomidae (Psilotrema spiculiferum Mühling). Compt. Rend. Acad. Sc., Paris. 178:1217-1219.

330. _____ 1927a. Cycle evolutif d'un trematode de la famille des Echinostomidae (Echinoparyphium recurvatum Linstow). An. Sc. Nat. Zool.,10 s. 10:289-310.

331. _____ 1930c. Sur le cycle evolutif d'un trematode de la famille des Notocotylidae Lühe (Notocotylus attenuatus Rud). Compt. Rend. Acad. Sc., Paris 191:75-77.

332. de Mello, Ali. 1931a. Da ocurrencia de Echinostoma revolutum (Fröelich, 1802) (Trematoda) em Gallus domesticus L. no Brasil. Arch. Escola Super. Agric. e Med. Vet., Rio de Janeiro. 10:172.

333. Mönnig, Herman O. 1922a. Ueber Leucochloridium macrostomum (Leucochloridium paradoxum Carus.) Ein Beitrag zur Histologie der Trematoden. Jena. 61 pp.

334. Morishita, Kaoru, and Tsuchinochi, Katsuji. (1925a). Notes on four avian trematodes from Formosa with remarks on the life history Hypoderaeum conoideum (Bloch) Jap. text. Contrib. Dept. Hyg., Govt. Res. Inst. Formosa

335. Mudaliar, S. Vaidyatha. 1930a. A description of the trematode, Echinochasmus nagpurii n. sp., with a comparison of some of the known species of the genus. Indian Vet. J. 15:109-114.

336. Mueller, Justus F. 1930c. The trematode genus Plagiorchis in fishes. Tr. Am. Micr. Soc. 49:174-177.

337. Mäsmark, Karl-Erik J. (1937g). A revision of the trematode family Paramphistomidae. Zool. Bidrag Uppsala. (1935-37). 16:301-565.

338. Nevenic, Vladislav. 1940g. (Infection massive d'un porc de Koupinovo par Echinochasmus perfoliatus. Jugoslov. Vet. Glasnik. 20:203-204.

339. Nicholson, Daniel. 1928g. Fish tapeworm. Intestinal infection in man; the infestation in fish of Manitoba lakes. Canad. Ass. J. 19:25-33.

340. _____ 1929g. Variations in the fish larvae of Diphyllobothrium latum. Canad. Pub. Health J. 20:193-195.

341. _____ 1932a. Diphyllobothrium infection in Esox lucius. Canad. J. Research. 6:166-170.

342. _____ 1932b. The triaenophorus parasite in the flesh of the tullibee (Leucichthys). Canad. J. Research. 6:162-165.

343. Nicoll, William. 1907f. Observations on the trematode parasites of British birds. Ann. and Mag. Nat. Hist., 7. s. (117). 20:245-271.

344. [illegible] 1909b. Studies on the structure and classification of the digenetic trematodes. Quart. J. Micr. Sc., n.s. (211) 53:391-487.

345. _____ 1914i. The trematode parasites of North Queensland. 2. Parasites of birds. Parasitology. 7:105-126.

346. _____ 1923d. A reference list of the trematode parasites of British birds. Parasitology. 15:151-202.

347. Nigrelli, Ross F.; and Maravontano, Louis V. 1944g. Pericarditis in Xenopus laevis caused by Diplostomulum xenopi sp. nov., a larval strigeid. J. Parasitol. 30:184-190.

348. Noble, A. E. 1933h. Two nev trematodes from the American coot. Tr. Am. Micr. Soc. 52:353-360.

349. Noble, A. E. 1936g. New avian trematodes of the genus Neodiplostomum. J. Parasitol. 22:247-254.

350. Nöller, Wilhelm.; and Wagner, Oskar. 1923g. Der Entwicklungskreis des Entensaugwurmes Hypoderaeum conoideum. Klin. Wchnschr. 2:2330.

351. Odhner, Teodor. 1910b. Gigantobilharzia acotylea n.g. n. sp., Ein mit den Bilharzien verwandter Blutparasit von enormer Länge. Zool. Anz., Leipzig. 35:380-385.

352. _____ 1911g. Echinostomum filoconum (Garrison) ein neuer Menschenparasit aus Ostasien. Zool. Anz., Leipzig. 38:65-68.

353. _____ 1913g. Ein zweites Echinostomum aus dem Menschen in Ostasien (Ech. malayanum Leiper). Zool. Anz., Leipzig. 41:577-582.

354. Olivier, Louis J. 1940g. Development of Diplostomum flexicaudum (Cort and Brooks) in the chicken by feeding precocious metacercariae obtained from the snail intermediate host. J. Parasitol. 26:85-86.

355. _____ 1947b. Observations on experimental dermatitis in humans induced by cercariae of Trichobilharzia stagnicolae (Talbot, 1936). J. Parasitol. Soc. 2, Suppl. 33:10-11.

356. _____; and Cort, W. W. 1941b. An experimental test of the life cycle described for Cotylurus communis (Hughes). J. Parasitol. 28:75-81.

357. Olson, Oliver W. 1937g. A systematic study of the trematode subfamily Plagiorchiinae Pratt, 1902. Tr. Am. Micr. Soc. 56:311-339.

358. _____ 1939f. The occurrence of the fluke Plagiorchis notoëmi Skrjabin, 1938, in Franklin's gull (Larus pipixcans Wagl.) in North America. Proc. Helminth. Soc. Washington. 6:20.

359. _____ 1940b. Two new species of trematodes (Ophiosoma bilobata: Strigeidae, and Cathaemasia myeticoracis: Echinostomidae) from herons, with a note on the occurrence of Clinostomum cymbulatum (Rud.) Zoologica; Scient. Contrib. N. Y. Zool. Soc. 25:323-328.

360. Ono, Sadao. 1930g. The life history of Echinostoma caproni n. sp. found in the vicinity of Mukden, with special reference to the second intermediate host. Select. Contrib. Mukden Inst. Infect. Dis. Animals. 1:201-208 (Japanese text), 239-240 (English text).

361. _____ 1935g. On the life-history of Plagiorchis (Lepoderma) and Prosthogonimus of dragon-flies found in the vicinity of Mukden. Orig. Contrib. Mukden Inst. Infect. Dis. Animals. 4:205-217, 303.

362. Onorato, Angelo R.; and Stunkard, H. W. 1931g. The effect of certain environmental factors on the development and hatching of the eggs of blood flukes. Biol. Bull. 61:120-132.

363. Ozaki, Yoshimasa. 1929g. Note on Coitocaecidae, a new trematode family. Annot. Zool. Japon. 12:75-90.

364. Palimpsestov, M. A. (1929h) Eine neue Trematode, Plagiorchis nogoyi nov. sp., aus dem Darme eines Hundes. Rabot. 74. Soiuz. Gel'mintol. Exped. v Astrakhanskom-Okruge Nizhno-Volzhskogo Kraia, 48-52.

365. Park, James T. 1936g. New trematodes from birds, Plagiorchis nobilei sp. nov. (Plagiorchiidae) and Galactosomum humphreysi sp. nov. (Heterophyidae). Tr. Am. Micr. Soc. 55:360-365.

366. _____ 1938g. A rat trematode, Echinostoma hortense Asada, from Korea. Keijo. J. Med. 9:283-286.

367. _____ 1939h. Trematodes from mammalia and aves. II. Two new trematodes of Plagiorchiidae: Plagiorchiides (i.e. Plagiorchoides) chinoini n. sp. and Plagiorchis orientalis n. sp. from Tyosen (Korea). Keijo J. Med. 10:1-6.

368. _____ 1939g. Trematodes of mammals and aves from Tyosen III. A new trematode of the family Plagiorchiidae Ward, 1917, Plagiorchis mamacotylus sp. nov. Keijo J. Med. 10:43-45.

369. Parnell, Ivan W. 1934g. Animal parasites of North-east Canada. Canad. Field-Naturalist. 48:111-115.

370. Patwardhan, S. S. 1935d. Three new species of trematodes from birds. Proc. Indian Acad. Sc. Sect.B. 2:21-28.

371. Penner, Lawrence R. 1942a. Studies on dermatitis-producing schistosomes in Eastern Massachusetts, with emphasis on the status of Schistosomatium pathlocoptieum Tanabe, 1923. J. Parasitol. 28:103-116.

372. Petrov, Aleksandr M.; and Tikhonov, P. N. 1927a. (Ein neuer Saugwurm des Darmes der Haushaarnivoren--Plerlorchis nasalnoi n. sp.) Sborn. Rabot Gel'mintol. Posv. K. I. Skriabinu. pp. 150-154.

