
PARASITES OF FISHES OF BEAUFORT,
NORTH CAROLINA.

By EDWIN LINTON, Ph. D.,
Professor of Biology, Washington and Jefferson College.

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INTRODUCTION.

The following report is based mainly on notes and sketches which were made at the time of collecting at the laboratory of the Bureau of Fisheries, Beaufort, N. C., in the months of July and August, 1901 and 1902. While it has not been possible to subject the whole collection to detailed study, in most cases, especially wherever the character of the material permitted, the information obtained at the time of collecting has been supplemented by subsequent study of the preserved material. Most of the species of distomes, for example, were studied with the aid of specimens which had been stained and mounted in balsam. In a few special cases serial sections were cut in order to clear up some anatomical obscurity.

This report should, perhaps, be understood as a contribution to economic rather than to systematic zoology. It is hoped that it may be followed by more detailed descriptions and more precise determinations than are here essayed.

Since the plan of the report has as its central idea an enumeration of all the parasitic forms which were actually found, brief descriptions are made necessary. In the carrying out of this plan no doubt some forms are mentioned which, even though accompanied with figures, it may not be possible to bring into harmony with subsequent finds. Frequently, after the most painstaking search in a large number of fish, a single distome, for example, would be found in the resulting collection of entozoa which differed specifically and, according to the later classification, generically, from any other find of this or of previous years. Such distome, moreover, even with careful manipulation, may show but a part of the anatomy necessary to a satisfactory determination. To bestow new specific names under such conditions is not to be thought of. On the other hand, if no mention be made of examples of entozoa unless found in sufficient numbers or in such excellent condition as to permit full descriptions, little will be accomplished toward an enumeration of the species which infest our fishes.

To the naturalist no defense need be made for time and energy spent in the study of life in any of its phenomena. To those who are not naturalists, however, some justification is due. Particularly does this become proper when the general public, by means of such laboratories as those of the Bureau of Fisheries, furnishes facilities for scientific inquiry. One who has never undertaken to get knowledge at first-hand from nature is likely to have little conception of the vast amount of work which is oftentimes necessary for the establishment of a very simple proposition. Suppose, for example, exact and complete information is desired as to the food of the English

sparrow. It should not require much reflection to convince anyone that before an adequate answer can be made to such an inquiry trustworthy observations must be made by competent investigators on the feeding habits of this bird, both adult and young, in different localities throughout the year and through a series of years. But the general public may wish to know, and in this case has a right to know, what advantage there is to it in such scientific inquiry as is implied by an investigation made on the food and the parasites of fishes.

It may, I think, be confessed that, so far as may be seen while the investigations are in progress, much of the information which is collected will be of interest only to zoologists. In view, however, of the well-known fact that many diseased conditions and even epidemics result from the presence of parasites, and, further, that the parasites are as a rule introduced, either as eggs or larvæ, along with the food, it is not difficult to see that the more complete and systematic our knowledge becomes of the interrelations of the animals which harbor the parasite—interrelations which depend very intimately on the food habits of fishes—the more certain are we to be able to cope successfully with any disease which may arise. A case in point is furnished by one of the recent triumphs of medical knowledge. It is scarcely possible that the cause of malaria and of yellow fever could have been discovered if it had not been for the previous contributions to knowledge made by investigators in parasitism. The germ of malaria is a parasite whose round of life is passed in the blood cells of man and in certain organs of the mosquito. The germ of yellow fever seems to have a similar history. These interrelations between the mosquito and man were not even dreamed of a generation ago. The history of trichinosis is now so well known that a simple allusion to it in this connection is sufficient. Every well-informed person knows, or may easily know, how the disease is communicated and what part is played in the matter by the pig and by rats and mice.

The immense value to humanity of such a discovery as the cause of malaria and of yellow fever is entirely beyond our powers to estimate; and yet this value must not be credited to this one discovery alone, as if it were a thing apart. No less credit must be given to the long line of investigators whose persistent interrogations of nature have led up to this discovery, and will surely lead to others no less valuable.

In the summer of 1901 the material for study upon which this paper is based was obtained in large part from the fish market, and therefore came from fish of adult size. The following year a good deal of seining was done by the laboratory party. Almost every day, in fact, during the latter half of the season, the seine was dragged in the harbor and adjacent waters. This placed at my disposal not only several species of fishes which had not been examined the preceding year, but, as a rule, much smaller individuals of the common food fishes of the region than those which are taken to the markets. The number of fish examined in 1901 was 842; in 1902 the number was 1,209. As a rule only the viscera and body cavity were examined for entozoa, although occasionally search was made in the muscles for parasites encysted in the flesh, and the character of the food was always noted.

The authority for the names of fishes in this report is Jordan and Evermann's *Fishes of North and Middle America*.

The faithful and efficient work of Mr. C. W. Stone, who assisted me in the collection of material, is most gratefully acknowledged.

ADDITIONS TO THE HELMINTHOLOGY OF NORTH AMERICA.

ACANTHOCEPHALA.

The adult form of *Echinorhynchus sagittifer* Linton is here recorded for the first time. This name was assigned to certain immature forms which have been found on the viscera of several of our food fishes. The adult was found at Beaufort in the intestine of the cobia (*Rachycentron canadus*).

At Woods Hole, Mass., the most abundant species of *Echinorhynchus* is the one which I have referred to the species *E. acus*, which infests a large number of the fishes of that region. It was not found at Beaufort, while *E. pristis*, not common at Woods Hole, was found frequently and in some 14 different hosts.

NEMATODA.

One new nematode is recorded—*Filaria galeata* sp. nov., from the bonnet-head shark (*Sphyrna tiburo*),

The generic name *Heterakis* is used instead of *Cucullanus* for certain small worms which I have recorded under the latter name in my Parasites of the Fishes of the Woods Hole Region. In like manner the same generic name is used for some small nematodes which I recorded in the above-cited paper as *Ascaris* (?) sp.

There is much need of systematic work on those nematodes which are referred by different authors to the genera *Cucullanus*, *Dacnitis*, and *Heterakis*.

Immature nematodes, most, if not all, belonging to the genus *Ascaris*, were found in 33 of the 59 species of fishes examined. So far as these have been studied the most frequently recurring type is characterized by having a diverticulum of the bulbous base of the œsophagus which extends caudad and lies parallel to the intestine. There is also a short diverticulum of the intestine which extends cephalad beside the œsophagus (figs. 26–29, 33). Another type has only the intestinal diverticulum. In it the basal bulb of the œsophagus is elongated instead of being nearly globular as in the others, while the postanal region is usually transversely corrugated (figs. 31, 32).

CESTODA.

Three new cestodes are recorded: *Dibothrium tortum*, *Otobothrium insigne*, *Rhynchobothrium plicatum*. The first, from *Synodus fætens*, should perhaps be referred to a new genus, between *Monobothrium* and *Dibothrium* (*Bothriocephalus*). The second is from *Carcharhinus obscurus*, and the third from *Sphyrna tiburo*.

One of the most interesting finds recorded in this paper is the species of *Rhynchobothrium*, near *R. flexile* Linton, found encysted on the viscera of the toad-fish (*Opsanus tau*). These cysts, occurring as they usually do in clusters (fig. 59), suggest some habit of budding while in the blastocyst (plerocercus) stage. Nothing of this kind, however, was demonstrated. Since this species appears to be very common in the toad-fish of Beaufort, and toad-fish are abundant and easy to get, the form might well repay a more extended study than is given it in this report. The same species was found encysted in six hosts, including the toad-fish.

Rhynchobothrium speciosum Linton was found for the first time in the adult stage. The final host was *Carcharhinus obscurus*. Among the larval forms belonging

to the genus *Rhynchobothrium*, one species was of very frequent occurrence, having been found in 15 different fishes. Doubtless some of the finds, in which the proboscides were not seen extended, also belong to this species, which is usually characterized in these notes as being small, with relatively long hooks, suggesting, indeed, *R. longispine* Linton (figs. 87-93).

Otobothrium crenacolle Linton, recorded in my Woods Hole papers as adult only, in *Sphyrna zygaena*, was found encysted in 14 different Beaufort fishes. It is quite evident that this form is encysted in the fishes of Woods Hole also. *Rhynchobothrium* sp., from *Rhombus triacanthus* (Parasites of Fishes of the Woods Hole Region, pp. 453-454, figs. 255-265) is really *Otobothrium crenacolle*.

Identification of the Tetrarhynchidæ is difficult unless the proboscides can be seen. It is better, indeed, that the proboscides be completely everted, since differences in the size and arrangement of the hooks in some species are often very considerable in different parts of the proboscis. But little can be determined relative to the arrangement of the hooks on the inverted proboscis.

At least two species of the genus *Synbothrium* are represented: *S. filicolle* Linton, neck of scolex elongated, slender; hooks, at least those at the base of the proboscis, slender and spine-like. *Synbothrium* sp., scolex relatively stout; hooks of several different sizes and forms, but all more or less recurved. (Figs. 116-118.)

The latter appears to be near the larval form referred in a former paper to *Tetrarhynchus erinaceus* Beneden (Proceedings U. S. National Museum, vol. xix, 1898, pp. 811-812, pl. LXVII, figs. 1-8), which belongs in the genus *Synbothrium*.

The larval cestodes, doubtless representing several different genera, recorded in Parasites of the Woods Hole Region under the name *Scolex polymorphus*, were found in 34 of the 59 Beaufort fishes examined (figs. 76-79).

As at Woods Hole, these forms are found not only in the alimentary tracts of their hosts, but also in the cystic ducts of several. They are almost never absent from the cystic duct of *Cynoscion regalis*. In all cases where these worms have been obtained from the cystic duct and from the intestine of the same fish, those coming from the cystic duct are larger, plumper, and more opaque than those from the intestine. Some of the older larvæ suggested the genera *Calliobothrium*, *Acanthobothrium*, and *Phoreiobothrium*.

One interesting cyst may be adverted to here (fig. 115) as furnishing an example of the absorption of an encysted larva. The cyst contains two bunches of hooks, which represent all that is left of a larval cestode, probably *Tetrarhynchus bisulcatus*.

TREMATODA.

It has been thought best to retain the generic name *Distomum* (see Bulletin of the U. S. Fish Commission for 1899, p. 408). Respecting the classification of the distomes, the author is aware that his papers should be brought into some sort of harmony with the nomenclature of Loos, Lühe, Pratt, Stiles, and others. An attempt indeed was made to refer some of the new forms to genera into which the old genus *Distomum* has been broken up, but the result was not altogether satisfactory, in that it seemed to necessitate the creation of still other new genera, which, in view of the small number of specimens in many cases, and their poor condition, or immaturity in others, seemed to me to be an undesirable thing to do.

The following new specific names are proposed:

- Aspidogaster ringens* from *Micropogon undulatus* and *Trachinotus carolinus*.
Distomum aduncum from *Opsanus tau*.
Distomum corpulentum from *Lagodon rhomboides* and *Orthopristis chrysopterus*.
Distomum imparispine from *Rachycentron canadus*.
Distomum inconstans from *Chactodipterus faber*.
Distomum pectinatum from *Bairdiella chrysura* and *Trachinotus carolinus*.
Gasterostomum baculum from *Scomberomorus maculatus*.
Gasterostomum gorgon from *Seriola lalandi*.

Other distomes were found which are evidently new, but to which it is not desirable to give names until more material is available. The form shown in fig. 204 is a case in point. In the find represented by that figure there was but one specimen, and it was necessary to cut it into sections before the anatomy could be made out.

The appendiculate distomes referred to the species *D. monticellii* were found in 19 species of fish. In many cases they were immature, so that identification was not always certain. The ratio between oral and ventral sucker was not uniform. In some the diameter of the ventral sucker was less than twice that of the oral; in others it was more than three times as great. In the case of the specimens from *Menticirrhus americanus* it is likely that more than one species is recorded under *D. monticellii*. The adult worms referred to this species agree fairly well with the one from *Rachycentron canadus* (fig. 154). The most characteristic feature is the lobed vitelline glands.

I think that there is much reason to believe that the same species of distome is affected differently by different specific hosts in which it becomes adult.

The forms which were referred to the genus *Aspidogaster* were particularly difficult to classify. Their position in this genus must be regarded as provisional, and points to the probable necessity of either extending the limits of the genus *Aspidogaster*, or of establishing a new genus.

A *Gasterostomum*, found in 8 species of fishes, has been referred to the species *G. gracilescens* Rudolphi.

The abundance of representatives of this genus is especially interesting and suggestive in view of the relative abundance of the larval *Gasterostomum* (*Bucephalus haimeanus* Lacaze-Duthiers) in the oyster.

In all cases the number of trematodes and of adult cestodes, nematodes and acanthocephala given on any date represents all that were seen. This is not the case, however, with many of the encysted forms. In a few cases the number recorded simply indicates the number of cysts collected by my assistant. As a matter of fact, such forms as the encysted larvæ of *Otobothrium crenacolle* and *Tetrarhynchus bisulcatus* as a rule occur in relatively large numbers.

The plan followed in this paper, of arranging the parasites by number under the several hosts, will, it is believed, make it possible to refer to any form with almost as much precision as if specific names had been given less sparingly. In order to simplify the work of printing this report a list has been prepared of all the species mentioned in it which have been described in my former papers, with references to the literature. References to the appended list of papers only are given, since in them will be found citations to other and older literature.

PAPERS REFERRED TO BY NUMBER IN THE FOLLOWING LIST OF ENTOZOA.

1. Notes on Entozoa of Marine Fishes of New England. Report U. S. Fish Commission for 1886.
2. Notes on Entozoa of Marine Fishes of New England. Part II, Cestodes. Report U. S. Fish Commission for 1887.
3. Notes on Entozoa of Marine Fishes of New England. Part III, Acanthocephala. Report U. S. Fish Commission for 1888.
4. Notes on Larval Cestode Parasites of Fishes. Proceedings U. S. National Museum. Vol. XIX. 1897.
5. Notes on Cestode Parasites of Fishes. Proceedings U. S. National Museum. Vol. XX. 1897.
6. Notes on Trematode Parasites of Fishes. Proceedings U. S. National Museum. Vol. XX. 1897.
7. Fish Parasites collected at Woods Hole in 1898. Bulletin U. S. Fish Commission for 1899. (1900.)
8. Parasites of Fishes of the Woods Hole Region. Bulletin U. S. Fish Commission for 1899. (1901.)

LIST OF ENTOZOA MENTIONED IN THIS REPORT, WITH REFERENCES TO ORIGINAL DESCRIPTIONS AND MORE IMPORTANT DESCRIPTIVE NOTES PUBLISHED IN THE AUTHOR'S EARLIER PAPERS.

[Figures in heavy-faced type refer to the preceding list of papers.]

NOTE.—Many of the references to **S** are to alphabetic lists, where detailed references will be found. Only species which are mentioned in the author's previous papers are included in this list.

- Acanthobothrium paulum* Linton. **2**, pp. 816-819, pl. VIII, figs. 1-7. **7**, p. 275. **S**, p. 411.
- Anthobothrium laciniatum* Linton. **2**, pp. 754-759, pl. III, figs. 10-13; pl. IV, figs. 1-3. **5**, p. 439. **S**, p. 411.
- Anthobothrium pulvinatum* Linton. **2**, pp. 759-765, pl. IV, figs. 4-9; pl. V, figs. 1-2. **5**, pp. 439-440, pl. XXX, fig. 1. **7**, p. 275. **S**, p. 411.
- Anthocephalum gracile* Linton. **2**, pp. 794-796, pl. VII, figs. 1-2. **7**, p. 275. **S**, p. 411.
- Ascaris brevicapitata* Linton. **S**, p. 425, pl. III, figs. 19-22.
- Ascaris habena* Linton. **7**, pp. 282, 302-303, pl. XLIII, figs. 109-115. **S**, p. 468.
- Ascaris increscens* Molin. **S**, p. 452, pl. VIII, figs. 62-64, and pp. 487-488.
- Ascaris iniquus* Linton. **S**, p. 452, pl. VI, figs. 46-50.
- Ascaris incurva* Rudolphi. **S**, pp. 410, 446-448, 481, pl. IV, figs. 29-32.
- Ascaris neglecta* Leidy. **S**, p. 465, pl. V, figs. 33-36.
- Crossobothrium angustum* Linton (*Orygmatobothrium angustum*). **1**, pp. 468-469, pl. III, figs. 1-3. **2**, pp. 796-799, pl. VII, fig. 3. **5**, p. 443. **7**, p. 272. **S**, pp. 426, 427.
- Distomum appendiculatum* Rudolphi. **7**, p. 289, pl. XXXVI, figs. 25, 26. **S**, p. 415, etc., pl. XXVIII, figs. 312-314; in eighteen hosts.
- Distomum areolatum* Rudolphi. **7**, pp. 279, 293-294, pl. XXXIX, figs. 60-63. **S**, p. 415, etc.
- Distomum bothryophoron* Olsson. **S**, pp. 437, 439, pl. XXXII, figs. 355, 356.
- Distomum dentatum* Linton. **7**, pp. 283, 294, pl. XXXIX, figs. 64-67. **S**, p. 483.
- Distomum globiporum* Rudolphi. **S**, p. 486, pl. XXXI, fig. 347.
- Distomum grandiporum* Rudolphi. **6**, pp. 520-521, pl. XLIV, fig. 9. **S**, p. 486.
- Distomum hispidum* Abilgaard. **S**, p. 478, pl. XXIX, figs. 321-323.
- Distomum monticellii* Linton. **6**, pp. 518-520, pl. XLIV, figs. 2-8. **S**, pp. 451, 473, 482.
- Distomum nigroflavum* Rudolphi. **6**, pp. 530-531, pl. XLVIII, figs. 8-11, and pl. XLIX, figs. 1, 2. **7**, p. 282. **S**, p. 466.
- Distomum polyorchis* Stossich. **S**, p. 460-461, pl. XXXIII, figs. 363-365.
- Distomum pudens* Linton. **7**, pp. 283, 290-291, pl. XXXVII, figs. 40-47.
- Distomum pyriforme* Linton. **7**, pp. 279, 292-293, pl. XXXVIII, figs. 52-59. **S**, p. 415, etc.
- Distomum simplex* Rudolphi. **6**, pp. 525-526, pl. XLVIII, figs. 3-7. **S**, p. 415, etc., pl. XXX, figs. 331, 332.
- Distomum tenue* Linton. **6**, pp. 535-536, pl. LII, figs. 2-8. **S**, pp. 455, 468.
- Distomum tornatum* Rudolphi. **6**, pp. 513-514, pl. XLII, figs. 6-12. **S**, pp. 442, 444, 452, 455, 469, pl. XXVIII, fig. 310.

- Distomum valde-inflatum* Stossich. **6**, pp. 527-528, pl. XLVII, figs. 10-14 and pl. XLVIII, figs. 1, 2. **8**, pp. 444, 464.
- Distomum vibex* Linton. **7**, pp. 281, 291-292, pl. XXXVIII, figs. 48-51. **8**, p. 464.
- Distomum vitellosum* Linton. **7**, p. 290, pl. XXXVII, figs. 38, 39. **8**, p. 416, etc., pl. XXX, figs. 333-340; in eighteen hosts.
- Echinorhynchus pristin* Rudolphi. **3**, pp. 530-532, pl. LVI, figs. 31-41, pl. LVII, figs. 42-53. **8**, p. 409, etc., figs. 12-14.
- Echinorhynchus proteus* Westrumb. **1**, pp. 496-497, pl. VI, figs. 3-5. **3**, pp. 537-538, pl. LX, figs. 85-88. **8**, p. 409.
- Echinorhynchus sagittifer* Linton. **1**, pp. 493-496, pl. VI, figs. 1, 2. **3**, pp. 535-536, pl. LIX, fig. 80. **8**, p. 409, etc.
- Gasterostomum arcuatum* Linton. **7**, pp. 297-298, pl. LXI, figs. 85-90. **8**, pp. 427, 446.
- Gasterostomum baculum* sp. nov. **8** (*Gasterostomum* sp.), p. 447, pl. XXXIV, figs. 369-372.
- Heterakis foveolata* Rudolphi. **8** (*Cucullanus globosus*, and sp.), pp. 476, 488, pl. XVII, figs. 205, 206.
- Heterakis* sp. **8** (*Ascaris* (?) sp.), p. 481, pl. VII, figs. 57-61, (*Cucullanus* sp.), p. 441, pl. XVII, figs. 207, 208.
- Ichthyonema globiceps* Rudolphi. **8**, pp. 437, 446, 450, 457, pl. XVIII, figs. 209-217.
- Lecanicephalus pellatum* Linton. **2**, pp. 802-805, pl. IX, figs. 2-4. **7**, p. 275. **8**, p. 433.
- Lecanicephalus annulatus* Molin. **8**, p. 455, pl. XIX, figs. 220-223.
- Monostomum vinal-edwardsii* Linton. **8**, p. 470, pl. XXXIV, figs. 373-376.
- Onchobothrium uncinatum* Diesing. **5**, p. 446, pl. XXXIV, figs. 2-5. **8**, p. 433.
- Otobothrium crenacolle* Linton. **2**, pp. 850-853, pl. XIII, figs. 9-15, pl. XIV, figs. 1-4. **7**, p. 273. **8**, p. 428.
- Otobothrium dipsacum* Linton. **4**, pp. 806-807, pl. LXVI, figs. 1-5.
- Paratemia medusia* Linton. **2**, pp. 862-866, pl. XV, figs. 5-9. **5**, p. 440. **7**, p. 275. **8**, p. 433.
- Phoreiobothrium lasium* Linton. **1**, pp. 474-476, pl. IV, figs. 24-29. **2**, pp. 819-820. **5**, p. 447. **7**, pp. 272-273. **8**, pp. 426, 427, 428.
- Phoreiobothrium triloculatum* Linton. **8**, p. 427, pl. XXVI, fig. 292.
- Phyllobothrium foliatum* Linton. **2**, pp. 787-794, pl. VI, figs. 5-10. **5**, p. 443. **7**, p. 275. **8**, p. 433.
- Rhinebothrium flexile* Linton. **2**, pp. 768-771, pl. V, figs. 3-5. **7**, p. 275. **8**, p. 433.
- Rhynchobothrium bulbifer* Linton. **1** (*R. tenuicolle* Rudolphi), pp. 486-488, 7 pl. V, figs. 17, 18. **2**, pp. 825-829, pl. X, figs. 8, 9, pl. XI, figs. 1, 2. **4**, p. 793. **5**, p. 448. **8**, 412, etc.; noted in seven hosts.
- Rhynchobothrium hispidum* Linton. **2**, pp. 833-835, pl. IX, figs. 12-17. **7**, p. 275. **8**, p. 433.
- Rhynchobothrium longispine* Linton. **2**, pp. 835-837, pl. XI, figs. 18-20.
- Rhynchobothrium speciosum* Linton. **4**, pp. 801-805, pl. LXIV, figs. 13, 14, pl. LXV, figs. 1-7. **7**, p. 784. **8**, p. 413, etc.; noted in eleven hosts.
- Rhynchobothrium tenuispine* Linton. **2**, pp. 837-838, pl. XII, figs. 1, 2. **5**, pp. 448-449, pl. XXXIV, fig. 8. **8**, 426, 433.
- Rhynchobothrium tumidulum* Linton. **2**, pp. 829-832, pl. XI, figs. 3-11. **8**, p. 468.
- Scolex polymorphus* Rudolphi. **1** (larval *Tetrabothria*), pp. 3-4, pl. VI, figs. 8, 9. **4** (larval *Echenei-*
bothria), pp. 789-792, pl. I, figs. 4-15. **7**, noted under name of "larval cestodes," as occurring in a number of hosts, pp. 270-284. **8**, p. 413, etc.; noted in twenty-eight hosts.
- Spongiobothrium variabile* Linton. **1**, pp. 462-464, pl. II, figs. 13-16. **2**, pp. 778-780. **5**, p. 442. **7**, p. 275. **8**, p. 433.
- Symbolium filicolle* Linton. **2** (*Syndesmobothrium filicolle*), pp. 861-862, pl. XV, figs. 2-4. **4**, p. 819, pl. LXVIII, fig. 10. **7**, p. 275. **8**, pp. 413-414, etc.; noted in ten hosts.
- Tetrarhynchus bicolor* Bartels. **4**, pp. 813-815, pl. LXVIII, figs. 1-6. **7**, p. 271. **8**, p. 414, etc.; noted in six hosts.
- Tetrarhynchus bisulcatus* Linton. **1** (*Rhynchobothrium bisulcatum*), pp. 479-486, pl. IV, figs. 9-23. **2**, pp. 857-861, pl. XIV, figs. 10-12, pl. XV, fig. 1. **4**, pp. 810-811, pl. LXVI, figs. 11-15. **5**, p. 452. **7**, p. 272. **8**, p. 414, etc.; noted in twelve hosts.
- Tetrarhynchus emineus* Beneden. **4**, pp. 811-812, pl. LXVII, figs. 1-8. **8**, pp. 451, 454, 460.
- Tetrarhynchus robustus* Linton. **2**, pp. 855-857, pl. XIV, figs. 7-9. **8**, p. 414, etc.; noted in five hosts.

LIST OF PARASITES AND THEIR HOSTS.

ACANTHOCEPHALA.

Parasite.	Host.	Page.
<i>Echinorhynchus pristis</i> Rudolphi.....	<i>Bairdiella chrysur</i>	387
	<i>Cynoscion regalis</i>	384
	<i>Dasyatis say</i>	346
	<i>Fundulus majalis</i>	355
	<i>Lagodon rhomboides</i>	380
	<i>Leiostomus xanthurus</i>	392
	<i>Lophopsetta maculata</i>	414
	<i>Menticirrhus americanus</i>	398
	<i>Micropogon undulatus</i>	394
	<i>Monacanthus hispidus</i>	401
	<i>Orthopristis chrysopterus</i>	377
	<i>Paralichthys albiguttus</i>	411
	<i>Pomatomus saltatrix</i>	368
<i>Echinorhynchus proteus</i> Westrumb.....	<i>Symphurus plagiura</i>	416
	<i>Synodus foetens</i>	353
<i>Echinorhynchus sagittifer</i> Linton (adult).....	<i>Rachycentron canadus</i>	371
	<i>Coryphæna hippurus</i>	372
<i>Echinorhynchus sagittifer</i> Linton (young).....	<i>Cynoscion regalis</i>	384
	<i>Lagodon rhomboides</i>	381
	<i>Micropogon undulatus</i>	394
	<i>Orthopristis chrysopterus</i>	377
	<i>Paralichthys albiguttus</i>	411
	<i>Paralichthys dentatus</i>	410
	<i>Prionotus tribulus</i>	404
	<i>Synodus foetens</i>	353
<i>Echinorhynchus sp. (fragments)</i>	<i>Cynoscion regalis</i>	384
	<i>Paralichthys albiguttus</i>	411

NEMATODA.

<i>Ascaris brevicapitata</i> Linton.....	<i>Carcharhinus obscurus</i>	339
	<i>Carcharhinus obscurus</i>	339
<i>Ascaris habena</i> Linton.....	<i>Leiostomus xanthurus</i>	392
	<i>Opsanus tau</i>	406
<i>Ascaris increscens</i> Molin.....	<i>Scollodon terre-nove</i>	342
	<i>Coryphæna hippurus</i>	372
<i>Ascaris ineurva</i> Rudolphi.....	<i>Seriola lalandi</i>	364
<i>Ascaris iniquus</i> Linton.....	<i>Rachycentron canadus</i>	371
<i>Ascaris neglecta</i> Leidy.....	<i>Chilomycterus schapfi</i>	403
<i>Ascaris sp</i>	<i>Kyphosus sectatrix</i>	383
<i>Ascaris sp</i>	<i>Coryphæna hippurus</i>	372
<i>Ascaris sp</i>	<i>Micropogon undulatus</i>	395
<i>Filaria galcata sp. nov</i>	<i>Coryphæna equisetis</i>	374
	<i>Sphyrna tiburo</i>	344
<i>Heterakis foveolata</i> Rudolphi.....	<i>Anguilla chryssa</i>	351
	<i>Galeichthys milberti</i>	350
	<i>Leptocephalus conger</i>	351
	<i>Micropogon undulatus</i>	395
	<i>Leiostomus xanthurus</i>	392
	<i>Lophopsetta maculata</i>	414
<i>Heterakis sp</i>	<i>Paralichthys albiguttus</i>	412
	<i>Scienops ocellatus</i>	390
<i>Ichthyonema globiceps</i> Rudolphi.....	<i>Paralichthys albiguttus</i>	412
<i>Ichthyonema sp</i>	<i>Pomatomus saltatrix</i>	368
	<i>Coryphæna hippurus</i>	372
Immature nematodes (<i>Ascaris</i>), usually encysted on viscera. Type with a diverticulum from the base of the esophagus and another from the anterior end of the intestine (figs. 26-30).	<i>Bairdiella chrysur</i>	387
	<i>Brevoortia tyrannus</i>	352
	<i>Centropristes striatus</i>	375
	<i>Cynoscion nebulosus</i>	385
	<i>Cynoscion regalis</i>	384
	<i>Fundulus majalis</i>	355
	<i>Hyporhamphus roberti</i>	358
	<i>Leiostomus xanthurus</i>	392
	<i>Lophopsetta maculata</i>	414
	<i>Menidia menidia</i>	360
	<i>Menticirrhus americanus</i>	398
	<i>Micropogon undulatus</i>	395
	<i>Opsanus tau</i>	407
	<i>Orthopristis chrysopterus</i>	377
	<i>Paralichthys albiguttus</i>	412
	<i>Paralichthys dentatus</i>	411
	<i>Pomatomus saltatrix</i>	368
	<i>Prionotus scitulus</i>	404
	<i>Prionotus tribulus</i>	404
	<i>Scollodon terre-nove</i>	342
<i>Spheroides maculatus</i>	402	
<i>Stolephorus brownii</i>	353	
<i>Synodus foetens</i>	354	
<i>Trachinotus carolinus</i>	366	
<i>Tylosurus raphidoma</i>	357	

List of parasites and their hosts—Continued.

NEMATODA—Continued.

Parasite.	Host.	Page.
	<i>Bairdiella chrysur</i>	387
	<i>Caranx hippos</i>	365
	<i>Carcharhinus milberti</i>	341
	<i>Centropriestes striatus</i>	375
	<i>Coryphaena hippurus</i>	372
	<i>Lagodon rhomboides</i>	381
	<i>Paralichthys albiguttus</i>	412
	<i>Paralichthys dentatus</i>	411
	<i>Pomatomus saltatrix</i>	368
	<i>Scoliodon terre-novae</i>	342
	<i>Scomberomorus regalis</i>	363
	<i>Tylosurus marinus</i>	356
Immature nematodes (<i>Ascaris</i>), usually encysted on viscera.	<i>Centropriestes striatus</i>	375
Type with basal bulb of oesophagus elongate and without diverticulum, intestine with diverticulum at anterior end, post-anal region transversely corrugated (figs. 31, 32).	<i>Micropogon undulatus</i>	395
Immature nematodes (<i>Ascaris</i>)	<i>Galeichthys milberti</i>	350
Type with clavate oesophagus.	<i>Pomatomus saltatrix</i>	368
Immature nematodes (minute)	<i>Pteroplatea maculata</i>	349
<i>Lecanocephalus annulatus</i> Molin	<i>Diplodus holbrookii</i>	383
Nematode (fragment)	<i>Menticirrhus americanus</i>	398
	<i>Eucinostomus gula</i>	383
Nematodes (small, probably two species)	<i>Lelostomus xanthurus</i>	392
	<i>Tylosurus marinus</i>	356

CESTODA.

<i>Acanthobothrium paulum</i> Linton	<i>Dasyatis say</i>	348
	<i>Pteroplatea maculata</i>	349
	<i>Raja levis</i>	346
<i>Anthobothrium laciniatum</i> Linton	<i>Carcharhinus obscurus</i>	339
	<i>Scoliodon terre-novae</i>	343
<i>Anthobothrium pulvinatum</i> Linton	<i>Dasyatis say</i>	346
<i>Anthocephalum gracile</i> Linton	<i>Dasyatis say</i>	347
<i>Calliobothrium</i> sp.	<i>Scoliodon terre-novae</i>	342
	<i>Bairdiella chrysur</i>	387
	<i>Lagodon rhomboides</i>	381
	<i>Lelostomus xanthurus</i>	393
	<i>Leptocephalus conger</i>	351
Cestode cysts and larvae	<i>Lophopsetta maculata</i>	415
	<i>Paralichthys albiguttus</i>	412
	<i>Pomatomus saltatrix</i>	369
	<i>Rachycentron canadus</i>	371
	<i>Scomberomorus regalis</i>	363
	<i>Carcharhinus obscurus</i>	339
<i>Crossobothrium angustum</i> Linton	<i>Scoliodon terre-novae</i>	343
	<i>Anguilla chrysa</i>	351
	<i>Centropriestes striatus</i>	375
	<i>Hyporhamphus roberti</i>	358
<i>Dibothrium</i> , larva	<i>Lophopsetta maculata</i>	415
	<i>Paralichthys albiguttus</i>	412
	<i>Pomatomus saltatrix</i>	369
<i>Dibothrium tortum</i> sp. nov.	<i>Synodus foetens</i>	354
<i>Echeneibothrium</i> sp.	<i>Dasyatis say</i>	346
<i>Lecanicephalum peltatum</i> Linton	<i>Dasyatis say</i>	347
<i>Onchobothrium uncinatum</i> Diesing	<i>Dasyatis say</i>	347
	<i>Bairdiella chrysur</i>	388
	<i>Carcharhinus obscurus</i>	340
	<i>Coryphaena hippurus</i>	372
	<i>Cynoscion nebulosus</i>	386
	<i>Cynoscion regalis</i>	384
	<i>Galeichthys milberti</i>	350
<i>Otobothrium crenacolle</i> Linton, encysted	<i>Lagodon rhomboides</i>	381
	<i>Micropogon undulatus</i>	395
	<i>Opsanus tau</i>	409
	<i>Orthopristis chrysopterus</i>	377
	<i>Paralichthys albiguttus</i>	413
	<i>Pomatomus saltatrix</i>	369
	<i>Scomberomorus regalis</i>	363
<i>Otobothrium crenacolle</i> Linton (adult)	<i>Scoliodon terre-novae</i>	344
<i>Otobothrium dipsacum</i> Linton	<i>Centropriestes striatus</i>	375
<i>Otobothrium insigne</i> sp. nov.	<i>Carcharhinus obscurus</i>	340
<i>Otobothrium</i> sp., encysted	<i>Tylosurus raphidoma</i>	357
<i>Paratænia medusa</i> Linton	<i>Dasyatis say</i>	347
<i>Phoreobothrium lasium</i> Linton	<i>Carcharhinus obscurus</i>	340
	<i>Scoliodon terre-novae</i>	343
<i>Phoreobothrium triloculatum</i> Linton	<i>Carcharhinus obscurus</i>	340
	<i>Scoliodon terre-novae</i>	343
<i>Phyllobothrium foliatum</i> Linton	<i>Carcharhinus obscurus</i>	340
	<i>Dasyatis say</i>	347

List of parasites and their hosts—Continued.

CESTODA—Continued.

Parasite.	Host.	Page.
Rhinebothrium flexile Linton	Dasyatis say	347
	Scolliodon terra-novæ	342
Rhinebothrium sp., encysted. Near <i>R. flexile</i>	Cynoscion regalis	384
	Dasyatis centrura	347
	Micropogon undulatus	395
	Opsanus tau	407
	Rachycentron canadus	371
	Siphostoma fuscum	359
Rhynchobothrium hispidum Linton	Dasyatis say	348
Rhynchobothrium plicatum sp. nov.	Sphyrna tiburo	345
	Scolliodon terra-novæ	343
Rhynchobothrium sp. (fig. 131)	Sphyrna tiburo	345
Rhynchobothrium sp. (figs. 129-130c)	Dasyatis say	348
Rhynchobothrium speciosum Linton (adult)	Scolliodon terra-novæ	343
	Carcharhinus obscurus	340
Rhynchobothrium speciosum Linton (encysted)	Coryphæna hippurus	373
	Cynoscion regalis	384
Rhynchobothrium tenuispine Linton (adult)	Pomatomus saltatrix	369
	Dasyatis say	348
Rhynchobothrium tenuispine Linton (encysted)	Micropogon undulatus	395
Rhynchobothrium tumidulum Linton (adult)	Dasyatis say	348
Rhynchobothrium tumidulum Linton (encysted)	Opsanus tau	409
	Anguilla chrysypa	351
	Bairdiella chrysura	388
	Centropristes striatus	375
	Lagodon rhomboides	381
	Leiostomus xanthurus	393
	Micropogon undulatus	395
	Orthopristes chrysopterus	377
Rhynchobothrium sp. (encysted)	Paralichthys albigitus	412
Cysts usually small, oval, often clustered in mesentery and on viscera.	Paralichthys dentatus	411
	Prionotus scitulus	404
Larvæ rather short, but with comparatively long contractile bulbs and hooks, suggesting <i>R. longispine</i> (figs. 87-94).	Prionotus tribulus	405
	Pteroplatea maculata	349
	Rachycentron canadus	371
	Synodus foetens	354
	Trachinotus carolinus	366
		Bairdiella chrysura .....	388
Rhynchobothrium sp. (encysted)	Centropristes striatus	375
	Cynoscion regalis	384
Cysts usually small, elliptical, or fusiform on viscera.	Orthopristes chrysopterus	377
		Bairdiella chrysura .....	388
	Centropristes striatus	375
	Cynoscion nebulosus	386
Rhynchobothrium sp. (encysted)	Menticirrhus americanus	398
	Micropogon undulatus	395
Cysts usually small, various shapes on viscera.	Orthopristis chrysopterus	377
	Pomatomus saltatrix	369
Larvæ with long necks and proboscides, small, but not minute hooks, suggesting form like <i>R. plicatum</i> (figs. 97, 98).		
		Elops saurus .....	352
Rhynchobothrium sp. (encysted)	Galeichthys milberti	350
	Scomberomorus maculatus	362
Cysts on viscera.	Scomberomorus regalis	363
		Menticirrhus americanus .....	399
Larvæ with broad, emarginate bothria, some at least having elevated borders (figs. 99, 100).	Anguilla chrysypa	351
	Bairdiella chrysura	387
Rhynchobothrium sp. (larva)	Centropristes striatus	375
	Coryphæna equisetis	374
	Cynoscion nebulosus	385
	Cynoscion regalis	384
	Diplodus holbrookii	383
	Etropsus crossotus	415
Scolex polymorphus Rudolphi	Fundulus heteroclitus	356
	Galeichthys milberti	350
	Hyporhamphus roberti	358
	Lagodon rhomboides	381
	Leiostomus xanthurus	393
	Leptocephalus conger	351
	Lophopsetta maculata	415
	Menidia menidia	360
	Menticirrhus americanus	398
	Micropogon undulatus	395

List of parasites and their hosts—Continued.

CESTODA—Continued.

Parasite.	Host.	Page.
	(<i>Monacanthus hispidus</i>	401
	<i>Opsanus tau</i>	407
	<i>Orthopristis chrysopterus</i>	377
	<i>Paralichthys albiguttus</i>	412
	<i>Prionotus tribulus</i>	405
	<i>Pomatomus saltatrix</i>	369
	<i>Pteroplatea maclura</i>	349
<i>Scolex polymorphus</i> Rudolphi	<i>Rachycentron canadus</i>	371
	<i>Sciaenops ocellatus</i>	390
	<i>Scoliodon terra-novae</i>	342
	<i>Siphostoma fuscum</i>	359
	<i>Stoleporus brownii</i>	353
	<i>Symphurus plagiusa</i>	416
	<i>Synodus foetens</i>	354
	<i>Trachinotus carolinus</i>	366
	<i>Tylosurus marinus</i>	356
<i>Spongiobothrium variabile</i> Linton	<i>Dasyatis say</i>	347
<i>Synbothrium filicolle</i> Linton	<i>Carcharhinus milberti</i>	341
	<i>Carcharhinus obscurus</i>	341
	<i>Lophopsetta maculata</i>	415
	<i>Micropogon undulatus</i>	396
	<i>Paralichthys albiguttus</i>	413
<i>Synbothrium filicolle</i> Linton (encysted)	<i>Pomatomus saltatrix</i>	369
	<i>Pteroplatea maclura</i>	349
	<i>Scoliodon terra-novae</i>	344
	<i>Scomberomorus maculatus</i>	362
	<i>Scomberomorus regalis</i>	363
	<i>Cynoscion regalis</i>	385
<i>Synbothrium</i> sp	<i>Galeichthys milberti</i>	350
Type with strong, recurved hooks.	<i>Orthopristis chrysopterus</i>	377
<i>Taenia</i> sp. (encysted)	<i>Pomatomus saltatrix</i>	369
<i>Tetrarhynchus bicolor</i> Bartels	<i>Fundulus majalis</i>	355
	<i>Coryphæna hippurus</i>	373
<i>Tetrarhynchus bisuleatus</i> Linton (adult)	<i>Carcharhinus milberti</i>	371
	<i>Carcharhinus obscurus</i>	340
	<i>Scoliodon terra-novae</i>	344
	<i>Bairdiella chrysuræ</i>	388
	<i>Caranx hippos</i>	365
	<i>Cynoscion nebulosus</i>	386
	<i>Cynoscion regalis</i>	385
	<i>Lagodon rhomboides</i>	381
	<i>Leiostomus xanthurus</i>	393
	<i>Lophopsetta maculata</i>	415
	<i>Acenticirrus americanus</i>	399
	<i>Micropogon undulatus</i>	395
	<i>Opsanus tau</i>	409
	<i>Orthopristis chrysopterus</i>	377
<i>Tetrarhynchus bisulcatus</i> Linton (encysted)	<i>Paralichthys albiguttus</i>	413
Usually in submucosa of alimentary canal, especially in the stomach.	<i>Pomatomus saltatrix</i>	369
	<i>Prionotus scitulus</i>	404
	<i>Prionotus tribulus</i>	405
	<i>Rachycentron canadus</i>	371
	<i>Scomberomorus regalis</i>	363
	<i>Scomberomorus maculatus</i>	362
	<i>Silene vomer</i>	366
	<i>Siphostoma fuscum</i>	359
	<i>Spheroides maculatus</i>	402
	<i>Symphurus plagiusa</i>	416
<i>Tetrarhynchus robustus</i> Linton	<i>Carcharhinus obscurus</i>	341

TREMATODA.

<i>Aspidogaster ringens</i> sp. nov.	<i>Micropogon undulatus</i>	397
<i>Cercarie</i>	<i>Trachinotus carolinus</i>	367
<i>Dactylocotyle</i> sp	<i>Monacanthus hispidus</i>	401
<i>Diclidophora</i> sp	<i>Brevoortia tyrannus</i>	352
<i>Distomum aduncum</i> sp. nov.	<i>Orthopristis chrysopterus</i>	380
	<i>Opsanus tau</i>	409
	<i>Brevoortia tyrannus</i>	352
	<i>Caranx hippos</i>	365
	<i>Coryphæna equisetis</i>	374
	<i>Lagodon rhomboides</i>	382
<i>Distomum appendiculatum</i> Rudolphi	<i>Leiostomus xanthurus</i>	393
	<i>Lophopsetta maculata</i>	415
	<i>Orthopristis chrysopterus</i>	378
	<i>Prionotus scitulus</i>	404
	<i>Prionotus tribulus</i>	405

List of parasites and their hosts—Continued.

TREMATODA—Continued.

Parasite.	Host.	Page.
Distomum areolatum Rudolphi	Bairdiella chrysurum	389
	Micropogon undulatus	396
	Orthopristis chrysopterus	379
	Sciaenops ocellatus	391
Distomum bothryophoron Olsson	Micropogon undulatus	397
	Orthopristis chrysopterus	378
	Paralichthys dentatus	411
	Lagodon rhomboides	382
Distomum corpulentum sp. nov.	Orthopristis chrysopterus	378
	Coryphæna equisetis	374
	Lophopsetta maculata	415
	Micropogon undulatus	396
Distomum dentatum Linton	Paralichthys albiguttus	413
	Paralichthys dentatus	411
	Pomatomus saltatrix	369
	Rachycentron canadus	372
Distomum globiporum Rudolphi	Fundulus majalis	356
	Leiostomus xanthurus	393
	Orthopristis chrysopterus	378
	Leptocephalus conger	351
Distomum grandiporum Rudolphi	Menticirrhus americanus	400
Distomum hispidum Abilgaard	Seriola lalandi	364
Distomum imparispine sp. nov.	Rachycentron canadus	371
Distomum inconstans sp. nov.	Chaetodipterus faber	400
	Bairdiella chrysurum	388
Distomum monticelli Linton	Centropristes striatus	376
	Coryphæna equisetis	374
	Coryphæna hippurus	373
	Cynoscion nebulosus	386
	Lagodon rhomboides	381
	Leiostomus xanthurus	393
	Menidia menidia	360
	Menticirrhus americanus	399
	Micropogon undulatus	396
	Paralichthys albiguttus	413
	Paralichthys dentatus	411
	Pomatomus saltatrix	369
	Prionotus tribulus	405
	Rachycentron canadus	371
Scomberomorus regalis	363	
Distomum nigroflavum Rudolphi	Seriola lalandi	364
	Synodus fætens	354
	Trachinotus carolinus	366
	Coryphæna equisetis	374
Distomum pectinatum, sp. nov.	Bairdiella chrysurum	389
	Trachinotus carolinus	366
Distomum polyorehis Stossich	Cynoscion regalis	385
Distomum pudens Linton	Paralichthys albiguttus	413
	Rachycentron canadus	372
	Brevoortia tyrannus	352
Distomum pyriforme Linton	Lagodon rhomboides	382
	Menidia menidia	360
Distomum simplex Rudolphi	Micropogon undulatus	397
	Caranx hippos	365
	Centropristes striatus	376
	Coryphæna equisetis	374
	Coryphæna hippurus	373
	Cynoscion nebulosus	386
	Menticirrhus americanus	399
	Micropogon undulatus	396
	Orthopristis chrysopterus	379
	Pomatomus saltatrix	370
Distomum tenue Linton	Sciaenops ocellatus	391
	Coryphæna equisetis	374
	Coryphæna hippurus	372
	Menticirrhus americanus	398
	Synodus fætens	355
	Tylosurus marinus	356
Distomum tornatum Rudolphi	Cynoscion nebulosus	386
	Leiostomus xanthurus	393
	Menticirrhus americanus	400
	Micropogon undulatus	396
	Monacanthus hispidus	401
	Opsanus tau	409
	Orthopristis chrysopterus	379
Distomum valde-inflatum Stossich	Paralichthys albiguttus	414
	Rachycentron canadus	372
	Siphostoma fuscum	359
	Trachinotus carolinus	366
	Spheroides maculatus	402
Distomum vibex Linton		

List of parasites and their hosts—Continued.

TREMATODA—Continued.

Parasite.	Host.	Page.
	<i>Bairdiella chrysur</i>	388
	<i>Cynoscion regalis</i>	385
	<i>Dasyatis centrura</i>	348
	<i>Lagodon rhomboides</i>	382
	<i>Leiostomus xanthurus</i>	393
	<i>Leptocephalus conger</i>	351
	<i>Menticirrhus americanus</i>	399
	<i>Micropogon undulatus</i>	397
<i>Distomum vitellosum</i> Linton	<i>Monacanthus hispidus</i>	401
	<i>Opsanus tau</i>	409
	<i>Orthopristis chrysopterus</i>	378
	<i>Paralichthys albiguttus</i>	413
	<i>Pomatomus saltatrix</i>	369
	<i>Prionotus scitulus</i>	404
	<i>Prionotus tribulus</i>	405
	<i>Sciænops ocellatus</i>	390
	<i>Trachinotus carolinus</i>	366
	<i>Tylosurus marinus</i>	357
	<i>Bairdiella chrysur</i> (figs. 168, 169)	389
	<i>Chilomycterus schœpfi</i> (fig. 208)	403
	<i>Coryphaena esquistis</i> (figs. 213, 214)	374
	<i>Coryphaena hippurus</i> (figs. 213, 214)	373
	<i>Cynoscion regalis</i> { Proceedings U. S. N. M.	385
	<i>Siphostoma fuscum</i> { xx, p. 537	359
	<i>Spheroides maculatus</i>	402
	<i>Galeichthys milberti</i> (fig. 209)	350
	<i>Lagodon rhomboides</i> (fig. 179)	382
	<i>Leiostomus xanthurus</i> (figs. 173, 198, 199)	393
	<i>Lophopsetta maculata</i>	415
	<i>Paralichthys albiguttus</i> (figs. 171, 172)	413
	<i>Rachycentron canadus</i>	372
<i>Distomum</i> sp.	<i>Menidia menidia</i> (Bul. U. S. F. C. for 1899, p. 444; figs. 857, 858)	360
List of unidentified specimens comprising distomes, usually represented by one or very few examples, and they often immature or in a poor state of preservation.	<i>Micropogon undulatus</i>	397
	<i>Opsanus tau</i>	410
	<i>Opsanus tau</i> (fig. 215)	410
	<i>Opsanus tau</i> (figs. 167, 205)	410
	<i>Paralichthys albiguttus</i>	414
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The copepod parasites mentioned in this report have been turned over to Prof. C. B. Wilson, who has kindly given me the generic names of a number of them.