373. Pratt, Henry S. 1902a. Synopses of North American invertebrates. 12. The Trematodes. Part 2. The Aspidocotylea and the Malacotylea, or digenetic forms. Am. Naturalist. (431) v.36:887-910; (432) 953-979.

374. Price, Emmett W. 1928d. The host relationship of the trematode genus Zygocotyle. J. Agric. Research, U. S. Dept. Agric. 36:911-914.

375. _____ 1929k. A synopsis of the trematode family Schistosomidae with descriptions of new genera and species. Proc. U. S. Nat. Mus. (2789)75:1-39. Art.18.

376. _____ 1931b. (A synopsis of the trematode family Schistosomidae. Note on Macrobilharzia Travassos) J. Parasitol. 17:230-231.

377. _____ 1932e. The occurrence of Echinochasmus inermis (Fuhrmann) in North America. J. Parasitol. 18:311.

378. _____ 1942b. A new trematode of the family Psilostomidae from the Lesser Scaup duck, Nyroca affinis. Proc. Helminth. Soc. Washington. 9:30-31.

379. _____ 1943d. A redescription of Heterobilharzia americana Price (Trematoda: Schistosomatidae) Proc. Helminth. Soc. Washington. 10:85-86.

380. _____ 1948g. Trematodes of poultry (In Hester, H.E.; and Schwarte, L.H. Diseases of poultry. 2. ed. Ames, Iowa. pp. 839-861.

381. Price, Helen F. 1931g. Life history of Schistosomatium douthitti (Cort). Am. J. Hyg. 13:685-727.

382. Prudhoe, Stephen. 1945a. On two echinostome trematodes from grebes. Ann. and Mag. Nat. Hist. 11s.(85) 12:1-8.

383. Nasin, Karel. 1933a. (Echinoparyphium recurvatum (Linstow, 1873) und sein Entwicklung). Mol. Spisy Vysoke Skoly Zverolek., Brno, 12:1-104, Art.1-2.

384. Read, Clark P. 1948a. Strigeids from Texas mink with notes on the genus Fibricola Dubois. Tr. Am. Micr. Soc. 67:165-168.

385. Rees, F. Gwendolen. 1933a. On the anatomy of the trematode Hypoderaeum conoideum Bloch, 1782, together with attempts (sic) at elucidating the life-cycles of two other digenetic trematodes. Proc. Zool. Soc. London. pt. 4, Jan., pp. 817-826.

386. Reish, Donald J. New host and distribution records for two trematodes from the western gull. J. Parasit. 36:84. 1950a

387. Reyes, Rafael V. 1938b. Un trematodo intestinal de los bovideos (Zygocotyle lunatum Diesing, 1836). Provenio-neia-Municipio de Rosa, Cundinamarca, Columbia. Rev. Med. Vet. Columbia (70) 8:4-6.

388. Reynolds, Bruce D. 1936b. A new host for Leucochloridium dryobatae. J. Parasitol. 22:409-410.

389. Rodrigues, I. L. (1940a) Echinostoma revolutum (Froelich, 1802) (Trematoda: Echinostomidae) estudiado por primera vez en Mexico como parasito del hombre. Thesis. Univ. (Mexico). 32 pp.

390. Roman, E. 1938b. Presence dans la region lyonnaise de Leucochloridium macrostomum (trematodes Leucochlorid-iidae). Bull. Soc. Zool. France. 63:145-152.

391. Ross, Harrison R. 1906a. Bilharzia haematobium. Blood fluke. Montreal Med. J. 35:596-600.

392. Sandground, J. H. 1940c. Plagiorchis javensis n. sp., a new trematode parasitic in man. Rev. Med. Trop. y Parasitol., Habana. 6:207-211.

393. _____; and Donne, C. 1940a. Echinostoma lindoensis n. sp., a new parasite of man in the Celebes with an account of its life history and epidemiology. Am. J. Trop. Med. 20:511-535.

394. _____; and Soewadji, Prawirohardjo. 1939a. On the occurrence of human echinostomiasis in Java. Geneesk. Tijdschr. Nederl.-Indië. 79:1497-1503.

395. Savage, Alfred.; and Isa, J. M. 1947a. Prosthorenimus macrorchis in Manitoba. Canad. J. Comp. Med. 11:4.

396. Schouring, Ludwig. 1923g. Parasitische Trematoden aus Lithauen. Abhandl. K. Bayer. Akad. Wissensch., Math.-Phys. Kl., Suppl.-Band, 2.-5. Abhandl., p. 253.

397. Schultze, Max. Sign. 1871g. (Ueber ein Exemplar von Leucochloridium paradoxum aus Succinea amphibia). Sitzungsb. Nied.-Rhein. Gesellsch. Nat.-u. Heilk. Bonn. p. 129.

398. Shtron, Zh. K. 1940g. (New species of the trematode worms of the genus Plagiorchis. Parazitol. Sborn. Zool. Inst. Akad. Nauk SSSR, Leningrad (8) pp. 225-231.

399. _____; and Sondak, V. A. 1935a. Some new and little-known trematode worms belonging to the families Plagiorchidae and Dicrocoeliidae (according to materials of the Talysh expedition. Parazit., Poronosch. i Iadovit. Sborn. Zhivotn. Rabot....Pavlovskii, 1909-1934, pp. 348-359.

400. Shul'ts, Rikhard E. S. 1932b. (Trematoden der Gattung Plagiorchis Löhe der Nagetiere). Vestnik Mikrobiol., Epidemiol. i Parazitol. 11:53-60.

401. von Siebold, Carl T. E. 1853g. Ueber Leukochloridium paradoxum. Zitschr. Wissensch. Zool. 5:425-437.

402. Sildnut, M. 1933a. (Plagiorchis arcuatus in a laying hen). Esthonian text. Eesti Loomaarstide Ühingvaade. 9:237-242.

403. Skrjabin, Konstantin I. 1928g. Sur la faune des trematodes des oiseaux de Transbaikalie. Ann. Parasitol. 6:80-87.

404. _____ 1938a. (Echinostoma paraulum -- nouveau parasite de l'homme. Med. Parazitol. i Parazitar. Bolezni. 7:129-138. (Russian text, Fr. sum.)

405. _____ 1944g. An analysis of the generic components entering into the composition of three trematode families: Opisthorchidae, Dicrocoelidae and Echinostomatidae. Dokl. Akad. Nauk SSSR, an. 12m. s. 44:299-301.

406. _____ 1949b. (Reorganization of the systematics of the trematode order Paramphistomata Skrjabin and Shulz, 1937) Dokl. Akad. Nauk SSSR, n.s. 65:919-921.

407. Skrjabin, Konstantin I. (1950g) (Trematodes of animals and man.) v.4, 495 pp. Moskva, Leningrad.

408. _____; and Massino B. G. 1925g. Trematoden bei den Vögeln des Moskauer Gouvernements. Centralbl. Bakteriol., 2. Abt., 64:453-462.

409. Soparkar, M. B. 1918g. A trematode parasite of Anopheline mosquitoes. Indian J. Med. Research. 5:512-515.

410. Southwell, Thomas.; and Kirshnor A. 1937g. A description of a new species of amphistome Chlorchis purvisi; with notes on the classification of the genera within the group. Ann. Trop. Med. and Parasitol. 31:215-244.

411. Sprehn, Curt E. W. 1933h. Trematoda. Tierwelt Nord- u Ostsee (Grimpe u. Wagler), Lief. 24, Teil IV. c 1, pp. IV. c 1-IV c 60.

412. Stafford, Joseph. 1903g. Two distomes from Canadian Urodela. Centralbl. Bakteriol., 1 Abt., Orig., 34:822-830.

413. _____ 1904h. Trematodes from Canadian fishes. Zool. Anz., Leipzig. 27:481-495.

414. _____ 1905g. Trematodes from Canadian vertebrates. Zool. Anz., Leipzig. 28:681-694.

415. _____ 1907g. Preliminary report on the trematodes of Canadian Marine fishes. Further Contrib. Canad. Biol. (1902-05), pp. 91-94.

416. Stossich, Michele. 1904d. Una nuova specie del genere Plagiorchis Lühe. Ann. Mus. Zool. R. Univ. Napoli n. s. 1:1-2.

417. Stunkard, Horace W. 1946g. Interrelationships and taxonomy of the digenetic trematodes. Biol Rev. Cambridge Phil. Soc. 21:148-158.

418. _____; and Dunihue, F. W. 1931g. Notes on trematodes from a Long Island duck with description of a new species. Biol. Bull. 60:179-186.

419. _____; Willey, C. H.; and Rabinowitz, Y. 1943g. Corrigan lunti Miller, 1923, a larval stage of Apatemon gracilis (Rudolphi, 1819) Szidat, 1928. Tr. Am. Micr. Soc. 60:485-497.

420. Sugimoto, Masaatsu. 1916d. (Ueber die Echinostomum echinatum, einen Darmschmarotzer des Hausvogels). Chuo Jui Kai Zasshi, Tokyo. 29:109-115. Jap. text.

421. _____ 1933a. On a trematode parasite (Echinostoma cinetorchis Ando and Ozaki, 1923) from a Formosan dog. J. Soc. Trop. Agric. (Nettai Nogaku Kwaishi).(Taihoku Imp. Univ.) 5:357-362. Jap. text.

422. Swales, William E. 1933a. A review of Canadian helminthology. I. The present status of knowledge of the helminth parasites of domesticated and semidomesticated mammals and economically important birds in Canada, as determined from work published prior to 1933. Canad. J. Research. 8:468-477.

423. _____ 1933c. A review of Canadian helminthology. II. Additions to part I, as determined from a study of parasitic helminths collected in Canada. Canad. J. Research. 8:478-482.

424. _____ 1935a. The life cycle of Fascioloides magna (Bassi, 1875), the large liver fluke of ruminants, in Canada, with observations on the bionomics of the larval stages and the intermediate hosts, pathology of fascioloidiasis magna, and control measures. Canad. J. Research. 12:177-215.

425. _____ 1936b. Further studies on Fascioloides magna (Bassi, 1875) Ward, 1917, as a parasite of ruminants. Canad. J. Research. Sect. D. 14:83-95.

426. _____ 1936g. Schistosome dermatitis in Canada. Notes on two causative agents and their snail hosts in Manitoba. Canad. J. Research. Sect. D, 14:6-10.

427. Szidat, Lothar. 1930g. Die Parasiten des Hausgeflügels. 4. Notocotylus Diesing und Catatropis Odhner, zwei, die Blinddärme des Geflügels bewohnende monostome Trematodengattungen, ihre Entwicklung und Uebertragung. Arch. Geflügelk., 4:105-114.

428. _____ 1930i. Ueber einen Saugwurm, Hilharzella polonica Nov. aus dem Blut ostpreussischer Enten. Schrift. Phys.-Oekonom. Gesellsch. Konigsberg. 1. Pr. 67:99-100.

429. _____ 1932a. Parasiten aus Liberia und Franzsisch-Guinea. II. Teil: Trematoden. Ztschr. Parasitenk., Berlin. 4:506-521.

430. Szidat, Lothar. 1936b. Studien zur Systematik und Entwicklungsgeschichte der Gattung Leucochloridium Carus. I. Bemerkungen zur Arbeit von G. Mitonborg (1925): Versuch einer Monographie der Trematodenunterfamilie Harmostominae Braun. Ztschr. Parasitenk. Berlin., 8:645-653.

431. _____ 1938b. Pseudobilharziella filiformis n. sp., eine neue Vogelbilharzie aus dem Höckerschwan Cygnus olor L. Ztschr. Parasitenk. Berlin. 10:535-544.

432. _____ 1939a. Beiträge zum Aufbau eines natürlichen Systems der Trematoden. I. Die Entwicklung von Echinocercaria choanophila U. Szidat zu Cathaemasia hians und die Ableitung der Fasciolidae von den Echinostomidae. Ztschr. Parasitenk. Berlin. 11:239-283.

433. _____ 1942a. Was ist Cercaria ocellata La Valette? Morphologische und entwicklungsgeschichtliche Untersuchungen über den Erreger der europäischen Cercarien-Dermatitis des Menschen. Deutsche Tropenmed. Ztschr. 46: (19)481-497, (20)509-524.

434. _____; and Szidat, Ursula. 1933a. Beitrage zur Kenntnis der Trematoden der Monostomidengattung Notocotylus Dies. Zentralbl. Bakteriol., 1. Abt., Orig., 129:411-422.

435. _____; and Wigand, Rudolf. 1931a. Ueber Fundinwirkung bei Bilharziella-Enten (Parasitologische, klinische und pharmakologische Beobachtungen). Arch. Schiffs-u. Tropen-Hyg. 35:159-171.

436. Szidat, Ursula. 1935a. Weitere Beiträge zur Kenntnis der Trematoden der Monostomidengattungen Notocotylus Diesing. Zentralbl. Bakteriol., 1. Abt., Orig., 133:265-270.

437. _____ 1936a. Beiträge zur Kenntnis der Trematodengattung Notocotylus Diesing. III. Notocotylus linearis (Rud. 1819?) n. sp. aus den Blinddärmen des Kiebitz (Vanellus vanellus L.) Zentalbl. Bakteriol., 1. Abt., Orig., 136:231-235.

438. Takahashi, Sozaburo. 1927a. I. Feststellung des erste u. auch des zweite zwischenwirt von Echinostoma cinetorchis II. Der erste und zweite zwischenwirte von Echinostoma macrorchis. Fukuoka Ikwadaigaku Zasshi. 20:712-723. (Japanese text, German summary).

439. Tanabe, Hiroshi. (1922d) Echinochasmus perfoliatus (Ratz) found in Japan. Okayama Igakkai Zasshi (307), pp.1-20.

440. _____ (1926b) A new species of Echinochasmus, E. japonicus n. sp. Nippon Dyori Gakkai Kaishi, Tokyo 16:295-296.

441. Teixeira de Freitas, J. F. 1948b. "Echinostomatidae" parasito do urotor de ave (Trematoda). Rev. Brasil. Biol. 8:489-492.

442. _____; and Lent, Herman. 1940a. Plagiorchis didelphidis (Parona, 1896). Um parasito pouco conhecido de marsupiais. Arq. Inst. Benjamin Baptista. 6:131-135.

443. Timon-David, Jean. 1953. Recherches sur les trematodes de la pie en Provence. Ann. de Parasitol. Hum. et Comp. Tome XXVIII, No.4, pp. 247-288.

444. _____ 1955. Cycle evolutif d'un trematode Cyclocoelidae: Pseudhyntiasmus dollfusi Timon-David, 1950, Recherches experimental. Ann. de Parasitol. Hum. et Comp. Tome XXX, No.1-2, pp. 43-61.

445. Topalov, Casian I. (1937a) Observatiuni asupra frecuentei lui Echinochasmus (sic) perfoliatus (R. Katz) la cainii din municipiul Bucuresti. Teze Doct. Med. Vet.

446. Travassos, Lauro P. 1921b. Contribuicao ao conhecimento dos Cyclocoelidae brasileiros. Brasil-Med. 35:121-123.

447. _____ (1925k) Cyclocoelidae Brasileiros. Brasil-Med. 1 Ann. v. 25 (1).

448. _____ 1927o. Nouvelle espece de trematodes (Plagiorchis Luchoi n. sp.) Compt. Rend. Soc. Biol. Paris. 97:1096.

449. _____ 1928c. Fauna helminthologica do Matto Grosso (Trematodeos. I parte) (Faune helminthologique du Matto Grosso. Trematodes. I part) Mem. Inst. Oswaldo Cruz. 21:309-341, 343-372. (French version)

450. _____ 1929h. Notas sobre Cyclocoelidae. Suppl. (6), Mem. Inst. Oswaldo Cruz, Mar., p. (54).

451. _____ 1933f. Observations sur Zyrocotyle lunatum (Olss., 1835) (Trem: Paramphistomidae) Compt. Rend. Soc. Biol. Paris. 114:958-959.

452. Travassos, Lauro P. 1934g. Synopse dos Paramphistomoidea Mem. Inst. Oswaldo Cruz. 29:19-176.

453. _____ 1938a. Informacoes sobre a fauna helminthologica de Matto Grosso. Trematoda II. Mem. Inst. Oswaldo Cruz. 33:461-468.

454. _____ 1942g. Contribuicoes ao conhecimento dos Schistosomatidae. Sobre Ornithobilharzia canaliculata (Rudolphi, 1819) Nov. Brasil Biol. 1:63-65.

455. _____ 1951. O Genero Pulchrosoma Travassos, 1916 e sua situacao no sistema de trematodeos. Arq. de Zool. do Estada do Sao Paulo, Dept. Zool. Sec. da Agric. Vol. VII--Art. IX--pp. 465-492.

456. Tsong, Shen. 1930a. Un nouveau monostome de la Chine: Cyclocoelum (Uvitellina) dollfusi n. sp. Ann. Parasit. 8:254-258.

457. Tsuchimochi, Katsuyi. 1924a. (On the life history of two species of Echinostoma. (No.1) Studies on trematodes parasitic on Formosan birds) Dobuts. Zasshi. Tokyo. 36:245-250. (Japanese text).