List of parasites and their hosts—Continued.

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ANALYTICAL KEY TO GENERA OF CESTODES MENTIONED IN THIS REPORT AND IN THE PAPERS GIVEN IN THE LIST ON PAGE 328.

1. Scolex spherical or subspherical, with cup-like bothria..... 3
2. Scolex of various shapes, but unlike 1..... 4
3. { Scolex simple, either with or without rostellum..... *Tenia*
- { Scolex with retractile, tentacle-like appendages in front..... *Paralamia*
4. { Scolex disk-shape without bothria..... *Discocephalum*
- { Scolex provided with bothria..... 5
- { Bothria two^a..... *Dibothrium (Bothriocephalus)*
5. { Bothria four..... 6
- { Bothria immersed in a discoidal or subglobular mass..... 7
6. { Bothria distinct..... 8
- { Scolex discoidal..... *Lecanicephalum*
7. { Scolex subglobular with subglobular myzorhynchus..... *Tylocephalum*
- { Scolex unarmed..... 9
8. { Scolex armed..... 19
- { Bothria without auxiliary suckers..... 10
- { Bothria with auxiliary suckers..... 13
9. { Bothria with costæ..... 11
10. { Bothria without costæ..... 12
- { Scolex with myzorhynchus..... *Echeneibothrium*
- { Scolex without distinct myzorhynchus in adult..... *Rhynchobothrium*
12. { Bothria in pairs with frilled or lobed borders..... *Spongiobothrium*
- { Bothria cruciform with entire margins..... *Anthobothrium*
13. { Two auxiliary suckers on each bothrium..... *Orygmalobothrium*
- { One auxiliary sucker to each bothrium..... 14
14. { Auxiliary suckers relatively large, formed from anterior part of bothrium..... 15
- { Auxiliary suckers small, circular..... 16
15. { Auxiliary suckers entire, scolex with terminal haustellum..... *Monorygma*
- { Auxiliary suckers horseshoe shape, anterior ends of bothria partly retractile..... *Calyptribothrium*
16. { Bothria in pairs..... 17
- { Bothria cruciform..... 18
17. { Scolex with terminal muscular disk..... *Cestode from Tile-fish*
- { Scolex without terminal muscular disk..... *Phyllobothrium*
18. { Bothria slender, pedicelled, with crenulate borders..... *Anthocephalum*
- { Bothria short-pedicelled, border not crenulate..... *Crossobothrium*
19. { Bothria armed with hooks..... 20
- { Scolex provided with retractile spiny proboscides..... 25

^aThe worms referred provisionally to this genus in this report appear to be without bothria. See *D. tortum* under *Synodus*.

20.	{Hooks inconspicuous, of densely fibrous structure	<i>Thysanocephalum</i>
	{Hooks chitinous, structureless	21
	{Hooks simple.....	22
21.	{Hooks compound.....	23
	{Bothria without auxiliary suckers	<i>Onchobothrium</i>
22.	{Bothria with auxiliary suckers anterior to hooks	<i>Calliobothrium</i>
	{Scolex flattened, bothria in pairs, hooks in pairs united by a chitinous bar	<i>Platybothrium</i>
23.	{Bothria cruciform	24
	{Hooks with two prongs each, bothria costate	<i>Acanthobothrium</i>
24.	{Hooks with three prongs each, bothria loculate at posterior end.....	<i>Phoreiobothrium</i>
	{Bothria two	26
25.	{Bothria four	27
	{Bothria without auxiliary pits	<i>Rhynchobothrium</i>
26.	{Bothria with auxiliary pits	<i>Otobothrium</i>
	{Bothria lateral	<i>Tetrarhynchus</i>
27.	{Bothria terminal	<i>Synbothrium</i>

TABLE OF NEW DISTOMES AND OF SOME UNDETERMINED SPECIES RECORDED AS DISTOMUM SP. IN THIS PAPER.

Species.	Suckers.	Vitellaria.	Testes.	Ovary.	Size (millimeters).	Ova (microns).	Intestine.	Remarks.
<i>D. corpulentum</i> sp. nov. from <i>Lagodon rhomboides</i> (figs. 180-182).	Ventral as much as four times oral.	Coarse granular, posterior and lateral to ventral sucker.	Two, transverse, a short distance behind ventral sucker.	Transverse, between ventral sucker and testes.	2.25.....	Not uniform, 51 x 27, 41 x 24, 27 x 20, 30 x 15.	Diverticula at anterior end; forks not traced to posterior end.	Body subspherical; oesophagus very short.
<i>D. imparispine</i> sp. nov. from <i>Rachycentron canadus</i> (figs. 189-194).	Ventral a little larger than oral.	Posterior and lateral granular masses, abundant, but not reaching ventral sucker.	Two, on median line, near together and near posterior end.	Oval-elliptical, near testes and in front of them.	9.....	70 x 40.....	Forks simple...	Thirty-four oral spines, unequal; anterior part of body with small spines; cirrus pouch behind ventral sucker; pharynx elongated.
<i>D. aduncum</i> sp. nov. from <i>Opsanus tau</i> (figs. 195-197).	Ventralsmaller than oral.	A few subglobular or lobed masses, lateral toward posterior end of body.	Two, lateral, in front of vitellaria.	Globular, in front of left testis.	0.87.....	Variable, average of best formed, 20 x 10.	Forks simple, reaching but short distance back of ventral sucker.	Minutely spinose; genital aperture sucker to left of ventral sucker; pharynx remote from mouth; oesophagus long.
<i>D. pectinatum</i> sp. nov. from <i>Bairdiella chrysura</i> (figs. 200-203).	Ventral twice oral.	Granular masses, lateral, not abundant.	Two, near posterior end.	Oval, in front of testes, remote.	2.1.....	22 x 15, 18 x 17.	Forks simple, reaching to posterior end.	Fleshy papillae on head and neck; pharynx cylindrical.
<i>D. inconstans</i> sp. nov. from <i>Chaetodipterus faber</i> (figs. 183-187).	About equal....	Abundant, posterior and lateral, may extend to pharynx.	Six on left, four on right side, a little behind middle of body.	Lobed, between lateral groups of testes.	0.7 to 2.1; very variable in shape.	60 x 40, some variation.	Forks simple, to posterior end; oesophagus distinct.	Cirrus bulb shifting with state of contraction. Minute, rounded spines on anterior half of body.
<i>D. sp.</i> from <i>Symphurus plagiusa</i> (figs. 161-164).	Oral equal to or slightly larger than ventral.	Lateral masses, probably dendritic.	Two, lateral.....	In front of right testis toward median line.	0.78 to 1.05...	22 x 15.....	Forks simple, extending to near posterior end.	Body covered with minute, flat spines. Some of the specimens obliquely truncate posteriorly.
<i>D. sp.</i> from <i>Rachycentron canadus</i> (figs. 171, 172).	Ventral twice oral.	Lobed behind ovary.	Two, close together, near middle of body.	Subspherical, close behind testes.	1.....	40 x 20.....		Ova much smaller at one end than the other; i. e., oval-pointed.
<i>D. sp.</i> from <i>Trachinotus carolinus</i> (fig. 204).	Ventral about twice oral.	Peripheral, from ventral sucker to near anterior end, not abundant.	Two, close together, near posterior end.	Lobed, at extreme posterior end behind testes.	5.5.....	27 x 14.....	Forks simple, extending to posterior end; oesophagus none.	Ventral sucker near posterior end. Genital aperture close behind forks of intestine.
<i>D. sp.</i> from <i>Bairdiella chrysura</i> (figs. 168-170).	Ventral larger than oral.	Coarse granular masses, posterior and lateral to pharynx, abundant.	Two, diagonal toward posterior.	Oval, close to testes, in front of them, to right.	0.84.....	63 x 35.....	Forks simple, to posterior end.	Pharynx pyriform, larger than ventral sucker.
<i>D. sp.</i> from <i>Lagodon rhomboides</i> (fig. 179).	Ventral sucker smaller than oral.	Abundant granular masses, posterior and lateral to pharynx.	Two, somewhat lobed under pressure toward posterior end.	Oval, transverse in front of testes.	2.....	75 x 58.....		

LIST OF FIFTY-NINE SPECIES OF BEAUFORT FISHES WITH NOTES ON FOOD AND ON THE PARASITES FOUND IN THEM IN JULY AND AUGUST 1901 AND 1902.

Carcharhinus obscurus, Dusky Shark.

Date.	Number and size of fish examined.	Food notes.
1901. July 8.....	1 (length 4½ feet)	Alimentary canal empty.
1902. July 11.....	1 (length 5 feet)	Fish.
July 26.....	1 (length 6 feet)	Fish (sheepshead, used for bait).
July 29.....	1 (length 6 feet 7½ inches, weight 111 pounds.)	Alimentary canal empty.
August 26.....	1 (length 7½ feet, weight 203 pounds.)	Fish.

These sharks are referred to this species although they do not agree in all diagnostic features with the descriptions published in Jordan & Gilbert's *Fishes of North America*, or Jordan & Evermann's later work. The pectorals do not reach quite to the first dorsal. The second dorsal is larger than the anal. There is not much difference between the upper and lower teeth. They agree rather well with *Prionace* in the character of the fins, but the nose is much shorter and broader than in that genus.

The specimen examined on July 26 had been caught less than an hour before by Mr. Russell J. Coles. It was a much cleaner cut and more graceful shark than any other seen by me at Beaufort. The tips of the pectorals were black, a character not noted in the others. The specimen taken on July 29 was caught at the Fish Commission wharf and was seen by me while it was still alive. Mr. Coles stated that the tips of all the fins of his specimen were black when it was first captured. He also said that it was much more voracious and gamy than the others he had taken.

NEMATODES.

1. *Ascaris habena* Linton.

1902.—July 26, 1 female. This specimen was not in good condition and looked as if it had been introduced recently with the food, but was not in the proper final host; length 45 mm.

2. *Ascaris brevicapitata* Linton. [Figs. 22, 23.]

1902.—Aug. 26, 8, immature. Five of these were taken directly from the stomach; the others were found in washings from the stomach and intestine. One of the smaller forms was transparent enough to allow it to be demonstrated that it belonged to the type which has a diverticulum of the intestine and an elongated basal enlargement of the œsophagus. This character in the encapsuled and immature forms found in various teleosts is associated with a corrugated postanal region, which, however, was not the case with these worms. They were found with their heads penetrating the mucus membrane of their host, where they caused some irritation, as was evidenced by the inflamed condition of the mucus membrane where they were attached.

The shortest measured 10 mm. in length, the longest 20. Some were slender, others were plump. There was considerable variation in the shape of the posterior end, but all agreed in having rather thickish lips at the anal aperture.

The jaws, while not fully developed, are seen to be those of a very short-jawed species. The specimens are referred provisionally to the species *A. brevicapitata*, which was originally described from the tiger shark.

CESTODES.

3. *Anthobothrium laciniatum* Linton.

1901.—July 8, few.

1902.—July 26, 2. July 29, 3. Aug. 26, numerous. All found in the intestine.

4. *Crossobothrium angustum* Linton.

1901.—July 8, very numerous.

1902.—July 11, few and small. July 26, 2. July 29, 36. Aug. 26, very numerous. All from intestine.

5. *Phyllobothrium foliatum* Linton.

1902.—July 11, few, small. July 29, 2, length 45 mm. Aug. 26, 2 small specimens and 1 larger, referred doubtfully to this species. Auxiliary acetabula were seen on the bothria, but the arrangement of the latter was more like that of *Crossobothrium* than *Phyllobothrium*.

6. *Phoreiobothrium lasium* Linton.

1901.—July 8, 2.

1902.—July 11, few, small. Aug. 26, few.

7. *Phoreiobothrium triloculatum* Linton.

1902.—July 29, 30, 1 measuring 55 mm. in length, others probably longer. Aug. 26, not numerous.

8. *Rhynchobothrium speciosum* Linton.

This specific name was made to accommodate certain encysted forms, which were found in several species of teleosts.

Owing to the lateness of the hour on two occasions and the abundance of other material to look over on all occasions when specimens of this species were found, but few notes were made of the fresh material. Enough was determined, however, to warrant the conclusion that the species is certainly either *R. speciosum* or very near it.

1902.—July 11, 2. One of these after killing in Lang's picro-aceto corrosive fluid measured 150 mm. in length. July 26, 4, found in both intestine and stomach. July 29, 2; 1 of these, measuring 60 mm. in length, presented an interesting abnormality, in what appeared to be the beginning of supernumerary contractile bulbs situated 8.5 mm. behind the normal bulbs. Length of head and neck to base of normal bulbs 7.5 mm. The second specimen measured 25 mm. in length. Aug. 20, few.

9. *Otobothrium crenacolle* Linton.

1902.—July 11, several in small cysts of elliptical outline in the submucosa of the stomach wall. July 26, immense numbers encysted in stomach wall, cysts small, ellipsoidal and oval-elliptical. Length of oval blastocyst, 1.5; greatest diameter, 0.9; length of larva 0.45 mm. Aug. 26, few.

10. *Otobothrium insigne* sp. nov. [Figs. 141-145.]

Head broad, bothria lateral, widely divergent at the posterior end, with flexible borders; neck elongated, expanding at posterior end into a prominent funnel-form collar, which overlaps the anterior end of the body; accessory bothrial organs conspicuous; proboscides armed with hooks of diverse shapes and sizes; contractile bulbs oval, about two and a half times as long as broad.

Body, so far as developed, of nearly uniform breadth; first segments beginning a short distance back of neck and very short; ripe segments not seen, last segment one and one-half times as long as broad; reproductive organs seen only in rudimentary condition; reproductive apertures irregularly alternate at a point a little in front of the middle of the lateral margin of the segment.

Lateral vessels conspicuous, slightly sinuous.

Dimensions, in millimeters, of specimen mounted in balsam: Length 10; length of head and neck 4.2; length of head 0.7; breadth of head 1.2, of neck just back of head 0.4, of neck at base 1.2, of body just back of neck 0.87; contractile bulbs, length 0.72, breadth 0.28; length of proboscis, estimated, 3; diameter, excluding hooks, 0.09; diameter, including hooks, 0.15; length of longest hook 0.045; diameter of accessory bothrial organ 0.15; distance from base of neck to first segment 0.6; length of first segment 0.05, breadth 0.82; last segment, immature, length 0.9, breadth 0.6.

Rudiments of reproductive organs begin 0.5 back of the junction between neck and body; collar of neck overlaps body 0.3. The distinction between the neck and body in the stained specimen is sharp.

1902.—July 26, 2.

11. *Tetrarhynchus bisulcatus* Linton.

Numerous in pylorus and intestine. The heads of these worms, as is usual with this species, were found to be embedded in the mucous membrane, sometimes several heads together in the same pit. This condition is attended with much irritation and gives rise to some inflammation in the mucous membrane.

1901.—July 8.

1902.—July 11, numerous. July 26, few. July 29, 1, associated with *T. robustus*. Aug. 26, very numerous in stomach, where they were attached to the mucous membrane.

12. *Tetrarhynchus robustus* Linton.

1902.—July 26, 10, in stomach and intestine. The heads were much larger than those of *T. bisulcatus*, the collars looser, with uneven or somewhat broken posterior borders. July 29, 3.

13. *Synbothrium filicolle* Linton.

1902.—July 11, few; July 26, several, from cysts in stomach wall, a few possibly free in the stomach. Several dark-colored cysts were cut out of the stomach wall, but owing to the lateness of the hour were not examined until the next day. No larvæ were noted at the time of collecting. The material was left in sea water over night. When the cysts were examined in the morning several specimens of *Synbothrium* were found associated with the cysts, from which they had evidently emerged. When the alcoholic material was reexamined a few days later a dark-colored cyst was found to contain degenerate waxy tissue with probocides of *S. filicolle*.

It would appear that some of these parasites had penetrated the mucous membrane of their host as larva with blastocyst attached and there became encysted.

14. *Cysts*.

1902.—July 11, 2 in mesentery. These cysts were translucent, the larger 9 by 11 mm., the other somewhat smaller. The larger cyst was opened, but nothing was found in the lymph with which it was filled but a small blood clot.

PARASITIC COPEPODS.

15. *Pandarus* sp.

1902.—July 29, 5, dark-brown.

***Carcharhinus milberti*, Blue Shark.**

1902.—July 25, 1. The identification of this shark was made with the aid of Jordan & Gilbert's Fishes of North America. While not agreeing with the description of this species in all particulars it was in closer agreement with it than with any other described by the above-named authors.

The shark was caught by Mr. Russell J. Coles of Danville, Va., with rod and reel. It was a female with young, exceptionally thick-bodied, and over 9 feet in length. Alimentary canal empty, except for a few small fragments (crystalline lenses, etc.) of fish, a plate from the test of a sea urchin and a few thin strips of vegetable tissue.

NEMATODES.

1. *Immature nematodes (Ascaris)*.

1902.—July 25, 10. This is the type with elongated bulbular basal portion of œsophagus and corrugated post-anal region. The parasites had evidently been recently introduced with the food.

CESTODES.

2. *Tetrarhynchus bisulcatus* Linton.

1902.—July 25, 12 scolices with fragments of strobiles.

3. *Synbothrium filicolle* Linton.

1902.—July 25, 1 scolex; posterior end behind contractile bulbs somewhat macerated. One mature segment, 7 mm. long, and 2 broad, with dark-brown ova.

Scoliodon terræ-novæ, Sharp-nosed Shark.

Date.	Number of fish examined.	Food notes. (Except where otherwise specified all the sharks were about a foot in length.)
1901.		
July 6.....	6.....	Fragments of fish and sand.
July 8.....	6.....	Fragments of fish and shrimp.
July 9.....	1.....	Fragments of fish.
July 15.....	1.....	Food completely digested except a piece of sea lettuce.
July 18.....	3.....	Crabs.
July 20.....	3.....	Fish and crustacea.
July 22.....	1 (length 3½ feet).....	Stomach empty, intestine with yellow mucus and sand.
Do.....	8.....	Crabs.
July 24.....	1 (length 3½ feet; female with young.).....	Stomach filled with fish (menhaden); large amount of mud in stomach and intestine.
Do.....	3.....	Fish and annelids.
July 25.....	10.....	Fish. Large numbers of a four-celled organism. These were of nearly uniform size, varying but little from 0.2 mm. in length and 0.02 mm. in breadth.
July 26.....	6.....	Fragments of fish, crustacea, and annelids.
July 27.....	1.....	Alimentary canal empty.
August 5.....	5.....	Fish.
August 6.....	1.....	Shrimp and other crustaceans.
August 7.....	3 (1 about 3 feet).....	Fish.
August 9.....	2.....	Crustacea (hermit, crabs, etc.); one caught with fiddler crab for bait.
August 12.....	3.....	Fish and shrimp.
August 15.....	4.....	Do.
August 16.....	1.....	Fish.
Do.....	3.....	Toadfish and shrimp.
1902.		
July 11.....	3 (3 feet in length).....	Fish in one; stomachs of others empty.
July 16.....	1 (14 inches).....	Fish in stomach, shrimp in intestine.
July 18.....	do.....	Alimentary canal empty.
July 28.....	do.....	Fish, shrimp.
July 29.....	do.....	Fish.
August 14.....	do.....	Fragments of small fish.

NEMATODES.

1. *Immature nematodes (Ascaris)*.

Type with diverticulum of intestine at anterior end and slender posterior diverticulum of œsophagus. These, together with Nos. 2 and 3, are doubtless introduced with the food and withstand the digestive action rather better than the tissues in which they are lodged, but do not become mature in the shark.

1901.—July 22, July 24, Aug. 10, few.

1902.—July 29, few.

2. *Immature nematodes (Ascaris)*.

Type represented by forms with short diverticulum of intestine and corrugated postanal region.

1901.—Aug. 15, Aug. 16, few. These had evidently been introduced recently with the food.

3. *Ascaris habena* Linton (?).

1901.—Aug. 15, fragment of a male, head missing, intestine red-brown. Two pairs of postanal papillæ and 17 pairs of preanal papillæ were made out. Parasite evidently introduced with food.

CESTODES.

4. *Scolex polymorphus* Rudolphi.

1901.—Aug. 5, 1. Aug. 7, few.

1902.—Aug. 14, several, with red pigment in neck and 2 *eostæ* developed on bothria.

5. *Calliobothrium* (?) sp., young. [Fig. 80.]

1901.—Aug. 16, 1, a scolex with rudiments of hooks. This immature scolex appears to be a more advanced stage of *Scolex polymorphus* than I have yet found.

6. *Rhinebothrium flexile* (?) Linton.

1901.—July 22, larvæ, from intestine, some not yet everted, others completely everted and active. When the scolex is in motion the bothria may be extended until they are filiform, particularly at their anterior ends. July 26, 1, scolex with blastocyst attached; a good view of the bothria was obtained; the number of loculi on each appears to be about 32. Aug. 16, 1, scolex. This was probably introduced with the toadfish, fragments of which were found in the intestine.

7. *Anthobothrium laciniatum* Linton. [Fig. 126.]

1901.—July 8, 1, small (4.5 mm. in length), from spiral valve. A free segment with the anterior end prolonged into a short, slender neck, surmounted by a round knob, which functioned as a sucker, measured 1.68 mm. in length and 0.7 mm. in breadth. July 9, numerous, length about 9 mm.; neck and anterior segments densely covered with exceedingly minute spines; ripe segments rather numerous, free, active, the largest measuring, when fully extended, 6 mm. in length and 2 mm. in breadth, the central portion being filled with ova, which are about 0.02 mm. in diameter. July 18, 2. July 20, 2. July 22, several. July 24, 2. July 24, few. July 25, 6. July 26, few. July 27, few. Aug. 5, 2. Aug. 6, 5. Aug. 7, several. Aug. 10, several. Aug. 15, few. Aug. 16, few.

1902.—July 11, 15, maximum length, 15 mm. July 23, few. Aug. 14, numerous, with large numbers of free segments.

8. *Crossobothrium angustum* Linton. (*Orgymatobothrium angustum* Linton.)

1901.—July 22, rather numerous; small, some not yet begun to form segments. July 24, 1. July 24, few, small. July 25, 6. July 27, few, small. Aug. 5, 2. Aug. 7, few. Aug. 15, few. Aug. 16, 2.

1902.—Found on July 11, 18, 23, and Aug. 14; maximum number found in one host, 30. Dimensions of 1 in millimeters: Length 7.5; diameter of bothrium 0.15; of neck 0.07 to 0.22; distance to first segment 2; last segment, length 1.17; breadth 0.48.

9. *Phoreiobothrium lasium* Linton.

1901.—July 6, 2, with several free segments. July 8, 1, and free segments. July 18, 1, and free segments. July 20, 1. July 25, 12, and free segments. Aug. 5, 3. Aug. 16, 1.

1902.—July 11, 1.

10. *Phoreiobothrium triloculatum* Linton.

1901.—July 24, 24. Most of these specimens were about 40 mm. in length. There were also numerous free segments with eggs. These segments soon became dark colored in sea water and discharged the eggs on the bottom of the glass vessel in which they were lying.

1902.—July 11, 2; length 25 mm. July 16, 1 scolex, no segments yet developed; length 2 mm.; hooks small. The specimen looks very much like some of the more advanced specimens of *Scolex polymorphus* which have occasionally been found, save that the bothria have assumed the characteristics of *P. loculatum*.

11. *Rhynchobothrium* sp. [Figs. 129-130c.]

1902.—July 11, 1. The following notes were made on the living worm: Bothria relatively large, with thin, flexible borders, which in certain states of contraction appear to be somewhat frilled. While lying in sea water the edges of the bothria were in continual motion, expanding and contracting, and so producing a constant wave-like motion. Head and neck white, body yellowish white. Head approximately two and a half times as broad as the neck at the widest part. Neck widest next to the head, tapering to its posterior end, where it is still wider than the anterior segments. The body displayed a tendency to coil into a spiral, which made its study in life difficult. It was straightened out in the killing fluid, when it measured 30 mm. in length, with enough fragments to bring the total length up to 45 mm. Proboscides partly everted, showing hooks of various sizes. In the killing fluid the head and neck shortened somewhat and remained much thicker than the body.

The bothria in the alcoholic specimen are nearly circular, about 1.12 mm. in diameter; contractile bulbs 0.9 in length and 0.3 in diameter; proboscides 0.15 in diameter excluding and 0.21 including hooks; large hooks 0.096 in length, small hooks 0.021; the large hooks are on the median, the small hooks mainly on the lateral side of the proboscis.

12. *Rhynchobothrium plicatum* sp. nov.

See No. 2 under *Sphyrna tiburo*.

1901.—July 22, several; scolices still attached to blastocysts, but completely everted and very active; a red pigment patch in neck at anterior end of contractile bulbs. July 24, 2, with scolices; attached to blastocysts; other blastocysts in the lot from which the scolices were lost in the collecting. The length of the part to which the scolex was attached was, after killing, 8 mm. My notes made at the time of collecting place this species near *R. tenuispine*. July 25, 10. One in this lot was noticed with the contraction fold in the vicinity of the contractile bulbs, as noted under No. 2, *Sphyrna tiburo*. This specimen had a red pigment patch in the neck, a feature not present in all. July 26, few. July 27, few; contraction fold at anterior end of bulbs. Aug. 10, few.

13. *Otobothrium crenacolle* Linton.

1901.—July 15, 1; length 10 mm.; about 5 free segments each 3 mm. in length. July 18, 2. July 22, 6, from 4 to 7 mm. in length, posterior segments easily detached; later on same date, 1, small. Aug. 15, 1.

1902.—July 11, 29.

14. *Tetrarhynchus bisulcatus* Linton.

1901.—July 24, 1, about 20 mm. in length. July 25, 2. The larger of these two specimens appeared to have a longer collar than is usual in this species. The collar was also thin and undulate on the posterior border. The other specimen was smaller than normal for this species. Aug. 5, 12. Aug. 6, 1. Aug. 12, 3. Aug. 15, 2; these two specimens, like those taken on July 25, presented considerable differences from each other. The larger agreed with typical representatives of the species. The smaller, besides the difference in size, also differed in some of its proportions and in having sharper hooks than the larger. In each case the scolex was attached to but a short piece of the strobile. The following measurements, in millimeters, were made on the scolices after they had lain overnight in sea water to which a little formalin had been added. The dimensions of the smaller specimen are given first in each case: Length 0.35 and 0.7; length of bothria 0.36 and 0.5; diameter of collar 0.25 and 0.42; length of head and neck 0.64 and 0.7; length of bulbs 0.20 and 0.21; diameter of bulbs 0.09 and 0.11; diameter of proboscis, excluding hooks, 0.27 and 0.34, including hooks 0.44 and 0.47; length of longest hooks 0.013 in each. A single specimen collected on the next day, Aug. 16, agreed with the smaller of the two whose dimensions have just been given. Another found later on the same date was typical.

1902.—Aug. 14, 1.

15. *Synbothrium filicolle* Linton.

1902.—July 11, 3; encysted in submucous membrane of stomach. There were also numerous cysts in the stomach wall, in which no larvæ were found, some of which might have been due to this parasite. One much-elongated specimen was obtained from beneath the serous coat of the liver.

16. *Cysts*.

1902.—July 11, numerous in stomach wall between muscular layer and mucosa. Many of them were filled with degenerate tissue, but among these two specimens of No. 15 were found.

Sphyrna tiburo, Bonnet-head Shark.

Date.	Number of fish examined.	Food notes.
1901.		
July 8.....	1.....	Fragments of crustacea and one blue crab.
July 24.....	2.....	Fragments of crustacea in great abundance, among them the abdomen of <i>Squilla mantis</i> .
July 25.....	2.....	Fragments of blue crab and broken lamellibranch shells.
July 26.....	4.....	Blue crab, other small crabs, and other crustacea.
July 27.....	1.....	Blue crab.
August 6.....	2.....	Crustacea, mainly shrimp.
August 7.....	1.....	Crustacea (crabs and shrimp mainly) and fish (bait).
1902.		
July 18.....	1.....	Crabs, shrimp.
July 25.....	1.....	Crabs, small isopod, <i>Balanus</i> , sea-weed.

The specimen taken on July 25, 1902, was a female with 8 young, each measuring 110 mm. in length.

NEMATODES.

1. *Philaria galeata*, new species. [Figs. 17-19. See also fig. 20.]

Slender, hair-like, active worms of nearly uniform diameter, maximum diameter near posterior end, whence it tapers very gradually to the anterior end. Head with cushion-like hood (figs. 18, 19), cesophagus equaling about one-eighth the length of the worm, tapering uniformly from base to point just in front of nerve-ring, where there is an offset, thence cylindrical to mouth; diameter of cesophagus at base about twice what it is at the anterior end.

Posterior end of female conical-pointed; of male provided with lateral outgrowths of cuticle (alæ); papillæ not yet completely worked out (fig. 17). Four pairs of post-anal and about the same number of pre-anal papillæ were seen. The posterior end of the male has a strong tendency to coil into a spiral when placed in the killing fluid. Some, even, which were killed in a mixture of glacial acetic acid

and absolute alcohol and kept straightened out by manipulation, still coiled into a spiral at the posterior end.

The spicules were not seen extruded in any of the specimens from the bonnet-head, but one from the small dolphin (fig. 20) had the spicule projecting, when it was seen to be modified at the distal end by lateral wings so as to resemble the fluke of an anchor.

The largest specimen measured was 35 mm. in length and 0.17 mm. in greatest diameter.

Dimensions of a male in acetic acid: Length 35; diameter of head, not including appendage 0.04, at middle of body 0.17, at anal aperture, not including alæ 0.11; of œsophagus, anterior 0.03, middle 0.05, at base 0.07; length of œsophagus 4.2, of longer head appendage 0.14; breadth of head appendage 0.1; distance from anterior end to nerve-ring 0.45; distance of anal aperture from posterior end 0.25.

Dimensions of ova in this species 0.04 and 0.02 mm. in the two principal diameters.

1901.—July 24, 9. July 25 and 26, numerous. July 27, few. Aug. 6, numerous. Aug. 7, 20.

1902.—July 18, 6. July 25, numerous.

2. *Rhynchobothrium plicatum* sp. nov. [Figs. 132–140.] From spiral valve.

Strobile slender, active, with tendency to coil up when compressed. Bothria about as broad as long. their bases not approximate; neck more or less elongated, very contractile, cylindrical, usually with a conspicuous collar-like fold at the contractile bulbs, always enlarging at the bulbs and usually narrowing again behind them. A patch of red pigment is usually present in the neck in front of the bulbs,

The contractile bulbs are pyriform or oval, and the retractor muscle, in those cases where the proboscis was retracted, could be seen lying in folds at the posterior end of the bulb. Sheaths and proboscides long. The proboscides are swollen at the base as in *R. tumidulum* and *R. tenuispine*. The hooks, except at the base of the proboscides, perhaps agree rather better with the latter. Beyond the basal portions of the proboscides they are rather more densely clothed with hooks than in either of the above-named species. Besides, they are stouter than in *R. tenuispine* and a little stouter, longer, and more curved than in *R. tumidulum*.

The segments begin close behind the bulbs, where the strobile may be slightly moniliform. At first they are much broader than long, but they soon become longer than broad, increasing in length rapidly until they are four or five times as long as broad; posterior segments much elongated. Testes conspicuous in two longitudinal, median rows in maturing segments; cirrus long, tapering, and smooth. Vitellaria lateral, ovary two-lobed at posterior end of the segment; vagina opening at posterior side of cloaca, which is at about the posterior third of the lateral edge of the segment; ova longer than broad, and bearing bristles on their surface as in *R. tumidulum*. Mature segments when full of ripe ova are fusiform, swollen, and dark-brown.

Dimensions, in millimeters, life: Length of bothria 0.32; breadth about the same; length of head and neck 1.43; length of contractile bulbs 0.32; length of posterior segments 3; diameter of neck 0.17; ova 0.05 and 0.02 in the two principal diameters; diameter of swollen base of proboscis 0.03.

The preserved specimens are about 10 mm. in length. Since the posterior segments separate rather easily, the actual length is doubtless greater than this.

Following are measurements of preserved material: Length of head and neck, one specimen 0.8, of another 1.28; contractile bulbs in three specimens 0.14 by 0.07, 0.17 by 0.08, 0.18 by 0.06, length and breadth respectively; diameter of proboscis excluding hooks 0.015, including hooks 0.027; tumid base, excluding hooks 0.024; length of longest hooks 0.01. One specimen was seen which had the blastocyst still attached. It agreed with specimens found in the sharp-nosed shark. (See No. 12 under *Scotiodon*.)

1901.—July 8, 1. July 24, few. July 25 and 26, numerous. July 27, few. Aug. 6, few. Aug. 7, 16.

1902.—July 18, 12. July 25, 10, one scolex adult, the others short and attached to blastocysts. Dimensions of one of the latter: length of head and neck 1; length of blastocyst 3.75; diameter of head 0.3, of neck just behind head 0.18, of blastocyst 1.2.

3. *Rhynchobothrium hispidum* Linton.

A single specimen from the spiral valve collected July 18, 1902, is referred with some hesitation to this species. The proboscides were not seen everted, and it is impossible to make out the arrangement of the hooks on the inverted proboscis.

Dimensions, in millimeters, of specimen mounted in balsam, compressed, neck contracted: Length of head and neck 0.6; length of bothrium 0.12; breadth of bothrium 0.12; breadth of neck 0.13; length of bulbs 0.3; diameter of bulbs 0.05; length of proboscis, estimated, 0.45; length of hooks 0.006 to 0.012.

The contractile bulbs are elongated, and there was a patch of red pigment in front of them.

Raja lævis, Barndoor Skate.

Date.	Number of fish examined.	Food notes.
1902. August 14.....	1 (small).....	Shrimp.
August 18.....	.....do.....	Shrimp and lamellibranches.

The specimen obtained on Aug. 14 was collected by the Fisheries steamer *Fish Hawk*, station 7310, in 18 fathoms, off Cape Lookout.

CESTODES.

1. *Acanthobothrium paulum* Linton.

1902.—Aug. 14, 10, with free segments. Length, in 5 per cent formalin, 10 mm. Strobiles, especially the smaller ones, lanceolate. Aug. 18; 2.

Dasyatis say, Sting Ray.

Date.	Number of fish examined.	Food notes.
1901.		
July 6.....	2.....	Small bivalve mollusks, amphipods, and annelids.
July 8.....	5.....	Small annelids.
July 9.....	1.....	Amphipods and large number of annelids.
July 12.....	1.....	Shrimps and annelids.
July 22.....	1.....	Bivalve mollusks, foot of a gasteropod, shrimp, and sea urchin (<i>Arbacia</i>).
July 24.....	2.....	Large quantity of a small annelid (<i>Nereis?</i>).
July 25.....	2.....	Otoliths and crystalline lenses of fish, amphipods, annelids, and sand.
July 27.....	2.....	Bivalve mollusks (<i>Solenomya</i>), annelids, sand.
1902.		
July 8.....	5 (medium).....	Large numbers of siphons of a lamellibranch (<i>Tagelus</i>) with broken shells.
July 22.....	8 (medium).....	Shrimp; one with intestine filled with shells of <i>Solenomya</i> .
July 23.....	7 (small).....	Shrimp.
July 29.....	1.....	Fish, crabs.
August 16.....	1.....	Crabs, shrimp, siphons and "feet" of lamellibranch mollusk (<i>Tagelus</i>), shells of <i>Solenomya</i> . It would appear from the nature of the food of this ray and those collected on July 5 that the sting ray bites off siphon tubes of lamellibranches without swallowing the shells.
August 18.....	1 (small).....	Shrimp.
August 20.....	.....do.....	Do.
August 26.....	1.....	Shrimp, <i>Solenomya</i> and univalve shells, annelids, sand.

All the rays were small, not varying far from 1 foot in length.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1902.—July 29, 1, female; probably introduced with food.

CESTODES.

2. *Echeneibothrium* sp. [Fig. 82.]

1902.—Aug. 26, 1 scolex. The muscular proboscis (myzorhynchus) was very prominent, being thrust out while the worm was active, until its length was fully equal to that of a bothrium. The latter were leaf-like with crenate borders as in *Spongiobothrium*; water-vascular system conspicuous; two sinuous vessels near each lateral margin.

3. *Anthobothrium pulvinatum* Linton. [Fig. 125.] Spiral valve.

1901.—July 6, 2 and a fragment, longest specimen 50 mm. in length, variable in life. July 8, 17 obtained from five rays. July 9, 14 from one ray. Brief note is here made of the extraordinary diversity of form assumed by the bothria of the living worms. A bothrium when expanded and attached to the bottom of the dish is a nearly circular, thin and transparent disk. When so expanded, which is a form not usually assumed under ordinary conditions, the appearance is that of a peltate leaf. The edges may then roll in upon each other, and, the central portion contracting, there results a pyriform bothrium, the anterior end becoming more or less elongated. Sometimes the anterior end elongates into what looks like an auxiliary auriculate appendage. In some cases, especially when placed in fresh water, the bothrium becomes finely wrinkled or cushion-like and roseate. This is a rather common form and was the one assumed by the specimen which was first studied by me.

July 22, 1, with a few fragments. July 24, 16, with many free segments from two rays. July 25, numerous in each of two rays. July 27, 8, with ripe segments.

1902.—July 29, fragments of strobiles; no scolices. Aug. 16, 1. Aug. 26, 1.

4. *Rhinebothrium flexile* Linton.

1902.—Aug. 16, few, small; bothria not hinged, loculi numerous.

5. *Rhinebothrium* sp.; spiral valve.

1901.—July 12, numerous. These worms agree, in superficial characters at least, with *R. flexile*, except in the number of loculi on the bothria. In this particular they are nearer *R. minimum*. The bothria are distinctly slender and linear, pointed when extended, very versatile, with two rows of loculi, about twelve in each row, with an odd loculus at each end; pedicels cylindrical and somewhat elongate. The rows of loculi are interrupted at the middle of the bothrium, where the musculature is such as to give the appearance of a transverse hinge. The bothria thus agree closely with *R. longicolle*, but, while there is a short neck in this species, it is not separated from the body by a constriction as in the other. A red pigment spot was present in most of the specimens at the junction of the neck with the body. The pedicels and neck were covered with minute bristle-like spines. In some there was a faint indication of a terminal mouth, as in larval forms (*Scolex polymorphus*). In no case, however, either in living or preserved specimens, was anything seen like the myzorhynchus of the genus *Echeneibothrium*. First segments very short, subsequent segments squarish, then longer than broad; last segment usually tapering at the posterior end; margins finely crenulate; genital cloaca about anterior fourth on the margin; some strobiles moniliform; mature segments not seen. July 27, a few small specimens, with numerous detached segments. Two free segments probably belonging to this species were observed to be copulating.

1902.—July 22, few. Aug. 16, very numerous. Aug. 18, very numerous. Aug. 26, numerous. Bothria hinged at middle; five pairs of loculi and a single terminal loculus to each half, or twenty-two loculi to each bothrium. Found in spiral valve.

6. *Spongiobothrium variabile* Linton. Spiral valve.

1901.—July 22, 5 or more. When first seen, these worms had their bothria elongated so as to produce a very different appearance from the specimens upon which the genus was founded. They appear indeed to be very closely related to *Rhinebothrium*, the bothria being somewhat narrowly elongated, the loculi very numerous, but confined to the margins, as mentioned in the original description of the genus.

1902.—Aug. 16, 3, no mature segments.

7. *Parataenia medusia* Linton. Spiral valve.

1901.—July 6; numerous, small, not exceeding 4 mm. in length. These specimens agree closely with this species and are probably identical. It was observed that the segments projected slightly around the posterior border, a feature not noted before. July 24, several, small.

1902.—Aug. 16, 5. Aug. 18, few.

8. *Phyllobothrium foliatum* Linton. Spiral valve.

1901.—July 9, 1. July 22, 1902; 5. Aug. 26, 1.

9. *Anthocephalum gracile* Linton. Spiral valve.

1901.—July 22, several. July 27, several.

1902.—July 22, few. Aug. 16, 26.

10. *Lecanicephalum peltatum* Linton.

1901.—July 9, 1. July 24, several.

1902.—Aug. 18, 3.

11. *Onchobothrium uncinatum* Diesing. [Fig. 127.] Spiral valve.

1901.—July 8, 2, length 48 mm. in alcohol. Sections were made of the maturing segments in order to learn the meaning of what appeared to be a row of apertures along the median line of one of the flat surfaces of the strobile. It was found that they represented points at which the very voluminous vas deferens protruded some of its convolutions through the wall of the proglottis. This character was observed in others of this species later in the season. The arrangement of the reproductive organs and the musculature of the neck present some peculiarities in this species which must be left for a subsequent paper.

1901.—July 22, 3. July 27, 1, length 60 mm.

1902.—July 8, 2 scolices and 10 fragments of strobiles. Specimens not in good condition, probably due to the large number of broken shells in the intestines. July 22, 50 from one ray. July 23, few, the

only species of entozoa found in the seven rays examined on this date. Aug. 18, 1. Small rays, as a rule, have few parasites.

12. *Acanthobothrium paulum* Linton. Spiral valve.

1901.—July 8, 2.

1902.—July 22, numerous. Aug. 16, 1. Aug. 26, numerous.

13. *Rhynchobothrium tumidulum* Linton. Spiral valve.

1901.—July 12, 1 seen among the numerous other small cestodes (No. 5, above).

14. *Rhynchobothrium hispidum* Linton. [Fig. 146.]

1901.—July 22, several; length 4.34 mm.

1902.—Aug. 16, 18, 20, few on each date. Aug. 26, a very few noted in dish with the very abundant *Rhinebothrium* sp. (No. 5) and *Acanthobothrium paulum*. There is red pigment usually present in this species, and since there is a small patch of this red pigment on each of the four proboscis sheaths and at the same level on each, it follows that two spots of red pigment are seen in any position in which the worm chances to lie.

15. *Rhynchobothrium tenuispine* Linton.

1901.—July 24, several.

1902.—Aug. 16, several. Aug. 18, few. These had comparatively strong spines on the neck, and on that account the name *hispidum* would be more fitting for them than for the individuals referred to No. 14. The proboscides, however, are armed with the characteristic minute hooks of this species. One case was observed where the proboscides were retracted so powerfully as to draw a considerable portion of each into the contractile bulb.

16. *Rhynchobothrium* sp. [Fig. 131.]

1902.—July 22, 1, scolex and first segments. This specimen had a narrow transverse band of red pigment behind the contractile bulbs. The retractor ribbons were unusually broad, each composed of a number of longitudinal fibers and originating from the posterior end of the long contractile bulb. Hooks of various shapes. Dimensions, life, compressed, in millimeters: Length of head and neck 8, of head alone 0.8; breadth of head 1.4; diameter of neck, behind head 0.7, at bulbs 1, behind bulbs 0.4; length of bulbs 3.45; diameter of bulb 0.22; distance from bulbs to first segment 0.7; length of first segment 0.11, breadth 0.45. Transverse striæ begin 0.4 mm. behind the bulbs.

17. *Cysts*.

1902.—July 8, 1 in liver, 2 in walls of intestine. These were filled with waxy degenerate connective tissue, and represent parasites which had been lodged in the tissues of their host for a long time.

TREMATODES.

18. *Distomum vitellosum* Linton.

1902.—Aug. 20, 1, small and active, no ova.

Pteroplatea maclura, Butterfly Ray.

Date.	Number of fish examined.	Food notes.
1901.		
July 9.....	1.....	Contents of alimentary canal completely digested.
July 12.....	1.....	Fish in stomach; fragments of crustacea and annelids in intestine.
July 15.....	1 (small).....	Allimentary canal empty; no entozoa.
July 31.....	2.....	Only mucus in alimentary canal.
August 1.....	2 (small).....	Crystalline lens of small fish; sand.
1902.		
July 7.....	2 (small).....	Shrimp.
July 11.....	1 (small).....	Food completely digested; no entozoa.
July 17.....	2 (small).....	Fish; no entozoa.
July 18.....	5.....	Fish.
July 22.....	3.....	Fragments of <i>Solenomya</i> in one.
July 29.....	2.....	Material digested.
July 31.....	1.....	Fragments of an annelid.
August 4.....	1.....	Allimentary canal empty; no entozoa.
August 11.....	2.....	Fish; no entozoa.
August 19.....	2.....	Fish (black sea bass).
August 20.....	5.....	Fish, lamellibranchs.
August 21.....	1.....	Small crustacea, megalops, copepods.
August 22.....	1.....	Fish; no entozoa.
August 26.....	2.....	Do.

NEMATODES.

1. *Immature nematodes.*

1902.—July 7, 1. The only entozoan found in the two rays examined on this date was an exceedingly minute nematode in the intestine. It was doubtless introduced with food, and can not be counted as a proper guest of the ray. Length 1.3; length of œsophagus 0.32; length of postanal region 0.19; diameter 0.045.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

1901.—July 31, few and small, in alimentary canal.

3. *Acanthobothrium paulum* Linton. [Fig. 128.]

1901.—July 12, 3, small, about 5 mm. in length; free segment 1.47; cirrus 0.38, long and spinose. July 31, 4; strobiles when subjected to slight pressure became moniliform and the posterior segments separated. Length of one 3.6 mm., length of last segment 0.45 mm. Aug. 1, 3.

1902.—July 18, 1 scolex and a few fragments, not in good condition. July 22, several. Aug. 20, 2 and several loose segments. Aug. 21, 5 and a few loose segments. Length of one 6; length of posterior segment 1.12; breadth 0.3, varying with different states of contraction. Reproductive cloaca at posterior fourth; neck distinct. About 20 distinct segments were counted in the longest specimen; the first 10 of these were short, the remainder were more or less elongated. A free segment, length 1.5, breadth 0.6 (compressed) had the reproductive cloaca 0.2 from the posterior end.

4. *Rhynchobothrium* sp.

1901.—Aug. 1, 3 small oval cysts outside of stomach wall.

5. *Synbothrium flicolle* Linton.

1901.—July 9. The only entozoa observed in the ray examined on this date were a few cysts on the viscera, from one of which a species of *Synbothrium* was liberated. Type with slender straightish hooks on proboscides.

1902.—July 29, 1, with beginning segments, small. The segments were slender and immature. Aug. 19, 1, not in good condition; scolex with blastocyst attached. Although these specimens were obtained from the intestine of the ray, it is doubtful whether the butterfly ray is the proper final host of *Synbothrium*.

TREMATODES.

6. *Distomum* sp. [Fig. 210.]

1902.—July 18, 1, immature in cyst. Dimensions, life, in millimeters: Length 1.35; breadth, anterior 0.18, at ventral sucker 0.38, near posterior end 0.53; diameter of oral sucker 0.8, of ventral sucker 0.12, of pharynx 0.12. Probably introduced with food, and the cyst yields more slowly to the digestive fluids than do the tissues in which it was embedded.

This is probably the young of *D. tenue*, or an allied species.

Galeichthys milberti, *Sea Cat-fish.*

Date.	Number of fish examined.	Food notes.
1901.		
July 8.....	3.....	Crustacea (shrimps).
July 20.....	1.....	Stomach distended, contained relatively large vertebræ and other bones of fish, part of arm of a large blue crab, one sea-cucumber (<i>Thyone</i>). The intestine was filled with white, granular chyle.
July 25.....	3.....	Mainly vegetable débris with spines of annelids and sand.
July 27.....	2.....	Lamellibranch shells (<i>Solenomya</i>), annelids.
August 5.....	1.....	Shrimp, bivalve mollusks, and fish.
August 8.....	1 (small).....	Shrimp and fish.
August 20.....	1.....	Fish, bivalve mollusks, odontophore of gastropod.
August 22.....	1.....	Food completely digested into chalky material, which effervesced briskly with acid.
August 23.....	1.....	Fish, crabs, lamellibranch mollusks.
1902.		
July 18.....	1.....	Fish (crystalline lenses, etc.), annelids, small gasteropods.
August 20.....	2.....	Fish, shrimp, annelids, sand.