458. Tubangui, Marcos A. 1921a. (An Echinochasmus in the dog in China). J. Parasitol. 7:197.

459. _____ 1931b. Trematode parasites of Philippine vertebrates, II: Two echinostome flukes from rats. Philippine J. Sc. 44:273-283.

460. _____ 1932a. Observations on the life histories of Himasthla Muhlingi Tubangui, 1931, and Echinostoma revolutum (Froelich, 1802), (Trematoda) Philippine J. Sc. 47:497-513.

461. _____ 1932f. Trematode parasites of Philippine vertebrates, V. Flukes from birds. Philippine J. Sc. 47:369-404.

462. _____ 1933c. Trematode parasites of Philippine vertebrates, VI. Descriptions of new species and classification. Philippine J. Sc. 52:167-197.

463. _____ 1939a. Echinostoma manilensis, a new trematode parasite of man. A preliminary report (Proc. 5 Philippine Sc. Conv.) Bull. (23), Nat. Research Council Philippine Islands, Doc. p. 139.

464. Tubangui, Marcos A.; and Masilungan, Victoria A. 1941a. Trematode parasites of Philippine vertebrates. IX. Flukes from the domestic fowl and other birds. Philippine J. Sc. 75:131-141.

465. Ujiie, Naoki. 1936a. On structure and development of Echinochasmus japonicus and its parasitism in man. Taiwan Igakkwai Zasshi, Taihoku. (371)35:535-546, 299-310. Japanese text, English summary.

466. Ussing, Hj. (1945a) Leucochloridium paradoxum Carus. Et sjaeldent Fund fra Gladbro. Flora og Fauna, København, pp. [illegible]. 51:94-96.

467. Van Haitsma, John P. 1931a. Studies on the trematode family Strigeidae (Holostomidae). XXII Cotylurus flabelliformis (Faust) and its life history. Papers Mich. Acad. Sc., Arts and Letters, (1930) 13:447-482.

468. Verma, S. C. 1935b. Studies on the Indian species of the genus Echinochasmus, part I, and on an allied new genus Episthochasmus. Proc. Indian Acad. Sc. Sect. B, 1:837-856.

469. _____ 1936c. Notes on trematode parasites of Indian birds. Allahabad Univ. Studies, Science Sect. II, Zool. (part I), 12:147-188.

470. Vevers, G. M. 1923b. Observations on the life-histories of Lyperosomum sonoideum (Bloch) and Echinostomum revolutum (Frool); Trematode parasites of the domestic duck. Ann. Applied Biol. 10:134-136.

471. Vidyarthi, R. D. 1938b. New avian trematodes (family Diplostomidae) from Indian birds. Proc. Nat. Acad. Sc. India. 8:76-84.

472. Wallace, Franklin G. 1939a. The life cycle of Pharyngostomum cordatum (Diesing) Ciurea (Trematoda: Alariidae). Tr. Am. Micr. Soc. 58:49-61.

473. Wankel. 1857a. (Leucochloridium (sic) paradoxum in Succinea putris L.) Allg. Deutsche Naturh. Ztg. n.F. 3:502.

474. Wardle, Robert A. 1932b. The Cestoda of Canadian fishes. II. The Hudson Bay drainage system. Contrib. Canad. Biol. and Fish., n.s. 7:(377)-403, art. 30.

475. _____ Contributions to the zoology of swimmers itch. Minutes Proc. Roy. Soc. Canada. p. cxxi.

476. Wardle, Robert A. (1938g?) Cercarial dermatitis in Manitoba. 20 Ann. Rep. Nat. Research Council, Canada. (1936-37), p. 124.

477. Wertheim, Paul. 1940g. (Les resultats preliminaires des recherches sur le developpement du sporocyste et de la cercaire de Cotylurus cornutus Rudolphi, 1809.(Fr. sum) Vet. Arhiv, Zagreb 10:644-646.

478. Wesenberg-Lund, Carl J. 1931g. Contributions to the development of the Trematoda Digenea. Part I. The biology of Leucochloridium paradoxum. K. Danske Vidensk. Selsk. Skr., Naturv. og Math. Afd., 9. R., 4:89-142.

479. Wetzel, Rudolf. 1930d. A nov species of trematode worm of the genus Ornithobilharzia from a Canadian goose. Proc. U. S. Nat. Mus. (2846) 78:1-4. Art. 3.

480. _____ 1933g. Zum Wirt-Parasitverhältnis des Saugwurmes Echinoparyphium paraulum in der Taube. Deutsche Tierärztl. Wchnschr. 41:772-775.

481. Willey, Charles H. 1929g. Studies on the lymph system of digenetic trematodes. Anat. Rec. 44:265.

482. _____ 1932g. The lymph system of Zygocotyle lunata, with a note on the subfamily Zygocotylinae. J. Parasitol. 19:165.

483. _____ 1936g. Cytology and development of flame cells in the redial generation of a trematode. Anat. Rec. Suppl. 1. 67:85.

484. _____ 1937g. The development of Zygocotyle from Cercaria nyanzensis Willey, 1930. J. Paras. 23:571.

485. _____ 1941g. The life history and bionomics of the trematode Zygocotyle lunata (Paramphistomidae) Zoological Scient. Contrib. N. York Zool. Soc. 25:65-88.

486. _____; and Godman, Gabriel C. 1951g. Cametogenesis, fertilization and cleavage in the trematode, Zygocotyle lunata (Paramphistomidae) J. Paras. 37:283-296.

487. Wilmoth, James H.; and Goldfischer, Rhoda. (1946g) On the distribution of glycogen in the trematode, Ostiolum sp. J. Parasitol. Sec. Suppl. 21:22.

488. Wilmoth, James H.; and Goldfischer, Rhoda. (1946g) Studies on the respiration of the frog lung fluke, Ostiolum sp. J. Parasitol. Soc. Suppl. 31:22

489. Wisniowski, Loslav W. 1934b. (Beitrag zur Systematik der Coitocaecidae (Trematoda) Nicolla g. n., Ozakia g. n., Coitocaecum provitum sp. n. Mem. Acad. Polon. Sc. et Lett., Cracovie, Cl. Sc. Math. et Nat., s. B: Sc. Nat. (6), pp. 27-41.

490. Witenberg, George G. 1923b. (The trematodes of the fam. Cyclocoelidae and a new principle of their systematics) Trudy Gostudarstv. Inst. Eksper. Vet. 1:84-141.

491. _____ 1926a. Die Trematoden der Familie Cyclocoelidae Kossack, 1911. Beitrag zur kenntnis der Helminthenfauna Russlands. Zool. Jahrb., Jena, Abt., Syst. 52:103-186.

492. _____ 1928a. Notes on Cyclocoelidae. Ann. and Mag. Nat. Hist., 10. s. (11). 2:410-417.

493. _____ 1932f. Ueber zwei in Pälastina in Hunden und Katzen parasitierende Echinochasmus-Arten (Trematoda). Ztschr. Parasitenk., Berlin. 5:213-216.

494. Woodhead, Arthur E. 1935b. The mother sporocysts of Leucochloridium. J. Parasitol. 21:337-346.

495. Wu, Liang-Yu. 1938a. Parasitic trematodes of tree sparrows, Passer montanus malvaccensis Hartert, from Canton with a description of three new species. Lingnan Sc. J. 17:389-394.

496. _____ 1953. A study of the life history of Trichobilharzia cameroni sp. nov. (Fam. Schistosomatidae) Canad. J. Zool. 31:351-373.

497. _____ 1953. On the life history and biology of Notocotylus stamnicolus Herber, 1942 (Fam. Notocotylidae) Canad. J. Zool. 31:522-527.

498. Yamaguti, Satyu. 1933b. Studies on the helminth fauna of Japan. Part 1. Trematodes of birds, reptiles and mammals. Japan. J. Zool. 5:1-134.

499. _____ 1934a. Studies on the helminth fauna of Japan. Part 2. Trematodes of fishes. Jap. J. Zool. 5:249-541.

500. Yamaguti, Satyu. 1934h. Studies on the helminth fauna of Japan. Part 3. Avian trematodes, II. Japan J. Zool. 5:543-583.

501. _____ 1935h. Plagiorchis maculosis (Rud, 1802) aus der japanischen Seiwalbe, Hirundo rustica gutturalis (Scopoli). Ztschr. Parasitenk. Berlin. 7:513-514.

502. _____ 1935g. Studies on the helminth fauna of Japan. Part 5. Trematodes of birds, III. Japan J. Zool. 6:159-182.

503. _____ 1936e. Studies on the helminth fauna of Japan. Part 14. Amphibian trematodes. Japan J. Zool. 6:551-576.

504. _____ 1936f. Studies on the helminth fauna of Japan. Part 15. Trematodes of fishes, II. 6 pp.

505. _____ 1936g. Studies on the helminth fauna of Japan. Part 16. Trematodes of fishes, III, Kyoto, 6pp.

506. _____ 1938g. Studies on the helminth fauna of Japan. Part 21. Trematodes of fishes. IV. Kyoto, 139 pp. published by the author.

507. _____ 1938f. Studies on the helminth fauna of Japan. Part 24. Trematodes of fishes, V. Japan J. Zool. 8:15-74.

508. _____ 1938h. Zur Entwicklungsgeschichte von Heterotylus attenuatus (Rud. 1809) und H. marmoratus Yamaguti, 1934. Ztschr. Parasitenk. Berlin. 10:268-292.

509. _____ 1939d. Studies on the helminth fauna of Japan. Part 25. Trematodes of birds, IV. Japan J. Zool. 8:129-210

510. _____ 1939g. Studies on the helminth fauna of Japan. Part 26. Trematodes of fishes, VI. Japan. J. Zool. 8:211-230.

511. _____ 1939f. Studies on the helminth fauna of Japan. Part 27. Trematodes of mammals, II. Japan J. Med. Sc. Pt. VI. Bacteriol. and Parasitol. 1:131-191.

512. _____ 1940h. Studies on the helminth fauna of Japan. Part 31. Trematodes of fishes, VII. Japan J. Zool. 2:35-100.

513. Yamaguti, Satyu. 1941g. Studies on the helminth fauna of Japan. Part 32. Trematodes of birds, V. Japan. J. Zool. 9:321-341.

514. _____ 1941f. Entwicklungsgeschichte von Echinochasmus tobi Yamaguti, 1939. Ztschr. Parasitenk. Berlin. 12:277-283.

515. _____ 1941g. Zur Entwicklungsgeschichte von Echinostoma hortense Asada, 1926, mit besonderer Berücksichtigung der Struktur der Cercarie. Ztschr. Parasitenk., Berlin. 12:273-276.

516. _____ (1942a) Studies on the helminth fauna of Japan. Part 37. Trematodes of fishes. VIII. Japan. J. Med. Sc., VI, Bacteriol and Parasitol. 2:105-129.

517. _____; and Asada, Zyuniti. (1942g) Trematodes of birds and mammals from Manchoukuo, I. Bull. Inst. Scient. Research, Manchoukuo. 6:498-512.

518. _____; and Mitunaga, Yosinori. 1943c. Trematodes of birds from Formosa. I. Tr. Nat. Hist. Soc. Taiwan (Jap) 33:312-329.

519. Yamashita, Jiro. 1935a. On Plagiorchis maculosus (Rud) a Trematode from Eastern-sandmartin. Byobutu oyobi Dobutu, Tokyo. 3:1861-1863. (Japanese text).

520. _____ 1937b. Studies on the Echinostomatidae Part II. A list of the family Echinostomatidae, trematode parasites of reptiles, birds and mammals, arranged systematically. Tr. Sapporo Nat. Hist. Soc. 15:82-95.

521. _____ 1938f. Studies on the family Echinostomatidae. Part I. Key to the sub-families and the genera of the family Echinostomatidae. (Japanese text) Byobutu oyobi Dobutu, Tokyo. 6:873-886.

522. _____ 1938g. Studies on the Echinostomidae. Part III. On Paryphostomum radiatum (Dujardin) Dietz, 1909 and Patagifer canorum Dietz, 1909 from the intestine of the Japanese cormorant, Phalacrocorax carbo hanedae Kuroda, in Japan. Byobutu oyobi Dobutu, Tokyo. 6:1005-1020. (Japanese text, English summary)

523. _____ 1938h. Studies on the Echinostomatidae. IV. On the occurrence of the echinostome in the intestine of a Japanese crane, Grus japonensis (Müller) Zool. Mag., Tokyo. 50:353-357. (Jap. text, Eng. sum)

524. Yamashita, Jiro. 1939b. (Studies on Echinostomatidae. Studies being made in the world with reference to the principal literature regarding the family of Echinostomatidae. Jap. J. Vet. Sc. 1:446-465.(Jap. text).

525. _____ 1939c. Studies on the Echinostomatidae. Part V. On the identity of Parvphostomum radiatum Dietz, P. sengaense Dietz, and Echinostomum lobulatum Ochner. Vol. Jub. Yoshida. 2:173-185.

526. _____ 1939d. Studies on the Echinostomatidae. Part VI. On four species of the echinostomes from Osaka prefecture. Oyo Dobuts. Zasshi. 11:25-30.

527. Yoshida, Sadao; and Toyoda, Kazunaga. 1930g. Notes on Cathaemasia hians (Rudolphi) from the mouth of Ciconia nigra. Ann. Trop. Med. and Parasitol. 24:85-94.

528. Young, Robert T. 1937a. Another record of avian schistosomes in North America. J. Parasitol. 23:295-296.

529. Zeliff, Clarke C. 1941g. Observations on Cathaemasia reticulata, a trematode from the belted kingfisher. Am. Naturalist. (760) 75:508-512.

530. _____ 1943g. A new species of Cyclocoelum, a trematode from the catbird. J. Acad. Wash. Sc. 33:255-256.

531. Zoller, Ernst. 1875a. On Leucochloridium paradoxum and the development of the larvae contained in it into Distoma. Ann and Mag. Nat. Hist., 4 s. 15:162-164.

532. Zerecero D, Maria C. 1943a. Acerca de un trematodo parasito de la "zarceta de alas azules" Querquedula discors, del Lago de Texcoco, Mex. An. Inst. Biol., Univ. Nac. Mexico. 15:53-57.

533. _____. (1950a). Acerca de una nueva especie del genero Plagiorchis Lühe, 1899: En el intestino de Tyrannus sp. (Aves, Passeriformes, Tyrannidae). An. Inst. Biol., Univ. Nac. Mexico. 20:293-299.

534. Zunker, Martin. 1925a. Echinostoma columbae n. sp., ein neuer Parasit der Haustaube. Berl. tierärztl. Wchnschr. 41:483-484.

ADDENDUM

535. Ameel, D. J; Van der Woude, Anne; and Cort, W. W. 1953. Studies on the miracidium of the genus Trichobilharzia with special reference to the germinal cells. Proc. Helm. Soc. Wash. 20:40-42.

536. Anderson, D. J.; and Cable, R. M. 1950. Studies on the life history of Linstowiella saldati (Anderson) (Trematoda: Strigeatoidea: Cyathocotylidae). J. Parasitol. 36:395-410.

537. Augustine, D. L.; and Uribe, C. 1927. Alaria arisaroides n. sp., a trematode from Vulpes fulva. Parasitology. 19:236-244.

538. Babero, B. B. 1953. Studies on the helminth fauna of Alaska. XVI. A survey of the helminth parasites of Ptarmigan (Lagopus ssp.) J. Parasitol. 39:538-546.

539. Bangham, R. V. 1955. Studies on fish parasites of Lake Huron and Manitoulin Island. Am. Mid. Nat. 53:184-194.

540. _____; and Venard, C. E. 1946. Parasites of fish of Algonquin Park Lakes. Ontario Fish. Res. Lab. 65:33-46.

542. _____; and Adams, J. R. 1954. A survey of the parasites of freshwater fishes from the mainland of British Columbia. J. Fish. Res. Bd. Can. 11:673-708.

542. Beaver, P. C.; and McMullen, D. B. 1942. Methods of investigating the life cycles of avian schistosomes. J. Parasitol. 28(Suppl.):13

543. Benthem Jutting, W. S. S. 1949. Neue Funde der Mühlermade, L. neglectum in den Niederlanden. Basteria. 13(1):25-26.

544. Bosma, H. 1934. The life history of the trematode Alaria Mustelae sp. nov. Tr. Am. Micr. Soc. 53:116-153.

545. Boughton, R. V. 1932. The influence of helminth parasitism upon the abundance of the snowshoe rabbit in western Canada. Canad. J. Research. 2:524-547.

546. Bozicovich, J. 1935. A method for making mounts of cross specimens. Turton News. 13:65.

547. Byrd, E. E.; and Macy, R. W. 1942. Mammalian trematodes. III. Certain species from bats. Tenn. Acad. Sci. 17:149-156.

548. Caballero y C, E. 1942. Descripcion de un Paramonostomum (Trematoda: Notocotylidae) encontrado en Los Patos Silvestres del Lago de Texcoco. Ann. Inst. Biol. Mex. 13:91-95.