NEMATODES.

1. *Small nematodes.*

1902.—July 18, fragment of ovary with segmenting ova; length 14 mm; diameter 0.5; ova 0.047 by 0.025. Also several small nematodes in alimentary canal; in poor condition; evidently introduced with food and not in proper final host.

2. *Heterakis foveolata* Rudolphi.

1901.—July 8, 1 male; length 10 mm; length of œsophagus 1.4; diameter of head 0.21, middle 0.31, at anal aperture 0.17; distance of anal aperture from posterior tip 0.34. In side view there were seen two post-anal and three pre-anal papillæ. Aug. 5, 1 male, in poor condition.

See remarks on this genus in introduction.

CESTODES.

3. *Rhynchobothrium* sp.

1901.—July 20, 1, an oval cyst on viscera about 5 mm. in length, glistening, translucent, thin-walled, tense, supplied with blood vessels. Blastocyst oval; length 5 mm.; breadth 2.5 mm.; translucent, with larva visible at one end. Length of larva 5.74 mm., to base of contractile bulbs 2.38 mm. Bothria at rest; length 0.42 mm.; breadth 0.49 mm., with prominent, raised border, emarginate posteriorly. Length of longest hooks 0.022 mm. July 25, 1 specimen agreeing with above. The larva in life had a peculiar collar-like structure on the neck immediately behind the head, which was probably due to unequal contraction of the tissues of the neck, as there is but a slight notch taking its place in the preserved specimen. See No. 3, under *Scomberomorus regalis*.

4. *Otobothrium crenacolle* Linton.

1901.—July 8, numerous small cysts about 2.5 mm. in length under serous coat of stomach and intestine. From one of these a pyriform blastocyst was liberated, 1 mm. in length and 0.3 mm. in diameter. The calcareous bodies in the parenchyma of the blastocyst were very abundant and separable into two groups. The larger bodies measured from 0.08 to 0.11 mm. in diameter, the smaller and more numerous 0.015 mm. and less, with scarcely any intermediate sizes. Aug. 5; 1 specimen, encysted.

5. *Synbothrium* sp. See No. 10, under *Cynoscion regalis*.

1901.—July 25, 8 elongated cysts with blastocysts and larvæ. The hooks on the proboscides were of different shapes and sizes, but all were more or less recurved. July 27; 2 elongated cysts on viscera, same type as above. Another cyst with calcareous deposit around it can not be identified on account of degeneration of its contents. Aug. 23, 2 cysts, 1 on viscera near rectum, the other on the dorsal wall of the abdominal cavity.

6. *Scolex polymorphus* Rudolphi.

1901.—July 20, 12 of these larval cestodes, obtained from the cystic duct near its junction with the intestine. These resemble forms found in similar situations in *Cynoscion* and *Paralichthys*. The specimens contracted freely between 4 and 8 mm. in length. At rest, with bothria retracted, the length was about 1.2 mm. There was no indication of costæ on the bothria nor of the red pigment patches often noted in these larval cestodes. Aug. 8; in alimentary canal. No entozoa were found in the fish examined on Aug. 20 and 22.

7. *Cyst.*

1902.—July 18, apparently blastocyst of a *Rhynchobothrium*; scolex not developed. Dimensions in millimeters: Length of cyst 5; diameter 2; blastocyst, length 7.5, diameter 1.5. Aug. 20, piece of cestode blastocyst, but no larva.

TREMATODE.

8. *Distomum* sp. [Fig. 209.]

1902.—Aug. 20, 1, spinose, immature. Dimensions, life, in millimeters: Length 1.8; breadth 0.6; diameter of oral sucker 0.16, of ventral sucker 0.15; pharynx, length 0.08, breadth 0.04. This may be a young specimen of No. 4, under *Symphurus plagiusa*.

Anguilla chrisypa, Eel.

Date.	Number of fish examined.	Food notes.
1901.		
August 2.....	1.....	Alimentary canal empty, except fragment of fish which had been used as bait. Stomach empty; material in intestine completely digested.
August 21.....	1.....	

NEMATODES.

1. *Heterakis foveolata* Rudolphi.

1901.—Aug. 2, 2, male and female, the latter with ova undergoing segmentation. Four and eight-celled stages of development were noted. See remarks on *Heterakis* in the introduction.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

Aug. 2, few, found in intestine.

3. *Dibothrium larva*.

Aug. 21, 1, small slender blastocyst on viscera.

4. *Rhynchobothrium* sp.

Aug. 21, 1 larva from cyst on viscera; not very distinctly seen, but appears to be of the type characterized in these notes as small with relatively long hooks. See introduction.

Leptocephalus conger, *Conger Eel*.

Date.	Number of fish examined.	Food notes.
1902.		
July 21.....	1 (length 18 inches) ..	Contents of alimentary canal completely digested. Fish and gasteropods (<i>Urosalpinx</i>). Fish (pipe-fish). Fish and shrimp. Alimentary canal empty. Fish.
July 24.....	1 (length 36 inches) ..	
July 25.....	1 (length 12 inches) ..	
August 19.....	1.....	
August 20.....	1.....	
August 25.....	4.....	

NEMATODES.

1. *Heterakis foveolata* Rudolphi.

1902.—July 25, 1, male. Aug. 20; 1, male. Aug. 25; 4. See remarks on this genus in introduction.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

July 24, few, small, no costæ nor red pigment. Aug. 19, not numerous. Aug. 20; few, very small. Aug. 25, few.

3. *Cestode cysts*.

July 24; in intestinal wall, blastocysts, no scolices.

TREMATODES.

4. *Distomum grandiporum* Rudolphi.

Aug. 25, 2.

5. *Distomum vitellosum* Linton.

Aug. 20, 1, small; in poor condition.

Elops saurus, Big-eyed Herring.

Date.	Number of fish examined.	Food notes.
1901. August 14.....	1.....	Six large shrimp (<i>Penaeus</i>) in stomach.

CESTODES.

1. *Rhynchobothrium* sp. [Figs. 99, 100a.]

Two in oval cysts on viscera. Dimensions, life, in millimeters: Cyst, length 5, breadth 3; blastocyst, length 5, breadth 2.5. Larva, flattened under cover-glass, length 7.35; breadth of head 0.9; length of bothria 0.77; length of head and neck to base of bulbs 4.2; length of bulbs 0.5; diameter of proboscis near base 0.062 without and 0.078 with hooks, at middle 0.04 without and 0.068 with hooks; length of longest hooks 0.03. During life the larva was very active, the bothria changing shape without pause. Head broader than long, water-vascular system conspicuous, a labyrinth of vessels in the head and extending halfway or more to the margins of the bothria.

Hooks for the most part rather long and slender, but moderately curved and not presenting a great variety of shape or size.

A specimen with hooks much like these was found in *Scomberomorus maculatus*.

Brevoortia tyrannus, Menhaden, Fat-back.

Date.	Number of fish examined.	Food notes.
1901. July 23.....	1.....	Allimentary canal filled with greenish mud, consisting of sand and vegetable débris; diatoms and algæ of many different kinds. Foraminifera with spherical shells, abundant, also <i>Discorbina</i> ; small fragment of copepod; numerous spines and spicules not identified. See Peck's valuable paper on the Food of the Menhaden, U. S. Fish Commission Bulletin for 1893, pp. 113-124, Pls I-VII; Bulletin for 1895, pp. 351-368.
1902. July 23..... August 7.....	1..... 4 (60 mm.)	Food not noted. Intestines packed with many kinds of copepods.

NEMATODES.

1. *Immature nematode*.

1901.—July 23, 1, small; type with diverticulum on both intestine and œsophagus; see introduction.

TREMATODES.

1. *Dactylocotyle* sp. [Fig. 151.]

1902.—July 23, 1, an imperfect specimen from the gills.

2. *Distomum appendiculatum* Rudolphi. [Fig. 160.]

Specimen in poor condition and determination of species uncertain. Aug. 7, 1902; 1, small, testes small, ovary close to testes; vitellaria two, small, not lobed, close to ovary; length 0.63; breadth 0.18; diameter of oral sucker 0.05, ventral sucker 0.10; ova 0.025 by 0.018.

3. *Distomum pyriforme* Linton.

1902.—Aug. 7, 1, small, partly macerated; length 1.05, no ova.

PARASITIC COPEPODS.

4. *Brachiella* sp.

1902.—July 23, 1, attached among gill-rakers.

Stolephorus brownii, *Striped Anchovy*.

Date.	Number of fish examined.	Food notes.
1902.		
July 16.....	1 (112 mm.).....	Glistening white chyle, in which little could be recognized; a few spines and other fragments of annelids, and foraminifera.
July 17.....	10.....	Mainly copepods, zoëa, and spines of annelids.
July 30.....	1.....	Small shrimp and other small arthropods.

NEMATODES.

1. *Immature nematodes (Ascaris)*.

1902.—July 17, 1; common type, diverticulum from both œsophagus and intestine.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

July 16; numerous; very small, one costa and red pigment. July 17; several.

TREMATODES.

3. *Distomum* sp. [Fig. 166.]

This is a young form of some distome related to *D. veliporum*.

1902.—July 16, a small, immature distome seen while the food was being examined under the compound microscope. Dimensions, life, in millimeters: Length 0.25; breadth 0.16; diameter of oral sucker 0.08, of ventral sucker 0.10. July 17, 1; apparently same species, but a larger specimen; length 1.2; breadth 0.6; diameter of anterior sucker 0.14, of ventral sucker 0.28.

4. *Gasterostomum gracilescens* Rudolphi.

1902.—July 30, few, encapsuled on viscera.

See under *Menidia menidia* and *Tylosurus marinus*.

Synodus fœtens, *Lizard Fish*, *Sand Pike*.

Date.	Number of fish examined.	Food notes.
1901.		
July 31.....	1.....	Alimentary canal empty, except mucus.
1902.		
July 7.....	1 (60 mm.).....	Food not noted.
July 17.....	1 (112 mm.).....	Small crab.
July 19.....	.....do.....	Food completely digested.
July 22.....	1 (125 mm.).....	Do.
July 23.....	.....do.....	Do.
July 25.....	3 (175 mm.).....	Fish.
July 30.....	2 (small).....	Shrimp, small annelids.
July 31.....	1 (small).....	Fish.
August 1.....	2 (small).....	Do.
August 7.....	1 (small).....	Fish (silverside).
August 15.....	12 (small).....	Food completely digested.
August 16.....	3 (small).....	Fish, spatangoid sea urchin.
August 18.....	1 (30 cm.).....	Food digested.
August 19.....	2 (small).....	Fish.
August 21.....	6 (small).....	Fish and shrimp.
August 25.....	2 (30 cm.).....	Food digested.

ACANTHOCEPHALA.

1. *Echinorhynchus proteus* Westrumb.

1901.—July 31, 2. A few nodules were noticed on the external surface of the intestine, which were at first thought to be cysts due to some larval cestode or nematode. They proved to be due to the head of this worm, which had penetrated the intestinal wall.

2. *Echinorhynchus sagittifer* Linton.

1901.—July 31, 1, from body cavity, on viscera.

NEMATODES.

3. *Immature nematodes (Ascaris)*.

1901.—July 31, 1 from viscera. The embryonic cuticle was in process of sloughing off. The specimen was of the kind which has a slender diverticulum of the œsophagus and a short anterior prolongation of the intestine—the type found in a large number of hosts both seasons.

1902.—July 19, few.

CESTODES.

4. *Scolex polymorphus* Rudolphi.

1901.—July 31, numerous. These were found in large numbers in the cystic duct, where they were attached by their heads to the mucous membrane in two clusters, as noted in former papers, in the squeteague. When the fish was first opened numerous small white bodies were seen beneath the serous coat of the stomach. A piece of the stomach wall was cut out and placed in sea water. When it was examined a few hours afterwards the parasites had crept out. They all appeared to be *S. polymorphus*, but smaller than those from the cystic duct.

This is the only instance in which I have found these forms occupying this position.

1902.—July 17, several; no costæ nor red pigment. July 9, 22, few. July 25, several; some appeared to have rudimentary segments. July 30, 31, several. Aug. 1, several. Aug. 15, numerous. Aug. 16, few. Aug. 18, several; large and small together in intestine. Aug. 19, several. Aug. 20, several, small. Aug. 25, few; small.

5. *Rhynchobothrium* sp.; probably encysted stage of *R. longispine*.

1902.—July 19, a single scolex found free in the intestine. The hooks are much like those of the frequently recurring form characterized in these notes as small, with relatively large hooks. This specimen had a patch of red pigment in the neck, while the blastocyst was attached to the larva.

6. *Dibothrium tortum* sp. nov. [Figs. 119-124.]

Scolex of the *Monobothrium* type—that is, there was no indication of bothria, even in transverse sections.

Color of body dead white; head and neck somewhat less opaque.

Anterior end subcylindrical or moderately compressed, sometimes spiral; when placed in killing fluid there is a strong tendency to assume a spiral or twisted shape, like a cork-screw or an augur. This tendency was observed to be characteristic of all—so much so that I did not succeed in getting an entire strobile free from kinks. Body proper flattened, tanæiform, nearly uniform in breadth, with a tendency to break into fragments of irregular length, but no indication of segments. The sets of reproductive organs follow each other closely, and the reproductive openings lie along the median line of one of the flat faces of the strobile. The vaginal opening and the posterior border of the spherical cirrus-bulb are contiguous on the median line. The ovary is laterally elongated and lies posterior to the other reproductive organs of its set. The uterus lies in front of it and passes alternately right and left of the reproductive aperture. Testes lateral, surrounded by the vitellaria, which occupy the greater part of the periphery of the body. Dimensions, life, in millimeters: Diameter of head 0.75; breadth of body 2; ova, elliptical, 0.054 by 0.036 in the two principal diameters. Approximate length of strobile 45. The ova in an alcoholic specimen measured 0.045 by 0.027.

1901.—July 31, 1 fragment.

1902.—July 17, several, attached to mucous membrane of their host, but easily detached. July 19, 3. July 22, few. July 25, several. July 30, 1 or more scolices, several fragments of strobile. July 31, several. Aug. 1, several. Aug. 7, 2. Aug. 15, 2. Aug. 16, several. Aug. 18, abundant. Aug. 19, 20, several fragments. Aug. 25, numerous.

The fragments of strobile, both in life and preserved, are much folded, frilled, and twisted.

These worms are referred to the genus *Dibothrium* (*Bothriocephalus*) provisionally. The scolex would place them in the genus *Monobothrium*, while the general character of the strobile is that of *Dibothrium*.

TREMATODES.

7. *Distomum monticellii* Linton. [Fig. 155.]

1901.—July 31, 1.

1902.—July 7, fragment. July 17, 9; length 5.1 mm; general color of larger specimens red-brown; smaller specimens, without ova, paler. July 19, 5. July 22, 1. July 23, 1. July 25, 12. July 30, 6. July 31, several. Aug. 1, 5. Aug. 7, 2. Aug. 15, 1; probably same species as others, but more

mature; intestine slender and not traceable in places, extending into appendix; intestines of others voluminous. Aug. 16, several. Aug. 19, 9 large, 1 small, immature. Aug. 20, numerous. Aug. 25, 10.

The specimen collected in 1901 was without ova; the two vitellaria had each three blunt digitate lobes; the intestine was yellow, excretory vessels dark by transmitted light, opaque white by reflected light.

8. *Distomum tornatum* Rudolphi.

1902.—Aug. 16, 1 and fragments; fragments of large, thick distomes, intestine dark brown and extending into posterior end; ova 0.018 by 0.011 mm. Aug. 25, 9, larger ones 10 mm. in length, reddish flesh color. Aug. 16, 19, few on each date.

Fundulus majalis, Killi-fish, Rock-fish.

Date.	Number of fish examined.	Food notes.
1902.		
July 7.....	3.....	Annelid fragments.
July 8.....	15.....	Mainly shrimp and small lamellibranchs.
July 16.....	13.....	Small shrimp, amphipods, copepods, lamellibranchs, and young gastropods.
July 17.....	1.....	Sand and many small amphipods in stomach; no entozoa.
July 21.....	1.....	Fragments of crustacea, pieces of lamellibranch shells, annelid setæ, and sand.
July 22.....	9.....	Shrimp.
July 23.....	1.....	Small crustacea and broken shells.
August 4.....	9.....	Annelids, solenomya, and other small lamellibranchs.
August 7.....	2.....	Not noted.
August 15.....	9.....	Mainly minute diptera; also small lamellibranchs, amphipods, and sand; no entozoa.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1902.—Aug. 7, 1 small male.

NEMATODES.

2. *Immature nematodes (Ascaris)*

Type with diverticulum on both intestine and œsophagus.

1902.—Aug. 7, few.

CESTODES.

3. *Tenia* sp. (encysted). [Figs. 85, 86.]

This is the encysted stage of a form whose adult stage will be found in some species of fish-eating bird.

The cysts are white and occur for the most part on the mesentery. When these were opened elongated larvæ were liberated, in most of which the characteristic four suckers and rostellum with its crown of hooks were found to be developed. In all cases the suckers and rostellum were invaginated, but could be seen plainly when the larva was flattened and viewed with transmitted light.

Dimensions of larva, life, moderately compressed, in millimeters: Length 5.5; breadth at anterior end 0.75, from whence the body tapers to the posterior end; sucker, length 0.16, breadth 0.15; length of invaginated head 0.9; length of rostellum, measured from actual anterior edge of sucker, 0.33; length of hooks 0.22.

Two scolices were obtained from one of the larger cysts: one of these had a constriction just back of the anterior end. In this one neither suckers nor rostellum had yet developed. The longitudinal vessels were conspicuous and the parenchyma was coarsely granular from the presence of calcareous bodies.

The cysts are soft and white and contain a whitish granular semifluid material, which is not unlike parenchyma and surrounds the larva. They are in this particular like the cysts found by the author in *Salmo mykiss*, containing larvæ of *Dibothrium cordiceps* (Bull. U. S. Fish Commission for 1889). Sections show these cysts to have rather thick walls composed of somewhat loose connective tissue. The larvæ lay at one side of the cavity closely adherent to the wall of the cyst. The cavity of the cyst sectioned contained also small masses of connective tissue, which were evidently derived from the wall of the cyst.

July 7, 8, 16, 21, and 23, a few found on each date. It has seemed best to use the old and more comprehensive generic name for these immature worms.

TREMATODES.

4. *Distomum globiporum* Rudolphi. [Fig. 159.]

July 22; 3; placed provisionally in this species. Dimensions, life, in millimeters: Length 2.25; maximum diameter 0.5; diameter of oral sucker 0.18, of pharynx 0.10, of ventral sucker 0.18; ova 0.09 by 0.07.

5. *Monostomum* sp. [Fig. 217.]

Small, oval. Dimensions of living specimens, compressed, in millimeters: Length 1.12; greatest breadth 0.33; diameter of oral sucker 0.10, of genital sucker 0.08, of pharynx 0.05; ova 0.025 by 0.014. This is the same species as No. 7 under *Menidia menidia*.

Fundulus heteroclitus, Killi-fish.

Date.	Number of fish examined.	Food notes.
1902.		
July 22	1	Ostracodes and diatoms; large proportion of latter circular.
August 1	1	Not noted; no entozoa.

CESTODES.

1. *Scolex polymorphus* Rudolphi.

July 22, few, small; seen in piece of intestine which was being examined for food contents.

Tylosurus marinus, Gar.

Date.	Number of fish examined.	Food notes.
1901.		
August 1	3 (small)	Contents of alimentary canal almost completely digested. With the help of the compound microscope a few fragments of crustaceans were found.
1902.		
July 22	1	Alimentary canal empty.
July 24	1	Do.
July 31	2	Spines of sea urchin (<i>Möira</i>) in one.
August 1	2	Fish.
August 7	1	Fish (silverside).
August 11	1	Fragments of annelids.
August 15	5	Fish, amphipods.
August 20	4	Fish, shrimp.
August 22	1	Shrimp.
August 25	1	Fish, shrimp.

NEMATODES.

1. *Immature nematode* (*Ascaris*).

Type with elongated basal portion of œsophagus and corrugated post-anal region.

1902.—Aug. 7, 1.

2. *Minute nematode*.

1902.—July 31, 1; curved like the letter C; probably related to the minute forms found in *Leiostomus*.

CESTODES.

3. *Scolex polymorphus* Rudolphi.

1902.—July 31, few, small; 2 red pigment spots present. Aug. 20, few, small.

TREMATODES.

4. *Distomum tornatum* Rudolphi.

1902.—July 22, 3; in cysts about 5 mm. in diameter in the intestinal wall. Cysts dark colored, almost black on account of accumulation of pigment. The diatoms were light pink or flesh color and very active; the neck could be stretched until it was filiform or contracted until the two suckers were brought together. The specimens, while of good size, were immature, no ova being present. Dimensions, in millimeters, of flattened specimen: Length 6, neck (contracted) 1; diameter, oral sucker 0.41, ventral sucker 0.96. Aug. 1, 2, immature. Aug. 11, several; large but without ova. Aug. 15, 2; large, no ova. Aug. 20, 3 large and 2 small, flesh color, no ova. Aug. 25, 2, no ova.

5. *Distomum vitellosum* Linton.

1902.—Aug. 7, 1; specimen in poor condition; ova few, 0.086 by 0.054, segmenting.

6. *Gasterostomum gracilescens* Rudolphi.

See under *Menidia menidia*, etc.

1901.—Aug. 1, numerous; fusiform, pale red to colorless; not much variation in size. One measured 1.44 mm. in length and 0.56 mm. in greatest breadth.

1902.—July 31, 1. Dimensions, life, compressed: Length 1.4; maximum breadth 0.65; transverse diameter, anterior sucker 0.33; mouth 0.10; ova 0.018 by 0.011. Aug. 1, 12. Aug. 11, numerous. Aug. 15, 30. Aug. 20, numerous. Aug. 22, numerous.

Small, minutely spinose, of very various shapes, translucent white to orange yellow, depending on relative abundance of ova. The anterior end in some was curved ventrad, turning the sucker into a hood-like organ.

These worms agree closely with Olsson's figures and descriptions of forms which he refers with some doubt to this species. The same species was found in this host at Woods Hole, Mass., but was not identified. (Bulletin U. S. Fish Commission for 1899, pp. 277, 298, pl. xli, fig. 91, and p. 442, pl. xxxiv, figs. 367, 368.)

COPEPOD PARASITES.

7. *Lernanthropus* sp. From gills.

These very singular forms are certainly appropriately named in their generic title; for not only do the males suggest the human form but the females, on account of a skirt-like prolongation of the abdomen for the protection of the ova, simulate with absurd accuracy the same as modified by the attire commonly worn by women in civilized communities.

1902.—July 22, 1; male. Aug. 1, 3; females. Aug. 11, 5 females, 2 males. Aug. 15, 9 females, 3 males. Aug. 20, numerous; males and females; Aug. 22, 4 females, 7 males. Aug. 25, 7 males, 3 females. Length of male 1.73, of female 2.85 mm.

8. *Copepod parasite*. From gills.

1902.—Aug. 1, 1; white with single, Cyclops-like eye-spot of red pigment; female with white egg masses. Length, including caudal spines 2.1 mm. Aug. 11, 20; 1 on each date.

***Tylosurus raphidoma*, Needle-fish.**

Date.	Number of fish examined.	Food notes.
1901. August 26.....	1, about 3 feet in length.	Fish (menhaden), and a few small crustaceans.

NEMATODES.

1. *Immature nematodes (Ascaris)*. [Figs. 29, 30.]

Two; from cysts on viscera. These belong to the type which is characterized in these notes as having a short anterior diverticulum of the intestine and a slender diverticulum from the base of the œsophagus.

Dimensions, life, in millimeters: Length 11; diameter, middle 0.3, tapering about equally in each direction; length of œsophagus, not including the posterior globular portion, 0.95; of globular portion 0.1; diameter of œsophagus 0.1; length of diverticulum of œsophagus 0.8, diameter of one 0.05; length of diverticulum of intestine 0.3; diameter at anal aperture 0.11; distance of anal aperture from posterior end 0.17.

One orange-yellow cyst filled with waxy, degenerate tissue also probably due to nematode.

CESTODES.

2. *Otobothrium* sp. [Figs. 102-109.]

In muscular tissues, very numerous, generally distributed through the muscles of the body, a few close beneath the skin, by far the greater proportion in the deep muscles. Of the latter a few were in the abdominal muscles, but most abundant laterally along the vertebral column. These flesh parasites

are blastocysts containing larvæ. They have doubtless penetrated the flesh from the alimentary canal. When placed in sea water they were very active, extending and contracting, and assuming a great variety of consecutive shapes and dimensions. The blastocyst which was sketched while living measured about 8 mm. in length, about half the length being taken up with the anterior enlarged part. The larva when liberated from the blastocyst is also quite active. Its length, at rest, was from 4 to 5 mm. After the larva was removed from the blastocyst the latter was much more active than the former, being, in fact, altogether as active as it was before it was damaged.

The neck of the larvæ, between the bothria and the contractile bulbs, was covered with rather thick and fleshy spines 0.08 mm. in length, so that the surface under moderate magnification is rough.

The proboscides are armed with hooks of various sizes and shapes; diameter of a proboscis near the base, 0.18 mm. excluding and 0.28 mm. including hooks; length of the longest of the large recurved hooks 0.14 mm. Other dimensions, life, in millimeters: Length 4.5; breadth of head (marginal view of bothria) 1.4; length of bothrium 1.4; contractile bulbs, length 1.4, breadth 0.4.

There were two varieties of these larvæ. The longer kind remained firmly attached to the blastocyst, which was not the case with the shorter kind. The posterior end of the neck is emarginate, with a deep rounded notch on each side. This notch in the elongated specimens appeared to be opposite the intervals between the two bothria, while in the shorter specimens it was opposite the bothria. The accessory bothrial organs are small and somewhat crescentic.

On account of the comparatively large size of these larvæ it was naturally suggested that they might prove to be the encysted form of the new species (*O. insigne*) found in the dusky shark. A comparison of the proboscides of the two forms, however, makes this very doubtful.

Tylosurus caribbæus, *Car-fish*.

Date.	Number of fish examined.	Food notes.
1902. August 15.....	1.....	Small crustacea and fragments of insects which seemed to be small crickets.

COPEPOD PARASITES.

1. *Copepod parasite*. From gill.

One from gills; same form as No. 8 under *T. marinus*; white with single median eye-spot of red pigment.

Hyporhamphus roberti, *Common Halfbeak*.

Date.	Number of fish examined.	Food notes.
1902. August 11.....	1.....	Algae, sea lettuce; contents of intestine green.
August 12.....	1.....	Do.
August 16.....	1.....	Do.
August 21.....	1.....	Food almost exclusively algae, color of contents of stomach and intestine green. Among the fragments of green algae were a few young crustaceans in the megalops stage, and a <i>Caprella</i> . These had evidently been taken while the fish was feeding on the algae.

NEMATODES.

1. *Immature nematodes (Ascaris)*.

Type with diverticulum to both intestine and œsophagus.

1902.—Aug. 11; 1.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

Aug. 12, few, small.

3. *Cestode larva*.

Aug. 16, 1; looks like young *Dibothrium*.

Siphostoma fuscum, Common Pipe-fish.

Date.	Number of fish examined.	Food notes.
1902.		
July 7.....	7.....	Not noted.
July 9.....	32.....	Do.
July 14.....	8.....	Fragments of small crustaceans.
July 15.....	3.....	Not noted.
July 16.....	1.....	Do.
July 17.....	1.....	Do.
July 19.....	5.....	Not noted; no entozoa.
July 21.....	1.....	Completely digested; looked like vegetable debris; no entozoa.
July 23.....	8.....	Not noted.
July 25.....	1.....	Not noted; no entozoa.
July 25.....	4.....	Amphipods and ostracodes.
July 29.....	4.....	Completely digested.
August 4.....	5.....	Small crustacea.
August 6.....	3.....	Do.
August 7.....	1.....	Not noted; no entozoa.
August 12.....	4.....	Copepods and minute spatangoid spines.
August 20.....	2.....	Not noted.

CESTODES.

1. *Scolex polymorphus* Rudolphi.

1902.—July 14; few; bothria with two costæ and rudiment at anterior end, suggesting the loculi which occur at the anterior end of bothria in *Echeneibothrium* and *Acanthobothrium*; no red pigment. My attention was called by Mr. Gudger to some minute oval forms from this same lot which proved to belong here. They were similar to minute specimens found in *Lagodon* and others; length 0.09, breadth 0.06 mm. These minute forms contained calcareous bodies of relatively large size in the parenchyma. July 15; large numbers, minute. July 16; immense members, length 0.06 when contracted, 0.12 when extended, heads relatively large, cases of constriction making pseudo-segments noted in this lot. July 17; very numerous, small. July 29; very numerous, 0.01 mm. in length. Aug. 4; few, comparatively large.

2. *Rhinebothrium* sp. [Fig. 75.]

Cysts with blastocysts containing larva which are identical with No. 4 under *Opsanus tau*, but do not occur in felted clusters so commonly as in that host.

July 7; few. July 9; 24. July 23, 25; several. Aug. 4; few. Aug. 6; a large number on and in the liver, others on viscera; as in the toad-fish, so in this case the blastocysts were much elongated at the posterior ends, which were felted together in clusters. No cases were found which demonstrated budding of blastocysts, although the manner in which the blastocysts are associated together would suggest that as a possible explanation of the frequent occurrence of clusters of this parasite. Aug. 20; several.

3. *Tetrarhynchus bisulcatus* Linton.

July 17; 1 scolex, encysted on viscera.

TREMATODES.

4. *Distomum* sp.

Aug. 12; 1; length 1.65 mm.; breadth 0.63 mm.; agrees with No. 4 under *Spheroides maculatus*.

5. *Distomum valde-inflatum* Stossich.

Aug. 12; 1; encapsuled on viscera.

PROTOZOA.

6. *Gregarines*.

July 17. The testis of a pipe-fish which was infested with what was taken to be a gregarine parasite was brought to my table by Mr. E. W. Gudger, who was working on the development of the pipe-fish. On account of the large amount of material to be looked over on this date, I was not able to give this much attention. Aug. 6; small, irregular gregarine-like forms observed in testis.

Menidia menidia, *Silverside*.

Date.	Number of fish examined.	Food notes.
1902.		
July 7	7.....	Fish.
July 8	7.....	Intestines filled with copepods and other minute entomostraca with a few foraminifera.
July 17	4.....	Amphipods, young gastropods, copepods, spines of annelids.
July 19	2.....	Same food as above with addition of shrimp eggs.
July 22	2.....	Contents nearly completely digested; some vegetable débris.
July 23	4.....	Material almost entirely digested; a few annelids.
August 1	3.....	Nearly digested; small fragments of annelids.
August 7	5.....	Food not noted.
August 11.....	1.....	Intestine packed with megalops, small shrimp, copepods, and a few small gastropod shells.

NEMATODES.

1. *Immature nematodes (Ascaris)*.

Common type, diverticula to both intestine and œsophagus.

1902.—July 19; few. Aug. 7; few.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

Aug. 1, minute forms seen in small piece of intestine which was being examined under the compound microscope for the food contents.

TREMATODES.

3. *Distomum monticellii* Linton.

Aug. 7; 1, voluminous intestine; no ova.

4. *Distomum* sp.

This form resembles that figured in Parasites of Fishes of the Woods Hole Region, figs. 357, 358. The body of this worm is densely clothed with exceedingly minute spines.

Dimensions, life, in millimeters: Length 0.94; diameter, anterior 0.07, middle 0.22, posterior end 0.12; diameter of oral sucker (not distinct) 0.04, of ventral sucker 0.09, of pharynx 0.03; ova 0.018 by 0.014.

Aug. 7; 1. The measurements of this specimen agree closely with the foregoing; the oral sucker, which was more plainly seen than in the specimen of July 7, measured 0.08 mm.; length 0.93; diameter 0.27; ventral sucker 0.11, pharynx 0.04; ova 0.025 by 0.018.

5. *Distomum pyriforme* Linton.

July 7; 2. July 8; 1. July 23; 1.

6. *Gasterostomum gracilescens* Rudolphi. [Fig. 236.]

See also under *Caranx*, *Menidia*, *Opsanus*, *Paralichthys*, *Pomatomus*, *Spheroides*, *Stolephorus*, and *Tylosurus*.

July 8; 1; length 0.75; greatest breadth 0.44; anterior sucker 0.2; mouth sucker 0.05. July 17; 12; small, oval, densely clothed with squarish spines; length 0.9, breadth 0.4; encapsuled, in some cases more than one in a capsule. July 23; few, small, not in good condition. Aug. 1; few. Aug. 7; several in yellowish cysts on viscera, small, oval. Aug. 11; few in cysts on viscera.

7. *Monostomum* sp.

This is the same species as No. 5 under *Fundulus majalis*. July 22; 3.

COPEPOD PARASITES.

8. *Ergasilus* sp., from gills.

Aug. 7; several; length, including egg masses, 1.5 mm.; length of egg mass 0.7 mm.

Mugil curema, *White Mullet*.

Date.	Number of fish examined.	Food notes.
1901.		
August 3.....	1.....	Mud consisting of vegetable débris with diatoms; no entozoa found.

Mugil cephalus, Common Mullet.

Date.	Number of fish examined.	Food notes.
1901.		
July 6.....	8.....	In general the contents of the alimentary canal consisted of vegetable débris reduced to a pulp, in which were immense numbers and many species of diatoms, with a considerable proportion of sand. One fragment of a nemertean was found. Most of the fish examined in 1902 were small.
July 9.....	6.....	
July 10.....	5.....	
July 11.....	6.....	
July 15.....	7.....	
August 6.....	1.....	
August 26.....	11.....	
1902.		
July 16.....	7.....	
July 17.....	3.....	
July 19.....	5.....	
July 21.....	1.....	
July 22.....	3.....	
July 31.....	2.....	
August 4.....	2.....	
August 19.....	1.....	

COPEPODS.

1. *Anchorella* sp.

Form with linear, tapering neck, postero-lateral egg sacks, and thoracic appendages modified into a cylindrical organ which slips over a gill filament of its host. [Figs. 57, 58.]

Dimensions, in millimeters, life: Length 6; breadth of posterior portion through egg sacks 2; length of neck 3.5; diameter of neck near base 0.7, at anterior end 0.2.

Cuticle transparent, colorless, glistening. General color white, faintly pinkish or flesh color by reflected light; alimentary canal black, making a broad black band with irregular outline, most conspicuous in the neck. The cylindrical organ of attachment was 1.6 mm. in length. It consists of two rings placed end to end, each ring having a distinct annulation at its middle. Rudimentary maxillæ occur at the anterior end. These were in constant, quick motion. The body and neck also kept up convulsive movements, which, in an unmutilated specimen, continued for a long time.

1901.—July 10; 2. July 11; 6. July 15; few. July 15; 6. The eggs in this lot were segmenting. Aug. 26; 1.

1902.—July 21; 3. July 31; 4. Aug. 4; 2. Aug. 19; 1.

2. *Copepods*. Small, white, from gills.

1901.—July 11; 4. July 15; few. Aug. 26; 1.

3. *Ergasilus* sp.

1901.—July 11; 1; from gills.

Sphyræna borealis, Northern Barracuda.

Date.	Number of fish examined.	Food notes.
1902.		
July 17.....	2 (small)	Fragments of small shrimp; no entozoa. Fish.
July 19.....	do	

TREMATODES.

1. *Distomum* sp. [Fig. 211.]

1902.—July 19; 1. This specimen was found when a small piece of the intestine was being examined under the compound microscope. Dimensions in millimeters: Length 0.24; diameter, anterior 0.028, at ventral sucker 0.057, maximum 0.072, near posterior end 0.021; diameter of anterior sucker 0.018, ventral sucker 0.036.

Upeneus maculatus, Red Goat-fish.

Date.	Number of fish examined.	Food notes.
1902.		
July 19.....	1 (75 mm.).....	Alimentary canal empty.

PARASITIC COPEPODS.

1. *Lernaeonema* sp.

Two on gill cover and 1 in flesh of abdomen near anal opening.

Body filled with red fluid which circulates by means of somewhat irregular pulsations. It was observed to grow gradually slower and slower, then pause. After a short time it would resume and go at the rate of from 100 to 108 beats a minute.

Pulsations were also noted at the arch of the neck next to the antler-like branches of the head. The head was also filled with red fluid; neck and branches yellowish by transmitted light. Length, head and neck 6 mm.; body 6 mm.; egg chains 8.5 mm. Considerable irritation is produced by this parasite. The tissues where the head and neck were buried were more or less congested and inflamed.

These together with other copepod parasites collected by me at Beaufort have been turned over to Prof. C. B. Wilson.

***Scomberomorus maculatus*, Spanish Mackerel.**

Date.	Number of fish examined.	Food notes.
1901. August 30.....	1.....	Contents of alimentary canal almost completely digested. There were recognized only a few crystalline lenses and small bones of fish and fragments of small crustaceans.

The viscera of a fish from the market, reported to me to be a mackerel, probably belong here. Examined on July 8, 1901. Fragments of fish in alimentary canal.

CESTODES.

1. *Rhynchobothrium* sp.

One. The larva has some points of resemblance in essentials with the specimens from *Elops saurus*, but is smaller, and the part behind the contractile bulbs is slender.

Dimensions of living specimens in millimeters: Length 3.43; length of bothrium 0.63, of contractile bulbs 0.35, of part behind bulbs 0.63. A comparison of the preserved material shows that the contractile bulbs have approximately the same length. The probocides in this specimen were only partly evaginated, but so far as could be made out they are in close agreement with the species from *Elops* (figs. 99, 100).

The same species is represented by No. 3 under *Scomberomorus regalis*.

2. *Tetrarhynchus bisulcatus* Linton.

July 8; 1 scolex, on viscera, very active.

3. *Symbothrium filicolle* Linton.

July 8, few, on viscera. Aug. 1; 1; similar to No. 6 under *Scomberomorus regalis*.

TREMATODES.

4. *Gasterostomum baculum* sp. nov. [Figs. 233, 244.]

1901.—Aug. 30, 6. This is the species recorded from this host before.

See No. 8 (*Gasterostomum* sp.) under *S. maculatus*, Bulletin U. S. Fish Commission for 1899, p. 447. Dimensions, in millimeters, life: Length 2; maximum diameter 0.4; anterior sucker, length 0.17, breadth 0.19; ventral sucker, length 0.069, breadth 0.065; ovum 0.021 by 0.014.

***Scomberomorus regalis*, Cero.**

Date.	Number of fish examined.	Food notes.
1901. August 23.....	1.....	Length of specimen 3 feet, weight 15 pounds. It did not quite agree with the description of this species given in Jordan & Gilbert's Fishes of North America, but was nearest that form. The contents of the alimentary canal were completely digested. No distinguishable fragments were found, even when looked for with the aid of the microscope.

NEMATODES.

1. *Immature nematodes (Ascaris)*. On viscera.
Type with short diverticulum of intestine and corrugated post-anal region.

CESTODES.

2. *Cestode blastocysts*.
Two from outside of viscera, vase-shaped.
3. *Rhynchobothrium* sp.
Two larvæ from cysts on viscera; neck elongated; bothria emarginate with elevated border; proboscides not seen everted, but long; sheaths in close spiral when neck is at rest. Dimensions in millimeters, specimen mounted in glycerine: Length of bothrium 0.36, breadth 0.42; diameter of neck 0.31, length of neck 2.4; length of part behind bulbs 0.68; length of longest hooks 0.021.

See No. 3 under *Hezanematichthys*.

4. *Otobothrium crenacolle* Linton. [Fig. 111.]
Enormous numbers of small cysts in walls of stomach and intestine, for the most part on the submucosa. Some of the cysts were amber colored and filled with waxy, degenerate tissue; others contained blastocysts which contained no identifiable embryo, while others contained larvæ which could be identified through the wall of the enclosing blastocyst. One of the latter in life and under slight pressure had the following dimensions, in millimeters: Length of blastocyst 1, diameter 0.8; length of larva 0.32, of bothrium 0.16, breadth of bothrium 0.12. One amber-colored, oval, thick-walled cyst was 1.54 by 1.09, the blastocyst 0.52 by 0.28; length of larva 0.28.

5. *Tetrarhynchus bisulcatus* Linton.
A few scolices were found in the material collected from this fish. It is likely that many of the cysts in the stomach and intestinal walls belong to this species. The hooks on the proboscides are shorter than is the rule in this species, but the number, shape, and arrangement are in agreement with the usual type. Diameter of proboscis, excluding hooks, 0.034, including hooks 0.044; length of hooks 0.01 mm.

6. *Synbothrium flicolle* Linton.
Numerous on viscera; type with small, slender, recurved hooks; elongated blastocysts in brownish cysts.

TREMATODES.

7. *Distomum monticellii* Linton.
One. Genital organs very indistinct. The stained specimen has a faint indication of lobed organs, apparently the vitellaria near the posterior end. Measurements of living specimen under slight pressure, in millimeters: Length 2; maximum breadth 0.52; oral sucker, length 0.09, breadth 0.011; pharynx, length 0.05, breadth 0.06; ventral sucker, length 0.26, breadth 0.27; ovum 0.017 by 0.010 in the two principal diameters.

8. *Gasterostomum arcuatum* Linton. [Fig. 235.]
Fifteen. These specimens resemble this species, although no spines were seen. They were not in good condition when found. At the anterior end there is a knob-like projection of the anterior sucker; vitellaria agree in number and position, but are smaller. Dimensions of specimen in sea-water, pressure of cover glass, in millimeters: Length 4.2; diameter 0.26, of anterior projection 0.11; length of cirrus pouch 0.63; ovum 0.020 by 0.014. Diameter of pharynx in another specimen 0.05.

Seriola lalandi, Amber Jack.

Date.	Number of fish examined.	Food notes.
1902. August 23.....	1.....	Alimentary canal empty.

This specimen was taken on Aug. 21 by the Fisheries steamer *Fish Hawk*, about 28 miles off Cape Lookout, North Carolina. The viscera were placed in formalin and brought into the laboratory on the 22d. The material was looked over on the 23d.

NEMATODES.

1. *Ascaris incurva* Rudolphi.

Four adult females and 2 smaller, which appear to be young; slender, fusiform; length 16-20 mm. Ova, some nearly spherical, about 0.05 mm. in diameter; others short oval 0.06 by 0.04.

So far as these specimens have been examined they agree with this species, although much smaller than specimens from the sword-fish.

TREMATODES.

2. *Distomum monticellii* Linton.

Few, small, immature.

3. *Distomum hispidum* Abilgaard.

Fifty; with oral spines and stout spines on the neck. There is considerable variety of shape and size in this lot, but so far as studied they appear to belong to the same species.

4. *Distomum* sp. [Figs. 206, 207.]

One, length 5 mm., breadth 0.5 mm. This specimen was at first a very puzzling one. On account of the apparent segmentation of the posterior part it was recorded in the notes made at the time of collecting as the fragment of a cestode. The posterior end is apparently four-jointed, the anterior end is much crumpled and folded together. The specimen had been killed with formalin before it was examined. When stained and sectioned it is seen to be not a cestode but a distome. The close approach to segmentation of the body is evident also in the sections. The general arrangement of the reproductive organs is shown in the diagrammatic sketch. The vitellaria are abundant, posterior and peripheral, extending as far forward as the seminal vesicle; testes two, on median line, following each other much as in *D. tenue*. The ovary is situated a short distance in front of the anterior testis. I was able to find only one intestine in the sections. It is persistent to the posterior end. The ova, which are numerous, are massed between the ovary and the seminal vesicle, 0.06 by 0.03 mm., in the two principal diameters. Very little can be made out of the section of the crumpled anterior part more than the presence of at least one sucker.

5. *Gasterostomum gorgon* sp. nov. [Figs. 240-242.]

Sketches and description based on specimens which had been killed in formalin.

Small, rather plump and somewhat fusiform worms, differing from other species of this genus mentioned in these notes by having a cylindrical neck and the anterior sucker surrounded by a crown of about eighteen tentacles. In most cases the anterior end was inverted, when the worms have the general appearance of such gasterostoma as those found in the gar and other fish. The appendages are not hooks, although somewhat rigid, and they doubtless function as a kind of grappling organ to enable the worm to maintain a lodgment in its host. There is a dense covering of minute spines on the body. These spines are very short, flat, and rounded when seen on the flat surface, although appearing slender when seen in profile.

The following points in the anatomy were made out: The characteristic cirrus pouch of the genus lay at the posterior end, and equaled nearly one-third the length of the body; the small, globular ovary was situated at its anterior end. The two testes lay on the dorsal side of the anterior third of the cirrus pouch, diagonal and close together. The intestine was ellipsoidal, elongate in a ventro-lateral view and immediately in front of the ovary. The globular vitellaria are dorsal and anterior to the intestine. The number was not definitely made out. Twenty-five were counted in lateral view.

The position assumed by the worms in formalin is arcuate, as shown in the sketches. In the inverted specimens the anterior end is more or less truncate in outline. The ova, which occupy the greater part of the interior of the body, are yellow and conical.

Dimensions of one in formalin: Length 1.65 mm; diameter of body 0.36 mm.; of neck 0.21 mm.; of circle of tentacles 0.36 mm.; ova 0.022 by 0.014 mm.

6. *Gasterostomum* sp.

Few. These are very small and are a different species from No. 5. The anterior sucker is relatively smaller, and there are no tentacular processes; ova elliptical.

COPEPOD PARASITES.

7. *Copepod parasites*.

Two; from gills.

Caranx hippos, *Crevallé*.

Date.	Number of fish examined.	Food notes.
1901.		
July 31.....	1 (small)	Small crustacea. No entozoa found.
August 15.....	1.....	Several otoliths of fish found in alimentary canal.
August 17.....	12.....	Nothing found in alimentary canals that could be identified except a few otoliths of fish.
1902.		
August 11.....	1 (small)	Food not noted.

NEMATODES.

1. *Immature nematodes* (*Ascaris* sp.).

1901.—Aug. 15, 2. This is the type characterized in these notes as having a short diverticulum of the intestine and transversely corrugated post-anal region. Aug. 17, few.

CESTODES.

2. *Tetrarhynchus bisulcatus*, Linton.

1901.—Aug. 15, from cyst in stomach wall. The hooks on the proboscis were rather smaller than the dimensions which I have given for this species. In other particulars the agreement is perfect.

TREMATODES.

3. *Distomum appendiculatum* Rudolphi.

1902.—Aug. 11, 2; small; no ova; in poor condition.

4. *Distomum tenue* Linton.

1901.—Aug. 17, 1. This agrees closely with the variety *tenuissime*. Dimensions, life, in millimeters: Length 6.3; diameter 0.56, of oral sucker 0.22, of pharynx 0.12, of ventral sucker 0.26; ovum 0.068 and 0.043 in the two principal diameters. The arrangement and proportions of the genitalia are in close agreement with this species. The ova, however, are considerably smaller. A few flat, rounded scales remained about the middle of the length on the dorsal side; pharynx remote from the oral sucker; esophagus short, specimen not in good condition.

5. *Gasterostomum arcuatum* Linton.

1901.—Aug. 17, 3; in poor condition, referred with some doubt to this species. Length about 2 mm.; ovum, length 0.020, breadth 0.013; another 0.024 and 0.017 in the two principal diameters.

6. *Gasterostomum gracilescens* Rudolphi. [Figs. 230-232.]

1901.—Aug. 15, 1; small, immature, fusiform, flask-shaped when compressed. Dimensions under pressure, in millimeters: Length 1.17; diameter, anterior 0.21, middle 0.54, posterior 0.11; pharynx, length 0.11, breadth 0.08. Body covered with very minute, squarish spines.

1902.—Aug. 11, 1.

See under *Menidia menidia* and *Tylosurus marinus*, etc.

Selene vomer, *Moon-fish*.

Date.	Number of fish examined.	Food notes.
1902.		
July 31.....	3 (small)	Shrimp and other small crustacea.
August 18.....	1 (small)	Shrimp, gastropods, lamellibranchs, sand; no entozoa.

CESTODES.

1. *Tetrarhynchus bisulcatus* Linton.

July 31; 1 scolex from cyst in stomach wall.

Trachinotus carolinus, Pompano.

Date.	Number of fish examined.	Food notes.
1901.		
August 28.....	1.....	Alimentary canal nearly empty, the scanty contents almost completely digested. There were recognized only a few bits of wood and the spine of a sea-urchin (<i>Tozopneustes</i>).
August 30.....	3.....	A large number of broken lamellibranch shells.
1902.		
July 18.....	7 (12 to 20 mm.).....	Diatoms and vegetable débris.
July 19.....	1 (75 mm.).....	Fragments of small crustacea.
July 21.....	1 (50 mm.).....	<i>Solenomya</i> .
July 22.....	1 (small).....	Fragments of small crustacea; no protozoa.
July 23.....	8 (small).....	Large number of broken lamellibranch shells, some copepods and small crustacea.
July 31.....	2 (small).....	Fish.
August 15.....	12 (small).....	Small amphipods and lamellibranchs.

PROTOZOA.

1. *Myxobolus (Henneguya)* sp. [Fig. 55.]

1901.—Aug. 30, cysts, 1 mm. and less in diameter, on mucous membrane of stomach and intestine. Color of cysts dead white. Spores: Length (not including caudal spine) 0.014 mm., breadth 0.007 mm.; length of caudal spine about equal to that of the spore proper.

These Sporozoa agree with those found in the drum (*Sciaenops ocellatus*) and sheepshead (*Archosargus probatocephalus*).

NEMATODES.

2. *Immature nematodes (Ascaris)*.

1901.—Aug. 28, few; type with slender diverticulum from basal bulb of œsophagus and short anterior diverticulum of intestine. Aug. 30, numerous, from alimentary canal; œsophagus long and slender; diverticula as in those of preceding date.

1902.—Aug. 15, several.

CESTODES.

3. *Scolex polymorphus* Rudolphi.

1902.—July 19 and 21, Aug. 15, few, small.

4. *Rhynchobothrium* sp.

1902.—Aug. 15, commonly recurring form—small larva with relatively large hooks from small oval cysts on viscera.

TREMATODES.

5. *Distomum monticellii* Linton.

1902.—Aug. 15, few; small, immature, with orange-colored spherical bodies in the excretory vessels.

6. *Distomum vitellosum* Linton.

1902.—July 19, 1, small, immature. July 23, 1, distended and rigid when first seen. It had lain in sea water about twelve hours.

7. *Distomum valde-inflatum* Stossich.

1902.—Aug. 15, few, in globular cysts.

8. *Distomum pectinatum* sp. nov.

See No. 15, under *Bairdiella chrysuræ*. July 19, 4. July 31, 3, small.

On July 18 clusters of distome eggs were found in the intestine of this host, about 100 ova in all, each 0.025 by 0.014.

9. *Distomum* sp. [Fig. 204.]

1901.—Aug. 28, 1. This is a very remarkable form, if the specimen is entire. Following are my notes made at the time of collecting:

Ventral sucker near posterior end, as if the neck and body in a form like the appendiculate distome *D. tornatum* had been interchanged. Surface slightly nodular, length 5.5 mm.; distance of center of ventral sucker from anterior end 4 mm., from posterior end 1.5 mm.

Other dimensions, life, in millimeters: Breadth at middle of neck 0.88, behind ventral sucker 0.61; oral sucker, length 0.4, breadth 0.5; pharynx, length 0.21, breadth 0.21; ventral sucker, length and breadth each 1. Posterior end tapering and truncate.

Specimen too opaque to show anatomy. It looked as if it had been broken behind the ventral sucker, but when examined with the aid of the microscope there was no indication of any break. Subsequent examination of longitudinal sections revealed the following anatomical features: The pharynx is adjacent to the posterior edge of the oral sucker. There is no œsophagus. The intestinal rami extend to the posterior end of the body. The ovary is lobed and lies at the extreme posterior end of the body, where it is immediately preceded by the testes, which are two in number, median, and close together. The uterus is voluminous and lies for the most of its length in front of the ventral sucker. The genital aperture is about median and close behind the pharynx. The cirrus is surrounded by a rather large prostate and the vas deferens lies in many folds posterior to it, but not inclosed in the cirrus pouch. The vitellaria appear as clustered granules, mainly peripheral from the testes to near the anterior end. Ova numerous, with thin shells 0.027 by 0.014 mm. in the two principal diameters.

10. *Monostomum* sp. [Figs. 226-229.]

1901.—Aug. 28, numerous small ovoid or elongated forms. Most of these worms were elongated anteriorly, very delicate and fragile. When highly magnified the body is seen to be crossed by exceedingly minute transverse lines, becoming a little coarser toward the posterior, where the outline is finely serrate. Posterior half of the body filled with eggs.

Dimensions of living uncontracted specimen, in millimeters: Length, 1.5; greatest breadth, 0.45; diameter of oral sucker, 0.075; of pharynx, 0.034; ova, 0.028 and 0.017 in the two principal diameters. Each ovum bears a filament of about the same length as the body of the ovum. A contracted specimen measuring 0.87 mm. in length yielded about the same measurements of other parts as the uncontracted specimen—i. e., oral sucker, 0.09; pharynx, length, 0.048; breadth, 0.034. The difference in length is made mainly by the contraction or elongation of the neck.

1901.—Aug. 30, 1.

11. *Aspidogaster ringens* sp. nov. (See No. 24, under *Micropogon undulatus*.) [Figs. 243-249.]

1901.—Aug. 28, many. There is a considerable variety of coloration in these worms. Some are orange, darker on back, pinkish below, pale posteriorly. Ventral sucker with pale border and pink center in some; in others pale throughout; in others orange. General color effect reddish-brown.

The ventral sucker is thick and fleshy and has many loculi. The head appeared to be expanded into four short leaf-like lobes. Dimensions of a specimen lying in sea water, somewhat contracted: Length, 2 mm.; breadth, 0.8 mm.; thickness, 0.7 mm. The favorite attitude seems to be with the back convex and the ventral surface concave. Some are doubled on themselves ventrally. None were seen in active motion.

1901.—Aug. 30, 19. A mounted specimen from this lot has two lobes on the ventral border of the mouth and three on the dorsal, as shown in figures of specimens from the croaker.

Pomatomus saltatrix, Blue-fish.

Date.	Number of fish examined.	Food notes.
1901.		
July 9.....	4.....	Young fish in alimentary canals.
July 10.....	6.....	Fragments of small fish.
July 18.....	1.....	Alimentary canal empty.
July 23.....	1.....	Fragments of fish.
July 29.....	1.....	Alimentary canal empty.
July 30.....	3.....	Fish.
August 3.....	1.....	Do.
August 24.....	1.....	Food completely digested.
August 27.....	7.....	Pin-fish and shrimp.
August 28.....	1.....	Fish and shrimp.
August 30.....	2.....	Shrimp.
August 31.....	3.....	Fish and shrimp.
1902.		
July 16.....	1 (60 mm.).....	Numerous exceedingly minute spines in chyle; no entozoa.
July 17.....	6 (small).....	Fish.
July 21.....	8 (small).....	Fish; no entozoa.
July 22.....	2 (small).....	Fish, amphipods and other small crustacea.
July 23.....	do.....	Fish, small gastropod shells; no entozoa.
July 25.....	6 (small).....	Fish and small annelids.
July 28.....	1 (small).....	Not recorded.
July 29.....	2 (small).....	Fish.
July 31.....	1 (small).....	Fish, shrimp.
August 4.....	2 (small).....	Fish.
August 8.....	5 (small).....	Fish, shrimp, spines of annelids.
August 11.....	1 (small).....	Fish, shrimp.
August 12.....	do.....	Shrimp.
August 16.....	3 (small).....	Fish, shrimp, bryozoa.
August 20.....	1 (small).....	Fragments of small crustacea.
August 22.....	4 (small).....	Fish.

All the blue-fish examined at Beaufort were small, but few of them reaching a length of more than 8 inches.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1901.—Aug. 28, 1 female.

NEMATODES.

2. *Immature nematodes (Ascaris sp.)*. [Fig. 34.]

1901.—Aug. 31, numerous, clustered cysts on viscera. Type with long diverticulum of œsophagus and short diverticulum of intestine—the most common form. Larger specimens with dark-brown intestine. Some of the cysts filled with brown, waxy secretion.

1902.—Aug. 11, cyst on viscera filled with fine granular material in which the very small worms were embedded.

3. *Immature nematodes (Ascaris sp.)*.

1901.—Aug. 27, 28, several on each date. This form differs from No. 2 in having no diverticulum of the œsophagus, and the postanal region corrugated. Same form noted on other occasions in other hosts, but not of such frequent occurrence as the preceding. Same type as shown in fig. 31.

4. *Ichthyonema globiceps* Rudolphi.

1902.—July 25, fragments; neither extremity was seen; intestine dark-brown. July 28, many fragments. Aug. 4, several fragments; filled with the characteristic young, anterior end blunt, posterior attenuated, length about 0.5 mm.; diameter 0.01 mm. These fragments were in poor condition. They were from the alimentary canal where they had evidently been affected by the digestive juices of the fish. Aug. 8, 2 females, 212 and 20 mm., respectively. Longer specimen with fully developed young in the uterus which occupied the greater part of the body. The smaller specimen with eggs in the uterus. These worms came from the stomach, color reddish, intestine, as in all, dark-brown. Aug. 11, fragments. Aug. 22, numerous fragments. The broken condition was doubtless due to the fact that the intestines of the fish had been cut into small pieces to allow any small distomes that might be in them to creep out into the water. Aug. 26, fragments, one blood-red.

CESTODES.

5. *Scolex polymorphus* Rudolphi.

1901.—July 23, few; very small, in alimentary canal. July 29; few, small; no red pigment observed; rudiment of costa on each bothrium; a strong, terminal, muscular sucker about equalling a bothrium in size.

1902.—July 17, 25, few. July 31; many, small. Aug. 4, 20; few, small.

6. *Larval Dibothrium* (?).

1901.—July 30, 2 flask-shaped larvæ from serous covering of viscera. The anterior end of one of them was everted with the aid of needle points, when it was seen to possess two structures which appeared to be the rudiments of bothria; length about 2 mm.

7. *Cestode larva*.

I here record a peculiar blastocyst collected on July 18, 1901, from the outside of the viscera; length 12 mm., breadth 2 mm., the dimensions, however, varying with states of contraction. [Fig. 81.]

The minute, spine-like bristles, characteristic of cestode larvæ and blastocysts, suggested by their shape the gland hairs of certain plants, being slightly knobbed at the ends. This feature was observed only at the anterior end of the specimen.

8. *Rhynchobothrium speciosum* Linton.

1901.—July 9, 1, encysted on viscera. Aug. 28; a specimen with rather long and slender neck, which was referred at the time of collecting to this species, but with some doubt.

9. *Rhynchobothrium* sp.

Hooks suggest *R. plicatum* sp. nov.

1901.—Aug. 30, few, from oval cysts on viscera. Aug. 31; 1.

1902.—July 22, few. July 31; 1.

Type with long neck and small but not minute hooks.

10. *Otobothrium erenacolle* Linton.

1901.—July 30, encysted in stomach wall. Aug. 28; numerous, encysted in stomach wall.

11. *Tetrarhynchus bisulcatus* Linton.

1901.—July 10, 30; Aug. 31; cysts in stomach wall; few on each occasion.

12. *Synbothrium filicolle* Linton.

1901.—Aug. 30, 1.

1902.—Aug. 22, 1, from cysts on viscera.

13. *Synbothrium* sp.

See introduction, and No. 10 under *Cynoscion regalis*.

1901.—Aug. 28, 3.

1902.—Aug. 20, 1, from cysts on viscera.

TREMATODES.

14. *Distomum monticellii* Linton (?).

Appendiculate distomes which were found in this host on the following dates were thought at the time of collecting to represent three different species.

1901.—Aug. 24, 1. Apparently identical with No. 9 under *Lagodon rhomboides*. Aug. 28; 6; 5 of these not in good condition. One recorded in notes made at time of collecting as a distinct species proves to be an immature appendiculate distome. Dimension of specimen in millimeters, slightly compressed, in glycerin: Length 2; maximum breadth 0.9; diameter of oral sucker 0.28; of pharynx 0.18; of ventral sucker 0.53. Intestinal rami voluminous; reproductive organs rudimentary. Aug. 31; 1. Dimensions, life, compressed, in millimeters: Length 5; breadth 1.5; diameter of oral sucker 0.34; of pharynx 0.21; of ventral sucker 0.82; no ova.

15. *Distomum vitellosum* Linton.

1901.—July 30, 2, small.

1902.—Aug. 16, 2.

16. *Distomum dentatum* Linton.

1901.—Aug. 31, 1. The specimen was in poor condition. It appears to be an individual which has lost the oral spines.

17. *Distomum tenue* Linton.

1902.—July 17, 1, not in good condition. Aug. 8; 1, in poor condition; no spines certainly made out, but specimen looks as if it had been armed with spines.

18. *Gasterostomum gracilescens* Rudolphi.

1902.—July 17, 1.

See under *Menidia*, *Tylosurus marinus*, etc.

19. *Microcotyle* sp. [Figs. 147-150.]

1902.—Aug. 8, 1, probably from gills; fragment, the posterior sucker-bearing portion missing. Figs. 147 and 148 were sketched from this specimen. The cirrus hooks formed an elongated cluster and are shown diagrammatically in fig. 148. Dimensions, life, in millimeters: Length 1.85; breadth at anterior end 0.12; greatest breadth 0.42; length of cirrus hooks 0.025. The specimen was very fragile. It was broken while it was being examined, and destroyed in an attempt to mount the fragments permanently. Aug. 16; 2, from gills. Aug. 22; 1. These specimens were complete and belong to this genus.

A mounted specimen has the following dimensions in millimeters: Length of body proper 1.20; of posterior sucker-bearing portion 1.12; diameter through anterior suckers 0.10; greatest diameter 0.37; diameter of posterior sucker-bearing part 0.18; suckers at anterior end, length 0.051, breadth 0.039; pharynx, length 0.42, breadth 0.036; posterior suckers number about 50 pairs, each sucker 0.042 by 0.021, the longer diameter transverse to axis of body; length of cirrus hooks about 0.015. The cluster of hooks on the cirrus is somewhat triangular, and each hook seems to be two-forked at the base. [Fig. 150.] The posterior suckers are provided with a chitinous framework, which is imperfectly shown in fig. 149.

PARASITIC COPEPODS.

20. *Lernanthropus* sp. From gills.

1901.—July 10, 3, from gills. While I have not undertaken to identify the parasitic copepods, I here record an unusual form. The most striking feature was the possession of a pair of forked leaf-like appendages. These appendages were flexible and were frequently bent dorsally by a convulsive movement. The inner ramus of each appendage was the more active of the two and kept up a rhythmic movement which appeared to be directly concerned with the circulation of the blood. At each such movement the blood was driven along the marginal vessel toward the body, at the same time the blood left the marginal vessel of the outer ramus. As soon as the convulsive contraction was over the appendage relaxed by its own elasticity and the blood returned to its vessels. The general color effect is dark reddish-brown. The blood is red. The appendages made out are: 1, a pair of small antennæ; 2, a pair of hooked mandibles; 3, two pairs of maxillæ; 4, a pair of appendages on the thorax which terminate in horseshoe-shaped suckers; 5, forked appendages at posterior end which function as gills. The tail is forked at the tip with two brown chitinous sucking-disks. Egg sacs 2, cylindrical, dark brown, protruding posteriorly, nearly equaling length of body.

1902.—Aug. 8, 1, female, with elongated pinkish egg-chains. Aug. 12; 1. Aug. 16; 2. Aug. 22; 14. Aug. 26; several, males and females. These have been turned over to Prof. C. B. Wilson.

***Rachycentron canadus*, *Cobia*, "Cabio" (Beaufort).**

Date.	Number of fish examined.	Food notes.
1901.		
August 1.....	1.....	Contents of alimentary canal completely digested, only yellow and green mucus present.
August 3.....	2.....	Fish, crabs, and shrimp.
August 8.....	2.....	Fish, shrimp, and crabs (spider crabs and others).
August 12.....	1.....	Fish.
1902.		
August 8.....	1 (150 mm.).....	Fish, shrimp, and annelid (<i>Arenicola</i>).
August 14.....	.....do.....	Fish.

All the fish examined in 1901 small, 16 to 18 inches in length.

ACANTHOCEPHALA.

1. *Echinorhynchus sagittifer* Linton. [Figs. 1-7.]

1901.—Aug. 3, 3, adult, in intestine. This is the first find of the adult of this species. Immature specimens from the body cavity of many different hosts have been found, and upon such material the species was based.

When these adult specimens were first seen they were collapsed, flattened, and much crumpled, except at the posterior end, which for about 5 mm. was not transversely wrinkled, and, on account of its shape, suggested the head of a *Dibothrium*. Indeed, the worm at first sight might very easily be mistaken for a cestode. The resemblance is heightened by the shelf-like projections with denticulate edges, which recur at rather regular intervals on the anterior half of the body, and of which 23 were counted in one individual, the last one, however, being rudimentary. These projections give to the worm a decidedly segmented appearance. The anterior 4 are somewhat crowded.

A specimen placed in fresh water plumped up after the manner of most of the *Echinorhynchi* when so-treated, and afterwards transferred to killing fluid, measured 70 mm. in length. This was a female; another female measured 40 mm. and a male 23 mm. in length.

1901.—Aug. 8, 1 young and 5 adults found in the pyloric caeca.

Details of the anatomy of a male are shown in figs. 1-4.

NEMATODES.

2. *Ascaris iniquis* Linton.

1901.—Aug. 3, 2, young. Aug. 8, 2 large, 6 small. Aug. 12, 3; 1 of them a male with very long spicules.

CESTODES.

3. *Scolex polymorphus* Rudolphi.

1902.—Aug. 14, 1, small.

4. *Rhinebothrium*, near *R. flexile*.

1901.—Aug. 3, many, in blastocysts. These were found in the alimentary canal. It is not at all likely that this fish is the final host. This larval *Rhinebothrium* is identical with the one found in the toad-fish.

5. *Cysts*.

1901.—Aug. 1, a few cysts found in the stomach wall; contained white, granular material, but no entozoa.

6. *Rhynchobothrium* sp.

This appears to be the kind referred to in this paper as small with relatively long hooks. (See introduction.)

1902.—Aug. 8, several small scolices, with blastocysts attached. Dimensions, life, in millimeters: Length 0.8; head, length 0.14, breadth 0.22; neck, length 0.40, breadth 0.15; length of body back of bulbs 0.38; diameter of proboscis, excluding hooks, 0.018; length of longest hooks 0.014.

7. *Tetrarhynchus bisulcatus* Linton.

1902.—Aug. 8, few, from cysts in stomach wall.

TREMATODES.

8. *Distomum monticellii* Linton. [Fig. 154.]

1901.—Aug. 1, 3, very active, the neck especially so, being filiform when fully extended and capable of speedily shortening until the oral and ventral suckers almost touch each other; color pale red. Length, when compressed, 5 mm.; ova 0.023 by 0.017 mm. in the two principal diameters. Aug. 3, 2; length 2 mm.; diameter of oral sucker 0.14 mm., pharynx 0.07 mm., ventral sucker 0.35 mm.; ova as in foregoing.

1902.—Aug. 8, 6, length 4.2 mm.; 1 smaller, 1.2 mm.

9. *Distomum imparispine*, sp. nov. [Figs. 189-194.]

Body elongate, of nearly uniform breadth throughout, narrowing somewhat at the neck and for a short distance behind ventral sucker. Neck and anterior part of body armed with spines, which are sagittate on the ventral side of the neck, slender and curved on the lateral margins of the neck, somewhat irregular on dorsal side of body, and disappear altogether about the posterior third. Mouth

surrounded by stout but unequal spines, which are 33 in number in the sketch (fig. 190); 34 were counted in the specimen. The number is probably variable. Ventral sucker larger than oral, its posterior border situated at about the anterior fourth of the entire length of the worm; pharynx large, long pyriform, remote from the mouth. Testes two, large, near posterior end, on median line, end to end, the posterior one the larger; cirrus-pouch long, behind ventral sucker; genital aperture not distinctly seen, but evidently on or near median line, close in front of ventral sucker. Ovary near front end of anterior testis; uterus in front of ovary, its folds mainly between ovary and cirrus-pouch; ova moderately numerous and relatively large; vitellaria diffuse, abundant posteriorly, and extending laterally to a point near base of cirrus-pouch.

1901.—Aug. 1, 3.

Dimensions, life, ventral view, in millimeters: Length 9; diameter of head 0.65; of neck, narrowest part, 0.5; transverse diameter of oral sucker a little difficult to make out on account of the spines but about 0.56; breadth of ventral sucker 0.7, length of same 0.9; diameter of globular ovary 0.3; length of anterior testis 0.84; of posterior testis 1.16; breadth of each 0.56; ova 0.07 by 0.04 in the two principal diameters; length of larger oral spines 0.15. Pharynx, same specimen in glycerin, length 0.45; breadth 0.21. Number of oral spines 34.

10. *Distomum* sp. [Figs. 171, 172.]

1901.—Aug. 3, 1. Dimensions, life, lateral view, in millimeters: Length 1; longitudinal diameter of oral sucker 0.08, of pharynx 0.05, of ventral sucker 0.17; ova much smaller at one end than the other, almost pointed-oval, 0.04 by 0.02 in the two principal diameters.

1902.—Aug. 8, 1.

See No. 17 under *Paralichthys albiguttus*.

11. *Distomum pudens* Linton.

1902.—Aug. 8, 1, in poor condition and crushed by accident under cover glass. Dimensions, life, in millimeters: Length 1.3; diameter of oral sucker 0.12, of pharynx 0.10, of ventral sucker 0.11; distance of pharynx from oral sucker 0.27, from ventral sucker 0.04; neck conical.

12. *Distomum dentatum* Linton.

1902.—Aug. 8, 1, small, immature; length 1.2 mm.

13. *Distomum valde-inflatum* Stossich.

1902.—Aug. 8, 1, in cyst.

***Coryphæna hippurus*, Common Dolphin.**

Date.	Number of fish examined.	Food notes.
1902. August 1.....	1.....	Fish, among which a small lizard fish and silverside were recognized.

This fish was sent to the laboratory by Mr. Charles S. Wallace, of Morehead City, N. C.

ACANTHOCEPHALA.

1. *Echinorhynchus sagittifer* Linton.

One, immature; encapsuled on the viscera.

NEMATODES.

2. *Ascaris increscens* Molin.

One, jaws short and broad; post-anal region very short.

3. *Ascaris* sp.

Fragments; one of them the posterior end of a male, with long conical post-anal region. Three pre-anal and four post-anal papillæ were seen in side view.

4. *Immature nematode* (*Ascaris*).

Type with elongated basal part of œsophagus and corrugated post-anal region.

5. *Ichthyonema* sp.

Fragments of female. Ova from one 0.036 by 0.018 mm., from another 0.032 by 0.016 mm. in the two principal diameters.

CESTODES.

6. *Rhynchobothrium speciosum* Linton.

One larva from cyst in stomach wall; another blastocyst without distinguishable larva may belong to a different species.

7. *Otobothrium crenacolle* Linton.

Very numerous, encysted in submucous coat of stomach.

8. *Tetrarhynchus bicolor* Bartels.

Two from cyst in stomach wall. The cyst was globular and of a greenish hue.

TREMATODES.

9. *Distomum tornatum* Rudolphi.

Very numerous, for the most part in the stomach; 671 were collected. There was great variation in size, one of the smallest measuring 3 mm. and one of the largest 12 mm. in length. The fish had been dead for about thirty-six hours, during the greater part of which time it had been kept on ice. The worms were dead, but were apparently in good condition. The color was white except where the folds of the uterus lay, where the color varied from pale yellow to orange. The cirrus was seen extruded in several cases and was noted to be distinctly nodular.

10. *Distomum monticellii* Linton.

Four; length 2.5 mm.

11. *Distomum tenue* Linton.

Forty-two; elongated, slender, white. These are without oral spines and the bodies of most are smooth. In a few cases spines were seen on the neck—faintly on some, more plainly on others. Head and neck of many macerated. Cirrus extended in some cases, when it was seen to be relatively stout and smooth. These specimens bear a close resemblance to *Distomum* sp. from *Enchelyopus cimbrius* (see Parasites of Fishes of Woods Hole Region, fig. 330), which may be a specimen of *D. tenue* from which the oral spines have fallen away.

Dimensions of specimen with elongated neck, in millimeters: Length 7.5; diameter, at oral sucker 0.21, at pharynx 0.51, at ventral sucker 0.6, from which point the diameter is nearly uniform to the posterior end; diameter of oral sucker 0.18, of pharynx 0.18, of ventral sucker 0.27; length of pharynx 0.2; distance of pharynx from anterior end 1.05; distance of ventral sucker from anterior end 2.25; ova 0.076 by 0.043. Another specimen with contracted neck measured 5 mm. in length; distance of pharynx from anterior end 0.3 mm.; distance of ventral sucker from anterior end 0.75 mm. The ova were undergoing segmentation.

12. *Distomum* sp. [Figs. 213, 214.]

Three, with extraordinarily voluminous intestines which obscure other organs. Same as No. 10 under *Coryphæna equisetis*.

Dimensions, in millimeters, slightly compressed: Length 3.35; diameter, anterior 0.11, at ventral sucker 0.33, nearly uniform to posterior end; oral sucker, length 0.10, breadth 0.08; ventral sucker, circular, 0.24 in diameter.

These specimens are immature. There is no pharynx. The œsophagus is slender. The intestinal rami begin in a convoluted mass slightly in front of the ventral sucker, and continue to the posterior end, being voluminous, and apparently irregularly constricted, so as to present the appearance of a series of translucent bodies filling the post-acetabular region of the body. The intestines are filled with structureless, seemingly colloid material. No trace of genitalia could be made out in any of these distomes.

While they are immature, there should be no difficulty experienced in recognizing these peculiar forms.

Coryphæna equisetis, Small Dolphin.

Date.	Number of fish examined.	Food notes.
1902. August 21.....	3.....	Fish.

These dolphins were taken by the Fisheries steamer *Fish Hawk* about 28 miles off Cape Lookout. They agree with descriptions of this species in length of maxillary, profile of head, number of spines in dorsal and anal fins, coloration, and size. Length 20 to 24 inches.

NEMATODES.

1. *Filaria galeata* sp. nov. [Fig. 20.]

See No. 1 under *Sphyrna tiburo* (figs. 17-19).

Numerous fragments from stomach. These worms have the appearance of having been introduced into the stomach of the dolphin along with some host in which they were adult. A number of these were males with only the posterior ends preserved. These fragments, while agreeing closely with the species described from the bonnet-head shark, present some differences. The posterior ends were simply curved in a helix instead of a spiral. This, however, may be accounted for by the flaccid condition of the specimens, due, presumably, to the digestive fluids of the dolphin.

The long spicule of the male (fig. 20) was winged at the distal end so as to resemble the fluke of an anchor.

The fragments of females contained ova in which young had already developed. It should be noted that the ova had lain in sea water for two days before they were examined. They varied somewhat in size. The best formed ova measured 0.032 by 0.018 mm. in the two principal diameters.

CESTODES.

2. *Scotex polymorphus* Rudolphi.

Numerous, small, but with two costæ developed on the bothria.

3. *Blastocyst*.

One, with no indication of larva. It resembles the kind of which *Rhynchobothrium speciosum* is a type.

TREMATODES.

4. *Distomum tornatum* Rudolphi.

Numerous, mainly from the stomach; 247 were counted.

5. *Distomum monticellii* Linton.

A few smallish, immature specimens appear to belong to the species which I have been recording under this name.

6. *Distomum appendiculatum* Rudolphi.

Some small slender distomes agree closely with this species.

7. *Distomum nigroflavum* Rudolphi.

Four, 3 adult and 1 young.

8. *Distomum tenue* Linton.

Forty-nine were counted. These agree with those from the common dolphin referred to this species.

9. *Distomum dentatum* Linton.

Two small distomes were found which differ from No. 8 in being flattened dorso-ventrally instead of having a cylindrical shape. They resemble this species, but are devoid of oral spines.

10. *Distomum* sp. [See figs. 213, 214.]

Six. These are the same as No. 12 under the common dolphin. Their most conspicuous character is the very voluminous intestinal rami which obscure the other organs, if any are yet developed, but which are themselves translucent.

PARASITIC COPEPODS.

11. *Lernæonema* sp.

Numerous on dorsal fins and sides; on all, but most abundant on one of the fish; egg-chains variously colored, green and purple; all with heads deeply buried in flesh of host.

12. *Caligus* sp.

One; yellowish-brown.

Centropristes striatus, Black Sea-bass.

Date.	Number of fish examined.	Food notes.
1901.		
August 2.....	1.....	Fish, crabs, shrimp.
August 3.....	3.....	Crabs.
August 5.....	1.....	Fish and crustaceans.
August 7.....	7.....	Fish, crabs (hermit crabs and others).
August 8.....	5.....	Fish and crustacea (crabs and isopods), bryozoa (<i>Bugula</i>).
August 10.....	4.....	Fish, crabs, annelids, bryozoa, seaweed.
August 12.....	6.....	Fish, crabs, mollusks.
August 13.....	6.....	Fish, crabs, bivalve mollusks, annelids.
August 15.....	3.....	Fish, crabs, shrimp, isopods.
August 16.....	1.....	Fish, crabs, shrimp, bivalve mollusks.
August 22.....	2.....	Crabs, sea-urchin (<i>Moiera atropos</i>).
Do.....	1.....	Crabs.

All the fish were rather small, many of them from 4 to 5 inches in length.

In 1902, from July 7 to August 19, 45 fish, all small, were examined. The contents of the alimentary canals comprised fish, crabs, shrimp, amphipods, and other small crustacea, annelids, 1 ophiuran, and sea lettuce.

NEMATODES.

1. *Immature nematodes (Ascaris)*. [Fig. 33.]

Type with diverticula to intestine and œsophagus.

1901.—Aug. 2, rather numerous, small on viscera. Aug. 3, 7, 12, 13, 16, 22, and 27, few on each date.

1902.—July 8, few; July 17, 1; July 19, 3; July 21, 1; July 22, several. A few, noted on July 14, 16, 22, which differed from the others in having a more distinctly clavate œsophagus; the subcuticular layer was conspicuously cellular.

2. *Immature nematodes (Ascaris)*.

Type with elongated basal part of œsophagus and corrugated post-anal region.

1902.—July 29, few.

CESTODES.

3. *Scolex polymorphus* Rudolphi.

1902.—July 25; elongated forms with 2 costæ on bothria and 2 red pigment patches on the neck.

4. *Rhynchobothrium* sp.

Probably larval stage of *R. plicatum* sp. nov.

1902.—July 16, 1. This specimen was found free in the water of a small dish in which the viscera had been lying. It had doubtless escaped from a cyst. The specimen was very active. The proboscides were not seen extended, but the hooks, seen through the body wall, suggest this species. Length 2.5 mm.; length of head and neck 0.8 mm.

5. *Rhynchobothrium* sp. [Fig. 94.]

Probably encysted stage of *R. longispine* Linton.

Small, oval, or pyriform cysts in viscera and mesentery; larvæ small, with relatively long contractile bulbs, and with hooks of various sizes, but some of them relatively rather large. Length of longer hooks 0.027 mm.

Same form recorded from various hosts in these notes, Aug. 5, 7, 8, 10, 12, 13, 17, 22, 27, 1901.

1902.—July 17, 21, 25, 29, and Aug. 12, 19; few to numerous. Some cysts were opened which had no trace of larva in the blastocyst.

6. *Rhynchobothrium* sp.

1901.—Aug. 10, 1 larva from small cyst on viscera noted which belongs to a type found in other hosts; characterized by elongated neck and proboscides armed with minute hooks. Probably *R. tenuispine* Linton.

1902.—July 16, 1; Aug. 15, 1.

7. *Otobothrium dipsacum* Linton.

1901.—Aug. 12, a single specimen from a blastocyst on the viscera.

8. *Cestode larva*.

Apparently a larval *Dibothrium*.

1902.—July 19, 1, encysted on viscera.

TREMATODES.

9. *Distomum monticellii* Linton. [Fig. 158.]

1901.—Aug. 10, a single immature appendiculate distome from intestine. Dimensions, compressed, in millimeters: Length 1.82; breadth 0.81; diameter of oral sucker 0.22, of pharynx 0.15, of ventral sucker 0.39. Color yellowish, intestine very voluminous; pharynx conical, the larger anterior end contiguous with the oral sucker.

1902.—July 14, 1. This specimen is immature. The reproductive organs are rudimentary, the intestines voluminous. In front of the ventral sucker and just behind it the excretory vessel is filled with orange-colored spherical concretions. Dimensions of living specimen in millimeters: Length 1.17; breadth 0.35; oral sucker, length 0.09, breadth 0.10; pharynx, length 0.054, breadth 0.050; ventral sucker, length 0.22, breadth 0.24.

10. *Distomum tenue* Linton.

1901.—Aug. 12, 1, probably a young specimen of this species. Spines on the ventral surface, low, flat, and rounded, those on the margins of the neck relatively long. The marginal spines disappear about the posterior third. The ventral spines in the oral circles are very small and slender, while the dorsal spines are stout. In this particular the specimen exhibits considerable variation from the typical form of this species. Dimensions in millimeters, specimen compressed: Length 1.68; breadth 0.5; diameter of oral sucker 0.14, of ventral sucker 0.25; pharynx, length 0.21, breadth 0.17.

1902.—July 17, 1. This specimen agrees with this species, except that the spines are missing.

***Orthopristis chrysopterus*, Hog-fish.**

Date.	Number of fish examined.	Food notes.
1901.		
July 10.....	3.....	Annelids and vegetable debris.
July 11.....	6.....	Amphipods, large numbers of fragments of annelids; spines and pieces of test of sea urchin (<i>Moirá</i>).
July 12.....	8.....	Bivalve mollusks, crabs, annelids, and sand.
July 17.....	10.....	Fiddler crabs, amphipods, several small horseshoe crabs (<i>Limulus</i>), bivalve mollusks (<i>Solenomya</i> and <i>Venus</i>), annelids, test of sea urchin, fragment of ophiuran, and large numbers of what were taken to be eggs of <i>Limulus</i> .
July 20.....	10.....	Broken shells of bivalve mollusks, annelids, and sand.
July 27.....	2.....	Fragments of shells and annelids.
July 30.....	10.....	Broken shells of lamellibranch mollusks (two or more species), gastropods, annelids, tests and spines of sea urchin, seaweed.
July 31.....	5.....	Annelids (<i>Arenicola</i>), mollusks, etc.
August 3.....	1.....	Broken shells, sand, etc.
August 6.....	10.....	Mainly broken shells and sand, young <i>Limulus</i> .
August 7.....	1.....	Fish, broken shells, crustacea, sand.
August 17.....	7.....	Shrimp, broken shells, annelids, sand.
August 28.....	3.....	Shrimp, broken shells (lamellibranchs), univalves (<i>Urosalpinx</i>), annelids, sea urchin.
August 30.....	1.....	Fish, shrimp, lamellibranchs, annelids.
August 31.....	7.....	Fish, shrimp, annelids.
1902.		
July 8.....	11 (small, 50-60 mm.)	Shrimp, small lamellibranchs, and gastropods, seaweed.
July 14.....	3 (small, 50-60 mm.)	Shrimp, small gastropods, annelids.
July 15.....	.....do.....	Amphipods and other small crustacea, copepods.
July 16.....	2 (small, 50-60 mm.)	Small shrimp, amphipods, copepods, lamellibranchs (<i>Solenomya</i>), annelids, sand.
July 19.....	5.....	Crab, shrimp, lamellibranchs, small gastropods, sand.
Do.....	3.....	Crab, shrimp, small lamellibranchs, annelids.
July 21.....	1.....	Shrimp, lamellibranchs (<i>Solenomya</i>), annelids. No entozoa.
July 22.....	1.....	Crab, shrimp. No entozoa.
July 25.....	1.....	Shells of <i>Solenomya</i> .
July 28.....	1 (small)	Shells of <i>Solenomya</i> , annelids.
July 31.....	4.....	Shrimp, amphipods, <i>Solenomya</i> , annelids, sea urchin testes.
August 4.....	6 (small)	Shrimp, lamellibranchs, annelids.
August 8.....	1.....	Small crustacea. No entozoa.
August 11.....	5.....	Fish, scales, crabs, shrimp, lamellibranchs, gastropods, spines of sea urchin, sand.
August 12.....	3.....	Lamellibranchs, gastropods, seaweed.
August 13.....	4.....	Amphipods and other small crustacea, annelids. No entozoa.
August 16.....	6 (5 small)	Gastropods, shrimp, annelids.
August 18.....	2.....	Lamellibranchs, annelids, sea urchin (<i>Moirá</i>).
August 19.....	6.....	Lamellibranchs, crabs, shrimp.
August 20.....	5.....	Crabs, annelids, sea urchin (<i>Moirá</i>).
August 21.....	5 (small)	Shrimp, amphipods, copepods, <i>Solenomya</i> .

The fish examined in 1901 were from the market and were of the usual size; those examined in 1902 were taken in a small seine and were all small.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1901.—July 20, 7. July 27, 1. July 30, 5. July 31, few and small. Aug. 6, few and small. Aug. 7, fragment of female. Aug. 28, 1, fragment.

1902.—July 19, 2. July 25, 2. July 31, 5. Aug. 11, 4. Aug. 18, 1.

2. *Echinorhynchus sagittifer* Linton.

1901.—Aug. 6, 1, from mesentery.

NEMATODES.

3. *Immature nematodes (Ascaris)*.

1901.—July 27. This is the type characterized in this paper as possessing a diverticulum on both intestine and œsophagus. A few cysts found July 20, 1901, although containing nothing recognizable, were probably due to these nematodes. Aug. 6, nematodes, same type as those found on July 27. Aug. 7, several cysts from mesentery and serous coat of stomach containing degenerate, waxy tissue; no entozoa found in them, but they are probably due to these nematodes. Aug. 28, same type as of July 27. The diverticulum of the œsophagus was elongated and slender. In the larger specimens the intestine was dark brown.

1902.—July 19, 25, 31, Aug. 12, few on each date.

CESTODES.

4. *Scolex polymorphus* Rudolphi.

1901.—Aug. 31, few, in intestine, with two red pigment spots and simple bothria.

1902.—July 14, 1, active, 2 costæ, no red pigment. July 15, ordinary type, also minuscule forms. Aug. 18, few, large. Aug. 20 and 21, few, small.

5. *Rhynchobothrium* sp. [Fig. 98.]

Hooks suggest *R. plicatum* sp. nov.

1901.—July 12, cysts containing type with elongated neck and proboscides armed with small, but not minute, hooks. July 17, several, encysted on viscera. Diameter of proboscis, including hooks, 0.017 mm.

1902.—Aug. 20, 1.

See No. 9, under *Bairdiella*.

6. *Rhynchobothrium* sp.

1901.—July 17, cysts containing small larvæ of the type recorded in field notes as being small with relatively long hooks and bulbs. July 27, small, encysted. Aug. 17 and 28, small oval cysts on viscera.

1902.—July 25 and 31, few, small oval cysts.

7. *Rhynchobothrium* sp.

1901.—Aug. 31, larvæ from blastocyst. This is the type recorded in these notes as slender with very long proboscides armed with very minute hooks.

8. *Otobothrium crenacolle* Linton. [Fig. 110.]

1901.—Aug. 6, cyst with two blastocysts, each with a larva. Upon compressing the cyst the larvæ could be made out through the transparent walls to belong to this species. Diameter of cyst 2 mm.

9. *Tetrarhynchus bisulcatus* Linton.

1901.—July 31, few. Aug. 28 and 30, scolices encysted in stomach wall.

10. *Synbothrium* sp. See introduction.

1901.—July 11, 1, cestode larva, which is probably to be referred to this species. The cyst was found in the liver, and measured 25 mm. in length and 3 mm. in diameter. The blastocyst was about the same size as the enveloping cyst and was very active. When flattened, marginal sinuous vessels were seen, but no appearance of a larva. The killed specimen measured 14 mm. in length. July 12, a cyst similar to the foregoing found on this date yielded a larva which appears to belong to this species. Dimensions in millimeters: Length 6; breadth of head, 1.2; diameter of neck, 0.6; length of contractile bulbs 1, diameter 0.27; diameter of proboscis, exclusive of hooks, 0.1; specimen somewhat compressed.

11. *Cestode larva.*

Same as No. 8, under *Micropogon undulatus*.

1902.—Aug. 16, 2, with crumpled bothria and striated neck—probably *Anthobothrium pulvinatum*.

12. *Cysts.*

1902.—July 8, cysts on viscera, probably cestode, but no larvæ found.

TREMATODES.

13. *Distomum appendiculatum* Rudolphi. [Fig. 152.]

1902.—July 14, a single specimen found in a small piece of the intestine, which was under examination for food under the compound microscope. The specimen was small, yellowish by transmitted and whitish by reflected light; excretory vessel white by reflected, dark by transmitted light; body crossed by fine transverse lines, active, contracting to 0.6 mm. in length and 0.45 mm. in breadth and extending to twice that length, at the same time narrowing proportionally.

Dimensions, life, in millimeters: Length 1.26; maximum breadth, just behind ventral sucker, 0.41; oral sucker, length 0.060, breadth 0.075; pharynx, length 0.054, breadth 0.036; ventral sucker, length 0.16, breadth 0.17, becoming nearly circular at times; ova, 0.025 by 0.011.

14. *Distomum vitellosum* Linton.

1901.—Aug. 31, 1. A fragment of a distome which resembles this species was found on this date.

15. *Distomum globiporum* Rudolphi.

1901.—July 11, 1. White, long, oval specimen belongs to this species or is near it. Dimensions in millimeters: Length 5.5, breadth 2.5; diameter of oral sucker 0.56, of pharynx 0.4, of ventral sucker 0.84; ova, 0.08 and 0.05 in the two principal diameters.

The following notes were made at the time of collecting: Pharynx globular, close to oral sucker, esophagus short, genital aperture immediately behind pharynx; intestinal rami simple, probably extending to posterior end; cirrus lying along median line, pouch dorsal to ventral sucker; ovary globular, 0.3 mm. in diameter, close behind ventral sucker and a little to the left; testes two, close together, about on median line, the anterior one near the posterior edge of the ventral sucker; vitellaria voluminous, filling posterior half of body and extending laterally to about middle of neck; ova only moderately abundant.

16. *Distomum corpulentum* sp. nov.

1901.—Aug. 28, a small, nearly spherical distome which agrees with No. 14 under *Lagodon rhomboides*. The surface of this specimen was roughened by exceedingly minute toothed or crenulate transverse lines. These appear in some places to be low blunt teeth. Dimensions in millimeters: Length 2.8; diameter of oral sucker 0.15, of ventral sucker 0.57; ova, 0.037 and 0.02 in the two principal diameters.

17. *Distomum bothryophoron* Olsson. [See figs. 174, 175.]

1901.—July 10, 1. When lying free in sea water this distome was rather plump, smooth, but with fine transverse wrinkles. Pharynx nearly globular and contiguous with oral sucker; esophagus none or very short; ova very numerous, obscuring other organs; apertures of both oral and ventral suckers transverse; genital aperture on median line just behind pharynx. Dimensions in millimeters: Length 3.24, breadth, median and maximum 1.19; oral sucker, length 0.18, breadth 0.21; ventral sucker, length 0.64, breadth 0.78; pharynx, diameter 0.1; ova, 0.051 and 0.024 in the two principal diameters. July 11, Figs. 174, 175 made from this specimen. July 30, 1, small. Dimensions in millimeters: Length 1; oral sucker, length 0.08, breadth 0.11; ventral sucker, diameter 0.31; pharynx, diameter 0.05; breadth of body, anterior 0.11, middle 0.43, posterior 0.11; ova, 0.044 and 0.017 in the two principal diameters.

1902.—July 8, 1. July 19, 2. July 25, 1. July 31, 5. Aug. 19, 1.

Rather plump, fusiform, often pale red. The flattened and stained specimens show the presence of a lobed vitelline gland like that of *D. bothryophoron*. The specimens found on July 8 and 25 were about as broad as long, and at first were taken to be representatives of a different species, but upon being cleared up show the characteristic vitellaria of this species and also agree in other particulars. Length 1.35 mm., breadth 1.35 mm.; another length 1.8 mm., breadth 0.9 mm.

18. *Distomum areolatum* Rudolphi.

1901.—Aug. 31, 1. A small specimen which belongs to this species or near it, agreeing with No. 16 under *Micropogon undulatus*. Dimensions in millimeters: Length 1.12; breadth 0.45; diameter of oral sucker 0.14, of pharynx 0.08, of ventral sucker 0.09; ovum, 0.12 and 0.08 in the principal diameters. Posterior part of body filled with minute oval bodies, 7 and 4 microns in the two principal diameters.

1902.—Aug. 11, 1 and fragment, immature. Aug. 19, few.

19. *Distomum tenue* Linton.

1901.—Aug. 30, a single specimen in close agreement with No. 6 under *Sciwnops ocellatus*, found on the same date, appears to belong to this species, although no spines could be made out either around the mouth or on the body. There were indications, however, that spines had been present in both situations. The intestine in front of and beside the ventral sucker was gorged with granular material of a faint orange color; the remainder of the worm was white. Dimensions in millimeters: Length 4; diameter, maximum 0.75, of oral sucker 0.19, of pharynx 0.28, of ventral sucker 0.3; distance from anterior end of pharynx 0.77, of ventral sucker 1.45; ova, 0.11 and 0.08 in the two principal diameters.

20. *Distomum valde-inflatum* Stossich.

1901.—July 11, 1, from cyst on viscera. Dimensions in millimeters: Length 2.1; breadth 1.12; diameter of oral sucker 0.15, of ventral sucker 0.22; pharynx, length 0.18, breadth, 0.14.

21. *Gasterostomum* sp. (?)

1901.—July 11, 2 small slender trematodes, in too poor condition to admit of determination, rather suggest this genus.

22. *Monostomum vinal-edwardsii* Linton.

1901.—Aug. 31, 1.

1902.—Aug. 11, 1.

23. *Monostomum* sp. [Fig. 222.]

1901.—Aug. 28, 2, small, short oval. Dimensions in millimeters: Length 0.86; breadth 0.65; diameter of oral sucker 0.14, of pharynx 0.06; ova, 0.021 and 0.014 in the two principal diameters; cirrus densely spinose. This species appears to be near the small form found in *Pomolobus* (Bulletin of U. S. Fish Commission for 1899, p. 439, fig. 377.) Aug. 30; 2, small, oval, resemble the foregoing, but the body is covered with minute spines, a feature not observed in the former lot. Aug. 31, few; same as those collected on the preceding date.

24. *Monostomum* sp. [Figs. 223-225.]

1901.—July 30, 1, rather slender when compressed, and bearing numerous ova, which are peculiar in that their longer diameter is three times the shorter. Dimensions in millimeters: Length 0.9; diameter, anterior 0.15, middle 0.25, posterior 0.08; diameter of oral sucker 0.14; pharynx, length 0.05, breadth 0.04; diameter of genital aperture 0.08; ova, 0.03 and 0.01 in the two principal diameters. Aug. 31, 1.

1902.—July 15, several, found in pieces of the intestine with the aid of the compound microscope. They are very irregular in shape and of considerable variety of size; dirty greenish-yellow by transmitted, paler by reflected, light. Dimensions of 7 specimens chosen at random, life, length, and breadth only: Length 0.30, breadth 0.24; length 0.34, breadth 0.24; length 0.18, breadth 0.15; length 0.15, breadth 0.13; length 0.25, breadth 0.19; length 0.30, breadth 0.18; length 0.19, breadth 0.16. When compressed these specimens become uniformly long oval, larger anteriorly, tapering posteriorly, and then are easily seen to be identical with the specimens taken in 1901.

25. *Monostomum* sp. [Figs. 216, 218.]

These are slender forms which were represented by only a few specimens, which were quite fragile and otherwise in poor condition, so that the anatomy revealed by them is very incomplete.