549. _____; Grocott, R. G.; and Zerecero y D, M. C. 1953. Helmintos de la Republica de Panama. IX. Algunos trematodeos de aves marinas del Oceano Pacifico del Norte. Ann. Inst. Biol., Univ. Nac. Mex. 24:391-414.

550. Cameron, T. W. M. 1944. The morphology, Taxonomy, and life history of Notorchis conjunctus (Cobbold, 1860). Canad. J. Research. 22:6-16.

551. Chandler, A. C. 1954. New strigeids from Minnesota birds and mammals. Am. Mid. Nat. 52:133-141.

552. _____; and Rausch, R. 1946. A study of strigeids from Michigan mammals with comments on the classification of mammalian strigeids. Tr. Am. Micr. Soc. 65:328-337.

553. Choquette, L. P. E. 1951. Parasites of freshwater fish. V. Parasitic helminths of the muskallunge, Esox M. masquinongy Mitchill in the St. Lawrence watershed. Canad. J. Zool. 29:290-295.

554. Chu, G. W. T. C.; and Cutress, C. E. 1954. Austrobilharzia variglandis (Miller and Northrup, 1926) Ponner, 1953 (Trematoda; Schistosomatidae) in Hawaii with notes on its biology. J. Parasitol. 40:515-524.

555. Ciordia, H. 1950. The chromosomes of Notocotylus filamentis Barker, 1915. A monostome from the muskrat (Fiber zibethicus). Tr. Am. Micr. Soc. 69:64

556. Ciurea, I. 1930. A l'etude morphologique et biologique de quelques strigeides des oiseaux ichthyophages de la faune de roumaine. Arch. Roum. Path. Exp. Micr. 3 3:277-323.

557. Cort, W. W. 1928. Schistosome dermatitis in U. S. J. Am. Med. Ass. 90:1027-1029.

558. Cort, W. W. 1928. Further observations on schistosome dermatitis in U. S. (Michigan). Science. 68:388

559. ____________; and Brooks, F. G. 1928. Studies of Holostome cercariae. Tr. Am. Micr. Soc. 47:179-221.

560. ____________; Brackett, S.; Olivier, L.; and Wolf, L. O. 1945. Influence of larval trematode infection in snails on their second intermediate hosts relation to the strigeid trematode, Cotylurus flabelliformis (Faust, 1917). 31:61-78.

561. ____________; Ameel, D. J.; and Van der Woude, A. 1954. Parasitological reviews: Germinal developement in the sporocysts and rediae of the digenetic trematodes. Exp. Parasitol. 3:185-225.

562. Department of Mines and Natural Resources. 1951. Game and Fisheries Branch. Game birds and animals of Manitoba. 27 pp.

563. Diesing, K. M. 1850. Systema Helminthum. Vienna; 679 pp.

564. Dubois, G. 1944. A propos de la specificite parasitaire des strigeida. Bul. Soc. Neuch. Sc. Nat. 69:5-103.

565. ____________ 1946. Sur l'identite de Paracoenogonimus katsuradai Lyster, 1940. (Trematoda: Strigeida). Actes Soc. Helvet. Sci. Nat. pp.153-154.

566. ____________ 1947. L'epervier commun, hote de Neodiplostomum spathoides Dubois. Rev. Suisse Zool. 54:280-282.

567. ____________ 1952. Revision de quelques strigeides. (Trematoda). Bul. Soc. Neuch., Sc. Nat. 75:73-86.

568. ____________ 1951. Nouvelles cle de determination des groupes systematiques et des genres de strigeida Poche (Trematoda). Rev. Suisse de Zool. An. Soc. Zool. Suisse et Mus. Hist. Nat. Geneve. 58:639-691.

569. Edwards, D. K.; and Jansch, M. E. 1955. Two new species of dermatitis producing schistosome cercariae from Cultus Lake, British Columbia. Can. J. Zool. 33:182-194.

570. Faust, E. C. 1918. Life history studies on Montana trematodes. Ill. Biol. Monog. 4:1-120.

571. Goodchild, C. G. 1955. Transplantation of Gorgoderine trematodes into challenging habitats. Exp. Parasitol. 4:351-360.

572. Green, N. K. V. 1941. Studies on the physiology of tapeworms. M.Sc. Thesis Univ. Manitoba.

573. Griffiths, H. J. 1939. Observations on the bionomics of ova and miracidia of Fasciola hepatica Linn. in eastern Canada. Canad. J. Research. 17(D):205-211.

574. Haderlie, E. C. 1953. Parasites of the freshwater fishes of northern California. Univ. Calif. Pub. in Zool. 57:303-440.

575. Harwood, P. D. 1936. Note on Tennessee helminths. III. Two trematodes from kingfishers. J. Tenn. Acad. Sc. 11:251-256.

576. Harvey, H. H. 1955. Some aspects of helminth physiology. M. Sc. Thesis, Univ. Manitoba. Unpublished.

577. Heller, A. F. 1949. Parasites of cod and other marine fish from the Baie de Chaleur region. Canad. J. Research. 27:243-264.

578. Hilmy, I. S. 1949. New paramphistomes from the Red Sea dugong, Halicora halicora with description of Solenorchis gen. n. and Solenorchinae subf. n. Proc. Egypt. Acad. Sci. Year 1948 IV, 1-14.

579. Hoffman, G. L. 1954. The occurrence of Ornithodiplostomum ptychocheilus (Faust)(Trematoda:Strigeida) in fish and birds. J. Parasitol. 40:

580. Huggins, E. J. 1954. Life history of a strigeid trematode, Hysteromorpha triloba (Rudolphi, 1819) Lutz, 1931. I. Egg and Miracidium. Tr. Am. Micr. Soc. 73:1-15.

581. _____ 1954. Life history of a strigeid trematode, Hysteromorpha triloba (Rudolphi, 1819) Lutz, 1931. II. Sporocyst through adult. Tr. Am. Micr. Soc. 73:221-236.

582. Hunter, G. W. 1937. A new approach to helminthological morphology. Rabot. Gel'mint. (Skrjabin) pp.241-244.

583. Hunter, G. W.; Ritchie, L. S.; Tigertt, W. D.; Lin, S.; Pan, C.; and Tanabe, H. 1949. Immunologic studies. I. Experiments with bird and human schistosomes. J. Parasitol. 35:(Suppl.):28-29.

584. Hurst, D. L. 1955. An examination of tapeworm histological and toto-mount technique. M.Sc. thesis Univ. Manitoba. Unpublished.

585. Hurst, C. T. 1927. Trematode parasites in Physa. Univ. Calif. Pub. Zool. 29:321.

586. Kagan, I. G. 1949. Quickella (Family Succleidae) a new host for sporocysts of Leucochloridium (Trem: Brachylaemidae) in southeastern Michigan. J. Parasitol. 35:(Suppl.):38-39.

587. _____ 1951. Further contributions to the life history of Neoleucochloridium problematicum (Nagath, 1920) new comb. (Trem: Brachylaemidae) Tr. Am. Micr. Soc. 71:20-44.

588. _____ 1952. Revision of the subfamily Leucochloridinae Poche, 1907 (Trem: Brachylaemidae). Am. Mid. Nat. 48:257-301.

589. Krull, W. H. 1934. Egg albumin as a mounting medium in the study of living helminths. Proc. Helm. Soc. Wash. 1:5-6.

590. Kuntz, R. E. 1950. Embryonic division of the excretory system in fork-tailed cercariae of the schistosomes and in a blunt-tailed Brachylaemid cercaria. Tr. Am. Micr. Soc. 69:1-

591. La Rue, G. R. 1927. Studies on the trematode family Strigeidae (Holostomidae). No. V. Proalaria hurononsis sp. nov. Tr. Am. Micr. Soc. 66:143-148.

592. Leigh, W. H. 1953. Cercaria huttoni sp. nov., a dermatitis-producing schistosome larva from the marine snail, Haminoea antillarum sundalunensis Sowerby. J. Parasitol. 39:625-629.

593. _____ 1955. The morphology of Gigantobilharzia huttoni (Leigh, 1953), an avian schistosome with marine dermatitis-producing larvae. J. Parasitol. 41:1-8.

594. Linton, E. 1914. Notes on a viviporous distome. Proc. U. S. Nat. Mus. 46:551-555. No. 2040.

595. Little, S. W. 1954. A survey of the cestode genera Protocephalus and Bothriocephalus from the freshwater fish of western Canada, including a redescription of Proteocephalus lucioperae (Wardle) and Proteocephalus stizostethi (Hunter and Bangham).

596. Macfarlane, D. G.; and Macy, R. W. 1946. Cercaria oregonensis, n. sp., a dermatitis-producing schistosome cercaria from the Pacific northwest. J. Parasitol. 32:281-285.