The general shape of the body is long and slender, especially in the specimens collected on Aug. 11 (fig. 216). The vitellaria are represented by a number (as many as 25 in one) of subglobular bodies, situated not far from the middle of the length of the body. Ova numerous, the convolutions of the uterus extending to the posterior end. Oral sucker and pharynx each longer than broad, the latter remote from the mouth.

1902.—July 18, 1 (fig. 218 sketched from this specimen). Dimensions in millimeters, life, compressed: Length 1.4, breadth 0.3; oral sucker, length 0.16, breadth 0.11; pharynx, length 0.12, breadth 0.09; genital sucker 0.10; ova, 0.025 by 0.011. Aug. 11, 3. Aug. 18, 1. These were not

recognized as agreeing with the specimen collected on July 18, and unfortunately the preserved material does not allow of a comparison, part of it having been lost or destroyed by accident.^a Fig. 216 was sketched from one of the specimens collected on Aug. 11. Dimensions of living specimen, slightly compressed, in millimeters: Length 1.8; diameter at anterior end 0.12; maximum diameter 0.27; oral sucker, length 0.15, breadth 0.10; pharynx, length 0.09, breadth 0.07; diameter of genital sucker 0.11. Another specimen measuring 2.25 in length had other dimensions agreeing almost exactly with the above. Ova, 0.18 by 0.14.

26. *Diclidophora* sp.

1902.—Aug. 12, 1, small, from gills. This specimen was very fragile, the posterior finger-like processes appearing to be somewhat macerated. Dimensions, in millimeters: Length 1.86, length exclusive of posterior sucker 1.28; diameter at anterior end 0.08; maximum diameter of body 0.52, of sucker region 0.96; diameter of one of the 8 small suckers 0.13.

COPEPOD PARASITES.

27. *Ergasilus* sp. From gills.

1902.—Aug. 18, 2, females. Thorax yellowish on border, reddish in center, abdomen red; posterior appendages yellowish, transparent, tinged with pink at the base; egg chains lavender, very long.

These specimens, together with others collected last year, were sent to Prof. C. B. Wilson, who informs me that he finds in the lot the two genera *Bomolochus* and *Ergasilus*.

Lagodon rhomboides, Pin-fish.

Date.	Number of fish examined.	Food notes.
1901.		
July 12.....	7.....	An abundance of green seaweed and a few amphipods and annelids.
July 16.....	2.....	Seaweed, amphipods, small crabs, and fragments of fish.
July 18.....	1.....	Small bivalve mollusks, amphipods, and annelids.
August 5.....	1.....	Fish, bivalve mollusks, and sea lettuce.
August 8.....	1 (small).....	Fish, seaweed.
August 10.....	1 (do).....	Fish.
August 12.....	2 (small).....	Fish, amphipods, copepods, bryozoa, vegetable debris, and sand.
August 13.....	2.....	Fish, crabs.
August 17.....	8.....	Bivalve mollusks, shrimp, annelids.
August 20.....	15.....	Fish, sea lettuce.
August 21.....	16.....	Fish, feces (fish taken at laboratory wharf).
August 22.....	11.....	Fish, sand (same locality).
August 23.....	12.....	Fish, seaweed, sand, feces (same locality).
August 24.....	11.....	Fish, bivalve mollusks, crabs, sea lettuce, sand.
August 27.....	2.....	Fish, crab, spines of sea urchin (<i>Moiria</i>), gorgonia spicules, seaweed, sand.
1902.		
July 7.....	35 (small).....	Shrimp, seaweed, small gastropods, and sand.
July 14.....	8 (small, 50 mm.).....	A small piece of the intestine contained many spines and other fragments of annelids and fragments of small crustacea.
July 15.....	1 (small).....	Sand with foraminifera, etc.
July 16.....	6 (50-125 mm.).....	The alimentary canals of the small fish contained small shrimp and amphipods; those of the larger fish contained broken lamellibranch shells, spines of sea urchin, and fragments of seaweed.
July 17.....	6 (small).....	Small shrimp and amphipods.
July 18.....	1 (small).....	Small crabs, gastropods, seaweed.
July 19.....	4.....	Sea-urchin spines, lamellibranchs, seaweed.
July 21.....	3.....	Vegetable debris; no entozoa.
July 22.....	1.....	Young shrimp, small lamellibranchs; no entozoa.
August 8.....	4.....	Crabs, lamellibranchs, seaweed.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1901.—July 12, a single specimen, female, is referred provisionally to this species; from intestine. Color yellowish white, proboscis and anterior end of body each partly inverted. Dimensions, in millimeters: Length 11, of proboscis 1.22, of sheath 2, of lemnisci 1.68; greatest diameter 0.53, of proboscis at base 0.14, middle and apex 0.15, of lemnisci 0.04, of ovarian masses 0.16 and 0.11 in the

^aIn searching for these specimens in the vial in which they had been placed two slender specimens of *Distomum pectinatum* were found, which had not been noted from this host at the time of collecting. They are not given a number in this report, since it is possible that they may have been placed in the vial by mistake.

two principal diameters; embryos 0.068 and 0.017 in length and breadth respectively. The body was slender fusiform, tapering from 0.53 mm. at near anterior end to 0.35 mm. at the middle and 0.25 mm. near posterior end. The anterior end was inverted, but was seen to be rather abruptly tapering to proboscis and armed near the proboscis with sagittate spines; a few scattering sagittate spines also on the uninverted anterior end of the body. Base of proboscis armed with a circle of about 12 relatively long and but slightly recurved hooks; anterior to this circle about 16 vertical rows of small, blunt hooks, about 6 in each row; anterior to these the hooks are arranged in the ordinary spirals, the basal for a short distance short, stout, and recurved, the remainder, so far as seen, of usual type, viz., stout and recurved on one side of the proboscis, and slender, straightish on the other; about 8 hooks visible in a single spiral. Proboscis nearly at right angles to axis of body.

2. *Echinorhynchus sagittifer* Linton.

1901.—Aug. 22, encapsuled on viscera.

NEMATODES.

3. *Immature nematodes (Ascaris sp.)*.

1901.—Aug. 20, 21, 24, few, from body cavity on viscera. These belong to the kind characterized in this paper as having diverticula of œsophagus and corrugated post-anal region. (Type shown in fig. 31.)

CESTODES.

4. *Scolex polymorphus* Rudolphi.

1901.—July 16, few in intestine. Aug. 5, few. Aug. 10, 1. Aug. 20, few; red pigment spot noted. Aug. 21, few; two red spots noted in these. Aug. 23, few. Aug. 27, few. All of these larval cestodes found in intestine.

1902.—July 14, several minute specimens were seen in a small piece of the intestine which was being examined under the compound microscope in order to ascertain the nature of the food. The bothria were all retracted and evidently still rudimentary. These minute forms were of nearly uniform size; length 0.14 mm.; breadth 0.06 mm.; color yellowish-white. Other specimens were also observed, which were larger and of the usual type. July 15, rather numerous, with red pigment patches, but no costæ on the bothria.

5. *Cestode blastocysts*.

1901.—July 16, 1, on viscera; no larva yet developed. Aug. 17, 1; slender, from viscera; active after several hours in sea water.

6. *Rhynchobothrium* sp.

Probably encysted stage of *R. longispine* Linton.

1901.—Aug. 23, 1. This appears to be the kind which is recorded in these notes as small, with relatively long hooks and contractile bulbs. From cyst on viscera.

1902.—July 7, 15, 19 and Aug. 8, few. Small, oval cysts on viscera.

7. *Otobothrium crenacolle* Linton.

1902.—Aug. 24, 1 cyst with larva.

8. *Tetrarhynchus bisulcatus* Linton.

1901.—July 18, from cyst.

TREMATODES.

9. *Distomum monticellii* Linton.

1901.—Aug. 20, 1, from intestine. Dimensions, in millimeters, compressed: Length 4.2; diameter of oral sucker 0.27, of ventral sucker 0.52, of body 0.56; ova, numerous, 0.028 and 0.014 in two principal diameters. Color light red; cirrus pouch in front of ventral sucker; testes close together placed somewhat diagonally and immediately behind the ventral sucker; ovary somewhat farther back, followed by the lobed vitellaria; rami of intestines extend to posterior end of body. Aug. 21, 2, young, 1.13 and 2 mm. in length respectively. The stained specimens show the testes, ovary, vitellaria, and rudiment of cirrus pouch, all agreeing with this species.

In each specimen in life the excretory vessel, just behind the ventral sucker and just in front of it, was filled with spherical, orange-colored concretions. These varied from very minute to 0.01 mm. in diameter.

10. *Distomum appendiculatum* Rudolphi.

1902.—July 18, 1, small distome, not in good condition, agrees closely with this species; ova 0.014 by 0.011.

11. *Distomum vitellosum* Linton.

1901.—Aug. 24, 1, from intestine.

12. *Distomum pyriforme* Linton.

1901.—Aug. 20, 4. Dimensions, in millimeters, of largest specimen, compressed: Length 1; breadth 0.42; diameter of oral sucker 0.07, of pharynx 0.04, of ventral sucker 0.09; ovum 0.068 and 0.034 in two principal diameters; smallest specimen, length 0.53, breadth 0.29. Aug. 23, 1, not in good condition.

1902.—Aug. 8, 3, not in good condition, belong to this species or are near it. Dimensions, life, in millimeters: Length 1; breadth 0.5; diameter of oral sucker 0.08, of pharynx 0.05, of ventral sucker 0.09.

13. *Distomum* sp. [Fig. 179.]

1901.—Aug. 17, 1, somewhat macerated. Dimensions, in millimeters: Length 2; diameter 1, of oral sucker 0.38, of pharynx 0.28, of ventral sucker 0.25; ovum 0.075 and 0.058 in two principal diameters.

14. *Distomum corpulentum* sp. nov. [Figs. 180–182.]

Body unarmed, subspherical, ventral sucker much larger than oral, sessile, prominent, aperture transversely elliptical, mouth subterminal; pharynx contiguous to oral sucker; œsophagus very short. Each branch of the intestine with a short diverticulum prolonged anteriorly, parallel with the pharynx. testes two, lateral behind the ventral sucker; ovary between the right testis and the ventral sucker; cirrus pouch muscular in front of ventral sucker and a little to the right, vitellaria lateral. The species has many points of resemblance to *D. pagelli* Beneden.

1901.—Aug. 21, 3, small and nearly spherical. One of the specimens was pinkish or light orange, when viewed by transmitted (artificial) light, the ova, which filled all the post-acetabular region, were seen to be amber-yellow, while the suckers, particularly the ventral sucker, were brownish-red. Dimensions of larger specimen, flattened under cover-glass, in millimeters: Length 2.25; breadth 1.74; oral sucker, length 0.21, breadth 0.29; pharynx, length and breadth each 0.12; ventral sucker, length 0.73, breadth 1.16; ovum 0.051 and 0.027 in the two principal diameters. Dimensions of a second smaller and paler specimen under same conditions: Length 1.54; breadth 1.26; oral sucker, length 0.17, breadth 0.21; pharynx, length 0.13, breadth 0.10; ventral sucker, length 0.46, breadth 0.83; ova, irregular, maximum, 0.041 and 0.024; others 0.027 and 0.020, 0.030 and 0.015, 0.027 and 0.017, respectively, in the two principal diameters. An unflattened specimen, which had lain in formalin over night, but which had not sensibly changed its proportions, had the following dimensions: Length 0.77; breadth 0.75; thickness 0.63. Aug. 23, 24, 1 on each date.

***Archosargus probatocephalus*, Sheepshead.**

Date.	Number of fish examined.	Food notes.
July 8.....	1.....	Crustacea, spines and fragments of tests of sea-urchins. Hermit crabs and other crustacea, comminuted shells and Gorgonia spicules.
August 3.....	1.....	

No entozoa were found in the alimentary canals of these fish, which is not surprising when one considers the nature of the contents of stomach and intestine, which would act as a mechanical anthelmintic.

PROTOZOA.

1. *Myxobolus* (*Henneguya*) sp.

Aug. 3, a small white patch on one of the pectoral fins, about 2 mm. in length, was found to contain spores which appear to be identical with those found in the intestinal wall of the drum (*Sciaenops ocellatus*) and pompano (*Trachinotus carolinus*). About the only difference noted was that the caudal prolongation of the shell was longer in these than in those from the drum. The length of the body was barely 0.01 mm., while the length of the spore, including the caudal spicule, was from 0.03 to 0.04 mm.

Diplodus holbrookii, Spotted Pin-fish.

Date.	Number of fish examined.	Food notes.
1902. July 22.....	2 (small)	Bryozoa.

COPEPOD PARASITES.

1. *Argulus* sp.

Few; found in washings from intestine, but doubtless from outside of host.

NEMATODES.

2. *Lecanocephalus annulatus* Molin.

One, a female, length 5 mm. Other dimensions, life: Diameter, of head 0.2; of body at base of œsophagus 0.5; middle of body 0.67, maximum diameter, a little behind middle, 0.85; length of œsophagus 0.9; diameter of body at anal aperture 0.18; distance from anal aperture to posterior end 0.16.

CESTODES.

3. *Scolex polymorphus* Rudolphi.

Few, minute, seen in a small piece of the intestine which was being examined to ascertain the character of the food.

Eucinostomus gula, Silver Jenny.

Date.	Number of fish examined.	Food notes.
1902. August 20.....	1 (small)	In a small piece of the intestine were found spines, setæ and hooks of annelids, eyes of small crustacea, diatoms, fragments of vegetable tissue, and sand. Annelids.
August 21.....	5 (small)	

NEMATODES.

1. *Small nematodes*. [Figs. 49, 50.]

Aug. 21, a male, which agrees with No. 6 under *Leiostomus xanthurus*.

Kyphosus sectatrix, Rudder-fish, Chub.

Date.	Number of fish examined.	Food notes.
1902. August 23.....	4.....	Crabs, lamellibranchs, vegetable débris, and sand.

NEMATODES.

1. *Ascaris* sp.

Fragments of a female. Dimensions in millimeters of alcoholic specimen: Length 20; diameter, maximum, 0.6, at anterior end 0.24, at anal aperture 0.3; distance from anal aperture to posterior end 0.45; length of œsophagus 3.5; ova 0.06 by 0.03. There was but one jaw left on the specimen: Length, 0.18; breadth, 0.15. There was a short diverticulum to the intestine and one to the œsophagus as in *A. habena*. The jaw also suggested that species. The œsophagus was cylindrical and the intestine had thick walls.

Cynoscion regalis, *Squeteague*, *Weak-fish*, *Gray Trout*.

Date.	Number of fish examined.	Food notes.
1901.		
July 6.....	3.....	Fragments of fish and legs of large shrimp.
July 10.....	3.....	Fragments of fish.
July 15.....	2.....	Do.
July 17.....	4.....	Do.
July 19.....	4.....	Fish, crabs, and shrimp.
July 22.....	3.....	Fragments of fish and seaweed.
July 29.....	2.....	A few fragments of broken shells.
July 30.....	2.....	Fish.
August 1.....	4.....	Do.
August 6.....	2.....	Fish, lamellibranchs, crustacea.
August 7.....	1.....	Fish, shrimp.
August 12.....	1.....	Fish.
1902.		
July 16.....	9.....	Fish, shrimp.
August 13.....	1 (small).....	Shrimp.
August 18.....	1.....	Fish, shrimp, lamellibranch.
August 19.....	1.....	Do.
August 20.....	2 (small).....	Fish, shrimp, annelids.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1901.—July 17, 1, a female. There was also found in this lot the posterior end of a female of this genus which was provided with papillæ. [Figs. 15, 16.]

2. *Echinorhynchus sagittifer* Linton.

1901.—August 6, 1, immature, from mesentery.

NEMATODES.

3. *Ascaris* sp. Immature.

1901.—July 17, several on viscera; type with diverticulum on both œsophagus and intestine. There were also in this lot numerous yellowish cysts on the mesentery. No entozoa were found in them, but they resemble cysts from which immature nematodes have been obtained on many occasions. July 19; numerous in mesentery. Same type as above; one examined carefully showed the rudiments of jaws characteristic of *Ascaris*. Many cysts also in the mesentery, some if not all of which were due to these nematodes. July 22; 1. July 29; few. Aug. 6, 7, 12; few on each date.

1902.—July 16, numerous, in yellowish cysts on viscera; the larger specimens with dark-brown intestine. July 19; numerous, in waxy cysts on viscera; intestine red-brown.

CESTODES.

4. *Scolex polymorphus* Rudolphi.

1901.—July 6, many, from alimentary canal; two pigment spots on neck. July 10; in gall bladders, not numerous; pigment spots; rudiments of costæ on bothria. July 15; larger forms in cystic duct; smaller in alimentary canal. July 17; numerous, from cystic duct. July 22; few in gall bladders. July 29; few. July 30; very numerous in cystic duct. Aug. 1, 6; many in cystic duct. Aug. 12, few.

1902.—July 16, Aug. 13, 18, 19, 20, numerous, in cystic duct and intestine, those in the latter about one-sixth as long as those from the cystic duct.

5. *Rhinebothrium* sp.

1901.—July 22. This agrees with type found in the toad-fish.

6. *Rhynchobothrium* sp.

1901.—Aug. 7. Cysts in clusters on mesentery. Type with long neck and minute hooks.

7. *Rhynchobothrium speciosum* Linton.

1902.—July 16, several.

8. *Otobothrium crenacolle* Linton.

Encysted in walls of alimentary canal.

1902.—Aug. 18, few. Aug. 19; several.

9. *Tetrarhynchus bisulcatus* Linton.
 1901.—July 17, encysted in stomach wall, not numerous. July 19, Aug. 6, 7, and 12; few on each date. July 30; a few cysts with degenerate tissue found in stomach wall.
 1902.—July 16, Aug. 13, 18, 19, 20, few each date.
10. *Synbothrium* sp. [Figs. 116-118.]
 See introduction and No. 13 under *Pomatomus*.
 1901.—July 19, 1, on viscera; larva with curved hooks. Aug. 1; 1, an elongated blastocyst; while no larva could be made out in this specimen, the resemblance of the blastocyst to this species was very close. Aug. 12; 1, blastocyst from viscera.
 1902.—July 16, 1, blastocyst, length 93 mm.

TREMATODES.

11. *Distomum vitellosum* Linton.
 1901.—July 30, a single small specimen, without ova, and in poor condition; resembles *D. vitellosum*, but with pharynx and acetabulum relatively smaller than usual in that species.
 1902.—Aug. 13, 1, small, immature.
12. *Distomum polyorchis* Stossich.
 In vicinity of pyloric caeca.
 1901.—July 17, 1; length 6, breadth 1.4; 14 testes visible on each side. Specimen not in good condition. July 19; 14 collected from 4 trout.
 1902.—July 16, 5. Aug. 18; 3.
13. *Distomum* sp.
 1902.—Aug. 13, 1. This is identical with No. 4 under *Spheroides maculatus*.
14. *Microcotyle* sp.
 1902.—Aug. 18, 4, small, length 1.5 mm. from gills. The specimens were in poor condition.

Cynoscion nebulosus, Spotted Weak-fish.

Date.	Number of fish examined.	Food notes.
1901.		
July 15.....	1.....	Fragments of fish in stomach.
July 22.....	2.....	Fish and shrimp.
July 29.....	1.....	Alimentary canal empty.
July 31.....	4.....	Fish.
August 21.....	2.....	Fish, crabs, and shrimp.
August 28.....	5.....	Fish, shrimp, jaws of an annelid.
August 31.....	2.....	Fish.
1902.		
August 11.....	1 (small, 150 mm.)....	Fish, shrimp.

NEMATODES.

1. *Immature nematodes (Ascaris sp.)*
 1901.—July 15, 22, 29, few. July 31; numerous, on viscera. These were noted as belonging to type designated in these notes as having a slender diverticulum extending caudad from base of oesophagus and a short diverticulum extending cephalad from anterior end of intestine. July 31; clusters of cysts on rectum; tissue degenerate, somewhat waxy; in others the contents were of the nature of fine-grained, tenacious masses in a semifluid. Aug. 28; 20 or more. Intestine of larger specimens dark brown; oesophagus relatively short; diverticula as in preceding; post-anal region rather short-conical. There were also numerous cysts of degenerate tissue on the mesentery which appear to be due to this worm.
 1902.—Aug. 11, few.

CESTODES.

2. *Scolex polymorphus* Rudolphi.
 1901.—July 29, 31, few; from intestine; small with prominent anterior sucker. Aug. 21; few; collected from cystic duct. Aug. 28; numerous; not seen in the cystic duct by Mr. Stone, who collected them, but they resemble those collected on former occasions from the cystic duct of this fish

and of *C. regalis*. Aug. 31; rather numerous; larger specimens in cystic duct; smaller in intestine; bothria simple; 2 red pigment spots in neck.

1902.—Aug. 11, 1, large, red pigment in neck.

3. *Rhynchobothrium* sp.

1901.—July 15, a slender larva from cyst on viscera; length of bothria 0.21 mm.; anterior end of bulbs 3.7 mm. from anterior end of scolex. The hooks bear some resemblance to those of *R. plicatum*.

4. *Otobothrium crenacolle* Linton. [Figs. 112-114.]

1901.—July 15, in cysts, very numerous in submucosa of stomach. The cysts were small; an average blastocyst measured 1.2 mm. in length and 0.7 mm. in breadth. Dimensions of larva in millimeters: Length 0.5; breadth of bothrium 0.16; diameter of neck 0.11; length of contractile bulbs 0.072, breadth 0.034; length of proboscis 0.45; diameter exclusive of hooks 0.017. July 22; large numbers of small oval cysts in stomach wall. A few of these were opened and the blastocysts liberated. They contained larvæ which were immature, but under pressure the characteristic pits on the borders of the bothria and the position of the contractile bulbs could be made out. Aug. 28; small cysts, numerous, in stomach wall.

5. *Tetrarhynchus bisulcatus* Linton.

1901.—Aug. 28, scolices encysted in stomach wall; associated with No. 4.

TEMATODES.

6. *Distomum monticellii* (?) Linton.

1901.—July 29, 1, an appendiculate distome from the intestine; dull yellowish-white, finely and transversely wrinkled when contracted. Length very variable while living. When the length was 3.6 mm. the breadth was 1.8 mm.; alcoholic specimen, length 2.63 mm., breadth 0.87 mm. Dimensions, in millimeters in life, specimen compressed: Oral sucker, length 0.31, breadth 0.38; pharynx, length 0.22, breadth 0.18; ventral sucker, diameter 0.83. The larger anterior end of pharynx included in oral sucker; intestinal rami long. This specimen was stained and sectioned, but the reproductive organs remained indistinct. Aug. 28; 1, probably same species, immature. So far as can be made out this specimen agrees with *D. monticellii*. It agrees very closely with No. 15, under *Micropagon undulatus*.

7. *Distomum tenue* Linton.

1901.—Aug. 21, 1, agreeing with this species, or more nearly with the variety *tenuissime*. This specimen was in a macerated condition when studied, and there were no spines on the body or around the mouth. The following notes were made on the specimen after it had been in weak formalin over night. Dimensions in millimeters: Length 3.5; breadth 0.45; oral sucker, length 0.13, breadth 0.15; pharynx, length 0.19, breadth 0.12; ventral sucker, length 0.24, breadth 0.22, three ova present, length of each 0.092, shorter diameters 0.044, 0.048, and 0.051, respectively. Testes long oval, following each other closely on the median line, near the posterior end, the anterior one closely preceded by the ovary. Vitellaria rather sparse, but distributed as in *D. tenue*, viz., peripheral in posterior region. Pharynx near ventral sucker, distance from ventral sucker 0.2, from oral sucker 0.7. Aug. 28; 1. This specimen has the general arrangement of its anatomy like this species, but with the habit of body rather more like *D. dentatum*, and with oral spines missing. Dimensions, life, in millimeters: Length 2.8; breadth 0.46; transverse diameter of oral sucker 0.17, of pharynx 0.1, of ventral sucker 0.19, no ova; pharynx remote from mouth; cirrus pouch behind ventral sucker.

8. *Distomum valde-inflatum* Stossich.

1902.—Aug. 11, few; in cysts with greenish-yellow waxy secretions on viscera.

Bairdiella chrysur, *Silver Perch*, *Yellow-tail*.

Date.	Number of fish examined.	Food notes.
1901.		
August 10.....	5.....	Small crustaceans and annelids.
August 12.....	16 (small).....	Fish, shrimp, amphipods, and annelids.
August 13.....	9.....	Great abundance of teeth and spines of annelids, and a few amphipods.
August 15.....	2.....	Fish, crabs, shrimp.
August 16.....	2.....	Shrimp.
August 21.....	1 (small, 85 mm.).....	Annelids.
August 22.....	5 (small, 85 mm.).....	Food material completely digested except a minute fragment of a shrimp and the zoaea of a crab.
1902.		
July 14.....	4 (50 mm. or less).....	Small crustacea.
July 16.....	26 (small).....	Shrimp, shell of <i>Solenomya</i> ; sand in intestine.
July 17.....	6 (small).....	Spines of annelids.
July 19.....	.....do.....	Shrimp and other small crustacea (<i>Caprella</i> , etc.).
July 21.....	5.....	Shrimp.
July 25.....	6.....	Shrimp and small gasteropod (<i>Olivia</i>).
July 29.....	5.....	Shrimp.
August 4.....	2.....	Do.
August 5.....	1 (small).....	Contents of alimentary canal completely digested.
August 8.....	5.....	Shrimp and annelids.
August 11.....	5.....	Crabs, shrimp, and small-lamellibranchs.
August 12.....	3.....	Crabs, shrimp.
August 18.....	1.....	Small crustacea.
August 19.....	5.....	Food not noted.
August 21.....	5.....	Do.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.
1902.—July 16, 2. July 19, 2. July 25, 1. Aug. 12, 1.

NEMATODES.

2. *Immature nematodes (Ascaris)*.
1901.—Aug. 10, few, from body cavity; small; type found in many hosts, i. e., with slender posterior diverticulum on œsophagus and short anterior diverticulum of intestine. Aug. 12, few. Aug. 13, few. These are probably the same as the foregoing, although only the diverticulum of the œsophagus could be made out. Posterior end of these worms acuminate. Aug. 15, few; diverticula easily made out, that from the œsophagus long and slender.
1902.—July 16, several, encysted on viscera. July 17; several, from clusters of yellowish cysts on mesentery. July 21; 2, encysted on viscera. Aug. 8, 11, 18, few, and very small on each date.
3. *Immature nematodes (Ascaris)*.
Type with elongated basal part of œsophagus and corrugated post-anal region.
1902.—Aug. 11, few, associated with No. 2.

CESTODES.

4. *Scolex polymorphus* Rudolphi.
1901.—Aug. 12, few, small.
1902.—July 14, these were very small and had been overlooked when the viscera were examined with the aid of the hand lens. A small piece of the intestine was examined under the compound microscope in order to ascertain the nature of the food, when minute parasites were noticed amid the intestinal contents. These were recognized as belonging to this group of immature cestodes. Dimensions when compressed, in millimeters, length 0.2, breadth 0.18. July 16, several. July 25, several; Aug. 5, several, small. Aug. 21, few, minute.
5. *Cyst in stomach wall*.
1902.—Aug. 11, an elongated blastocyst was obtained from this cyst, but no larva was yet developed in it.
6. *Nodular cysts*.
1902.—Aug. 11, on the stomach, intestine, in the mesentery and in the substance of the liver. These cysts suggested the occurrence of sporozoa, but no entozoa of any kind were found in them. The fish from which they were obtained was reported by Mr. Stone to be in poor condition and to have an enlarged and bloated abdomen in which there was an accumulation of serous fluid.

7. *Rhynchobothrium* sp.

Type characterized by slender larva, long neck, exceedingly minute hooks, from fusiform cysts on viscera. *R. tenuispine* Linton is suggested.

1902.—Aug. 12, 1.

8. *Rhynchobothrium* sp. [Fig. 93.]

1901.—Aug. 10, numerous on viscera in pyriform cysts. This is the type seen in many hosts, and characterized in these notes as small, with relatively long hooks. The larva is short, and the hooks are of various sizes and shapes. The larger hooks are relatively long when compared with the size of the larva. A similar remark may be made respecting the contractile bulbs. Dimensions of a living larva, in millimeters: Length 1.54; length of head 0.35, of contractile bulbs 0.5, of longer hooks 0.04. Both this species and the following (No. 9) were found in the black bass (*Centropristes striatus*) on the same date. Both hosts were taken at the jetty near Fort Macon. Their food habits are practically identical. Aug. 12, cysts on viscera; one of these was examined and the contained larva appeared to be a very immature stage of this species.

1902.—July 25, several. July 29, few.

9. *Rhynchobothrium* sp. [Fig. 97. See also fig. 98.]

1901.—Aug. 10, cysts on viscera. These contain relatively elongated larvæ. A type found in other hosts, but not of such frequent occurrence as No. 8. See under *Centropristes*. The neck is long, the proboscis sheathes in a close spiral in ordinary conditions of contraction; proboscides rather long, the hooks relatively short and close together. Dimensions of a living larva, compressed, in millimeters: Length 3.85; length of head 0.46, of contractile bulbs 0.43, of longest hooks 0.014.

1902.—Aug. 19, from fusiform cyst on viscera, the hooks suggest *R. plicatum*, similar to specimen from *Orthopristis chrysurus* collected Aug. 20.

10. *Otobothrium crenacolle* Linton.

1901.—Aug. 12, small cysts from viscera in which were blastocysts containing larvæ. These were rudimentary but appeared to belong to this species. Aug. 15, 2 larvæ from cysts in body cavity. Such numbers as here given do not represent the actual number in the fishes examined on this date. It may be added that in the majority of instances where this species was found at all it was found in comparatively large numbers.

1902.—July 17, 19, Aug. 8, encysted on viscera and mesentery.

11. *Tetrarhynchus bisulcatus* Linton.

1901.—Aug. 12, rather numerous, encysted in stomach wall.

1902.—Aug. 13, numerous in stomach wall. Aug. 15, 1 encysted in stomach wall. Aug. 5, 11, 18, 19, 21, few on each date; cysts in stomach wall.

TREMATODES.

12. *Distomum monticellii* Linton.

1901.—Aug. 13, 1. In this specimen the testes are close behind the ventral sucker, where they are perhaps crowded forward by the voluminous folds of the uterus, which are filled with ova. The ovary is separated from the posterior testis by folds of the uterus, and is itself followed by the vitellaria. The latter are lobed, having about three lobes on each side. The shell gland is at the junction of the lobes of the vitellaria just back of the middle of the ovary. Cirrus pouch in front of the ventral sucker, a little to the left; genital aperture on median line of the neck, just back of origin of intestinal rami. Dimensions of living specimens, compressed, in millimeters: Length (appendix partly retracted) 3.2; maximum diameter 0.5; diameter of oral sucker 0.2, of ventral sucker 0.42, of pharynx 0.08, ova 0.024 by 0.014.

13. *Distomum vitellosum* Linton. [Fig. 178.]

1901.—Aug. 10, 2, lobes on the border of the ventral sucker very distinct.

1902.—July 17, 2. July 29, Aug. 4, 8, 11, few on each date. Aug. 19, several. Aug. 21, 2.

As usual, the individuals present a great variety of shapes.

In 1901 other small distomes were taken (fig. 170) which probably belong here, although the characteristic lobes around the ventral sucker were not made out. The posterior end is slightly emarginate in all the preserved specimens and the aperture of the ventral sucker is narrow and transverse.

1902.—Aug. 15, 2. Aug. 22, 3. The intestine was very indistinct, but the œsophagus was evidently very short or none. Dimensions, life, in millimeters: Length 1, breadth 0.5; transverse diameter of oral sucker 0.11, of pharynx 0.05, of ventral sucker 0.22; ova (average of two) 0.08 by 0.04.

14. *Distomum* sp. [Figs. 168, 169.]

These differ from the foregoing mainly in the position of the testes.

1901.—Aug. 15, 1. Dimensions, life, in millimeters: Length 0.84, breadth 0.42; oral sucker 0.12, pharynx 0.06, and ventral sucker 0.17 in diameter; ova 0.063 by 0.035. Aug. 16, 2. Aug. 21, 3.

1902.—July 17, few. July 19, 1. July 21, 1. July 29, Aug. 4 and 19, few. The testes in some are placed somewhat diagonally.

15. *Distomum pectinatum* sp. nov. [Figs. 200–203.]

Body elongate, somewhat fusiform, color white, except where the yellow ova show through the translucent walls. Neck narrowing to head, very fragile, and provided with 12 fleshy, papillary lobes, 6 on each side just back of the head. There are also 14 similar lobes, making a crown dorsal and lateral on the head; otherwise the worm is smooth. Ventral sucker much larger than the oral, and situated about the anterior third; pharynx cylindrical, its anterior end touching the oral sucker; œsophagus long; rami of intestines simple, slender, beginning at anterior edge of ventral sucker and extending to posterior end of the body. Testes 2, subglobular, at posterior end of body, near together and placed a little diagonally. Cirrus-pouch rather large, with coiled cirrus, on left side contiguous to the anterior edge of the ventral sucker; genital aperture in front of ventral sucker on left of median line. Ovary in front of testes, as far as or farther than the diameter of a testis, and on the right of the median line. Uterus very voluminous, filling the body from the posterior testis to the ventral sucker, and extending thence laterally to the cirrus on the left side to the genital aperture. Vitellaria distributed laterally from the anterior testis nearly to the ventral sucker. They appear to be much reduced in the specimens studied. Ova minute, of two kinds, oval and nearly spherical, the latter larger than the others and seen near the middle of the body.

Dimensions in millimeters, life, specimen collected Aug. 10, 1901: Length 2.1; greatest breadth, specimen compressed, 0.38; oral sucker, length 0.12, breadth 0.10; pharynx, length 0.21, breadth 0.11; ventral sucker, length 0.28, breadth 0.25; most of the ova 0.022 by 0.015 in the two principal diameters; a few were seen which were nearly spherical, about 0.018 by 0.017. The head and especially the neck quickly macerate.

1901.—Aug. 10, 2, much macerated. Aug. 12, 5. Aug. 13, 18. Aug. 15, 8. Aug. 16, 1. Aug. 21, 3. Aug. 22, 20.

1902.—July 16, 1. July 17, 8. July 19, numerous, one small piece of the intestine 4 mm. in length yielded 10. July 21, 8. July 25, 10. July 29, 10. Aug. 4, 5. Aug. 5, 6. Aug. 8, 40. Aug. 11, 5. Aug. 12, 3. Aug. 18, 6. Aug. 19, 17. Aug. 21, 6. The specimens collected on Aug. 6 were more slender than the type but do not appear to be specifically different.

16. *Distomum areolatum* Rudolphi.

1902.—Aug. 8, numerous. These specimens agree closely with the species which I have referred in former papers to *D. areolatum*. Dimensions of a living specimen, slightly compressed, in millimeters: Length 0.75, breadth 0.40; diameter of oral sucker 0.11, pharynx 0.05; ventral sucker 0.08. The one ovum measured 0.12 by 0.07 in the two principal diameters.

COPEPOD PARASITES.

17. *Caligus* sp.

1902.—July 16, 1. Found in washings from intestine but doubtless from outside of its host.

18. *Parasitic copepod* (*Lernanthropus*).

1902.—Aug. 19, 2. Aug. 21, 1; from gills.

Sciænops ocellatus, Red Drum.

Date.	Number of fish examined.	Food notes.
1901.		
August 9.....	5.....	Shrimp.
August 10.....	1.....	This specimen was about 20 inches in length; contents of alimentary canal completely digested.
August 15.....	2.....	Fish, crabs, shrimp.
August 30.....	1.....	Fish.
1902.		
July 18.....	1 (250 mm.).....	Crabs, shrimp.
July 30.....	1.....	Food not noted.

PROTOZOA.

1. *Myxobolus (Henneguya)* sp. [Fig. 56.]

1901.—Aug. 10, the pyloric cæca and beginning of the intestine of the fish examined on this date were almost completely covered with white bodies 2 mm. or less in diameter. Twenty-four of these bodies were counted in a space 15 mm. square. The sporozoa were oval, about 0.013 mm. in length, 0.010 mm. in greatest breadth and 0.006 mm. thick, with a slender posterior spicule of about the same length as the body of the sporozoon. The cell wall is relatively thick, the two oval bodies of the usual shape and of a faint greenish color. When first liberated in sea water there appeared to be a third body behind the oval bodies. Later this could not be seen. The caudal spicule was straight in most, but not infrequently was curved.

The fish had been caught several hours before it was examined and the mucous membrane had sloughed off, leaving the cysts exposed on the inner side of the intestine when it was opened; they showed quite plainly also from the outside, their color being an opaque dead white. Numerous minute, highly refractile bodies were seen to be scattered among the sporozoa where the cysts were flattened on the slide.

See also under *Archosargus probatocephalus* and *Trachinotus carolinus*.

NEMATODES.

2. *Heterakis* sp. [Figs. 24, 25.]

("Ascaris (?) sp.," from *Paralichthys dentatus* No. 6, p. 481, pl. VII, figs. 57-61, Parasites of Fishes of the Woods Hole Region.)

1901.—Aug. 9, 1. This specimen has two prominent post-anal papillæ. There is no indication of spicules. Dimensions in millimeters, life: Length, 5; diameter, anterior 0.4, middle 0.5, at anal aperture 0.08; distance of anal aperture from posterior end 0.18; length of œsophagus 0.67.

A specimen similar to this was found in the flounder (see No. 6 under *Paralichthys albiguttus*). It was at first supposed to be a male, but upon examination it was found to be a female, the reproductive aperture being situated two-fifths of the whole length from the posterior end.

See also under *Leiostomus*, and *Lophopsetta*, and introduction for remarks on *Heterakis*.

CESTODES.

3. *Scolex polymorphus* Rudolphi.

1901.—Aug. 30, few. July 30, few.

TREMATODES.

4. *Distomum vitellosum* Linton. [Figs. 176, 177.]

1901.—Aug. 9, numerous; great variety of shape and size as in *Menticirrhus americanus*. In certain stages of little contraction the border of the ventral sucker, which is undulate when moderately contracted, is deeply lobed or even fimbriate. Some of the specimens while still in sea water had become rigid and turgid, with prominent ventral sucker. In the latter case the characteristic border of the ventral sucker is obliterated. In one specimen under pressure the testes appeared to be lobed. Relative dimensions agreed with published descriptions. Aug. 15, 6. Aug. 30, 12. In this lot a surprising variety of shape, and particularly in the condition of the ventral sucker, was found. In some the ventral sucker was seen to be surrounded by four lobes, each of which is denticulate or fimbriate, having four or more processes. When seen in dorsal or ventral view this feature is not conspicuous, but in lateral view, when the ventral sucker is prominent and its border uncontracted,

it becomes a very conspicuous object. In some positions these lobes suggest by their outline the fore foot of a mole.

1902.—July 18, 4. July 30, few.

5. *Distomum areolatum* Rudolphi.

1902.—July 18, 6. These agree closely with the species which I have been recording under this name. The outline, however, is oval-elliptical, with the greatest diameter at the middle of the length, or a little in front of the middle. July 30; 6, small, oval, yellowish; posterior end, when first seen, emarginate; body with a dense covering of minute spines.

6. *Distomum tenue* Linton.

1901.—Aug. 9, 3, resembling this species, although there were no oral spines. Dimensions in millimeters: Length 3.6; diameter 0.65, about uniform for the posterior two-thirds, i. e., from the ventral sucker to the posterior end; transverse diameter of oral sucker 0.19, of the circular ventral sucker 0.26; pharynx, length 0.28, breadth 0.26; ova, average of four, 0.09 and 0.06 in the two principal diameters. Aug. 15, 3, long and slender, same as foregoing. Aug. 30, 4. The cuticle on the neck of these was thrown into rather coarse folds, at least on the margins, probably an evanescent and possibly an accidental character. It gave to these specimens a very characteristic appearance. Dimensions in millimeters: Lengths of two measured 2.6 and 4.5. Further dimensions of the latter: Diameter, maximum, 0.6, of oral sucker 0.2, of ventral sucker 0.3; pharynx, length 0.3; breadth 0.18; distance of pharynx from anterior end 0.8.

1902.—July 18, 4, and several others which appear to be the young of this species.

Leiostomus xanthurus, Spot.

Date.	Number of fish examined.	Food notes.
1901.		
July 11.....	1.....	Crustacea, mainly shrimp.
July 12.....	2.....	Broken shells of small bivalve mollusks, amphipods, ostracodes, and green seaweed.
July 17.....	12.....	Ostracodes, sand with a few small bivalve mollusks with much vegetable debris.
July 19.....	10.....	Large quantities of broken shells of bivalve mollusks, amphipods.
July 30.....	3.....	Large quantities of broken shells, with small spines of sea-urchin and sand.
Do.....	7.....	Broken shells, many; a few annelids, shrimp, and amphipods; much sand.
July 31.....	2 (specimens small, 60 mm. in length.)	Fragments of shells and sand.
August 10.....	4 (small)	Bivalve mollusks and shrimp.
August 17.....	1 (small)	Small gasteropod and lamellibranch shells; copepods; spines of sea-urchin and sand.
August 24.....	1.....	Bivalve mollusks, shrimp, annelids.
August 30.....	3.....	Fish, shrimp, lamellibranchs and small univalves, sea-urchins.
1902.		
July 8.....	14 (small)	Shrimp, small lamellibranchs, sea-urchins, sand.
July 16.....	6 (small)	Small spines of sea-urchins, ostracode shells, very small isopods, sand.
July 17.....	do	Shrimp, small gastropod shells (<i>Olivia</i>), sand.
July 19.....	do	Mainly small crustacea; no entozoa.
July 21.....	5 (small)	Shrimp, green vegetable debris.
July 22.....	do	Amphipods, small gastropods, annelids.
July 23.....	6 (small)	Spines of sea-urchin and broken lamellibranch shells.
July 25.....	1 (small)	Mainly amphipods.
July 28.....	7 (small)	Ostracodes, copepods, annelids, spines of sea-urchin, sand.
July 29.....	4 (small)	Spines of annelids, diatoms.
July 31.....	5.....	Broken shells, small gastropods, two small sea-urchins.
August 1.....	5.....	Broken shells, sea-urchin spines.
August 4.....	4 (small)	Lamellibranchs, ostracodes, spines of sea-urchin, annelids.
August 7.....	1.....	Lamellibranchs, gastropods, small crustacea, bryozoa, spines of sea-urchin.
August 8.....	5 (small)	Lamellibranchs, entomostraca, annelids, spines of sea-urchin.
August 11.....	5.....	Shrimps, sea-urchin, sand.
August 13.....	4.....	Shrimps, sea-urchin, sand; no entozoa.
August 16.....	1.....	Lamellibranchs, sea-urchin spines, sand.
August 18.....	2.....	Do.
August 21.....	5 (small)	Small lamellibranchs, copepods, annelids, spines of sea-urchins, sand.

The sea-urchin spines were those of the common spatangoid *Moiria atropos*. The sand so commonly found in the alimentary canal of the spot doubtless comes from the intestines of this sea-urchin.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi. [Figs. 8-14.]

1901.—July 12, 2. July 17, 11, some white, others translucent, others yellowish and others pink. July 19, 7; translucent, white, pinkish and orange-yellow individuals. Length of female 16 mm., of male 7 mm. July 30, 15 from one lot, 8 from another; same colors as above; one male noted, which was white but with an orange bursa. When placed in fresh water these worms become turgid. Aug. 30, 1. This species is well adapted to maintain its hold on the mucous membrane of its host by means of the long and slender thorny proboscis and the attenuated anterior end of the body, which is likewise armed with spines. These appliances, together with the tough tissues of the body, are all doubtless needed to preserve the worms when exposed to the anthelmintic action of broken shells and sea-urchin spines which are frequently found filling the entire length of the alimentary canal of the fish.

1902.—July 16, 1 fragment. July 23, 3. July 25, 2. Aug. 13, 1.

NEMATODES.

2. *Immature nematodes* (*Ascaris* sp.).

1901.—July 11, 1, encysted on viscera; posterior end conical, anal aperture with prominent lips, mouth simple; July 17, several, small; a single diverticulum extending posteriorly from base of œsophagus noted. A small cyst in this lot, when opened, liberated a minute nematode; July 30. This seen plainly to be the type of most common occurrence, viz., with a diverticulum extending posteriorly from the base of the œsophagus and an anterior prolongation of the intestine. Also found in another lot of fish examined later on this same date.

1902.—July 8, 2.

3. *Ascaris habena* Linton.

1902.—July 23, 1, female; length 28 mm.

4. *Heterakis* sp.

1901.—July 19, 1, female. This worm agrees closely with No. 2 under *Sciænops ocellatus*. Dimensions in millimeters, life: Length 2.1, length of œsophagus 0.46; diameter, anterior, 0.15; middle 0.22, at anal aperture 0.06; distance of anal aperture from posterior end 0.77; distance of genital aperture from anterior end 0.4. See also under *Lophopsetta* and *Paralichthys*.

5. *Small nematodes*. [Figs. 35-42.]

These, which may indeed represent different species, were seen by me for the first time in the summer of 1902. They are minute nematodes provided with a few bristles, especially near the anterior end, a circular pit on each side of the head, and the body curved much like the letter C. Such minute forms, while of much interest, are rather too small for satisfactory study in the kind of survey contemplated in this report.

1902.—July 8, few; minutely, but distinctly, transverse-corrugate. Usually with a few straight, slender, sharp spines at the anterior end and sparsely scattered on the body. This feature was not observed on all. Reproductive aperture of female near the middle of the body. A single comparatively large ovum and what were taken to be several smaller ova were noted. Dimensions of a female, life, in millimeters: Length 1.4; length of œsophagus 0.22; diameter, anterior 0.043, at genital aperture 0.086, at anal aperture 0.046; distance of genital aperture from anterior end 0.75; distance of anal aperture from posterior tip, 0.075. July 28, rather numerous, very small. Aug. 4, few, same type as foregoing, among them one male, which was larger than the females, and may belong to another species. The tail was much elongated. The spicules are shown in figure. Aug. 8, few, males and females. If these really belong to the same species there is a remarkable difference between the heads of the two sexes. Fig. 35 shows a view of the posterior end of a male from this lot. Aug. 11, 5, identical with those found on July 8. Aug. 18, several, males and females. The females agree with type of July 8. The head of the male differs from this type, see figs. 38 and 39. Length, 1 mm. Aug. 21, few, same as type of July 8, minute, bristly, with circular pit on each side of head.

6. *Small nematodes*. [Figs. 43-48 and 51-54.]

1902.—July 17, 2, males. [See figs. 53 and 54.] Dimensions, life, in millimeters: Length 3; diameter, head 0.045; at base of œsophagus 0.09, from which point it is nearly uniform to the anal

aperture; distance of anal aperture from posterior tip 0.18; length of œsophagus 0.42; œsophagus nearly cylindrical, increasing uniformly from 0.045 to 0.06 in diameter; length of copulatory spines 0.12. The papillæ were not made out very satisfactorily; about 16 were counted in lateral view, very minute, and all preanal. The most posterior papilla was nearly 0.4 millimeter in front of the anal aperture. From this the papillæ continue at nearly regular intervals for about 0.8 millimeter. July 25, 2. [See figs. 45 and 46.] One of these, a female, yielded the following measurements in millimeters: Length 2; length of œsophagus 0.36; distance from anal aperture to posterior tip 0.18; diameter of head 0.03, at anal aperture 0.04, at genital aperture 0.07; distance of genital aperture from posterior end 0.54. July 28, 1 male, associated with No. 5, but about three times as long. [See figs. 43 and 44.] July 29, 2, same type as those of July 17 and 25.

CESTODES.

7. *Scolex polymorphus* Rudolphi.
1901.—July 19, few; intestine. July 31, few, small; intestine.
8. *Larval Cestode*.
1901.—July 17, a flask-shaped, slender larva, associated with No. 10.

CESTODES.

9. *Rhynchobothrium* sp.
Probably larval stage of *R. longispine* Linton.
Type with oval cysts; small larva with relatively long hooks.
1901.—July 1, small cysts on viscera.
1902.—July 17, 22, Aug. 7, 11, few on each date. The hooks on the specimens collected in 1901 were noted as resembling those figured in Proceedings of the National Museum, vol. XIX, pl. LXIII, figs. 4, 5.
10. *Tetrarhynchus bisulcatus* Linton; encysted in stomach-wall.
1901.—July 17, few. July 19, 1. July 30, 1 in one lot; several in another on same date. Aug. 10, 2. Aug. 24, 1. Aug. 30, 1.

TREMATODES.

11. *Distomum appendiculatum* Rudolphi.
1902.—Aug. 21, 1. Dimensions of living worm in millimeters: Length 1; diameter 0.23; diameter of oral sucker 0.06, of ventral sucker 0.13; ova 0.025 by 0.011.
12. *Distomum monticellii* Linton.
1902.—Aug. 21, 1, not in good condition.
13. *Distomum vitellosum* Linton.
1902.—July 29, few. July 31, 2. Aug. 8, 11, few. Aug. 16, 2.
14. *Distomum valde-inflatum* Stossich.
1902.—Aug. 8, few, in globular cysts.
15. *Distomum globiporum* Rudolphi. [Figs. 173, 198, 199.]
1901.—July 11, 1, not in good condition. Dimensions in millimeters, life: Length 3; breadth 0.75; diameter of oral sucker 0.22, ventral sucker 0.25; pharynx length 0.15; breadth 0.11; ovium 0.096 and 0.062 in the two principal diameters. July 17, 2; in one of the worms ova were noticed which were beginning to segment. No spines were noted on the foregoing, while those collected on the three following dates were armed with spines which, however, were small and inconspicuous. These have many points in common with a distome from *Opsanus tau* (Bulletin U. S. Fish Commission for 1899; A. p. 469; fig. 324). Aug. 10; 1, a distome with low, flat, squarish spines along dorsal side and along margins of neck. Color, dirty greenish-yellow by transmitted light. Dimensions in millimeters, life: Length 3.3; breadth 1.26; diameter oral sucker 0.42, ventral sucker 0.52; pharynx, length and breadth each 0.12; œsophagus short, about length of pharynx; intestinal rami extending nearly to posterior end; suckers and their apertures nearly circular. When the specimen was fixed over the flame under pressure the œsophagus contracted so that the branches of the intestine appeared to originate immediately behind the pharynx. Aug. 17; 1 [fig. 198], evidently same species as the specimen collected on Aug. 10, but smaller. Spines on neck and anterior part of body mainly dorsal, ventral spines only in patches on either side of the pharynx. Ova, 0.103 mm. and 0.062 mm. in the two principal

diameters, few. Testes two, rather large, median, central, one following the other closely, appearing to be lobed. Ovary subglobular, between anterior testis and ventral sucker, a little to right of median line. Vitellaria posterior and marginal, voluminous. Cirrus pouch dorsal to ventral sucker, aperture close in front of ventral sucker on median line. Aug. 30, 5. These agree with the foregoing. Three ova measured had the following dimensions in microns: 108 by 51, 102 by 65 and 122 by 51. July 30, 2 small, immature distomes [fig. 173], which are probably immature specimens of the foregoing. Dimensions in millimeters, life: Length 0.56 and 0.91, breadth 0.36 and 0.39, oral sucker 0.10 and 0.15, pharynx 0.04 and 0.05, ventral sucker 0.08 and 0.15 respectively.

1902.—July 22, 9. Length of smaller 1.72, of larger 3.75; other dimensions of larger: breadth 1.05; diameter of oral sucker 0.3, of pharynx 0.15, of ventral sucker 0.51; ova 0.10 by 0.06. July 25, few. July 16, 1 and a fragment.

***Micropogon. undulatus*, Croaker.**

Date.	Number of fish examined.	Food notes.
1901.		
July 6	8	Bivalve mollusks (<i>Solenomya</i>); crabs, and other crustacea (many fragments); sand.
July 10	1	A few fragments and many spines of annelids.
July 11	2	Do.
July 16	6	Many fragments of small crustacea.
July 20		Large number of broken shells of bivalve mollusks; fragments of crustacea; a few pieces of a large annelid, and a quantity of sand.
July 27	6	Fish, bivalves (<i>Solenomya</i>); annelids.
July 29	3	Mainly broken bivalve shells.
July 30	3	Shells of bivalves, mollusks, annelids, and numerous pieces of a large <i>Balanoglossus</i> .
August 5	1	Bivalve mollusks, crustacea, annelids.
August 5	5	Fish, bivalve mollusks, annelids, sea urchins.
August 12	1	Alimentary canal empty, except completely digested material.
August 17	4	Bivalve mollusks, annelids, ascidians, sand.
August 20	8	Fish, bivalves (<i>Solenomya</i> , etc.), sea urchins (<i>Mora</i>), annelids, shrimp, and large amount of sand, which doubtless comes from alimentary canals of the sea urchins.
August 24	1	Fish, bivalve mollusks, and annelids.
August 26	6	Bivalve mollusks, annelids, and <i>Balanoglossus</i> .
August 31	9	Fish, crabs, shrimp, bivalve mollusks, and annelids.
1902.		
July 7	25 (small)	Shrimp, several kinds of lamellibranch and gastropod shells, annelids, sand.
July 17	5	Annelids, lamellibranchs.
July 18	5	Fish, shrimp, annelids.
July 21	1	Lamellibranchs (<i>Solenomya</i>), annelid, fragment of sea urchin.
July 22	4	Annelids and mollusks.
July 25	2	Do.
July 31	4	Large annelid (<i>Arenicola</i>), shrimp, lamellibranchs (<i>Solenomya</i>).
August 11	1	Fish, shrimp, lamellibranchs.
August 13	1 (small)	Shrimp, lamellibranchs, annelids.
August 16	5	Do.
August 18	3	Shrimp, lamellibranchs, annelids, crabs, sea urchin.
August 18	3	Shrimp, lamellibranchs, and gastropods.
August 19	3	Annelids and bryozoa.
August 20	3	Annelids and lamellibranchs.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi; intestine.

1901.—July 20, 4, small. July 27, 3. July 29, 2 females and 1 male; one of the former with ovarian masses only, the other with embryos. Aug. 12; 2, male and female, small. Aug. 17, 2. Aug. 24, 1 female; ovarian masses only, no embryos in this specimen. Aug. 31, 2.

1902.—July 7, 9. July 17, 3. July 18, 1. July 22, few. July 31, 1. Aug. 11, 3. Aug. 18, few. Aug. 19, 2. Aug. 20, 1.

2. *Echinorhynchus sagittifer* Linton; body cavity.

1901.—Aug. 26, 1, on viscera.

NEMATODES.

3. *Immature nematodes (Ascaris sp.)*.

1901.—July 16, few, on viscera. These belong to the type with posteriorly directed diverticulum of bulbous base of œsophagus and anteriorly directed diverticulum of intestine, found in a large number of fish. July 20, few. July 29, 1 small. July 30, few, very small. Aug. 26, few.

1902.—July 18, 25, Aug. 11, 16, 18, 19, few on each date. Also July 31, 1; and Aug. 18, few encysted. Forms with clavate œsophagus, short diverticulum on œsophagus only.

4. *Ascaris sp.*

1901.—July 11, 1 male, small. Posterior three-fourths of the length is of nearly uniform diameter anteriorly attenuate; jaws prominent, breadth nearly equaling length, a single papilla made out on each of the lateral jaws; a posteriorly prolonged diverticulum of œsophagus; spicules slender; post-anal region short. Dimensions in millimeters, life: Length 9, length of œsophagus 0.84; length of diverticulum 0.63; diameter, anterior 0.12, middle 0.37, at anal aperture 0.12; distance anal aperture from posterior end 0.08; distance nerve ring from anterior end 0.24.

5. *Heterakis foveolata* Rudolphi.

1902.—July 25, 1 male, and minute specimen in cyst. See introduction for remarks on *Heterakis*.

CESTODES.

6. *Scolex polymorphus* Rudolphi.

1901.—July 30, few, small, from intestine.

1902.—July 25, few, elongated. July 31, several. Aug. 18, 19, 20, few, small.

7. *Rhinebothrium sp.*

1901.—July 29, a single specimen, immature. While this agrees with the genus *Rhinebothrium* there is a well-defined anterior muscular sucker, which shows relationship with the genus *Echeneiobothrium*. The terminal sucker, however, is a character which appertains to the larval stages of a number of cestodes. (See under *Opsanus tau*, 3 and 4.)

8. *Cestode larva*. [Figs. 83, 83a.]

These larvæ, much larger than any referred to No. 6, were found on several occasions, and had the borders of the bothria much crumpled or frilled and the neck strongly ribbed longitudinally. They were very active and changed their shape constantly. They were provided with a large terminal sucker, which, if not an embryonic feature, would rather point to the genus *Echeneiobothrium* than *Anthobothrium pulvinatum*, which is suggested by the general appearance of the scolex. The terminal sucker was eversible and in some cases became a knob-like proboscis.

1902.—July 17, 2. Aug. 16, 1. Aug. 19, 2. Aug. 20, 3.

Same larvæ found in *Orthopristis* (No. 11).

9. *Rhynchobothrium sp.* [Figs. 87-92.] Cysts in body cavity.

These are larvæ inclosed in their blastocysts and encysted on the viscera, in the mesentery, etc. They belong to the type characterized in these notes as small, with relatively long hooks on the proboscides and relatively long contractile bulbs.

1901.—July 6, numerous on viscera; length of longest hooks 0.03 mm. July 12, numerous cysts on viscera. July 30, several in cluster on mesentery. Aug. 5, few. Aug. 6, numerous small oval cysts clustered on mesentery. Aug. 17, several on viscera. Aug. 20, 1. Aug. 26 and 31, few.

1902.—July 7, 17, 25 and 31, Aug. 11, 16 and 18, clusters on mesentery.

10. *Rhynchobothrium tenuispine* Linton. [Fig. 101.]

1901.—Aug. 31, several larvæ from blastocysts inclosed in cysts on viscera. The first of these seen were in a watch glass of sea water. They had emerged from their cysts and were everted with the blastocysts still attached. The spines are exceedingly minute.

11. *Rhynchobothrium sp.*

Type with hooks suggesting *R. plicatum*.

1902.—July 18, 1 scolex, from cyst on viscera.

12. *Otobothrium crenacolle* Linton.

1901.—Aug. 6, few, from cysts on mesentery associated with No. 9.

1902.—Aug. 11, 1. Aug. 18, encysted in mesentery.

13. *Tetrarhynchus bisulcatus* Linton; stomach wall.

1901.—July 6, numerous, encysted in stomach wall. July 16, 1. Aug. 26, scolices from stomach wall. Aug. 31, cysts in stomach wall. The favorite lodging place of these larvæ both in this and other hosts is in the submucosa of the stomach.

1902.—July 21, 31, Aug. 13, 18, 20, in stomach wall, not numerous.

14. *Synbothrium flicolle* Linton.

From cysts on viscera.

In all cases where these larval forms were examined they were found to belong to the type with slender, straightish hooks.

1901.—July 6, few, on viscera. July 10, 12 from one host, on viscera. July 11, 2. July 16, several. July 20, 1, immature, hooks not developed. July 27, 1, cyst with blastocyst on viscera. The blastocyst was 48 mm. in length. The anterior portion, which contains the larva, is usually very active. It remains attached to the larva when the latter is liberated, thus contributing to the developing strobile in the final host. July 29, 1. July 30, 1, an elongated blastocyst without larva; probably belongs here. Aug. 20, 1. Aug. 26, 1. Aug. 31, numerous. These, as also proved for many of the foregoing, were found to belong to the type with slender, straightish spine-like hooks on the proboscides.

1902.—July 18, Aug. 16, from elongated blastocysts on viscera.

TREMATODES.

15. *Distomum monticelli* Linton.

1901.—Aug. 17, 1, an appendiculate distome, immature. The reproductive organs could not be made out with certainty. Dimensions of specimen fixed over flame in water, in millimeters: Length 2.5; breadth 0.7; diameter of oral sucker 0.26, of pharynx 0.16, of ventral sucker 0.56. Intestinal rami capacious, extending to but not entering appendix. This specimen agrees very closely with No. 6 under *Cynoscion nebulosus*, collected Aug. 28.

1902.—July 18, 1.

16. *Distomum areolatum* Rudolphi.

1901.—Aug. 31, 1, a small spinose distome, with ventral sucker smaller than oral, cesophagus as long as pharynx, testes side by side toward the posterior end, ova larger than ventral sucker. Dimensions, in millimeters: Length 0.8; breadth 0.46; diameter of oral sucker 0.11, of pharynx 0.04, of ventral sucker 0.08; ovum 0.120 and 0.064 in the two principal diameters, another 0.115 and 0.078. Small oval bodies are present, probably in excretory vessel, which might be mistaken for ova in a worm in which no ova are present. Aug. 6, 1, immature; probably belongs here.

1902.—Aug. 11, 1; Aug. 16, 2; Aug. 18, 12. Some transparent as if macerated, others yellowish and nearly opaque until flattened, densely clothed with spines.

17. *Distomum tenue* Linton.

1901.—July 10, 22. General color of the greater proportion yellowish brown, occasioned by the vitellaria and intestine, lighter colored anteriorly and along median line; of various shapes, but most of them oblong-linear. Dimensions in millimeters: Lengths 1.44, 2.3, and 3; breadths of same three 0.58, 0.60, and 0.44; ovum 0.09 and 0.048 in two principal diameters. Double row of spines around mouth; body covered with scales. July 27, 3. Aug. 6, 1. This specimen appears to belong here, although spines around mouth are wanting. Dimensions in millimeters: Length 5.5; diameter, uniform from ventral sucker to posterior end, 0.7; diameter oral sucker 0.11, ventral sucker 0.35, pharynx 0.35 in length by 0.25 in width; ovum 0.088 and 0.048 in the two principal diameters. Aug. 26, 1. Aug. 31, 3, 1 large, 2 small.

1902.—July 17, 5. July 18, few. Aug. 16, 18, 20, 1 on each date. Aug. 19, 4. Some long and slender; length 7.5 mm.; breadth 1 mm.; others smaller; length 2.5 mm.; breadth 0.3 mm., the latter without ova, some without spines.

18. *Distomum dentatum* Linton.

1902.—July 31, 1, immature. Aug. 11, few.

19. *Distomum valde-inflatum* Stossich.

1902.—July 7, 1, encapsuled. This is probably the young of adult forms like Nos. 17 and 18.

20. *Distomum* sp.

1902.—July 21, 2. Dimensions, life, in millimeters. Length 0.78; maximum breadth 0.5; diameter of oral sucker 0.09, of pharynx 0.05, of ventral sucker 0.07; ova 0.031 by 0.018.

21. *Distomum vitellosum* Linton.

The distomes referred to this species are represented by a very great variety of shapes.

1901.—July 30, 1. This specimen is in almost exact agreement with fig. 336, pl. xxx. Parasites of Fishes of Woods Hole Region, U. S. Fish Commission Bulletin for 1899. Yellowish, body covered with fine, transverse wrinkles, characteristic fimbriae around the ventral sucker; length 1 mm. Aug. 5, 1. Aug. 17, few. Aug. 24, 3. Aug. 31, 1. It should be noted that as individuals begin to macerate, or even before that, the characteristic lobes or fimbriae around the ventral sucker disappear.

See remarks on this species under *Menticirrhus*.

1902.—July 7, few. July 17, 3. July 18, several, some transparent, cylindrical, rigid, with prominent ventral sucker, one yellowish, flattened, oval. July 31, 2; 1, length 3.15 mm., remarkable for the elongated posterior region, which was flat and leaf-like, fimbriae around the ventral sucker prominent. Aug. 11, few. Aug. 16, 12. Aug. 18, 2. Aug. 19 and 20, few on each date.

22. *Distomum simplex* Rudolphi.

In this species the testes are lobed, the body elongated, and there are no lobes around the ventral sucker.

1902.—July 18, 1. July 21, 2. July 22, 1. Dimensions of one, life, in millimeters: Length 4; diameter, anterior 0.21; at ventral sucker 0.5, middle (maximum) 0.6, near posterior end 0.43; diameter of anterior sucker 0.18, of ventral sucker 0.3; pharynx, length 0.11, breadth 0.06; ova 0.07 by 0.04.

23. *Distomum bothryophoron* Olsson.

1902.—July 21, 1, oval, tapering anteriorly. Dimensions, life, compressed, in millimeters: Length 1.2; maximum breadth 0.55; diameter of oral sucker 0.10, of pharynx 0.05, of ventral sucker 0.2; ova 0.018 by 0.014.

24. *Aspidogaster ringens* sp. nov. [Figs. 243-249.]

See No. 11 under *Trachinotus carolinus*.

Usually convex dorsally and concave ventrally. Body proper elongate, tapering at both ends and usually projecting beyond the ventral sucker at each end, but subject to some variation (figs. 244, 245); posterior end conical-pointed. Neck cylindrical, head slightly expanded and divided by a lateral cleft into a three-lobed dorsal and a two-lobed ventral lip. Head and neck often completely retracted. Ventral sucker elliptical, with numerous marginal loculi and marginal sense organs. Thirty-six marginal loculi were found in the specimen sketched in fig. 246. In the same specimen, which was in good condition, there were 17 larger transverse median loculi, with a median ridge not strongly developed, but quite distinct. The ventral sucker is thus divided into 4 longitudinal rows of loculi, and is therefore of the *Aspidogaster* type. In some specimens all the loculi are very indistinct. Dimensions of living specimen, in millimeters: Length 2.57; diameter of head 0.4; pharynx, length 0.16, breadth 0.14; ventral sucker, length 1.61, breadth 1.1; ova 0.103 and 0.058 in the two principal diameters.

Color variable; in general brownish red with anterior end whitish, border of ventral sucker slightly yellowish or translucent. A not infrequent color effect is amber yellow above, purplish red below.

The testis is single, median, usually not far from the middle of the length of the body, but sometimes crowded back to near the posterior end of the conical tail by the voluminous folds of the uterus, which are filled with comparatively large ova and occupy the dorsal and posterior portions of the body. The ovary lies in front of the testis. The vitellaria consist of two elongated lateral masses. The voluminous vas deferens and muscular copulatory organ lie well forward near the anterior margin of the ventral sucker. The genital aperture is on the left side of the neck.

The placing of these specimens in the genus *Aspidogaster* is provisional, since they possess characters which point with almost equal distinctness to *Cotylaspis* and *Cotylogaster*. In a revision of the *Aspidobothridae* it will doubtless be found to be necessary either to emend the genus *Aspidogaster* or to erect a new genus to accommodate this species.

1901.—Aug. 20, 2. Aug. 31, 3.

1902.—July 17, 1. July 22, 2. July 31, 3. Aug. 11, 1. Aug. 16, 1. Aug. 18, 3.

PARASITIC COPEPODS.

25. *Anchorella* sp.
1902.—Aug. 20, 2, from gills.

***Menticirrhus americanus*, Whiting.**

Date.	Number of fish examined.	Food notes.
1901.		
July 29.....	2.....	Fish.
Do.....	1.....	Crustacea (crabs and shrimp).
July 30.....	6.....	Crabs and shrimp, mollusk shells.
July 31.....	1.....	Fish and piece of sea lettuce.
August 1.....	5.....	Almost exclusively shrimp; a few bivalve mollusk shells; also a few shells of <i>Bulla</i> and <i>Urosalpinx</i> .
August 6.....	1.....	Fish.
August 20.....	1.....	Crabs.
August 24.....	5.....	Large numbers of broken lamellibranch shells; a few fragments of small crustacea and sand.

In 1902, 22 fish, all small, were examined from July 18 to Aug. 20. Annelids, crabs, lamelli-branches, and shrimp found in alimentary canal.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1901.—July 29, 1, female. July 30, 2, females; yellow, length 20 and 22 mm. Aug. 1, 2, male and female. Aug. 24, 12.

1902.—July 23, 3. July 31, 1. Aug. 1, 1. Aug. 15, 3, small.

NEMATODES.

2. *Immature nematodes* (*Ascaris* sp.).

1901.—July 29, nematodes belonging to the type which have a slender diverticulum directed posteriorly from the bulbous base of the œsophagus and an anterior prolongation of the intestine. Dimensions of living specimen, slightly compressed, in millimeters: Length 7.2; length of œsophagus 0.77, of diverticulum of intestine 0.21, of diverticulum of œsophagus 0.77; diameter, nearly uniform, 0.22; distance from anal aperture to posterior end, which tapers to an acute point, 0.32. On viscera, some encysted. July 30, 2. July 31, few. Aug. 1, not abundant; from capsules on viscera. Aug. 6, few. Aug. 24, few.

1902.—July 18, few.

3. *Nematode*.

1901.—July 29, slender bodies which appear to be fragments of the ovary of *Ichthyonema* in material from intestine. These exhibit moderately active contractile movements. One piece was about 4 mm. in length and 0.11 mm. in diameter. It was completely filled with elliptical ova 44 by 27 microns in the two principal diameters. In some of these ova young nematodes had already developed.

CESTODES.

x. *Scolex polymorphus* Rudolphi.

1901.—July 29, few, from intestine; rather larger than usual for these larval cestodes when found in the intestine of their host; red pigment present; terminal sucker very much smaller than bothria. July 31, several, rather large, 2 red pigment patches, 2 costæ on the bothria; also some small. Aug. 6, few.

1902.—July 31, few, small.

5. *Rhynchobothrium* sp.

1901.—Aug. 1, 1, larva released from blastocyst which was inclosed in a fusiform cyst. Dimensions in millimeters: Length 3; length of bothria 0.17, head and neck to base of bulbs 2; length of contractile bulbs 0.36; diameter of head 0.28, of neck 0.14; length of longest hooks 0.01. Bothria and neck to base of bulbs thickly beset with minute bristles. The hooks suggest *R. plicatum*.

6. *Rhynchobothrium* sp.

1901.—Aug. 24, 1, a larva, not mature enough to admit of identification. It was obtained from a very long blastocyst from the ovary of its host. Length of blastocyst 180 mm., average diameter 2 mm. July 29, elongated blastocysts on viscera. Larva from one not far enough developed to allow even generic determination.

7. *Tetrachynchus bisulcatus* Linton.

1901.—July 29, scolex from cyst in stomach wall, under serous coat. Other cysts were opened, but no entozoa found. One liberated a yellow mass, which appeared to be a degenerate blastocyst. The interior was semifluid, with irregular masses of carbonate of lime scattered through it. The same condition existed in a cluster of cysts on the mesentery. The presence of carbonate of lime in these cysts was shown by the brisk effervescence in dilute hydrochloric acid. In some cases the calcareous material, instead of being scattered through a fluid in granules, was aggregated into a mass which filled the greater part of the cyst. Other scolices obtained from another fish examined later on this same date. July 30, scolices from cysts in stomach wall. July 31, few. Aug. 6, few.

1902.—July 18, 23, 25, Aug. 1, 15, few on each date; cysts in stomach wall.

TREMATODES.

8. *Distomum monticellii* Linton (?).

1901.—July 30, 1, incomplete specimen closely agreeing with this species. Oral sucker 0.10 mm., ventral sucker 0.32 mm.; ova 24 by 14 microns. July 31, 3, pale orange; ventral sucker more than three times diameter of oral; ova 27 by 14 microns, cirrus spinose, one of the vitellaria distinctly three-lobed, but not situated far back of ventral sucker. Aug. 6, 3 small distomes, which agree with this species in proportions and character of vitellaria, but the ova are smaller than in any appendiculate I have hitherto seen. This latter feature is true also of a large distome which was associated with these (see No. 9, below). Dimensions in millimeters: Length 2.8; diameter of oral sucker 0.11, ventral sucker 0.46; ova 0.014 and 0.010 in the two principal diameters.

9. *Distomum tornatum* Rudolphi. [Fig. 156.]

1901.—Aug. 6, 1; vitellaria tubular. Dimensions, in millimeters: Length 10, breadth 2; transverse diameter of oral sucker 0.32, of ventral sucker 0.84; ova 0.015 and 0.010 in the two principal diameters. See No. 8, above.

10. *Distomum vitellosum* Linton.

1901.—July 29, numerous; of great variety of size and shape, e. g., length 1.12, breadth 0.4; and length 3.6. The ova do not vary much from 60 by 40 microns in the two principal diameters. Fimbriated borders of ventral sucker very prominent. When placed in fresh water these distomes become rigid, the body cylindrical, and the neck reflected until it stands nearly at right angles to the body. The neck, even in the larger specimens, is always very short. Fifty or more were obtained from a third fish which was examined later on this date. Most of these were elongated, 5 mm. and more in length, with prominent ventral sucker and reflected neck. The distomes in this lot were rather delicate and fragile. There were a very considerable variety of shapes. Indeed, if they were not seen in such large numbers together they might very easily help to increase the confusion which exists at the present time in the classification of the distomes. July 30, large numbers and great variety of size and shape. July 31, few, large (4.25 mm.) and fragile. Aug. 1, numerous. Aug. 6, numerous, very variable in shape and size, most of them somewhat macerated. Aug. 20, 150 from one host. Aug. 24, numerous.

1902.—July 18, 23, 25, Aug. 1, 15, 20, usually numerous and of diverse shapes.

Dimensions, in millimeters: Length 1.12; diameter 0.15; another, length 3.92, diameter 0.4. A leading character of this species is the presence of a number of short lobes surrounding the ventral sucker, often very prominent, but in certain stages of contraction to be made out only with great difficulty. In specimens which are not in good condition these lobes can not be made out at all. Indeed, they were not noticed in the specimens upon which the original description of the species was based. The longer specimens owe their greater length principally to the extension of the body, and not to the neck, which remains short. Oesophagus distinct and of moderate length.

11. *Distomum tenue* Linton.

1901.—July 29, 3 or more; length of one 1.62 mm.; ova 93 by 52 microns.

12. *Distomum valde-inflatum* Stossich.

1902.—July 18, few; encapsuled on viscera.

13. *Distomum hispidum* Abilgaard.

1901.—Aug. 1, 2, 3.5 and 1.5 mm. in length, respectively. Spines were missing from the neck of the larger specimen, but were present in the smaller.

Abudefduf saxatilis, Cow Pilot.

Date.	Number of fish examined.	Food notes.
1902. July 17.....	1 (length 32 mm.)....	Copepods and zoëa of crabs—no entozoa found.

Chætodipterus faber, Porgee.

Date.	Number of fish examined.	Food notes.
1901. July 11.....	1.....	Contents of alimentary canal almost indistinguishable, but under the microscope fragments (for the most part spines) of annelids; the eye of a shrimp or small crab, and a number of small, sandy, oblong bodies, presumably foraminifera. No entozoa. This specimen was small, 100 mm. long. The alimentary canal contained sand, in which setæ of annelids and tests of diatoms were recognized. Small specimen. The only recognizable material was a gorgonian coral (<i>Leptogorgia</i>), orange colored, and with slender, straight spicules.
July 31.....	1.....	
August 6.....	1.....	

TREMATODES.

1. *Distomum inconstans* sp. nov. (Figs. 183-187.)

These are small distomes of very diverse shape, some being nearly circular or squarish in outline, while others are long-oval or fusiform. The short or contracted specimens are yellowish and densely clothed anteriorly with low, flat, rounded spines. The elongated specimens are translucent, bluish white, with spines very scanty and difficult to make out. Suckers about equal, sometimes one, sometimes the other being the larger. The pharynx, not of constant shape, is a little longer than broad, and in specimens which are not too strongly contracted is separated from the anterior sucker by a distance rather less than the length of the pharynx. There is a distinct œsophagus, and the intestinal rami are simple and extend nearly to the posterior end of the body. Testes subglobular, lateral, about the middle of the length of the body; in the specimens studied 6 were counted on the left side and 4 on the right. The cirrus passes to the left of the ventral sucker, opening in front and a little to the left of it. Its position, however, varies with the state of contraction. In some cases the cirrus pouch is posterior to the ventral sucker; in others it is to the left, and in yet others in front of the ventral sucker. The prostate gland and seminal vesicle are both included in the cirrus pouch. The ovary is median, situated between the two groups of testes. It is lobed, and is about the same size as a single testis. The vitellaria are very abundant, filling the posterior and lateral regions of the body, and extend as far forward as the origin of the intestinal rami, or even to the pharynx, covering and obscuring the other organs. Folds of the uterus lie in the median line both in front of and behind the testes, continuing on the left side of the ventral sucker, lateral to the cirrus, to the genital aperture.

Dimensions, in millimeters, life: Lengths of two short-oval specimens 0.7 and 1.15; breadths of same 0.45 and 0.65; diameter of oral sucker 0.18, of ventral sucker 0.2; ova 0.06 by 0.04.

In another lot: Longest specimen 2.1, breadth 0.77; average length about 1.25, and breadth 0.8. Diameters of oral suckers in three specimens 0.17, 0.18, and 0.16, respectively; diameters of the corresponding ventral suckers 0.18, 0.16, and 0.17, respectively.

1901.—July 31, 9, small, short-oval. Aug. 6, numerous, of great variety of shapes.

Monacanthus hispidus, File-fish.

Date.	Number of fish examined.	Food notes.
1901. July 31.....	1 (small)	Small amphipods, fragments of other smaller crustacea, sea weed; no entozoa.
1902. July 7.....	11 (small)	Shrimp, annelids.
July 8.....	9 (small)	Hermite crabs, amphipods, small lamellibranchs, sea weed.
July 14.....	13 (small)	Small piece of intestine examined with compound microscope and found to be packed with a bryozoan (<i>Bugula</i>).
July 16.....	2 (small)	Large quantities of <i>Bugula</i> sp. and amphipods, also copepods, a few fragments of lamellibranch shells, a few egg cases of a gastropod, and a little sand.
July 18.....	6 (small)	<i>Bugula</i> , gastropod eggs, small lamellibranch, <i>Crepidula</i> and three other small gastropods.
July 19.....	3 (small)	Mainly <i>Bugula</i> .
July 21.....	do	Small lamellibranchs and amphipods.
July 23.....	2 (small)	Small crustacea, several species of lamellibranchs, and bryozoa; no entozoa.
July 25.....	1 (small)	Food not noted.
July 26.....	3 (small)	Do.
July 29.....	do	Amphipods and small gastropods (<i>Olivia</i> , etc.).
August 11.....	1 (small)	Amphipods, small lamellibranchs, and bryozoa.
August 20.....	do	Amphipods, small sea urchins, sand; no entozoa.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.
1902.—July 25, 1, male.

CESTODES.

2. *Scolex polymorphus* Rudolphi.
1902.—July 8, few. July 14, numerous, forms with one costa on bothria. July 18, few. July 19, several. July 21, 23, few, forms with two costae. July 25, few, minute. July 26, few, forms with two costae. Aug. 11; 1.

3. *Cysts*.
1902.—July 7, small cysts on viscera; no larvae found.

TREMATODES.

4. *Distomum vitellosum* Linton.
1902.—July 8, 1.
5. *Distomum valde-inflatum* Stossich.
1902.—July 16, 1, in capsule on viscera. Dimensions, life, compressed, in millimeters: Diameter of capsule 1.05; length of distome 0.85; diameter, anterior 0.21, posterior 0.45 (nearly uniform from ventral sucker back); diameter of oral sucker 0.18, of ventral sucker 0.19. Thirty-four oral spines, double row dorsal and ventral, single row lateral. This arrangement of hooks is like that of *Distomum imparispine* from *Rachycentron canadus*. July 18, 1.
6. *Cercariae*.
1902.—July 8, 3 redia-like bodies from body cavity; shape reniform with a few oil globules in the hilus; several individual aggregations of cells which are probably young *Cercariae*. Dimensions in millimeters: Redia, length 1.05; breadth 0.45; cercaria from 0.07 to 0.15 in length.

Alutera schoepfii, File-fish.

Date.	Number of fish examined.	Food notes.
1901. July 16	1 (160 mm.)	Alimentary canal throughout its length crowded with bryozoa.
August 8.....	1 (small)	Shrimp, amphipod, and sea lettuce.

No entozoa were found save one small cyst with nothing in it that could be identified.

Spheroides maculatus, Puffer.

Date.	Number of fish examined.	Food notes.
1901.		
July 31.....	5.....	A great variety of mollusk shells, broken, both bivalves (<i>Pecten</i> , <i>Anomia</i> , <i>Solenomya</i> , <i>Venus</i>) and univalves. Also barnacles (<i>Balanus</i>); bits of worm tubes made of sand and pieces of shell; fragments of tests of sea urchin (<i>Moira atropos</i>) and small spines of same; sponge.
August 1.....	4 (small).....	Food practically the same as in foregoing. Fragments of tests and loose spines of the <i>Moira</i> sea urchin, <i>Moira</i> , especially abundant.
1902.		
July 7.....	1 (150 mm.).....	<i>Arbacia</i> .
August 11.....	1.....	Crab, shrimp, Larnacle (<i>Balanus</i>), annelids, sea urchin (<i>Moira</i>), watermelon seed.
August 15.....	1.....	Operculum of gastropod, sea urchin (<i>Moira</i>).
August 20.....	1.....	Crab, shrimp, amphipod, annelid, bryozoa, seaweed.
August 23.....	2.....	Ascidian, oyster and other lamellibranchs, <i>Arbacia</i> .

NEMATODES.

1. *Ascaris*, immature.

Type with diverticula on œsophagus and intestine.

1902.—July 7, 2, the larger 12 mm. in length, with characteristic jaws of *Ascaris*; post-anal region of smaller specimen rather more slender than the other; diverticulum of œsophagus with a series of punctate dots along its axis. Aug. 11, few. In this lot the jaws were sufficiently developed to show apparent identity of the species with *A. habena*. The diverticula of œsophagus and intestine also agree with that species.

CESTODES.

2. *Tetrarhynchus bisulcatus* Linton.

1902.—Aug. 11, 1 scolex from viscera.

TREMATODES.

3. *Distomum vibex* Linton. [Fig. 188.]

1901.—July 31, 1. Aug. 1, 1; color blood red. The flattened specimen measured 6 mm. in length and 3 mm. in greatest breadth. A reexamination of sections of specimens of this species showed the presence of diverticula of the intestines prolonged anteriorly parallel to the pharynx, as shown in sketch of this specimen.

1902.—Aug. 11, 2 large, 14 small; reddish-brown, diverticula of intestines noted in flattened specimen. Aug. 15, 1.

4. *Distomum* sp. [Fig. 165.]

This distome is the same as that described in my Trematode Parasites of Fish, Proceedings U. S. National Museum, vol. xx, pp. 537-538, pl. LIII, figs. 1, 2. Same as No. 4 under *Siphostoma fuscum*, and No. 13 under *Cyposcion regalis*.

Squarish-oblong, thick, white. Dimensions in millimeters of living specimen, slightly compressed: Length 1.27; breadth through anterior sucker 0.3, through ventral sucker 0.4, maximum breadth 0.61, near posterior end 0.45; transverse diameter of oral sucker 0.16, of pharynx 0.13, of ventral sucker 0.16; ova 0.07 by 0.05.

1902.—Aug. 15, 3. Aug. 20, 12. Aug. 23, 8.

5. *Gasterostomum gracilescens* Rudolphi.

1901.—Aug. 1, 1. This is identical with the species from the gar (*Tylosurus marinus*) collected on the same date. It is of course possible that this specimen came from that lot. Since, however, great care has been exercised to prevent the mingling of material from specifically different hosts, I do not think it is likely to have chanced on this occasion.

Chilomycterus schœpfi, Rabbit Fish.

Date,	Number of fish examined.	Food notes.
1902.		
July 5.....	1 (125 mm.).....	Principally small mollusk shells, both gastropods and lamellibranchs, among which a small <i>Crepidula</i> was abundant; shells more or less broken.
July 8.....	1.....	Large numbers of broken lamellibranch shells and small gastropods. The latter, for the most part, harbored hermit crabs.
July 22.....	1.....	Same as above.
August 13.....	1.....	Same as above; small oyster shells, young <i>Cardium</i> , <i>Ayanassa</i> , and claw of crab noted.
August 16.....	1.....	Fish, crab, lamellibranchs, and gastropods and seaweed.
August 26.....	1.....	Gastropods and lamellibranchs, several species; also bryozoa and an isopod.

NEMATODES.

1. *Ascaris neglecta* Leidy.

1902.—July 8, 1, female. Body wall of living worm transparent, faintly yellow by transmitted light, vascular; intestine broad, yellowish; ovary darker; intestine and œsophagus each with a slender diverticulum. Aug. 16, 2.

TREMATODES.

2. *Distomum* sp. [Fig. 208.]

1902.—July 5, 2, small, white, subspherical; immature. Intestines voluminous, the bifurcation ventral to posterior half of pharynx, contents of intestine granular. Whole body appears to be filled with granular material when moderately compressed. Dimensions, life, moderately compressed, in millimeters: Length 1.06, breadth 0.82; diameter of oral sucker 0.15, ventral sucker 0.17; pharynx, length 0.105, breadth 0.120; orifice of oral sucker, length 0.06, breadth 0.09; ventral sucker, length 0.06, breadth 0.06. Both suckers circular.

1902.—July 22, 1; apparently adult of this species. Dimensions of living specimen in millimeters: Length 2.25, breadth 1.5; diameter, of oral sucker 0.33, of pharynx 0.16, of ventral sucker 0.38; ova 0.072 by 0.043. Aug. 16; 1. This was at first taken to be a *Monostomum*, the ventral sucker for some reason being difficult to make out. The dimensions agree with those of the one found on July 22. Aug. 26; 3. The body of these specimens is squarish, truncate in front, the oral sucker being sometimes retracted. Testes two, rather large, subspherical near posterior, and in all but one so close together as to appear to be but one. Vitellaria abundant, posterior, lateral and peripheral to œsophagus; ovary in front of testes, dorsal.

Unfortunately the anatomy of these worms is not distinctly shown in the preserved specimens. In one the genital aperture appeared to be a little in front of the ventral sucker to the left of the median line, but was not made out with absolute certainty. In another the cirrus appeared to make a sharp turn dorso-caudad then mediad to open in the ventral sucker as in *Monostomum*.

Two specimens were cut into serial sections, one transverse, the other sagittal, but the material having been in poor condition when first collected, even with this aid the anatomy was poorly shown.

In all the specimens the ventral sucker is less distinct than the oral, and the pharynx in all is very distinct.

COPEPODS.

3. *Chondracanthus* sp.

These interesting forms, along with other parasitic copepods collected at Beaufort, have been referred to Prof. C. B. Wilson. These were found on the gills, fins, ventral surface of body, and under the eyes of their hosts. At the points of attachment the skin was white and opaque, the patches looking somewhat like sporozoa cysts. Length 5.5 mm; length of egg-chains 3 mm. Some of the ova contained nauplii.

1902.—July 5, 37. July 22, 23. Aug. 13, numerous. Aug. 16, 1.

Prionotus scitulus, Sea Robin.

Date.	Number of fish examined.	Food notes.
1901.		
August 1.....	5 (small).....	Numerous small mollusks (<i>Bulla</i> , <i>Solenomya</i> , etc.) and crustacea (ostracoids, copepods, cumacea, etc.).
August 16.....	1 (small).....	Shrimp, small univalve mollusks (young <i>Olivia</i>).
1902.		
August 1.....	1.....	Crabs, shrimp, small gastropods.
August 15.....	6.....	Fish, crabs, shrimp, small gastropods.

NEMATODES.

1. *Immature nematodes* (*Ascaris* sp.).

1901.—Aug. 1, few, on viscera; type with diverticula on both œsophagus and intestine.

CESTODES.

2. *Rhynchobothrium* sp.

Type with oval cysts, short larva, and relatively long hooks. Aug. 1, 1902; 1.

3. *Tetrarhynchus bisulcatus* Linton.

1901.—Aug. 1 and 16, few, encysted in stomach wall.

1902.—Aug. 15, cysts in stomach wall.

TREMATODES.

4. *Distomum appendiculatum* Rudolphi.

1902.—Aug. 15, 1.

5. *Distomum vitellosum* Linton.

1902.—Aug. 15, 1, not in good condition.

6. *Distomum* sp. [Fig. 157.]

1902.—Aug. 1, 1, not in good condition. Dimensions, in millimeters: Length 1.65; diameter of oral sucker 0.09, of pharynx 0.05, of ventral sucker 0.2; ova 0.032 by 0.016.

Prionotus tribulus, Sea Robin.

Date.	Number of fish examined.	Food notes.
1901.		
July 8.....	2.....	Fish and crabs.
July 18.....	2.....	Fiddler crabs.
July 31.....	2 (small).....	Otoliths of small fish, crabs, shrimp.
August 1.....	4 (small).....	Crabs and shrimp.
August 16.....	6 (small).....	Fish and crabs.
1902.		
July 8.....	1.....	Crustacea; no entozoa.
July 11.....	5 (150 mm.).....	Crabs, shrimp.
July 23.....	1.....	Lamellibranchs, young <i>Limulus</i> , small crustacea; no entozoa.
July 24.....	1.....	Crabs, shrimp.
August 8.....	3.....	Shrimp, amphipods, copepods, etc., annelids.
August 13.....	2.....	Shrimp.
August 18.....	1.....	Shrimp, lamellibranchs.
August 20.....	2.....	Shrimp, sea urchin.

ACANTHOCEPHALA.

1. *Echinorhynchus sagittifer* Linton.

1901.—July 31 and Aug. 16, 1 on former date and 2 on the latter, on serous coat of viscera inclosed in thin membranous cyst.

NEMATODES.

2. *Immature nematodes*.

1901.—Aug. 1, few, not in good condition.

1902.—Aug. 13, few, type with diverticula on œsophagus and intestine.

CESTODES.

3. *Scolex polymorphus* Rudolphi.
1902.—Aug. 20, few, small.
4. *Rhynchobothrium* sp.
1901.—July 8 and 18, numerous, encysted in stomach wall. They agree with the form figured in Larval Cestodes of Fishes, Proceedings of U. S. National Museum, vol. XIX, pl. LXIII, figs. 3-5.
1902.—July 11, few, type with small oval cysts on viscera, short larva, and relatively long hooks.
5. *Tetrarhynchus bisulcatus* Linton.
1901.—July 31, Aug. 16, few, encysted in stomach wall.
1902.—July 11, few. Aug. 12, 3.

TREMATODES.

6. *Distomum appendiculatum* Rudolphi.
1901.—Aug. 1, 2, cylindrical, with fine, regular, transverse wrinkles, under high magnification resembling annulations; position and general character of testes, ovary, and vitellaria agree with this species. Dimensions, in millimeters, life: Length, not including appendix, 0.88; diameter of oral sucker 0.069; pharynx, length 0.045, breadth 0.034; ventral sucker, length 0.12, breadth 0.13; diameter, anterior 0.12, middle 0.49; ova 0.028 by 0.014.
1902.—Aug. 8, 1. [Fig. 153.] Annulate, with sharply serrate outlines in life. Testes 2, close behind ventral sucker, diagonally placed. Seminal receptacle between testes and ventral sucker. Prostate, elongated, and conspicuous. Ovary behind testes a distance equal to its own diameter; Vitellaria 2, close to posterior edge of ovary, not lobed; uterus voluminous. Length, in millimeters, 1.12; maximum diameter 0.3; diameter of oral sucker 0.06, of pharynx 0.03, of ventral sucker 0.15; ova 0.025 by 0.014. Aug. 20, 4, small.
7. *Distomum monticellii* Linton.
1901.—Aug. 16, 1. Dimensions, in millimeters, life, compressed: Length 3.29, breadth 0.61; diameter of oral sucker 0.17, of ventral sucker 0.38, of pharynx 0.08; ovum 24 by 14 microns.
8. *Distomum vitellosum* Linton.
1901.—July 8, 31, 1 on each date.
1902.—Aug. 8, 1. This specimen was remarkable for the elongation of the ventral sucker on a pedicel; the fimbriated border around the ventral sucker was also unusually prominent. The specimens had no ova and appeared to be immature. Aug. 18, 2. These were of very different appearance, the one from the other. One was oval and looked at first like *D. pyriforme*. The other at first had somewhat the habit of body of *D. appendiculatum*. This diversity of form is not unusual in this species. Specimens in the same lot are often found which bear but little resemblance to each other, but which, after flattening under a cover glass in the presence of gentle heat, expand into identical forms.
9. *Lernanthropus* sp. From gills.
1902.—Aug. 18, 2, females with long egg chains.

COPEPOD PARASITES.

Opisanus tau, Toad-fish.

Date.	Number of fish examined.	Food notes.
1901.		
July 9.....	1 (small)	Fragments of crustacea.
July 16.....	1.....	Fish and shells of gastropods (<i>Ilyanassa</i> , <i>Urosalpinx</i> , <i>Achirus</i> (?), <i>Truttia</i> , etc.).
July 18.....	2.....	Small crabs.
July 24.....	1 (small)	Crabs.
July 26.....	1.....	Crabs and other crustacea.
August 2.....	2.....	(1) <i>Ilyanassa</i> (several), <i>Pecten</i> , sea anemone, small crab, piece of bark, and large pebble. (2) Pieces of test and spines of <i>Arbacia</i> (a large quantity). These fish were taken near the wharf at the laboratory. No entozoa were found in the alimentary canal of the second. It would appear that the diet of sea urchins had in this case acted as an anthelmintic.
Do.....	4.....	This lot, which was taken at the breakwater near Fort Macon, contained only crabs in the alimentary canals.
August 3.....	2.....	Crabs and gastropods (<i>Ilyanassa</i> and <i>Urosalpinx</i>).
August 6.....	4.....	Fish, crabs, and gastropods.
August 8.....	1.....	Lamellibranch mollusks.
August 9.....	2.....	Crustacea (hermit crabs).
August 12.....	6.....	Fish and crustacea.
August 13.....	9.....	Crabs, gastropods, and sea urchin (<i>Arbacia</i>).
August 16.....	1.....	Fish and crabs.
August 20.....	2.....	Fish and mollusks.
August 21.....	1.....	Stomach empty; material in intestine completely digested.
August 22.....	2.....	Fish and crabs.
August 23.....	2.....	Fish.
August 27.....	5.....	Fish, gastropod and lamellibranch mollusks, small stone crabs.
August 29.....	1.....	Fish, lamellibranch mollusks, spider crabs, and other crabs.
August 30.....	3.....	Spider crabs and other crabs, gastropod mollusks.
1902.		
July 14.....	2.....	Hermit crabs and shrimp.
July 16.....	9.....	Crabs, gastropod shells (most of them with hermit crabs), annelids.
July 19.....	4.....	Crabs, shells, shrimp.
July 21.....	2.....	Crabs, shells.
July 22.....	4.....	Crabs, shells, shrimp, <i>Pecten</i> .
July 26.....	4.....	Shrimp.
July 28.....	1.....	Not noted.
July 29.....	4.....	Crabs.
July 30.....	4.....	Crabs (fiddler, stone, and hermit), shrimp.
July 31.....	3.....	Shrimp.
August 4.....	11.....	Shrimp, crabs, gastropods, lamellibranchs, eel grass.
August 7.....	1 (large).....	Alimentary canal empty.
August 8.....	1.....	Crabs, shrimp, sea urchin (<i>Arbacia</i>).
August 11.....	5.....	Crabs, shrimp, gastropods.
August 16.....	1.....	Stone crab, shrimp.
August 18.....	4.....	Crabs, gastropods.
August 19.....	8.....	Stone crabs, hermit crabs, shrimp, gastropod shells (<i>Ilyanassa</i> , <i>Urosalpinx</i>), <i>Arbacia</i> (spines and test), eel grass.
August 20.....	9.....	Hermit crabs, spider crabs, etc., fish.
August 21.....	2.....	Crabs.
August 22.....	1.....	Not noted.
August 23.....	1.....	Alimentary canal empty.
August 26.....	2.....	Spider crabs.

NEMATODES.

1. *Ascaris habena* Linton.

1901.—July 9, 2, young. July 18, 1, male, length 15 mm. July 24, 1, female; ova not mature, length 20 mm. July 26, 1, female; ova 65 by 45 microns. Aug. 2, 5, all males; later on same date, 2 adults, 1 male and 1 female; also 2 immature nematodes. The latter had diverticula to œsophagus and intestine. Aug. 3, 6 in one, 2 in the other. Aug. 6, few, only 1 adult female in the lot; ova segmenting. Aug. 8, 1. Aug. 9, few, young and adult. Aug. 2, 6. Aug. 13, 25, adult males and females, and immature. Aug. 21, 2 large and 3 small. Aug. 22, 12, all from one of the fish, adult and immature. The diverticula of an immature form with rudimentary jaws were compared with those of a young worm with the characteristic jaws of this species and found to agree. It would seem that a great many of the immature nematodes recorded from a variety of hosts are young of this species. Aug. 23, few, small. Aug. 27, 6. Aug. 29, 5, female. Aug. 30, 6, young.