597. Macfarlane, W. V. 1949. Schistosome dermatitis in New Zealand. Part II. Pathology and immunology of cercarial lesions. Am. J. Hyg. 50:152-167.

598. _____ 1949. Schistosome dermatitis in New Zealand. Part I. The parasite. Am. J. Hyg. 50:143-151.

599. _____ 1952. Schistosome dermatitis in Australia. Med. J. Australia. p.669.

600. Macy, R. W. 1952. Studies on schistosome dermatitis in the Pacific Northwest. Northwest Medicine. 51:947

601. _____; and Moore, D. J. 1953. The relationship between Trichobilharzia oregonensis and T. elvae, etiological agents of schistosome dermatitis in the Pacific Northwest. Science. 118:650

602. MacLulich, D. A. 1943. Parasites of trout in Algonquin Provincial Park, Ont. Canad. J. Res. (D)(21:405-412.

603. Manter, H. W. 1955. The zoogeography of trematodes of marine fishes. Exp. Parasitol. 4:62-86.

604. Maplestone, P. A. 1923. Revision of amphistomata of mammals. Ann. Trop. Med. Paras. 17:113-212.

605. Marchant, E. H. J. 1934. The estimated number of nemas in the soils of Manitoba. Can. J. Research. 11:594-601.

606. McMullen, D. B. 1935. The life history and classification of two allocreadid-like Plagiorchids from fish, Macrodoroides typicus (Winfield) and Allocreadium cortii (Lamont). J. Parasitol. 21:369-380.

607. Mondheim, H. 1940. Beitrage zur systematik und Biologie der familie Echinostomatidae (Trem).
Nova Acta Leopoldina, Neue Folge, Band 8, #5:489-588.

608. Manter, H. W. 1926. Some North American fish trematodes. III. Biol. Monographs. 10:127-264.

609. Miller, M. J. 1936. Runodorina sucellae gen. et sp. nov. A new papillose Allocreadiidae from the stickle back. Canad. J. Research. Sect. D. 14:11-14.

610. _____ 1937. The parasites of pigeons in Canada. Canad. J. Research. Sect. D. 15:91-103.

611. _____ 1940. A new trematode, Fibricola larue, from the racoon in Canada. Canad. J. Res. 18:333-335.

612. _____ 1940. Parasites of freshwater fish. III. Further studies on the intestinal trematodes of fish in the central St. Lawrence watershed.
Canad. J. Research. Sect. D. 18:423-434.

613. _____ 1941. A critical study of Stafford's report on "Trematodes of Canadian Fishes" based on his trematode collection. Canad. J. Res. 19:28-52.

614. Najarian, H. H. 1954. Developemental stages in the life cycle Echinoparyphium flexum (Linton, 1892) Diets, 1910 (Trematoda: Echinostomatidae).
J. Morph. 94:165-198.

615. Neiland, K. A. 1953. Leucochloridium parvicorpus, a new species of trematode (Leucochloridinae) from the Oregon jay, with a discussion of the application of host-parasite relationships to the taxonomy of this group. J. Parasitol. 39:553-557.

616. Neufeld, N. 1954. A survey of cestodes in birds of Manitoba. M. Sc. Thesis, Univ. Manitoba. Unpublished.

617. Neveu-Lemaire, M. 1936. Traite d'Helminthologie medicale et veterinaire.

618. Newton, M. V. B. 1932. The biology of Echinorhynchus tricuspidatus (Bloch, 1779) in western Canada.
M. Sc. Thesis, Univ. Manitoba.

619. Odlaug, T. O. 1940. Morphology and life history of the trematode Alaria intermedia. Tr. Am. Mic. Soc. 59:490-510

620. Otsu, T. 1927. On a new species of avian schistosome developing in the portal veins of the duck and investigation of its life history. (Jap. text, Eng. summary) Taiwan Igakkwai Zasshi (270), pp.648-665.

621. Olivier, L. 1953. Observation on the migration of avian schistosomes in mammals previously unexposed to cercariae. J. Parasitol. 39:237-246.

622. _____; and Weinstein, P. P. 1953. Experimental schistosome dermatitis in rabbits. J. Paras. 39:1-12.

623. Najim, A. T. 1951. Life history of Gigantobilharzia huronensis Najim, 1950, a dermatitis producing blood fluke. (Trem: Schistosomatidae). Ph. D. Thesis, Univ. Michigan. Pub. No.3539, Ann Arbor.

624. Ponner, L. E. 1950. Cercaria littorinalinae sp. nov., a dermatitis-producing schistosome larva from the marine snail, Littorina planaxis Philippi. J. Parasitol. 36:466-472.

625. _____ 1953. The red-breasted merganser as a natural avian host of the causative agent of clam diggers' itch. J. Parasitol. 39:20.

626. _____ 1953. Experimental infection of avian hosts with Cercaria littorinalinae Ponner, 1950. J. Parasitol. 39:20.

627. _____ 1953. The biology a marine dermatitis-producing schistosome cercaria from Labillaria nigra (Gmelin). J. Parasitol. 39:19-20.

628. Penrod, F. W. 1947. Neodiplostomum bonhami, a nov Diplostomid strigeoidean trematode from an eagle. Tr. Am. Mier. Soc. 66:141-145.

629. Price, E. W. 1934. Losses among wild ducks due to infection with Sphaeridiotrema globulus (Rudolphi) (Trem: Psilostomidae). Proc. Helm. Soc. Wash. 1:31-34.

630. _____ 1934. New trematode parasites of birds. Smith. Misc. Coll. 91:6. Pub. 3233. pp. 1-3.

631. Peterson, R. T. 1941. A field guide to western birds. 240 pp. Houghton Mifflen Co.

632. _____ 1947. A field guide to the birds. 290 pp. Houghton Mifflen Co.

633. Prudhoe, S. 1944. On some trematodes from Ceylon. Ann. and Mag. Nat. Hist. Ser. 11, 11:1-13.

634. Rayner, J. A. 1932. Parasites of wild birds in Quebec. Sci. Agr. 12:307-309.

635. Rempel, W. E. 1946. A study of the importance, overwinter survival, and geographical distribution of internal parasites of sheep in Manitoba. M.Sc.Thesis, U. of Man.

636. Rider, C. L.; and Macy, R. W. 1947. Preliminary survey of the helminth parasites of muskrats in north western Oregon, with description of Hymenolepis ondatrae n. sp. Tr. Am. Micr. Soc. 66:176-181.

637. Riddle, V. H. 1931. A survey of the cestodes in the cats of Winnipeg. M. A. Thesis, Univ. Manitoba.

638. Riser, N. W. 1950. Notes on toto mount technique. Proc. Helm. Soc. Wash. 17:132-133.

639. Ritchie, J. 1916. On an Ayrshire great shrike (Lanius excubitor) also mite from same and (now to Britain) the trematode (L. macrostomum)(Rud.) from the intestine of the shrike. Glasgow Naturalist. 2:43-45.

640. Senger, C. H. 1954. Notes on the growth, developement and survival of two echinostome trematodes. Exp. Parasitol. 3:491-496.

641. Self, J. T.; and Douchard, J. L. 1950. Parasites of the wild turkey, Holeauris gallopavo intermedia Sinnot, from the Wichita Mountains Wildlife Refuge. J. Parasitol. 36: #5.

642. Singh, K. S. 1954. Some trematodes collected in India. Tr. Am. Micr. Soc. 23:202-210.

643. Sinitsin, D. 1931. Studien über die Phylogenie der Trematoden V. Revision of Harmostominae in the light of new facts from their morphology and life history. Ztschr. Parasitenkunde. 3:786-835.

644. Skrjabin, K. I. 1913. Vogeltrematoden aus Russisch Turkestan. Zool. Jahrb. 35:351-388.

645. Smyth, J. D. 1952. Egg shell formation in trematode and cestodes as demonstarted by the methyl or malachite green techniques. Nature. 168:322.

646. _____ 1951. Specific staining of egg-shell material in trematodes and cestodes. Stain Tech. 26:255-256.

647. _____ 1953. Standardization of methyl green for specific staining of egg-shell material in a trematode. 94:243-246.

648. _____ 1954. A technique for the histochemical demonstartion of polyphenol oxidase and its application to egg-shell formation in helminth and byssus formation in Mytilus. Quart. J. Micr. Sci. 95:139-152.

649. Stafford, J. 1900. Some undescribed trematodes. Zool. Jahrb., Syst., 13:399-414.

650. Stewart-Hay, R. K. 1936. I. The problem of enzyme resistance in the sheep tapeworm, Moniezia expansa (Rud., 1805) II. A note on the hemolysins of Moniezia expansa (Rudolphi, 1805). M. Sc. Thesis, Univ. Manitoba.