1902.—July 14, 1, male. July 16, 12, adult. July 19, 1, female. July 21, 2, females, large and small, stouter than usual, intestine greenish. July 26, 6. July 29, several, ova segmenting. July 30, few. July 31, few. Aug. 4, several. Aug. 7, 1. Aug. 8, several. Aug. 11, 16, 18, several on each date, large and small. Aug. 19, numerous, large and small. Aug. 20, few. Aug. 21, few, small. Aug. 23, 1, female.

Usually in the intestine near the pylorus, not infrequently in the stomach.

2. *Immature nematodes.*

Probably for the most part young of *Ascaris habena*.

1901.—July 16, few, from alimentary canal; diverticula of intestine and œsophagus, as in many different hosts; the most usual type; agreeing in this particular with *A. habena*. Length 15 mm. July 26, several. Aug. 2, 2. Aug. 6, few. Aug. 12, few; one of these immature worms, after lying for twenty-four hours in water, shed the cuticular investment and revealed the characteristic head of *Ascaris*. Aug. 20, numerous, encysted in intestinal wall. Some of the cysts were without nematodes and filled with waxy, degenerate tissue. Aug. 22, a yellowish cyst with calcareous nucleus, agreeing in general appearance with those of preceding date. [Fig. 27.] The diverticulum of the intestine was observed to extend halfway to the mouth, while the diverticulum of the œsophagus was longer than the œsophagus. [Fig. 28.]

1902.—July 14, 2; length 8 mm. July 16, numerous. July 21, several, different sizes. Aug. 7, several, some encysted and surrounded by yellowish, granular material; several, encysted, with waxy secretion. Aug. 18, several. Aug. 20, several.

CESTODES.

3. *Scolex polymorphus* Rudolphi. [Figs. 76–78.]

1901.—July 9, numerous in intestine and larger than I have been accustomed to see them in this situation. Each bothrium was crossed by two distinct ribs (costæ). Anteriorly there was a distinct muscular organ like a globular pharynx, which doubtless functions as a sucker. The appearance of this structure was not unlike the mouth and pharynx of a trematode. July 16, several, active; red pigment present in neck, and costæ on the bothria. When disturbed some retracted the bothria until nearly inverted. The last part to disappear is the posterior edge of the bothrium. July 18, rather numerous in alimentary canal; very active; two costæ on each bothrium. One was noticed which, in addition to the two costæ, carried an anterior loculus on each bothrium. It is probably a young *Calliobothrium*. Another had the characteristic bothria of *Echeneibothrium* and *Rhinebothrium*. Its prominent muscular proboscis (myzorhynchus), if retained in the adult, would place it in the former genus. This free larva was very much smaller than the larval *Rhinebothrium*, which was encysted on the viscera, and abundant in this lot. (See No. 4, below.) Length of bothria, in this larva, about the same as that of its associates which have but two ribs on the bothria, instead of the numerous ribs of this one, viz., 0.2 mm. Corresponding forms released from blastocysts (No. 4, below) measured about 0.7 mm. when at rest. July 26, numerous; large, two costæ developed on bothria and two pigment patches in neck. Same found on three following dates: Aug. 2, few; in both lots on this date. Aug. 6, 23, several. Aug. 27; numerous; in intestine small; also in cystic duct, larger. Aug. 29, numerous, from intestine. The largest had bothria which resembled those of *Calliobothrium* and *Acanthobothrium*, but without hooks. Some of the smaller also had costæ faintly outlined on the bothria. Aug. 30, few.

1902.—July 14, rather numerous in intestine, with costæ on bothria but no red pigment. July 16, different stages of development, the longest with two costæ. July 19, numerous. July 21, two sizes, the smaller about one-tenth the length of the larger, one curious abnormal form with three-forked posterior end, very changeable. [Fig. 78.] July 22, several. July 26, few. July 28, few. July 30 and 31, several, large and small. Aug. 4, numerous, some comparatively large. Aug. 7, numerous, small, with two costæ. Aug. 11, rather numerous. Aug. 16, few. Aug. 19, specimens with red pigment and two costæ. Aug. 30, several, red pigment, two costæ, one specimen noted with rudimentary hooks (*Calliobothrium* or *Acanthobothrium*). Aug. 21, large, two red pigment patches, rudimentary hooks. Aug. 22, rather numerous, small. Aug. 26, several, of good size.

4. *Rhinebothrium* sp. [Figs. 59–74.]

These are larval forms near *R. flexile*. They were found in 19 out of 20 lots of fish examined during the season of 1901. The dates on which they were found are included between July 9 and Aug. 30.

These larvæ are found on the viscera generally, but especially on or near, occasionally in, the liver, and in the mesentery. Early in the season of 1901 I was struck by the large numbers of blastocysts clustered together in comparatively small compass. [Fig. 59.] The frequent recurrence of these clusters led me to examine them with some care with the hope that the reproduction of successive generations of blastocysts by some process of budding could be demonstrated. The cysts are, as a rule, comparatively thin-walled. The blastocysts are club shape, the part representing the handle of the club being usually much, often enormously, elongated. [Fig. 62.]

Dimensions of one, in millimeters, life: Enlarged anterior portion 3 in length and 1 in diameter; slender posterior portion 9 in length and 0.1 in diameter. This specimen enlarged slightly into a rounded knob at the extreme posterior end, a characteristic feature of these blastocysts and possibly having some bearing on the method of development of new blastocysts.

The larva is situated in the enlarged anterior portion. When a blastocyst is subjected to slight pressure the larva may be seen through the transparent walls at the anterior end of the enlarged portion. The parenchyma of the blastocyst contains numerous calcareous bodies, which often are rather irregularly shaped. Upon continued pressure, especially if aided with needle points or similar tool, the larva may be liberated from the blastocyst [fig. 64]. When so liberated it separates from the blastocyst. Even when separated entirely from its blastocyst its bothria often remain retracted. They may be seen in some instances protruding from the anterior end of the scolex. What is thus seen is of course the posterior edges of the bothria, since in retracting the head it is really inverted and the last part of the bothria to disappear is the posterior border. Usually the bothria may be made to appear by suitable manipulation, although I did not succeed in getting them to expand freely after they had been thus unsheathed. The bothria are leaf-like and have the characteristic loculi of the genus *Rhinebothrium*. The number of loculi on each bothrium was found in one favorable example to be as represented in fig. 71; that is, 27 on each side with an odd one at each end, or 56 in all. One character possessed by these larvæ, which would at first glance ally them with *Echeneibothrium* rather than *Rhinebothrium*, is a terminal aperture into which the bothria may be retracted. This is a character, however, which is possessed by cestodes generally during larval stages of the scolex. Doubtless the larvæ of the genera *Rhinebothrium* and *Echeneibothrium* will be found to be much alike. (See above under *Scolex polymorphus*.)

It is not unusual to find two or more blastocysts each with a larva inclosed in the same cyst. Attempts to demonstrate the vital connection between two blastocysts each containing a larva by means of sections have not been successful. A cyst containing two blastocysts each containing a well-developed scolex was sectioned and the sections mounted serially. The long tail-like portions appeared upon the first study of the sections to be continuous with each other, which would have amounted to a demonstration of budding. A careful reconstruction of the sections, however, showed that the two blastocysts were independent of each other.

An interesting case in this connection, although demonstrating nothing, is shown in fig. 66, sketched from a cyst which was stained and mounted in balsam. The cyst is small, 1.41 mm. in length, shaped like a dumb-bell, completely invested with a connective tissue cyst, but with undoubted continuity of the material of the blastocyst. Further dimensions of blastocyst, in millimeters: Length, of larger end 0.45, of smaller end 0.21, of connecting part 0.65; diameter, of larger end 0.30, of smaller end 0.19, of connecting part 0.09, in the middle, constricted to 0.027 and 0.021 near the larger and smaller ends, respectively.

1901.—July 9, numerous cysts on liver, stomach, intestine and mesentery. July 16 and 18, numerous on viscera. In one of the fish the long tails of the blastocysts were felt together in a mass on the mesentery. July 26, very numerous, in a cluster 20 mm. square and containing several hundred cysts on the mesentery. One cyst in this lot contained three blastocysts, each with a larva. Aug. 2, numerous on liver, stomach, and intestine, some in clusters. Aug. 3; numerous in cluster in one of the fish, few on the liver in the other. Aug. 6 and 8, numerous, clustered. Aug. 9, numerous in clustered cysts on serous coat of rectum. Aug. 12, 13, 16, 20, 21, 22, 23, numerous clusters of cysts on viscera on each date. Aug. 27, clusters of cysts on rectum, in and on liver, cysts in stomach wall. Aug. 29, numerous clusters of cysts on liver and other viscera. Aug. 30, few, cysts on viscera.

Clusters of cysts containing blastocysts and larvæ on viscera.

1902.—July 14, 19, numerous. July 21, 22, several, also elongated cysts with blastocysts, but no larvæ [fig. 84]. July 26, 28, numerous. July 29, 30, 31, several. Aug. 4, numerous. Aug. 7, 8, not

numerous. Aug. 11, 12, 16, 18, numerous. Aug. 19, numerous, much waxy secretion associated with the clusters. Aug. 20, 21, numerous clusters. Aug. 23, 26, small clusters of cysts.

See No. 2 under *Siphostoma fuscum*.

5. *Rhynchobothrium tumidulum* Linton.

1901.—July 26, from cysts associated with No. 4; larvæ remaining attached to blastocysts; contractile bulbs long and slender with red pigment spot at anterior end of each, length 0.56 mm.; diameter 0.07 mm.; proboscides not seen extended. Aug. 27, from cysts on viscera.

1902.—Aug. 16, 1, cyst on viscera.

6. *Otobothrium crenacolle* Linton.

1901.—Aug. 30, encysted, few.

7. *Tetrarhynchus bisulcatus* Linton.

1901.—Aug. 20, 1 scolex from cyst. Hooks blunt; neck thicker than head.

1902.—July 21, 1, encysted in stomach wall.

TREMATODES.

8. *Distomum vitellosum* Linton.

1902.—July 16, 3. July 28, 2, immature. Aug. 16, few. Aug. 18, 5. Aug. 19, few. In some the testes were lobed, best seen under moderate pressure; in others they were not lobed.

9. *Distomum valde-inflatum* Stossich.

1901.—July 16, globular cysts encapsuled on viscera containing immature distome with double circle of oral spines, about 24 in each circle; length of distome 1.96 mm. July 26, Aug. 2, 6, 23, in globular cysts on each date, associated with No. 4. Dimensions of a distome collected on Aug. 2, in millimeters: Length 2.38; diameter, at anterior end 0.28, at ventral sucker 0.53, near posterior end 0.76, of anterior sucker 0.18, of ventral sucker 0.25, of pharynx 0.2; length of oral spines 0.048. Aug. 30, few, in globular, pediceled cysts on viscera. It is to be noted that this species rests on immature forms and is doubtless identical with some adult form—e. g., *D. dentatum*. In globular cysts on viscera associated with No. 4, frequently with yellowish secretions.

1902.—July 14, few. July 16, numerous. July 19, 21, several. July 26, 29, 31, few on each date. Aug. 16, numerous. Aug. 21, few. Aug. 23, 1. Aug. 26, few.

10. *Distomum aduncum* sp. nov. [Figs. 195–197.]

Small and minutely spinose, ovate, greatest diameter near posterior end, whence it tapers to the anterior end; posterior end broadly rounded. Oral sucker larger than ventral; pharynx a little longer than wide, remote from the oral sucker; œsophagus long; intestinal rami simple, thick-walled, short, extending but a short distance beyond the ventral sucker, which is situated a little behind the middle of the body. Testes two, lateral, a short distance behind the ventral sucker. The very muscular base of the cirrus pouch lies on the right side of the ventral sucker. Four stout hooks were seen at the anterior end of this muscular organ [fig. 197h] which doubtless make a grappling copulatory armature at the base of the cirrus when everted. The cirrus was not seen everted; it appeared to arch from the muscular organ in front of the ventral sucker to terminate in the genital aperture. The genital aperture is a very conspicuous organ in this species. It lies close beside the ventral sucker on the right side, and is specialized into a muscular sucker, slightly larger than the ventral sucker and of similar appearance. Ovary subglobular, adjacent to anterior edge of the left testis and to the genital sucker. The vitellaria are lateral lobed masses lying immediately behind the testes. The folds of the uterus are in the post-acetabular region, both behind and among the testes and vitellaria; ova numerous and small.

Dimensions in millimeters of a specimen in formalin: Length 0.7; greatest breadth 0.35; transverse diameter of oral sucker 0.07; pharynx, length 0.04, breadth 0.03; ventral sucker, length 0.048, breadth 0.041; genital aperture, length 0.061, breadth 0.058; ova, some variation in size, average of best-formed ones 0.020 by 0.010. The largest specimen measured 0.87 mm. in length and 0.38 mm. in breadth. A specimen which was not observed until after it had been killed was arcuate, the ventral surface being concave from side to side and from front to rear.

1901.—Aug. 27, 4.

1902.—Aug. 8, 11, 16, 1 on each date.

A small specimen, apparently identical with the specimens above described, was found on Aug. 15, 1902, in the sand snipe (*Calidris arenaria*).

11. *Distomum* (?) sp. [Fig. 215.]

1901.—Aug. 27, 1, pale red, thick, dorsal surface roughly nodular. In lateral view about five papillae visible on the side, back of middle. When the worm was placed on the slide it lay on its side, in which position it was studied. While it was under the cover glass a white excretion was forced from the posterior end in a slender thread, probably from the excretory vessel. Dimensions, in millimeters, side view: Length 2.8; diameter, anterior 0.42, middle 0.70, posterior 0.42.

12. *Distomum* sp.

A small fusiform distome. Aug. 8, 1902; 1. Dimensions, life, in millimeters: Length 0.7; breadth, at anterior end 0.09, at ventral sucker, near middle and maximum, 0.3, tapering to posterior end; oral sucker, length 0.07, breadth 0.06; pharynx, length 0.06, breadth 0.05; ventral sucker, length 0.12, breadth 0.16; ova 0.029 by 0.018.

This species resembles *D. bothryophoron*.

13. *Distomum* sp. [Figs. 167, 205.]

A small, oval, minutely spinose distome resembling *D. pyriforme* Linton, but with smaller, more numerous and distinctly fusiform ova. Dimensions, life, in millimeters: Length 0.5; breadth 0.3; diameter, of oral sucker 0.09, of pharynx 0.04, of ventral sucker 0.06; ova 0.029 by 0.018.

In fig. 167 the specimen is compressed more than in fig. 205.

14. *Gasterostomum gracilescens* Rudolphi. [Figs. 238, 239.]

1902.—Aug. 8, several, small, oval, very minutely spinose, immature. Dimensions, in millimeters: Length 0.6; diameter, middle and maximum 0.45; diameter of anterior sucker 0.21, of mouth 0.09.

See under *Menidia*, *Tylosurus marinus*, etc.

15. *Monostomum vinal-edwardsii* Linton. [Figs. 220-221.]

1901.—July 9, 1. July 16, 5. July 18, 5. Aug. 3, 1. Aug. 16, 8. Aug. 22, 6. Aug. 27, 8. Aug. 30; 2. The excretory vessels of the neck seen in ventral view appeared to be enlarged into oval sacs at their inner ends and terminated at the surface in minute tubes.

1902.—July 14, 11. July 16, 7. July 22, 5. July 26, 1. July 29, 4. July 30, few. Aug. 8, 5 of usual size, length 1.8 mm., breadth 1.14 mm.; 1 smaller, length 0.42 mm., breadth 0.25 mm. Aug. 11, 11. Aug. 16, 1. Aug. 18, 3. Aug. 20, 1.

***Hypsoblennius hentz*, *Blenny*.**

Date.	Number of fish examined.	Food notes.
1901. Aug. 9.....	1.....	Algæ of various kinds, diatoms, and sand.
1902. July 8.....	1 (small)	Seaweed, broken shells, clusters of egg capsules of small gasteropod.
July 30.....	.....do	Shell and sponge.
July 31.....	.....do	Otoliths of small fish, seaweed, sand.

No entozoa found.

***Paralichthys dentatus*, *Summer Flounder*.**

Date.	Number of fish examined.	Food notes.
1902. August 1.....	1.....	Food not noted.

It is probable that some of the flounders recorded under *P. albiguttus* belong here, as they were not always examined critically. Both species of flounder are common at Beaufort, and, moreover, are very much alike.

ACANTHOCEPHALA.

1. *Echinorhynchus sagittifer* Linton.

Aug. 1; 1, immature, from mesentery.

NEMATODES.

2. *Immature nematodes (Ascaris)*.
Type with diverticula on both intestine and œsophagus; 1.
3. *Immature nematode (Ascaris)*.
Type with elongated basal portion of œsophagus and corrugated post-anal region; 1.

CESTODES.

4. *Rhynchobotrium* sp.
Probably encysted stage of *R. longispine* Linton. Type from oval cysts on viscera, small larva with relatively long hooks; few.

TREMATODES.

5. *Distomum monticellii* Linton.
One.
6. *Distomum bothryophoron* Olsson.
One.
7. *Distomum dentatum* Linton.
One.

PARASITIC COPEPODS.

8. *Lernanthropus* sp.
One, male, same species as that found on gills of *Tylosurus marinus*.

Paralichthys albiguttus, Flounder.

Date.	Number of fish examined.	Food notes.
1901.		
July 17.....	3.....	Fish and mud in alimentary canal.
July 19.....	2.....	Fragments of fish.
July 22.....	2.....	Fish.
August 1.....	1.....	Alimentary canal empty, except for mucus.
August 3.....	1.....	Fish, head of mullet.
August 6.....	1.....	Contents of alimentary tract completely digested, whitish.
August 8.....	1.....	Shrimp.
August 13.....	9.....	Stomachs empty, intestines with whitish chyle.
August 15.....	1.....	Fish and shrimp.
August 16.....	5 (small).....	Shrimp and fish.
August 20.....	3.....	Fish.
August 21.....	1.....	Do.
August 26.....	4.....	Do.
August 27.....	1 (small).....	Shrimp and sea urchin.
1902.		
July 7.....	do.....	Shrimp.
July 8.....	3 (small, 60-75 mm.).....	Shrimp, mud, and sand.
July 14.....	1 (small).....	Shrimp and other small crustacea.
July 15.....	do.....	Shrimp.
July 16.....	do.....	Food completely digested.
July 19.....	do.....	Small crustacea (<i>Caprella</i> , etc.). No entozoa.
July 22.....	do.....	Alimentary canal empty.
Do.....	1 (large).....	Do.
July 23.....	1 (20 cm.).....	Do.
July 30.....	1 (small).....	Do.
July 31.....	do.....	Annelids.
August 11.....	1.....	Food completely digested.
August 14.....	2.....	Do.
August 16.....	2.....	Fish.
August 18.....	1.....	Shrimp.
August 19.....	2.....	Fish, lamellibranchs, shrimp.
August 20.....	2.....	Fish, shell of <i>Urosalpinx</i> .
August 21.....	1 (small).....	Shrimp and amphipods.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.
1902.—July 15, 1, male
2. *Echinorhynchus sagittifer* Linton.
1901.—July 22, 1, mesentery. Aug. 8, 2. Aug. 13, 1, body cavity.
3. *Echinorhynchus* sp.
1902.—Aug. 16, 3 from mesentery, orange color, immature.

NEMATODES.

4. *Immature nematodes (Ascaris)*. [Figs. 26, 26a.]

The type is here recorded which is characterized in this paper as having an anterior diverticulum of the intestine and a slender posterior diverticulum of the œsophagus, of frequent occurrence in this and other hosts, usually in the mesentery.

1901.—July 17, few. July 19, rather numerous. July 22, few, some of which proved to be young ascarids. Aug. 1, few. Aug. 8, not numerous. Aug. 13, 1. Aug. 15, few; cysts in this lot, which occurred under the serous coat of the stomach appeared to be due to small nematodes. Aug. 20, 26, and 28, few on each date.

1902.—July 22, numerous. Aug. 16, 19, few.

5. *Immature nematodes*. [Figs. 31–32.]

These belong to the type which is characterized by having an elongated bulbous basal portion of the œsophagus, with no diverticulum of the œsophagus, but with an anterior cœcal prolongation of the intestine. The post-anal region is transversely corrugated.

1901.—Aug. 13, 20, 21, few.

1902.—Aug. 11, 19, few.

6. *Heterakis* sp.

This appears to be identical with "*Ascaris* (?) sp.," from *Paralichthys dentatus* (Bulletin of U. S. Fish Commission for 1899, p. 481, pl. VII, figs. 207, 208). See also under *Leiostomus*, *Lophopsetta*, and *Scienops*, and introduction for remarks on *Heterakis*.

1901.—July 17, 1, female, but not with mature ova; length 3.78 mm., length of œsophagus 0.74 mm. July 19, 1, female, not in good condition, the cuticle for two-thirds the length being digested off; ova not developing; length 6.5 mm., length of œsophagus 0.74 mm. Aug. 16, 1, female; length 5 mm., length of œsophagus 0.7 mm. In this specimen the œsophagus was constricted in the middle, giving to it an hour-glass shape. The specimen was first supposed to be a male, there being two post-anal papillæ present. In alcohol it measures 4.3 mm. The reproductive aperture was noted 1.8 mm. from the posterior end.

1902.—July 22, 2, females.

7. *Ichthyonema globiceps* Rudolphi. [Fig. 21.]

1902.—Aug. 14, 1, from lower lip. Color reddish, particularly at the posterior end, and due to the perivisceral fluid. Intestine dark brown. The specimen is a female with an enormous number of young, which could be seen as a continuously wriggling mass through the transparent walls of the body and uterus. Dimensions, life, in millimeters: Length 25; diameter, at anterior end 0.10, at nerve ring 0.21, at anterior end of uterus 0.25; distance from anterior end to nerve ring 0.21; from anterior end to anterior end of uterus 0.3; diameter of œsophagus 0.05; diameter of young 0.01. The young are characterized by having half a dozen or less brown granular masses apparently in the intestine.

CESTODES.

8. *Scolex polymorphus* Rudolphi. [Fig. 79.]

1901.—July 19, numerous in cystic ducts of both hosts examined on this date. July 22, Aug. 8, 15, numerous in cystic duct on each date.

1902.—July 7, 8, 15, few. July 16, abundant. July 18, few, large and small. Aug. 20, numerous.

9. *Cestode*.

1901.—July 17, a slender flask-shaped larva from surface of viscera. Similar to No. 8 under *Leiostomus*.

1902.—Aug. 18, cyst with larva, probably *Dibothrium*; length 4.5 mm.; breadth 0.7 mm.

Agrees with No. 7 under *Lophopsetta maculata*.

10. *Rhynchobothrium* sp. [Figs. 95, 96.]

These are larval forms from small oval cysts in stomach wall, most of them, if not all, belonging to the type designated in these notes as small with relatively large hooks and relatively long contractile bulbs. The hooks of this species agree closely with those figured in Larval Cestode Parasites of Fishes, pl. LXII, fig. 7 (Proceedings of the National Museum, vol. XIX).

1901.—July 22, several. Aug. 6, 1. This may be a different species from the foregoing, the edges of the bothria being raised into a prominent border. Dimensions in millimeters: Cyst 2.8 by 1.4; blastocyst 1.4 by 1; length of larva 1.1 [figs. 95, 96]. Aug. 26; same as those found on July 22.

1902.—July 22, few, on viscera.

11. *Otobothrium crenacolle* Linton.
1901.—Aug. 21, very numerous, cysts in stomach wall.
12. *Tetrarhynchus bisulcatus* Linton. [Fig. 115.]
1901.—Aug. 21, cyst containing a mass of hooks only. They doubtless represent the remains of a disintegrated scolex. They agree with this species. There are two bunches of hooks piled together irregularly and inclosed in the same cyst. Dimensions in millimeters: Cyst 0.2 by 0.14; thickness of wall 0.017; length of longest hooks 0.023. Aug. 26, scolex from stomach wall.
1902.—July 15, 2. July 18, 31, Aug. 19, 20, 21, few.
13. *Symbothrium filicolle* Linton.
Usually in elongated blastocysts inclosed in thin cysts on viscera, especially on the liver.
1902.—July 22, 2. Aug. 16, few.

TREMATODES.

14. *Distomum monticellii* Linton.
1902.—July 15, 1, immature, but reproductive organs developed sufficiently to admit of determination. Excretory vessels filled with orange-colored spherical concretions, as in No. 9 under *Centropristes striatus*.
15. *Distomum vitellosum* Linton.
1902.—Aug. 18, 1.
16. *Distomum pudens* Linton.
1902.—July 14, 1; length 1.42 mm.; ova 0.07 by 0.04 mm. Specimen in poor condition.
17. *Distomum* sp.
1902.—Aug. 8, 1; length 1 mm.; ova 0.04 by 0.02 mm., conical.
See No. 10 under *Rachycentron canadus*. [Fig. 171.]
18. *Distomum dentatum* Linton.
1901.—Aug. 3, 1; agrees closely with this species, but oral spines missing. The cirrus was spinose and lay for the most part behind the ventral sucker, and rather to the right instead of the left of that organ. Dimensions in millimeters: Length 2; diameter of oral sucker 0.21, of pharynx 0.15, of ventral sucker 0.23; ova 0.065 and 0.037 in the two principal diameters. Aug. 6, 2, in poor condition; the oral spines were missing; otherwise in agreement with this species. Aug. 13, 1. Aug. 16, 12; 1 specimen without ova resembles the distome from the scup described in Bulletin of the U. S. Fish Commission for 1899, page 296, pl. xxxix, fig. 72. Aug. 20, numerous, 75 counted. In this lot there was a great variety both of form and size. The larger specimens were yellowish-white, thickish and nearly opaque; the smaller specimens more slender than the larger ones, bluish-white and translucent. These two forms appear, however, to be specifically identical. The oral spines, characteristic of the species, are present in the thick opaque specimens, while they appear to be absent from the translucent worms. The latter, indeed, seem to be in poor condition, fragile and degenerate. Cirrus in both kinds armed with minute spines; seen in dorsal view it passes dorsal to the ventral sucker near the right edge of the latter organ in one of the larger opaque individuals, more nearly median in one of the translucent worms. In another larger specimen the cirrus lay to the right of the ventral sucker, the spinous portion being in front of the sucker.
Forms resembling *Distomum* sp., Bulletin of the U. S. Fish Commission for 1899, page 296, figs. 72-74, occur in this lot. Dimensions of 4 specimens in millimeters:

	1.	2.	3.	4.
Length	1.28	2.31	3.01	4.20
Diameter of oral sucker .....	.18	.19	.22	.28
Length of pharynx .....	.12	.18	.16	.22
Breadth of pharynx .....	.07	.14	.16	.25
Diameter of ventral sucker .....	.20	.28	.23	.30
Maximum breadth of body .....	.56	.95	.70	1.12

Ova about same size in all, viz, 0.07 mm. and 0.04 mm. (maximum) in the two principal diameters. 1901.—Aug. 21, numerous, spined and spineless forms as in foregoing lot. The spines were larger in this lot than in former lots, and were imbricated on the anterior part of the body. There were twenty-four spines in each of the circumoral circles. Length of spines on neck 0.02 mm., of longest oral spines 0.06 mm., of spines on cirrus 0.01 mm. Aug. 26, several.

1902.—Aug. 28, 15. Aug. 30, few. In these lots both spined and spineless forms occurred. There was also great diversity of form, long and short oval, pyriform, flask-shape, etc. July 15, few. July 30, 4. Aug. 11, 12. Aug. 14, 1. Aug. 16, 5. Aug. 19, 6. Aug. 20, 10. Small and mature specimens together; some slender and almost spineless.

19. *Distomum valde-inflatum* Stossich.

1901.—Aug. 21, 1, from cyst. This specimen appears to agree with forms which I have been referring to this species. It agrees so well with *D. dentatum*, however, in the same host that there is some reason to regard it as the immature form of that species. Dimensions, in millimeters, of specimen liberated from its cyst: Length 0.62; diameter 0.5; diameter of oral sucker 0.11, of ventral sucker 0.10; pharynx, length 0.05, breadth 0.06; length of oral spines 0.04.

1902.—July 16, several, encysted on the liver and associated with much pigment; spines on body and around mouth, but still very small, the largest of the latter measuring only 0.014 mm. in length, in two rows and shaped like those of No. 18. Another encysted distome is evidently the same as that which I have been recording under the name *D. valde-inflatum*. Dimensions, life, in millimeters, compressed: Length 1.12; diameter, anterior 0.15, at ventral sucker 0.45, near posterior end, maximum, 0.6; diameter of oral sucker 0.12, of pharynx 0.18, of ventral sucker 0.24; length of oral spines 0.04.

20. *Distomum* sp.

1901.—Aug. 28, 1, a filiform specimen, a fragment. Dimensions in millimeters: Length 4; diameter (compressed) 0.16, uniform throughout; ova 0.024 and 0.017 in the two principal diameters, found throughout the greater part of the length of the fragment.

1902.—Aug. 18, 1, a fragment; anterior end of a single specimen. Distance to posterior edge of ventral sucker 1.5; diameter of oral sucker 0.25, of pharynx 0.16, of ventral sucker 0.36.

21. *Gasterostomum gracilescens* Rudolphi. [Fig. 237.]

1902.—July 22, 2, oval, armed with minute spines. Dimensions, life, in millimeters: Length 1.27; breadth 0.6; diameter of anterior sucker 0.2, of mouth 0.08; ova 0.02 by 0.011.

See under *Menidia*, *Tylosurus marinus*, etc.

Lophopsetta maculata, Sand-shoal Flounder.

Date.	Number of fish examined.	Food notes.
1901.		
July 22.....	10.....	The only food-material identified was fish scales. Crabs.
August 8.....	7.....	
1902.		
July 15.....	2 (small).....	Mainly small shrimps.
July 23.....	1.....	Contents of alimentary canal completely digested.
August 1.....	3.....	Fish.
August 11.....	1.....	Shrimp.
August 18.....	1 (small).....	Do.
August 25.....	3 (small).....	Do.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1902.—July 23, 1, male.

NEMATODES.

2. *Ascaris* sp. Immature.

1901.—July 22, from viscera. These belong to the type with a diverticulum from both œsophagus and intestine. Rudiments of the jaws of an *Ascaris* were made out in a specimen from which the embryonic cuticle was sloughing off. Aug. 8, numerous, from viscera. There were numerous clustered cysts on the mesentery which appear to have been due to nematodes, although no worms were found in them.

1902.—July 15, 1. Aug. 1 and 25, few.

3. *Heterakis* sp.

1902.—Aug. 1, 1, a female, and fragment; length 4.2 mm. This is similar to *Ascaris* (?) sp. (Bulletin U. S. Fish Commission for 1899, page 481, pl. vii, figs. 57-61, and probably *Cucullamus* sp., page 441, pl. xvii, figs. 207, 208.)

See introduction for remarks on *Heterakis*.

CESTODES.

4. *Scolex polymorphus* Rudolphi.
1901.—July 22, numerous.
1902.—July 15, very small. A few noted in small piece of intestine which was being examined under the compound microscope. Aug. 1, few, good size; some from cystic duct.
5. *Tetrarhynchus bisulcatus* Linton.
1902.—July 15, 23, Aug. 1, 18, 25, from cysts in stomach wall.
6. *Synbothrium filicolle* Linton.
1901.—July 22, from viscera; type with slender spine-like hooks on proboscides; hooks with minute notches on the end.
7. *Cestode larva*.
1902.—Aug. 18, an elongated specimen; probably a *Dibothrium*. Agrees with No. 9 under *Paralichthys abigitus*.
8. *Cysts*.
1901.—July 22, numerous small cysts were found in the stomach-wall which, however, could not be identified.

TREMATODES.

9. *Distomum appendiculatum* Linton (?).
1902.—July 15, a small appendiculate distome which was accidentally crushed before the examination was complete. The posterior end was filled with ova which concealed the reproductive organs. Dimensions, in millimeters: Diameter of oral sucker 0.09, of ventral sucker 0.21; ova 0.036 by 0.022, many of the ova considerably smaller at one end than the other.
10. *Distomum dentatum* Linton.
1901.—Aug. 8, 2, small specimens without spines and otherwise in poor condition, but apparently belonging to this species.
1902.—July 23, 1, small oval, no spines around mouth, but in other particulars agreeing with this species; ventral sucker but little larger than oral. Also a few very small distomes, length 0.6 mm., were noted, which made their appearance when a comparatively large cyst was broken, liberating the white granular contents. Aug. 11, several.
11. *Distomum* sp.
Same as form shown in fig. 171.
1902.—Aug. 18, 1.

***Etropus crossotus*.**

Date.	Number of fish examined.	Food notes.
1902. August 25.....	1 (small)	Numerous spines of annelids seen in a small piece of the intestine.

CESTODES.

1. *Scolex polymorphus* Rudolphi.
One, small.

***Symphurus plagiusa*, *Acedia*, "Sole."**

Date.	Number of fish examined.	Food notes.
1901. August 26.....	1 (small)	Small univalve (<i>Olivia</i>), setae of annelids, fragments of fish scales, diatoms.
1902. July 7.....	1 (small)	Food not noted.
July 14.....	2 (small)	Minute spines and other fragments of small crustacea; fine, white sand.
July 17.....	1 (small)	Setae of annelids, mud and sand.
July 21.....	do	Annelids, much sand.
July 22.....	do	Small crustacea and lamellibranchs, setae of annelids.
July 25.....	do	Diatoms.
July 29.....	do	Spines of annelids, sand, etc.
July 31.....	2 (small)	Small lamellibranch shell, minute crustacea.
August 4.....	3 (small)	Food completely digested; no entozoa.
August 13.....	5 (small)	Small crustacea, gastropod shell.
August 18.....	3 (small)	Fish, shrimp.
August 19.....	1 (small)	Fragments of vegetable tissue.

ACANTHOCEPHALA.

1. *Echinorhynchus pristis* Rudolphi.

1902.—Aug. 18, fragment of female.

CESTODES.

2. *Scolex polymorphus* Rudolphi.

1902.—July 7, few. July 14, several, with two costæ. July 21, 1, small. July 25, several, comparatively large, with two costæ and red pigment, like young *Acanthobothrium*, but without hooks. July 31, many. Aug. 18, several, elongated, with two costæ and red pigment spots. Aug. 19, few, small.

A larval cestode found on July 17, and looking like an immature *Rhynchobothrium*, is here recorded.

3. *Tetrarhynchus bisulcatus* Linton.

1901.—Aug. 26; scolices from cysts in stomach wall.

1902.—July 25, few. Aug. 13, 6. Aug. 18, 6.

TREMATODES.

4. *Distomum* sp. [Figs. 161-164, 212. See also fig. 209.]

Here are recorded several finds of small distomes which probably belong to the same species. They agree in having the oral sucker equaling or slightly surpassing the ventral sucker in diameter.

(a) 1902.—July 7, 1. Dimensions, in millimeters: Length 0.96; breadth 0.51; oral sucker, length 0.09, breadth 0.10; ventral sucker, length 0.09, breadth 0.10. July 21; 2. Dimensions, in millimeters: Length 0.7; breadth 0.3; oral sucker 0.11, ventral sucker 0.10. Ova present; one of the specimens with conspicuous branching vitellaria laterally placed. Aug. 18; 1. Dimensions, in millimeters: Length 0.62; oral sucker 0.10, pharynx 0.04, ventral sucker 0.08. [Fig. 212.]

(b) Larger than (a). [Fig. 164.] 1902.—July 17, 1. Dimensions, in millimeters: Length 1.35; breadth, anterior 0.18, at ventral sucker 0.51, maximum, a little way behind ventral sucker, 0.57; diameter of oral sucker 0.16, of ventral sucker 0.15; ova 0.022 by 0.014. July 31; 2. Aug. 19; 1.

(c) [Figs. 161-163.] 1902.—July 14, 2. These small distomes were found with the aid of the compound microscope in a small piece of the intestine which was under examination for the character of the food. They were not seen until the morning of the 15th, after they had lain overnight in sea water, to which a few drops of formalin had been added. Each was peculiar in being somewhat diagonally truncate at the posterior end. This truncated condition caused such an unusual appearance that they were first, when but slightly magnified, thought to be parts of the same worm accidentally cut in two. Body covered with minute, flat spines, 0.005 mm. in length arranged in transverse rows. Dimensions, in millimeters, of one specimen: Length 0.79; maximum breadth near posterior end 0.35; diameter of oral sucker 0.14, of ventral sucker 0.11; pharynx, length 0.06, breadth 0.045. Corresponding dimensions of the other: Length 0.78; maximum breadth 0.53; diameter of oral sucker 0.15, of ventral sucker 0.12; pharynx, length 0.07, breadth 0.045; ova 0.022 by 0.015.

The stained and mounted specimens show some details of structure which were not evident in the living worms. The testes are two, lateral and posterior; ovary between the right testis and ventral sucker; vitellaria lateral, as far forward as the posterior edge of the ventral sucker in one, nearly to the middle of the ventral sucker in the other. The cirrus appears to pass to the right side of the ventral sucker to the genital aperture in front of that organ. It is relatively large and armed with spines.

No. 8 under *Hexanematichthys* may be an immature example of this distome. [Fig. 209.]

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[Most of the references to the names of parasites which are given in this index are to the list of entozoa with citations to literature (pp. 328-329), and to the lists of parasites and their hosts (pp. 330-336), where detailed references will be found.]

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EXPLANATION OF PLATES.

PLATE I.

Echinorhynchus sagittifer Linton. Adult. From cobia (*Rachycentron canadus*).

- FIGS. 1-4.—Male, mounted in balsam. Actual length 34 mm.; *s h*, proboscis sheath; *c g*, cement glands; *e d*, ejaculatory duct; *b*, bursa.
 FIG. 5.—Portion of one of the transverse groups of spines with which the anterior part of the body is armed; $\times 210$.

PLATE II.

Echinorhynchus sagittifer Linton. Adult. From cobia (*Rachycentron canadus*).

- FIG. 6.—Anterior end of female with proboscis, neck, and anterior end of body everted. Sketched from life; $\times 20$.
 FIG. 7.—Proboscis of same. $\times 80$.

Echinorhynchus pristis Rudolphi. From spot (*Leiostomus xanthurus*).

- FIG. 8.—Anterior end of male. Sketched from life; $\times 50$. Letters same as in Figs. 1 to 4.
 FIG. 9.—Posterior end of same. Life; $\times 50$. Letters as before.
 FIG. 10.—View of proboscis at about middle of its length. $\times 315$.
 FIG. 11.—Hooks from circle near base of proboscis. $\times 315$.

PLATE III.

Echinorhynchus pristis Rudolphi. From spot (*Leiostomus xanthurus*).

- FIG. 12.—Hooks near base of proboscis. $\times 315$.
 FIG. 13.—Spines from anterior end of body, a little posterior to those figured next. $\times 315$.
 FIG. 14.—Spines from anterior end of body just back of neck. $\times 315$.

Echinorhynchus sp. From gray trout (*Cynoscion regalis*).

- FIG. 15.—Fragment of female, posterior end, lateral view. Life; $\times 50$.
 FIG. 16.—Dorsal view of same. Life; $\times 50$.

Filaria galeata, sp. nov. From bonnet-head shark (*Sphyrna tiburo*).

- FIG. 17.—Posterior end of male, lateral view; *s p*, spicule. Life; $\times 315$.

PLATE IV.

Filaria galeata, sp. nov. From bonnet-head shark (*Sphyrna tiburo*).

- FIG. 18.—Anterior end; *n r*, nerve ring. $\times 315$.
 FIG. 19.—Same, opposite side. $\times 315$.
 FIG. 20.—Posterior end of male from stomach of small dolphin (*Coryphæna equisetis*), evidently introduced with food. $\times 170$.

Ichthyonema globiceps Rudolphi. From lip of flounder (*Paralichthys albiguttus*).

- FIG. 21.—Anterior end. Actual diameter of head, 0.1 mm. *u*, Uterus with young.

Ascaris brevicapitata Linton, immature. From stomach of dusky shark (*Carcharhinus obscurus*).

- FIG. 22.—Anterior end. Actual diameter of jaws, 0.15 mm.
 FIG. 23.—Posterior end of same. Actual distance from anal aperture to tip, 0.37 mm.

Heterakis sp. From drum (*Sciænops ocellatus*).

- FIG. 24.—Posterior end, ventral view. Life; $\times 210$.

PLATE V.

Heterakis sp. From drum (*Sciaenops ocellatus*).FIG. 25. Anterior end. Life; \times 315.Immature nematodes (*Ascaris*).FIG. 26.—Anterior end of specimen from flounder (*Paralichthys albigitus*), showing junction of œsophagus and intestine. Life; \times 540.FIG. 26a.—Posterior end of same, lateral view. Life; \times 315.FIG. 27.—Specimen from toad-fish (*Opsanus tau*). Life; \times 315.FIG. 28.—Another specimen from same host. Actual diameter at base of œsophagus, 0.4 mm. Probably the young of *Ascaris habena*.FIG. 29.—Anterior end of specimen from gar (*Tylosurus raphidoma*). Life; \times 50. Same type as that shown in Figs. 27 and 28.FIG. 30.—Posterior end of same. Life; \times 210.

PLATE VI.

Immature nematodes (*Ascaris*).FIG. 31.—Specimen from flounder (*Paralichthys albigitus*). In this type the bulbous base of the œsophagus is elongated and without diverticulum.FIG. 32.—Posterior end of another specimen of same type. Life; \times 315.FIG. 33.—Two specimens and three calcareous bodies in cyst from black sea bass (*Centropristis striatus*). Life; \times 50.FIG. 34.—Cyst containing young nematodes from body cavity of blue-fish (*Pomatomus saltatrix*). Actual length of cyst, 1.44 mm.FIG. 35.—Small nematode from spot (*Leiostomus xanthurus*); posterior end of male. \times 525.

PLATE VII.

Minute nematodes from spot (*Leiostomus xanthurus*).

FIG. 36.—Female, collected August 18, 1902. Actual length, 1 mm.

FIG. 37.—Enlarged view of head of same.

FIG. 38.—Male from same lot. Actual length, 1 mm.

FIG. 39.—Enlarged view of same.

FIG. 40.—Female, same host, collected July 8, 1902. Actual length, 1.2 mm.

FIG. 41.—Anterior end of same, lateral view. \times 525.FIG. 42.—Posterior end of male. \times 300.

FIG. 43.—Male, different species from foregoing, lateral view of head. Actual length of specimen, about 3 mm.

FIG. 44.—Copulatory spines of same. \times 170. (See Fig. 51.)

FIG. 45.—Another species from same host, collected July 25, 1902; female. Actual length, 2 mm.

PLATE VIII.

Minute nematodes.

FIG. 46.—Female, enlarged view of head of specimen from *Leiostomus xanthurus* sketched in Fig. 45. Actual diameter behind spines, 0.03 mm.

FIG. 47.—Outline of posterior end, lateral view of same. Diameter at anal aperture, 0.04 mm.

FIG. 48.—Outline of posterior end of male from *Leiostomus xanthurus*. The head of this specimen was like that sketched in Fig. 46; from lot collected July 29, 1902. \times 300.FIG. 49.—Small nematode agreeing with specimen from spot, Fig. 46, but from silver jenny (*Eucinostomus gula*). Diameter at *x*, 0.1 mm.

FIG. 50.—Lateral view of posterior end of male from same lot. Diameter at anal aperture, 0.76 mm.

FIG. 51.—Outline of specimen from *Leiostomus xanthurus* shown in Figs. 43 and 44. \times 46.

- FIG. 52.—Copulatory spines from male from *Leiostomus xanthurus* collected August 4, 1902. Actual length of spicules, chord of arc, 0.12 mm. In this lot were specimens with same type of head shown in Figs. 40 and 41. The worm from which this sketch was made was larger than the others, and the tail was elongated as in Fig. 47.
- FIG. 53.—Anterior end of male from *Leiostomus xanthurus* collected July 17, 1902. Actual length of worm about 3 mm. Optical section, $\times 300$.
- FIG. 54.—Posterior end of same. Optical section, $\times 300$.

Sporozoa.

- FIG. 55.—Piece of intestine of pompano (*Trachinotus carolinus*) with cysts containing sporozoa. Life; about natural size.
- FIG. 56.—Sporozoa from drum (*Sciaenops ocellatus*). Actual breadth, 0.01 mm. Life.

Parasitic copepod.

- FIG. 57.—Specimen from gills of mullet (*Mugil cephalus*), lateral view. Life; actual length, 6 mm. *c l*, Modified appendages which form a clasping organ to slip over a gill filament of the host.
- FIG. 58.—Sketch of specimen which had lain in water a few days.

PLATE IX.

Rhinebothrium sp., from toad-fish (*Opsanus tau*).

- FIG. 59.—Cluster of cysts from surface of liver. Life; enlarged about 2 diameters.
- FIG. 60.—Small cluster detached from No. 59 and flattened under cover glass. $\times 6$. *d*, Small cyst containing a distome (*D. valde-inflatum*). The remaining cysts contain blastocysts, which in turn contained larvæ.
- FIG. 61.—A single cyst and blastocyst. The latter is seen to be much elongated, with an enlargement at the distal end. Life; $\times 6$.
- FIG. 62.—An enormously elongated blastocyst removed from its cyst, flattened, and showing a larva through the transparent wall. Life; $\times 50$.
- FIG. 63.—Cyst with contained blastocyst, slightly enlarged.
- FIG. 64.—Blastocyst removed from No. 63 and compressed. The posterior ends of two of the bothria of the larva are seen protruding from the anterior end.
- FIG. 65.—Larva (scolex) removed from blastocyst.
- FIG. 66.—Small dumb-bell-shaped blastocyst in its cyst; optical section of specimen mounted in balsam; $\times 70$.

PLATE X.

Rhinebothrium sp., from *Opsanus tau*.

- FIG. 67.—Cyst containing blastocyst. Life; $\times 20$. *b*, Blood vessels distributed over wall of cyst; *ex p*, excretory pore.
- FIG. 68.—Front view of head of embryo; partly diagrammatic. Life; $\times 50$.
- FIG. 69.—Section, nearly longitudinal through cyst, blastocyst, and larva. $\times 110$.
- FIG. 70.—Anterior end of blastocyst, showing orifice and pit into which the scolex is retracted. Sketched from another section of same series from which No. 69 was made. $\times 110$.
- FIG. 71.—Diagrammatic sketch, showing plan of arrangement of loculi.

PLATE XI.

Rhinebothrium sp. from *Opsanus tau*.

- FIG. 72.—Transverse section of cyst with blastocyst and larva. $\times 110$.
- FIG. 73.—Portion of walls of cyst and blastocyst. $\times 525$.
- FIG. 74.—Transverse section of wall of blastocyst. $\times 525$.
- FIG. 75.—Part of viscera of pipe-fish (*Siphostoma fuscum*) with cysts containing larvæ of *Rhinebothrium* sp., same species as the one found in the toad-fish. Life; $\times 3$. *g b*, gall-bladder; *i*, intestine; *l*, liver; *s*, stomach.

Scolex polymorphus Rudolphi.

- FIG. 76.—From alimentary canal of toad-fish (*Opsanus tau*). Life; $\times 80$. This suggests the genus *Calliobothrium*.
- FIG. 77.—Same, more highly magnified. $\times 315$.
- FIG. 78.—Specimen showing different states of contraction. *a*, View of entire specimen; *b* and *c*, posterior end of same. The numerals 1, 2, and 3 refer to identical parts in the several sketches. Actual length of *a* about 0.38 mm.
- FIG. 79.—One larger, many small specimens from flounder (*Paralichthys albiguttus*) in place on intestine. Life; $\times 72$.

PLATE XII.

- FIG. 80.—*Calliobothrium* (?) sp. from the sharp-nosed shark (*Scoliodon terra-novae*). Young scolex with rudiments of hooks. Life; $\times 135$.
- FIG. 81.—Blastocyst from body cavity of blue-fish (*Pomatomus saltatrix*). Anterior end, life. The length of the entire specimen was 12 mm and its breadth 2 mm. 1. Anterior end, tip everted. 2. Same, retracted. 3. Anterior tip showing characteristic knobbed bristles.

Larval cestodes.