651. Stiles, C. W.; and Hassall, A. 1900. Index Catalog of medical and veterinary zoology. Bull. 37. Hyg. Lab. U. S. Pub. Health Service, Wash. D. C. 398 pp.

652. (Hassall, A.; et al. 1932.-1955. Index-Catalogue of Medical and Veterinary Zoology. U. S. Dept. Agr. Parts 1-18, and Supplements 1-4.)

653. Stossich, M. 1892. I distomi degli uccelli Lavoro, monographico. Boll. Soc. Adriat, Nat. in Trieste. 13:143-196.

654. Stunkard, H. W. 1934. The life history of Zymbiocoelum cymbium (Diesing, 1850) Kossack, 1911 (Prom: Cyclocoelum Linne) a contribution to the study of the monostomes. Bull. Soc. Zool. France. 59:44-7.

655. _____ 1917. Studies on North American Polystomidae, Aspidogastridae, and Paramphistomidae. Ill. Biol. Monog. 3:71-74.

656. Stunkard, H. W.; and Hinchliffe, M. C. 1952. The morphology and life history of Microbilharzia variglandis (Miller and Northrup, 1926) Stunkard and Hinchliffe, 1951, avian blood-flukes whose larvae cause "Swimmers' itch" of ocean beaches. J. Parasitol. 38:248-265.

657. Todd, A. C. 1947. New records of helminths in chickens from Tennessee. J. Parasitol. 33:170

658. Travassos, L. P. 1922. L. parvum sp. n. in cloaca of Ostinops decumanus. Folia Medica. 3:189.

659. _____ 1939. Um novo Trematodeo parasito da garcas: Fibeirola insignis n. g., n. sp. Bol. Biol. (N.S.) 4:301-304.

660. Tubangui, M. A. 1922. Two new intestinal trematodes from the dog in China. Proc. U.S. Nat. Mus. 60:1-12.

661. Ulmer, M. J. 1952. A critique of methods for the measurement of parasitic worms. Papers Mich. Acad. Sci., Arts and Letters. 36:149-153.

662. _____ 1955. Notes on the morphology and host parasite specificity of Fibricola cratera (Barker and Noll, 1915) Dubois, 1932. (Trematoda: Diplostomatidae). J. Parasitol. 41:460-466.

663. Van Thiel, H. P. 1954. Trematode, Gregarine, and Fungus parasites of anopheline mosquitoes. J. Paras. 40:271-279.

664. Van Haitsma, J. P. 1930. Studies on the trematode family Strigeidae (Holostomidae) No. XX. Parodiplostomum ptychocheilus Faust. Tr. Am. Micr. Soc. 50:140-153.

665. Vernberg, W. B. 1952. Studies on the trematode family Cyathocotylidae Poche, 1926 with the description of a new species of Holostephanus from fish and the life history of Prohemistomum chandleri sp. n. J. Parasitol. 38:327-340.

666. Vianna, L. 1924. Tentativa de catalogacao das especies brasileiras de trematodeos. Mem. Inst. Os. Cruz. 17:95-227.

667. Vidyarthi, R. D. 1937. New avian trematodes of the subfamily Cotylurini Dubois 1936 (Family Strigeidae, Railliet, 1919). Proc. Indian Acad. Sci. 5:315-323.

668. Von Wicklen, J. H. 1946. Trematode genus Opecoeloides and related genera with a description of Onecoeloides polycani n. sp. J. Parasitol. 32:156

669. Ward, H. B. 1909. The influence of hibernation and migration on animal parasites. Proc. 7. Int. Zool. Cong.

670. _____ 1917. On the structure and classification of North American parasites worms. J. Parasitol. 4:1-12.

671. Wardle, R. A. 1934. The viability of tapeworms in artificial media. Physiol. Zool. 7:36-62.

672. _____ 1937. The physiology of tapeworms. Manitoba Essays. pp. 338-361.

673. _____ 1937. The physiology of the sheep tapeworm, Moniezia expansa Blanchard. Canad. J. Research. Sect. D. 15:117-126.

674. Wards' Natural Science Bulletin, p.70. Hematein staining of trematode whole mounts.

675. Wickware, A. B. 1922. Notes on the parasites of domestic fowls in Canada. Canad. Vet. Record. 3:142-146.

676. Wright, R. R. 1879. Contribution to American Helminthology No.1 Proc. Canad. Inst. n. ser. 1:55-75.

677. Wetmore, A. 1951. A revised classification for the birds of the world. Smith. Misc. Coll. 117:1-22, Pub.(4057)

678. Beaver, P. C. 1942. Acquistona, nom. nov. for Pseudechinostomum Shchupakov, 1936 preoccupied by Pseudechinostomum Odhner, 1911. Helminth. Soc. Wash. 9:31.

679. Chandler, A. C. 1955. Introduction to Parasitology. 799 pp. 9th edition. Wiley.

680. Dieing, C. H. 1836. Monographie der Gattungen Amphistoma und Diplodiscus. Ann. Wiener Mus. Naturgesch. 1:(235)-260.

681. Duthoit, C. H. G. 1931. A new species of trematode, genus Notocotylus. Ann. and Mag. Nat. Hist. 7:290-293.

682. Fischoeder, F. 1903. Die Paramphistomiden der Säugethiere. Zool. Jahrb., Abt. System, Geog. u. Biol. Thiere 17:435-66p.

683. Freitas, J. F. T. 1941. Cathaemasioides collis n.g., n. sp. trematodeo parasito de Luscinia melanta (Molina) Mem. Inst. Oswaldo Cruz. 35:569-592.

684. Harral, E. C. 1921. Two new monostomes from Asia. J. Parasitol. 7:162-165.

685. Hoffman, G. L. 1955. Life cycle of Diplostomum (Baer1?) (Trematoda: Strigeidae). 41:22.

686. Houdemer, E. F. 1938. Recherches de parasitologie comparee indo-chinoise. Paris, Le Francoise edit. 235pp.

687. Hyman, L. H. 1951. The Invertebrates-Platyhelminthes and Rhynchocoela. Vol. 2. 550 pp. McGraw-Hill.

688. Lakela, O. 1932. Chickens definitive hosts to species of Prosthogonimus. Poultry Sci. 11:181-184.

689. Levine, N. D.; Clark, D. T.; and Hanson, L. E. 1955. Encephalitis in a swan due to Dendritobilharzia sp. J. Parasitol. 41:36.

690. Manter, H. W. 1949. The trematode Cathaemasia pulchrosa (Travassos, 1916) n. comb. from the body cavity of a kingfisher (Megaceryle alcyon) in Nebraska. J. Parasitol. 35:221

691. Odhner, T. 1911. Nordostafrikanische Trematoden, grösstenteils von Weissen Nil. Results Swed. Zool. Exped. White Nile, Part IV, 166 pp.

692. _____ 1926. Zwei neue Arten der Trematodengattung Cathaemasia Looss. Archiv. fur Zoologie. 18:1-4.

693. Peters, L. E. Jr. 1955. Morphology of the adult and miracidium of a progenetic species of Allocreadium from water beetles of the family Dytiscidae. J. Parasitol. 41:36.

694. Porter, A. 1938. The larval trematodes found in certain South African mollusca with special reference to schistosomiasis (bilharziasis). Publ. South African Inst. Med. Res, No. 42, Vol. VIII, 492 pp. Johannesb.

695. Rothschild, M. 1938. Notes on the classification of the cercariae of the subfamily Notocotyloidea (Trematoda), with special reference to the excretory system. Novit. Zool. 41:75-83.

696. Shchupakov, I. 1936. Parasites of the Caspian Seal. Ann. Koulmoff State Univ. Leningrad 2(3):134-143.

697. Short, R. B. 1955. Chromosomes and sex determination in Schistosomatium douthitti (Fam: Schistosomatidae) [illegible] J. Parasitol. 41:24.

698. _____; and Menzel, M. Y. 1955. Chromosomes in parthenogenetic miracidia of Schistosomatium douthitti and their progeny in snails. J. Parasitol. 41:24-25.

699. Smedley, E. M. 1932. A partial survey of the nematode parasites of Canadian marine and freshwater fishes. M. Sc. Thesis, Univ. Manitoba, Unpublished.

700. Witenberg, G. 1925. Versuch einer Monographie der Trematodenunterfamilie Harmostominae Braun. Zool. Jahrb. Syst. 51:167-254.

701. Kuitunen-Ikheim, E. 1932. A study of the cestode genus Dubothrium in Canadian fishes. M. Sc. Thesis, Univ. Manitoba, Unpublished.