- FIG. 82. *Echeneibothrium* sp. Immature scolex from sting ray (*Dasyatis say*). Life; actual length of head about 0.5 mm; length of specimen 5 mm.
- FIG. 83.—Specimen from croaker (*Micropogon undulatus*). Life; actual length 5 mm.
- FIG. 83a.—Another from same host, different date. Length 7 mm.
- FIG. 84.—Cyst with blastocyst from body cavity of toad-fish (*Opsanus tau*). Actual length of cyst 1.35 mm.

Tenia sp. from body cavity of rock-fish (*Fundulus majalis*).

- FIG. 85.—Scolex with rostellum retracted. Life; actual diameter through suckers 0.9 mm.
- FIG. 86.—Hook of same. Actual length 0.22 mm.

Rhynchobothrium sp. encysted.

- FIG. 87.—Cyst with blastocyst and larva from mesentery of croaker (*Micropogon undulatus*). Life; $\times 50$.
- FIG. 88.—Same, larva everted, but still attached to the blastocyst. $\times 50$.

PLATE XIII.

Rhynchobothrium sp.

- FIG. 89.—Same as No. 88, larva compressed and proboscides everted. $\times 80$. This type was found many times during the season and in several species of fish.
- FIG. 90.—Portion of proboscis of same. $\times 315$.
- FIG. 91.—Portion of proboscis near apex. Specimen collected from same host (*Micropogon undulatus*), but on different date. $\times 315$.
- FIG. 92.—Proboscis of same as No. 91 toward base. $\times 315$.
- FIG. 93.—Cyst of probably same species from silver perch (*Bairdiella chrysura*), compressed and showing blastocyst and contained larva. $\times 20$.
- FIG. 94.—Portion of proboscis of specimen from black sea bass (*Centropristis striatus*). $\times 540$.
- FIG. 95.—Cyst with blastocyst and larva from stomach wall of flounder (*Paralichthys albiguttus*). Actual length, 2.48 mm.
- FIG. 96.—Larva removed from cyst, Fig. 95. Actual length, 1.1 mm.
- FIG. 97.—Cyst with blastocyst and larva from silver perch (*Bairdiella chrysura*). $\times 20$. Type with neck and proboscides rather long and hooks short and close together.
- FIG. 98.—Proboscides of specimen of *Rhynchobothrium*, probably same species as Fig. 97, from mesentery of hog-fish (*Orthopristis chrysopterus*). $\times 540$.
- FIG. 99.—Cyst with blastocyst and larva from big-eyed herring (*Elops saurus*). Actual length of cyst, 5 mm.
- FIG. 100.—Portion of proboscis of same. $\times 540$.

PLATE XIV.

FIG. 101.—*Rhynchobothrium tenuispine* Linton, from cyst on viscera of croaker (*Micropogon undulatus*). Sketch from life; $\times 80$.

Otobothrium sp. from muscles of gar (*Tylosurus raphidoma*).

FIG. 102.—Cyst containing blastocyst. Life; actual length, 8 mm.

FIG. 103.—Blastocyst removed from cyst.

FIGS. 104-107.—Larvæ removed from blastocysts. Actual length at rest, 4 to 5 mm. The true relation of the bothria to the notch at the base of the neck is shown in Fig. 107.

FIG. 108.—Posterior end of bothrium showing the two auxiliary acetabula.

FIG. 109.—One of the auxiliary acetabula greatly enlarged.

Otobothrium crenacolle Linton.

FIG. 110.—Cyst with two blastocysts. From hog-fish (*Orthopristis chrysopterus*). Actual diameter of cyst, 2 mm.

FIG. 111.—Cyst from stomach wall of cero (*Scomberomorus regalis*). Actual length of blastocyst, 1 mm. Thick-walled, amber-colored cyst containing blastocyst with larva.

PLATE XV.

Otobothrium crenacolle Linton.

FIG. 112.—Cyst with blastocyst from submucous coat of stomach of gray trout (*Cynoscion nebulosus*). Life; actual length 1.2 mm.

FIG. 113.—Larva from same. Life; $\times 135$.

FIG. 114.—Portion of proboscis of same. Life; $\times 540$.

FIG. 115.—Cyst formed around two masses of hooks, which are probably those of *Tetrarhynchus bisulcatus* Linton, from flounder (*Paralichthys albiguttus*). Actual length of cyst 0.2 mm.

Synbothrium sp., from surface of viscera of gray trout (*Cynoscion regalis*).

FIG. 116.—Proboscis, near base. $\times 315$.

FIG. 117.—Same, near middle. $\times 315$.

FIG. 118.—Same, near apex. $\times 315$.

PLATE XVI.

Dibothrium tortum, sp. nov., from sand pike (*Synodus fætens*).

FIG. 119.—Sketch from life enlarged. Most specimens are relatively more slender than the one represented in the sketch. Anterior egg clusters nearly transverse, succeeding ones becoming diagonal.

FIG. 120.—Fragment from posterior end with egg clusters but little inclined to the axes of the body.

FIG. 121.—Anterior end of living specimen. Actual diameter at *x*, 0.45 mm.

FIG. 122.—Anterior end of alcoholic specimen. Actual diameter at anterior end 0.36 mm.

FIG. 123.—Sketch of body with three sets of genitalia. Specimen mounted in balsam. Actual breadth 1.7 mm.

FIG. 124.—Sketch of two sets of genitalia. Life, with a few details added from stained specimens. $\times 300$.

PLATE XVII.

FIG. 125.—Three views of head of *Anthobothrium pulvinatum* Linton, from the sting ray (*Dasyatis say*). Sketched from living specimen showing some of the characteristic contraction stages; $\times 4$.

FIG. 126.—Free segment of *Anthobothrium laciniatum* Linton, from the sharp-nosed shark (*Scoliodon terra-nove*). $\times 50$. *s g*, Shell gland.

FIG. 127.—*Onchobothrium uncinatum* Diesing, from the sting ray (*Dasyatis say*). Sketch from life. Actual length 48 mm.

FIG. 128.—*Acanthobothrium paulum* Linton, from the butter-fly ray (*Pteroplatea machura*). Free-hand sketch of single bothrium. Life.

- FIG. 129.—*Rhynchobothrium* sp., from sharp-nosed shark (*Scoliodon terre-novae*). Lateral view of head. Life.
- FIG. 129a.—Front view of same. Life.
- FIG. 130.—Same species, head and neck, alcoholic specimen. Actual diameter of bothrium 1.12 mm.
- FIGS. 130a and 130c.—Different views of proboscis; larger hooks on medial side. Actual diameter of proboscis, excluding hooks, 0.15 mm.

PLATE XVIII.

- FIG. 131.—*Rhynchobothrium* sp., from sting ray (*Dasyatis say*). One view of proboscis, sketched from specimen in balsam. Actual diameter, excluding hooks, about 0.09 mm.

Rhynchobothrium plicatum, sp. nov., from bonnet-head shark (*Sphyrna tiburo*).

- FIG. 132.—Head, neck, and anterior segments. Life; $\times 50$.
- FIG. 133.—Outline of median and post-median segments. $\times 50$.
- FIG. 134.—Median segment. Life; $\times 80$.
- FIG. 135.—Segment toward posterior end. Life; $\times 50$. This specimen was stained and mounted in glycerin when a conspicuous rudiment of the uterus became visible along the median line which was not seen in the living specimen and is not included in the sketch.
- FIG. 136.—Posterior segment. Life. Actual length about 3 mm.
- FIG. 137.—Ova. $\times 210$. No bristles were seen on these ova, although in another segment of the same worm ova were seen with bristles as shown in the next figure.
- FIG. 138.—Ovum armed with bristles. $\times 540$.

PLATE XIX.

Rhynchobothrium plicatum, sp. nov., from bonnet-head shark (*Sphyrna tiburo*).

- FIG. 139.—Immature specimen. Life; actual length 4.8 mm. *r*, Patch of red pigment.
- FIG. 140.—Another with scolex partly retracted. Life; actual length 4.5 mm.

Otobothrium insigne, sp. nov., from dusky shark (*Carcharhinus obscurus*).

- FIG. 141.—Sketch of specimen mounted in balsam. Actual diameter of head 1.2 mm. *b*, Contractile bulbs; *s*, proboscis sheath.
- FIG. 142.—Same, more enlarged.
- FIG. 143.—View of another specimen, also in balsam. Actual diameter of head 1.35 mm.
- FIGS. 144 and 145.—Views of opposite sides of the same proboscis at about the same level. Actual diameter, excluding hooks, 0.06 mm.

Rhynchobothrium hispidum Linton, from the sting ray (*Dasyatis say*).

- FIG. 146.—Strobile. Life; $\times 50$. *r*, Red pigment.

PLATE XX.

Microcotyle sp., from gill of blue-fish (*Pomatomus saltatrix*):

- FIG. 147.—Sketch of damaged specimen. Life; actual length 1.85 mm.
- FIG. 148.—Cirrus of same, diagrammatic. $\times 525$.
- FIG. 149.—One of the small suckers from posterior end of another specimen. Actual length 0.042 mm. There were about 50 pairs of these suckers.
- FIG. 150.—Hooks from cirrus; actual length about 0.015 mm.

Dactylocotyle sp., from menhaden (*Brevoortia tyrannus*).

- FIG. 151.—Sketch of damaged specimen. $\times 66$. *a*, Posterior lobe with hook, more highly magnified.

Distomum appendiculatum Rudolphi.

- FIG. 152.—Dorsal view. From hog-fish (*Orthopristis chrysopterus*). Life; actual length 1.26 mm.
- FIG. 153.—Same from sea robin (*Prionotus tribulus*); ventral view. Actual length 1.12 mm.

PLATE XXI.

Distomum monticellii Linton.

- FIG. 154.—Specimen from cobia (*Rachycentron canadus*). Actual length 5 mm. Sketched from life, but some details added from stained and mounted specimens.
 FIG. 155.—Ovary and vitellaria of distome identified as this species, from the sand pike (*Synodus fetens*). Actual length of distome 4.2 mm.

Distomum tornatum Rudolphi. From the whiting (*Menticirrhus americanus*).

- FIG. 156.—Sketch made from specimen in glycerin. Actual length 10 mm.
 FIG. 157.—Ova of distome from sea robin (*Prionotus scitulus*). Actual length 0.03 mm.

PLATE XXII.

- FIG. 158.—*Distomum monticellii* Linton. Immature specimen from black sea bass (*Centropristes striatus*). Actual length 1.17 mm.
 FIG. 159.—*Distomum globiporum* Rudolphi (?), from rock-fish (*Fundulus majalis*). Actual length 2.25 mm.
 FIG. 160.—*Distomum appendiculatum* Rudolphi, from menhaden (*Brevoortia tyrannus*). Specimen in poor condition when found. Actual length 0.63 mm.
 FIGS. 161 and 162.—Distomes from sole (*Symphurus plagiosa*). These specimens were obliquely and conspicuously truncate when first seen, becoming somewhat less so under pressure. Actual length 0.78 and 0.79 mm., respectively; specimens in weak formalin when sketched.
 FIG. 163.—Spines from anterior regions of same. Actual length of spine 0.005 mm.
 FIG. 164.—Probably same species, from same host, but collected on different date. Sketch made from stained specimen mounted in balsam; actual length 1.05 mm.
 FIG. 165.—*Distomum* sp., from puffer (*Spheroides maculatus*). Actual length 1.27 mm.
 FIG. 166.—Immature distome in intestine of anchovy (*Stolephorus brownii*). Actual length 0.25 mm.
 FIG. 167.—*Distomum* sp., from toad-fish (*Opsanus tau*). Actual length 0.65 mm.; life. Like many finds of distomes, in poor condition when seen; from same lot as figure 205. Dorsal view. Ova in this species distinctly fusiform.

PLATE XXIII.

Distomes from silver perch (*Bairdiella chrysura*).

- FIG. 168.—Ventral view. Life; actual length 0.8 mm.
 FIG. 169.—Another specimen from same lot. Life; $\times 135$.
 FIG. 170.—Another specimen from same lot. Life; $\times 80$.
 FIGURES 168, 169, and 170 were sketched from living specimens collected on the same day. See text for notes. Incidentally these figures show some of the difficulties which are encountered in identifying distomes.

Distomum sp., from cobia (*Rachycentron canadus*).

- FIG. 171.—Lateral view. Life; actual length 1 mm.
 FIG. 172.—Ova of same. Actual length 0.04 mm.

Distomum globiporum Rudolphi. From spot (*Leiostomus xanthurus*):

- FIG. 173.—Immature specimen, dorsal view. Actual length 0.9 mm. (See Figs. 198, 199.)

Distomum bothryophoron Olsson. From hog-fish (*Orthopristis chrysopterus*).

- FIG. 174.—Ventral view. Life; actual length 1 mm.
 FIG. 175.—Dorsal view of same. Life.

PLATE XXIV.

Distomum vitellosum Linton.

FIG. 176.—From the drum (*Sciænops ocellatus*). Ventral view. $\times 80$.

FIG. 177.—Lateral view of specimen from same host but collected on different date. Life. When subjected to pressure, the specimen assumed proportions like those in the following figure.

FIG. 178.—From silver perch (*Bairdiella chrysura*). Life; $\times 50$. The characteristic lobes around the ventral sucker are shown in Figs. 177 and 178.

Distomum sp., from pin-fish (*Lagodon rhomboides*).

FIG. 179.—Ventral view. Life; actual length 2 mm.

PLATE XXV.

Distomum corpulentum, sp. nov., from pin-fish (*Lagodon rhomboides*).

FIG. 180.—Ventral view. Life; $\times 50$.

FIG. 181.—Ventral view of specimen compressed. Life; $\times 50$. In this specimen the ova were escaping from the posterior edge, which appeared to be somewhat macerated.

FIG. 182.—Dorsal view of a larger specimen. Life; $\times 50$. *i d*, Diverticula of intestine.

PLATE XXVI.

Distomum inconstans, sp. nov., from porgee (*Chatodipterus faber*).

FIG. 183.—Four individuals showing some shapes assumed. Life; actual length 1 to 2 mm.

FIG. 184.—Another specimen from same lot, compressed, ventral view. $\times 50$.

FIG. 185.—Dorsal view of another specimen, same lot. Life; $\times 80$.

FIG. 186.—Ventral view of another specimen. Life; $\times 80$.

FIG. 187.—Spines from under side of neck. $\times 540$.

PLATE XXVII.

Distomum vibex Linton. From puffer (*Spheroides maculatus*).

FIG. 188.—Ventral view. Life; actual length 6 mm. *i d*, Diverticula of intestine.

Distomum imparispine, sp. nov., from cobia (*Rachycentron canadus*).

FIG. 189.—Ventral view. Life; actual length 9 mm.

FIG. 190.—Ventral view of head. $\times 108$.

FIG. 191.—Dorsal view of same. $\times 108$.

FIG. 192.—Sagittate spines from under side of neck. $\times 315$.

FIG. 193.—Spines on margin of neck. $\times 315$.

FIG. 194.—Spines on body just back of ventral sucker. $\times 315$.

Distomum aduncum, sp. nov., from toad-fish (*Opsanus tau*).

FIG. 195.—Sketch of specimen lying in formalin. $\times 80$.

FIG. 196.—Ventral view. Sketch from life, but a few details added from specimen stained and mounted in balsam. Actual length 0.87 mm. *a c*, Ventral sucker; *g a*, genital acetabulum.

FIG. 197.—Cirrus, cirrus-pouch, etc. Sketched from living specimen. $\times 315$. *h*, Hooks, three in number, on cirrus; *v s*, ventral sucker.

PLATE XXVIII.

Distomum globiporum Rudolphi. From spot (*Leiostomus xanthurus*).

FIG. 198.—Ventral view. Actual length 2.3 mm.

FIG. 199.—Spines from neck. $\times 540$. (See Fig. 173.)

Distomum pectinatum, sp. nov., from silver perch (*Bairdiella chrysura*).

FIG. 200.—Dorsal view. Life; $\times 80$.

FIG. 201.—Ventral view of another specimen. Life; $\times 80$.

PLATE XXIX.

Distomum pectinatum. From silver perch (*Bairdiella chrysura*).

FIG. 202.—Dorsal view of head. Life; $\times 315$.

FIG. 203.—Ventral view of head and part of neck. Life; $\times 315$.

Distomum sp., from the pompano (*Trachinotus carolinus*).

FIG. 204.—Longitudinal section. Actual length 5.5 mm.

Distomum sp.

FIG. 205.—From the toad-fish (*Opsanus tau*), same lot as 167. Ventral view. Ova peculiar in being distinctly fusiform.

FIG. 206.—Imperfect specimen from amber jack (*Seriola lalandi*). The specimen simulates a segmented worm. Actual length 5 mm.

FIG. 207.—Longitudinal and nearly horizontal section of same.

FIG. 208.—Immature specimen from rabbit-fish (*Chilomycterus schoepfi*). Actual length 1.06 mm.

FIG. 209.—Immature specimen from sea cat-fish (*Galeichthys milberti*). Actual length 1.8 mm.

PLATE XXX.

Distomum sp.

FIG. 210.—From butter-fly ray (*Pteroplatea machura*). Specimen removed from capsule. Actual length 1.35 mm.

FIG. 211.—Immature specimen from barracuda (*Sphyræna borealis*). Actual length 0.24 mm.

FIG. 212.—Immature specimen from sole (*Symphurus plagiosa*). Actual length 0.62 mm.

FIG. 213.—Immature specimen from intestine of common dolphin (*Coryphæna hippurus*). Ventral view. Actual length 2.5 mm.

FIG. 214.—Immature specimen, apparently same species as shown in figure 213. Actual length 2.4 mm.

FIG. 215.—*Distomum* (?) sp., from toad-fish (*Opsanus tau*). Lateral view. Actual length 2.8 mm. *ex c*, Material extruded from excretory vessel.

Monostomum sp., from hog-fish (*Orthopristis chrysopterus*).

FIG. 216.—Sketch of specimen not in good condition; peculiar in that the species bears a superficial resemblance to *Gasterostomum arcuatum*. Actual length 2.25 mm.

PLATE XXXI.

Monostomum sp.

FIG. 217.—From rock-fish (*Fundulus majalis*). Actual length 1.12 mm., life.

FIG. 218.—From hog-fish (*Orthopristis chrysopterus*). Actual length 1.4 mm. (See Fig. 216.)

FIG. 219.—Ova and yellow bodies from uterus of same. Actual length of ovum 0.025 mm.

FIG. 220.—*Monostomum vinal-edwardsii* Linton, immature, from toad-fish (*Opsanus tau*). Life; actual length 1 mm. *ex p*, Excretory pore.

FIG. 221.—Excretory pore of same. Life; $\times 525$.

FIG. 222.—*Monostomum* sp., from hog-fish (*Orthopristis chrysopterus*). Life; actual length 0.86 mm.

FIG. 223.—From same host. Ventral view, life. Actual length 0.9 mm.

FIG. 224.—Cirrus, genital acetabulum, etc., dorsal view. Life; $\times 315$.

FIG. 225.—Ova. $\times 540$.

FIG. 226.—From pompano (*Trachinotus carolinus*). Actual length 0.87 mm.

PLATE XXXII.

Monostomum., from pompano (*Trachinotus carolinus*).

FIGS. 227 and 228.—Two specimens from same lot as 226. Life; actual length of larger 1.5 mm.

FIG. 229.—Ova. Actual breadth 0.017 mm.

Gasterostomum gracilescens Rudolphi, from crevalle (*Caranx hippos*). (See Figs. 236-239.)

FIG. 230.—Ventral view, life; actual length 1.17 mm.

FIG. 231.—Spines from body. $\times 540$.

FIG. 232.—Pharynx, etc. $\times 315$.

Gasterostomum baculum, sp. nov., from Spanish mackerel (*Scomberomorus maculatus*).

FIG. 233.—Dorsal view, life; actual length 2 mm.

FIG. 234.—Ventral view of another specimen, life.

Gasterostomum arcuatum Linton, from cero (*Scomberomorus regalis*).

FIG. 235.—Lateral view, life; actual length 4.2 mm.

PLATE XXXIII.

Gasterostomum gracilescens Rudolphi.

FIG. 236.—From silverside (*Menidia menidia*), encysted. (See Figs. 230-232.) Cyst filled with material that resembled small fat globules and an immature *Gasterostomum*. Actual length of cyst 1.5 mm. *i*, Rudiment of intestine.

FIG. 237.—From flounder (*Paralichthys albiguttus*); dorsal view. Life; actual length 1.28 mm.

FIG. 238.—From toad-fish (*Opsanus tau*). Immature specimen. Life; actual length 0.9 mm.

FIG. 239.—Another specimen from same lot.

Gasterostomum gorgon, sp. nov., from amber jack (*Seriola lalandi*).

FIG. 240.—Sketch of specimen killed in formalin, tentacles extended. Actual length 1.65 mm., diameter of neck 0.21 mm.

FIG. 241.—Another specimen from same lot, with tentacles retracted, the most usual condition in the preserved specimens. Sketch made from specimen in balsam, somewhat diagrammatic. Actual length 0.6 mm.

FIG. 242.—Ova of same. Length of ovum 0.022 mm.

PLATE XXXIV.

Aspidogaster ringens, sp. nov., from croaker (*Micropogon undulatus*).

FIG. 243.—Lateral view. Actual length about 2 mm. There is great variation in this species with different states of contraction; for example, the head may be retracted, or head and tail both retracted until the body proper is shorter than the ventral sucker.

FIG. 244.—Dorsal view of a specimen the actual length of which was 1.5 mm., life.

FIG. 245.—Dorsal view of living specimen, compressed. $\times 50$.

FIG. 246.—Ventral view of alcoholic specimen. Actual length 1.8 mm.

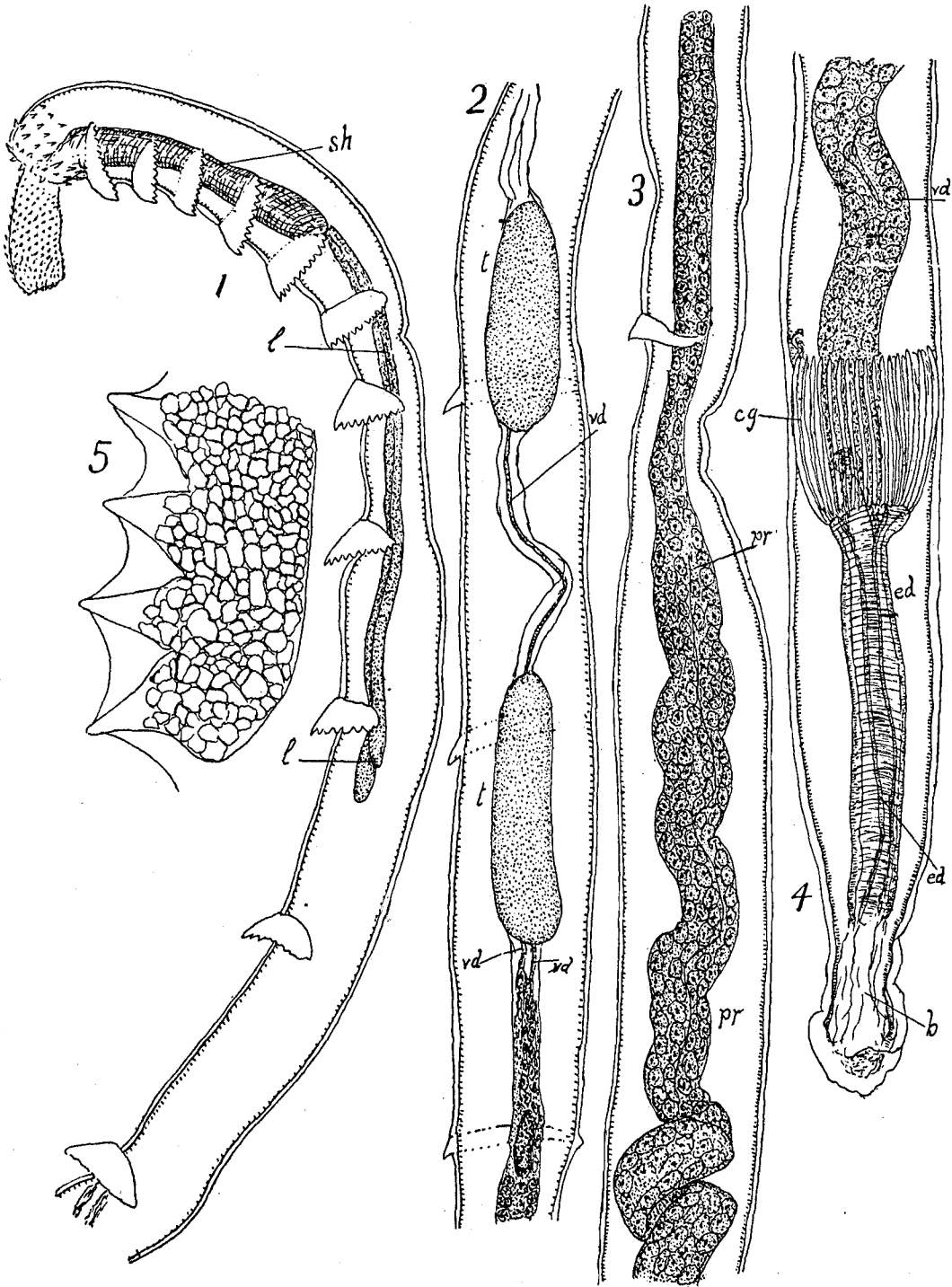
FIG. 247.—Ventral view of head and neck of living specimen, ventral sucker omitted. $\times 50$.

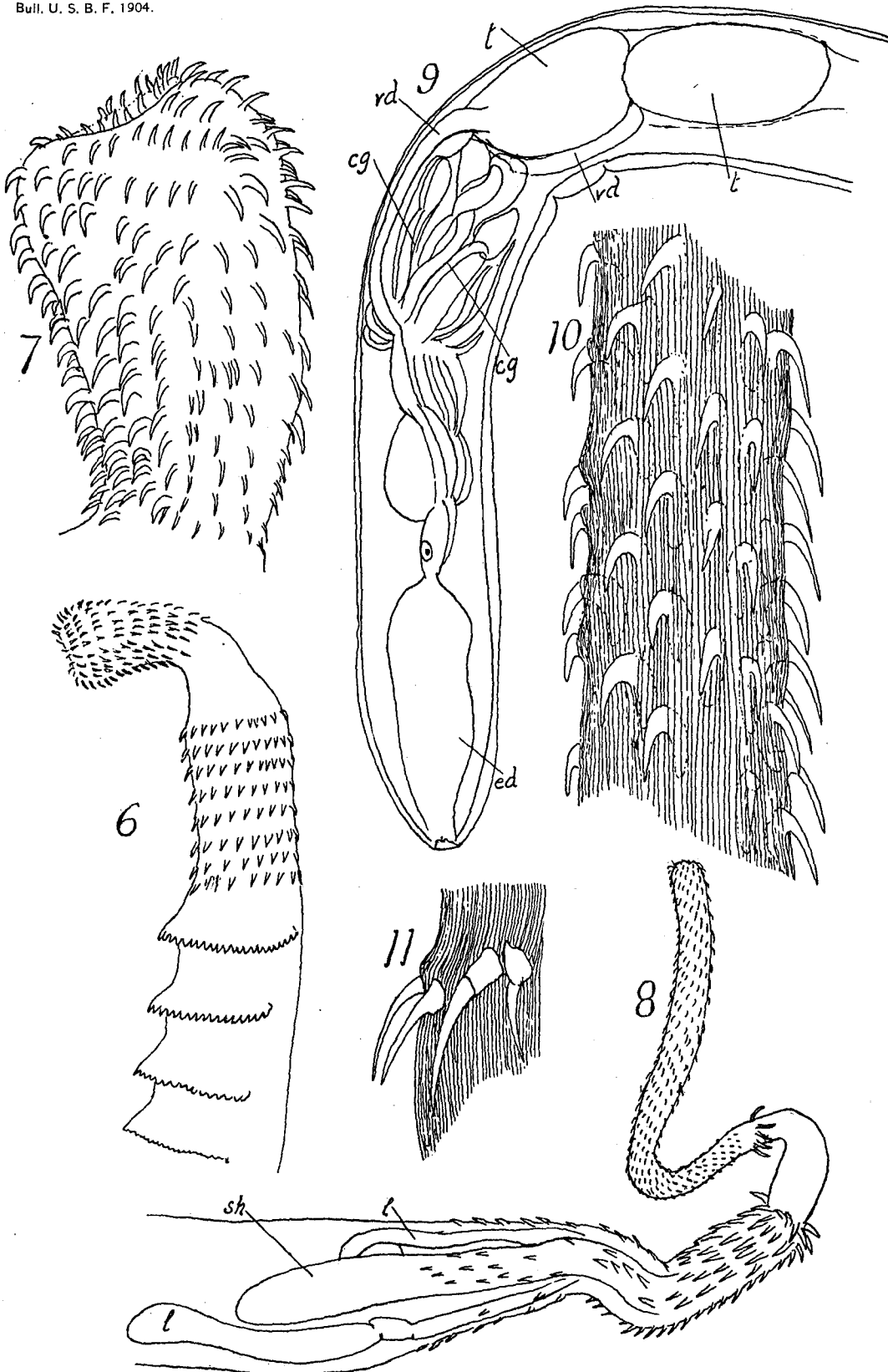
FIG. 248.—Lateral view of posterior end of body of living specimen. $\times 50$. The position of the testis and ovary is variable. In some cases they lie near the middle of the length of the body.

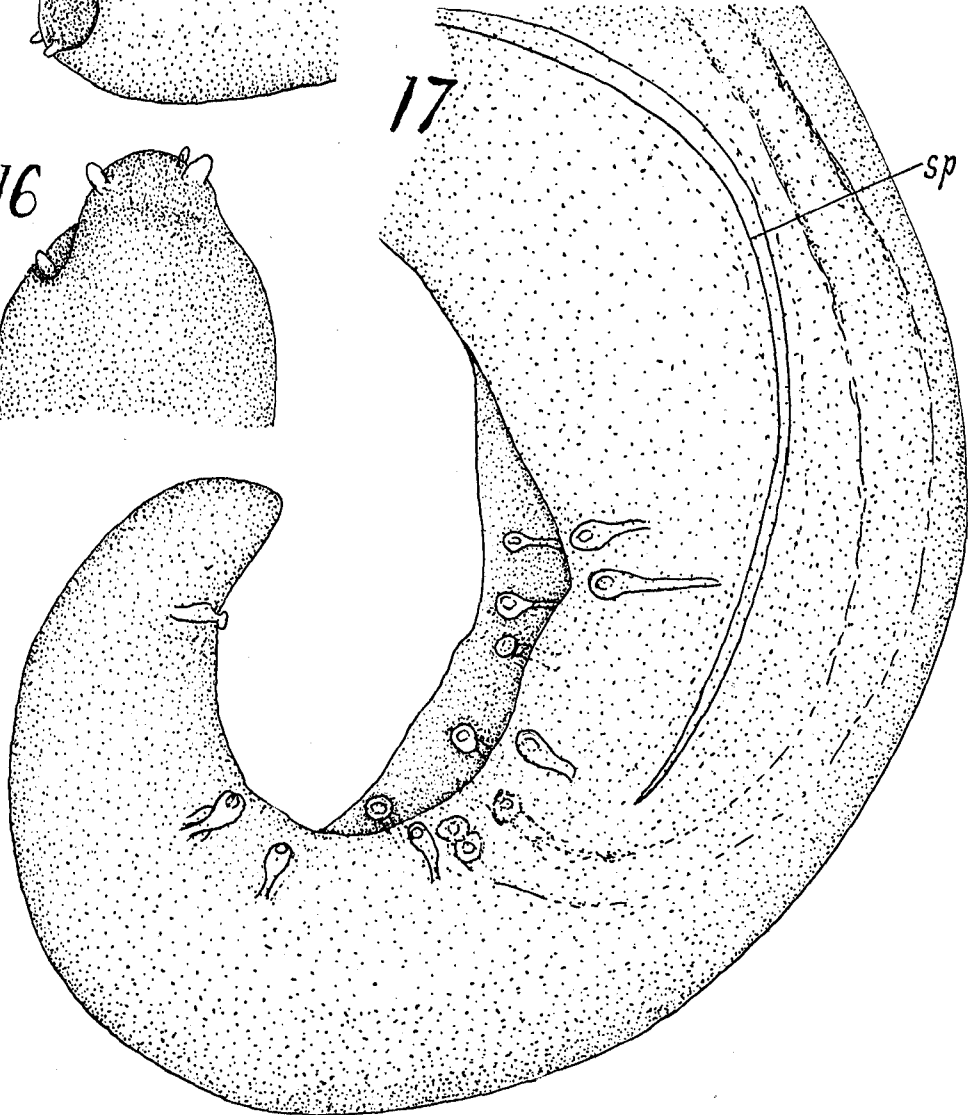
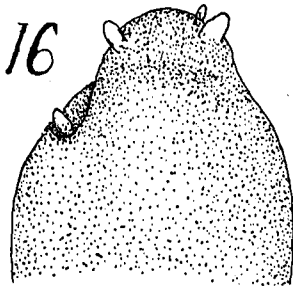
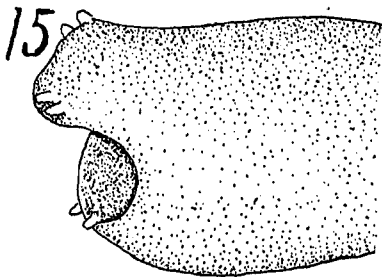
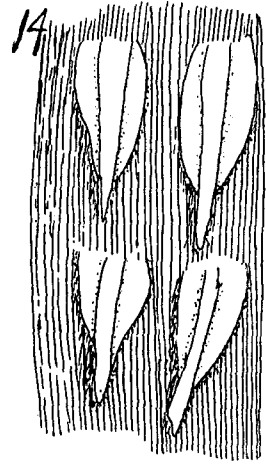
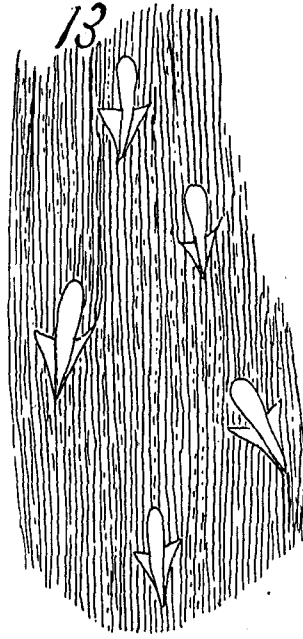
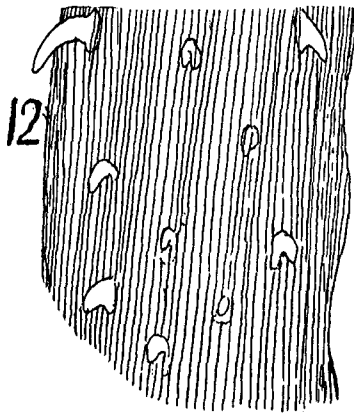
FIG. 249.—Front view of head, alcoholic specimen.

EXPLANATION OF LETTERS ON PLATES.

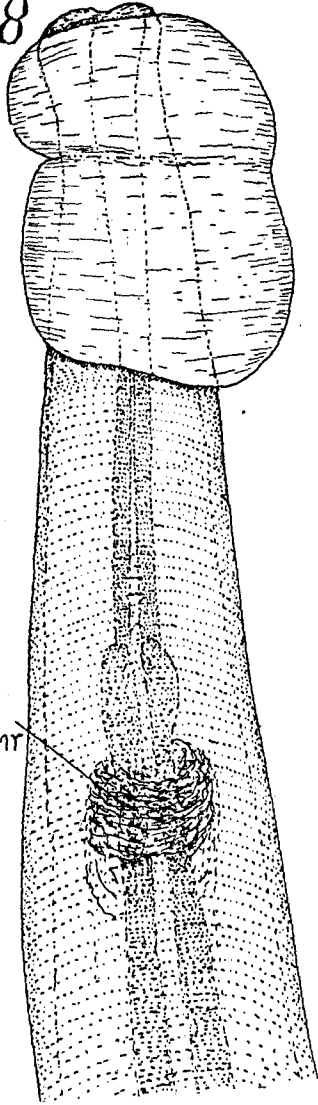
<i>bl</i>	blastocyst.	<i>od</i>	diverticulum of œsophagus.
<i>c</i>	cirrus.	<i>œ</i>	œsophagus.
<i>cp</i>	cirrus pouch.	<i>ph</i>	pharynx.
<i>cy</i>	cyst.	<i>pr</i>	prostate gland.
<i>ex</i>	excretory vessel.	<i>sr</i>	seminal receptacle.
<i>g</i>	genital aperture.	<i>sv</i>	seminal vesicle.
<i>i</i>	intestine.	<i>t</i>	testis.
<i>id</i>	diverticulum of intestine.	<i>u</i>	uterus.
<i>l</i>	lemniscus.	<i>v</i>	vagina.
<i>la</i>	larva.	<i>vd</i>	vas deferens.
<i>m</i>	mouth.	<i>vg</i>	vitelline gland.
<i>o</i>	ovary.	<i>vd</i>	vitelline duct.



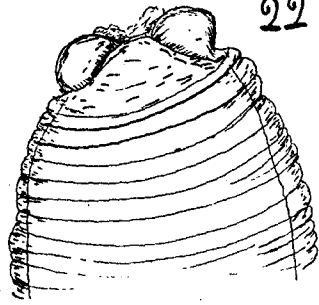




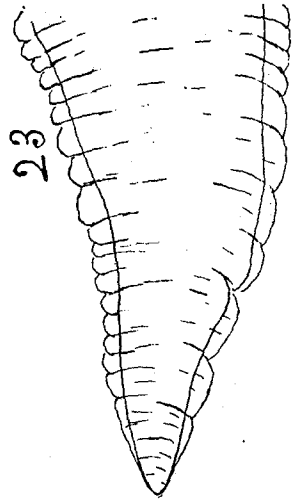
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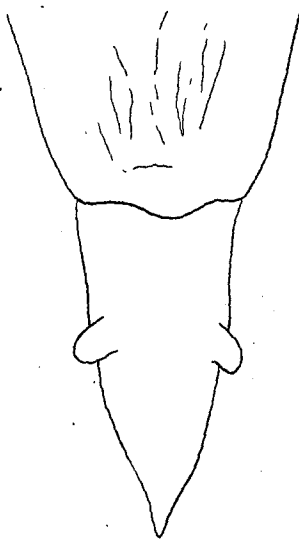
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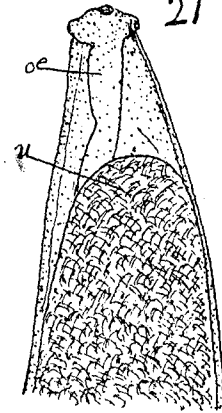
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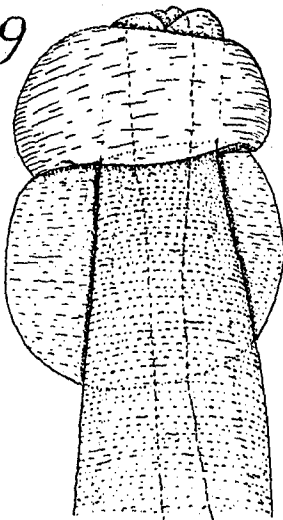
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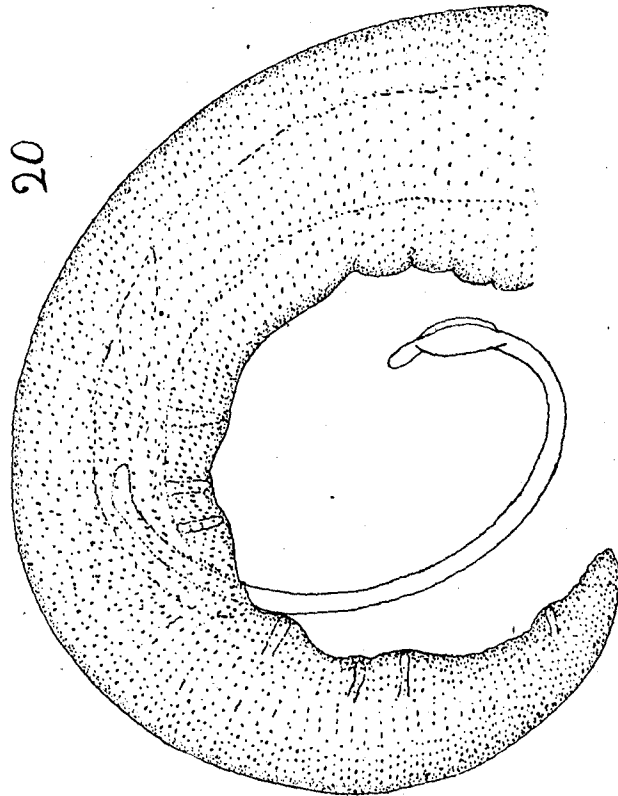
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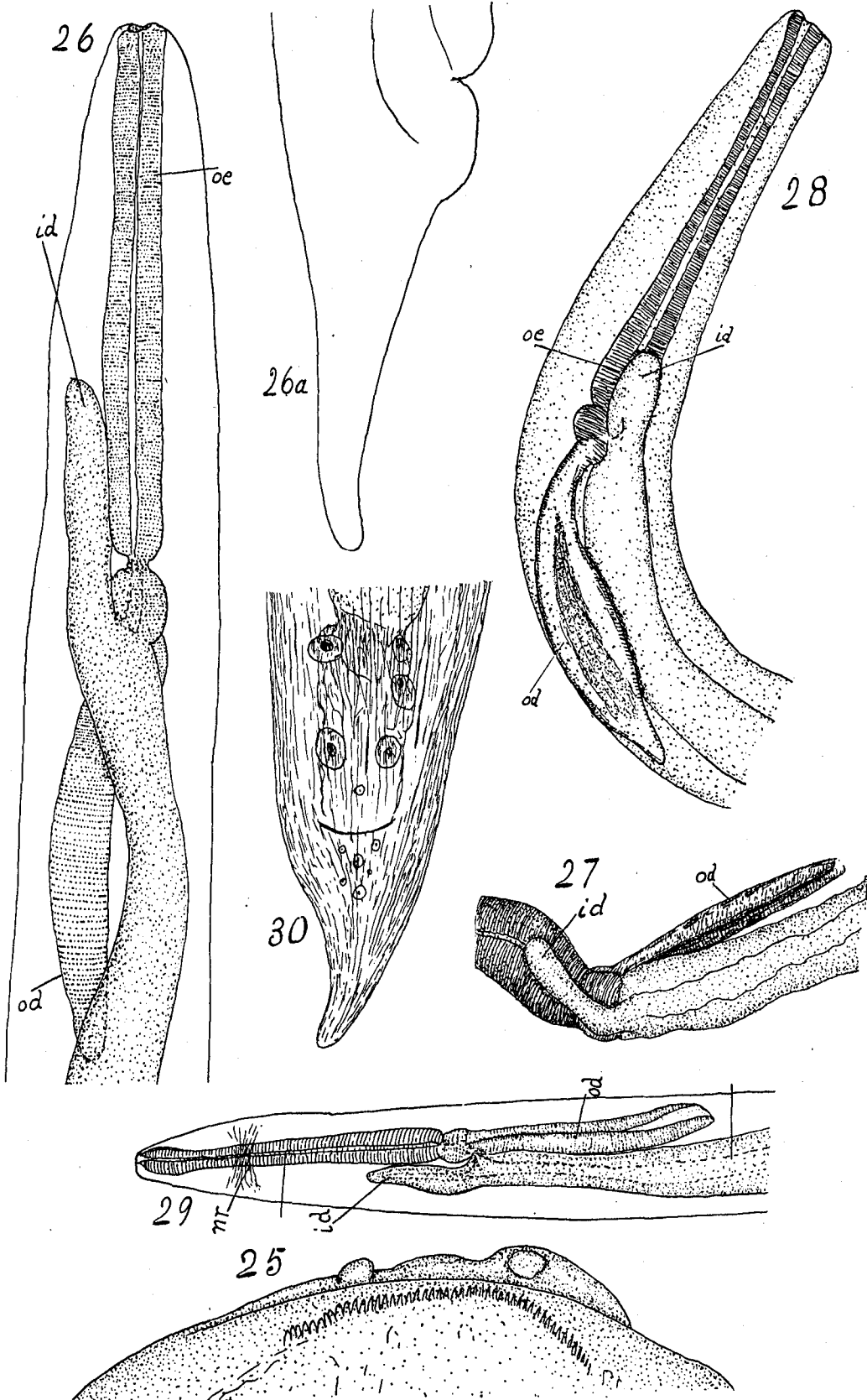


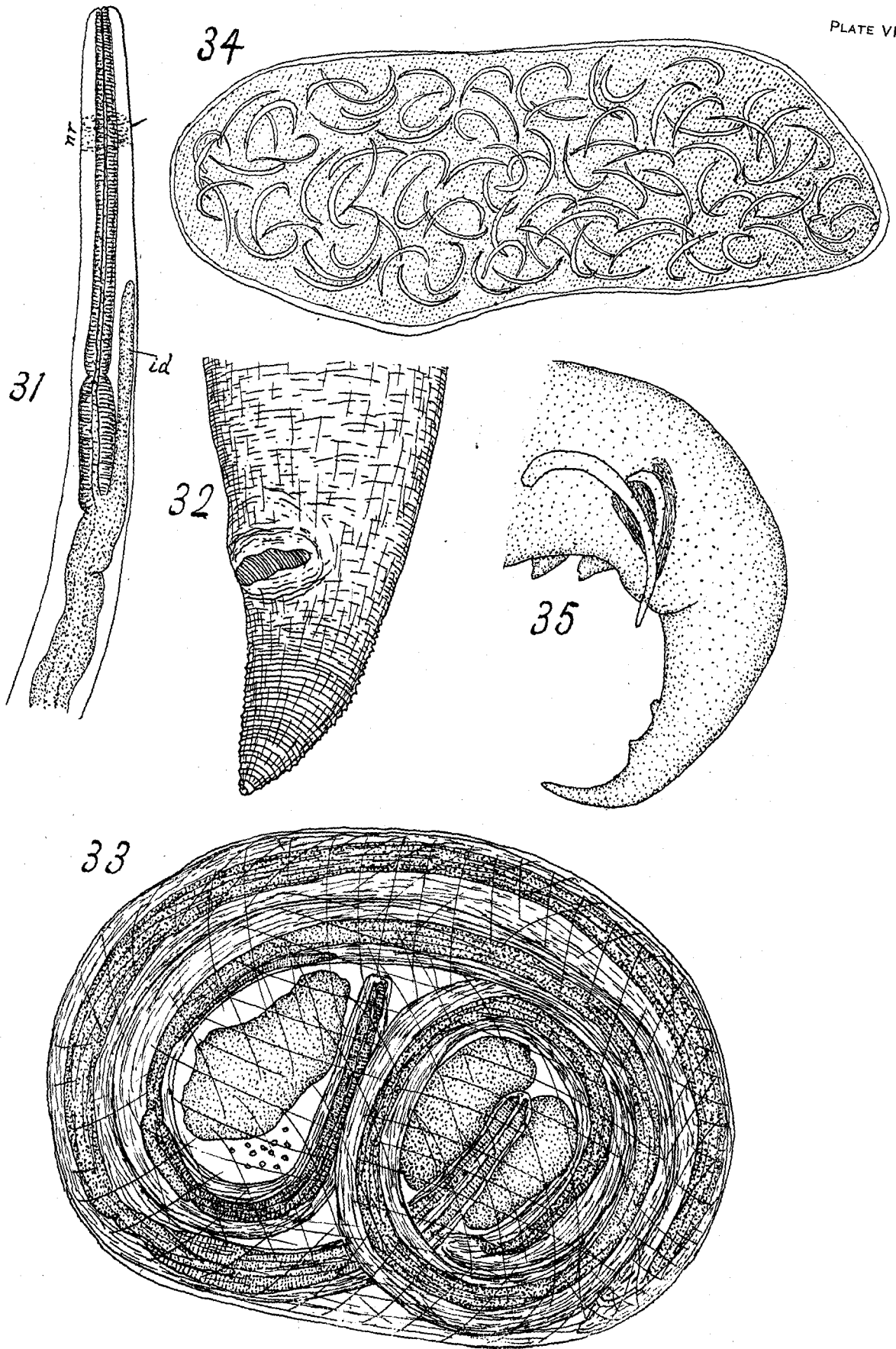
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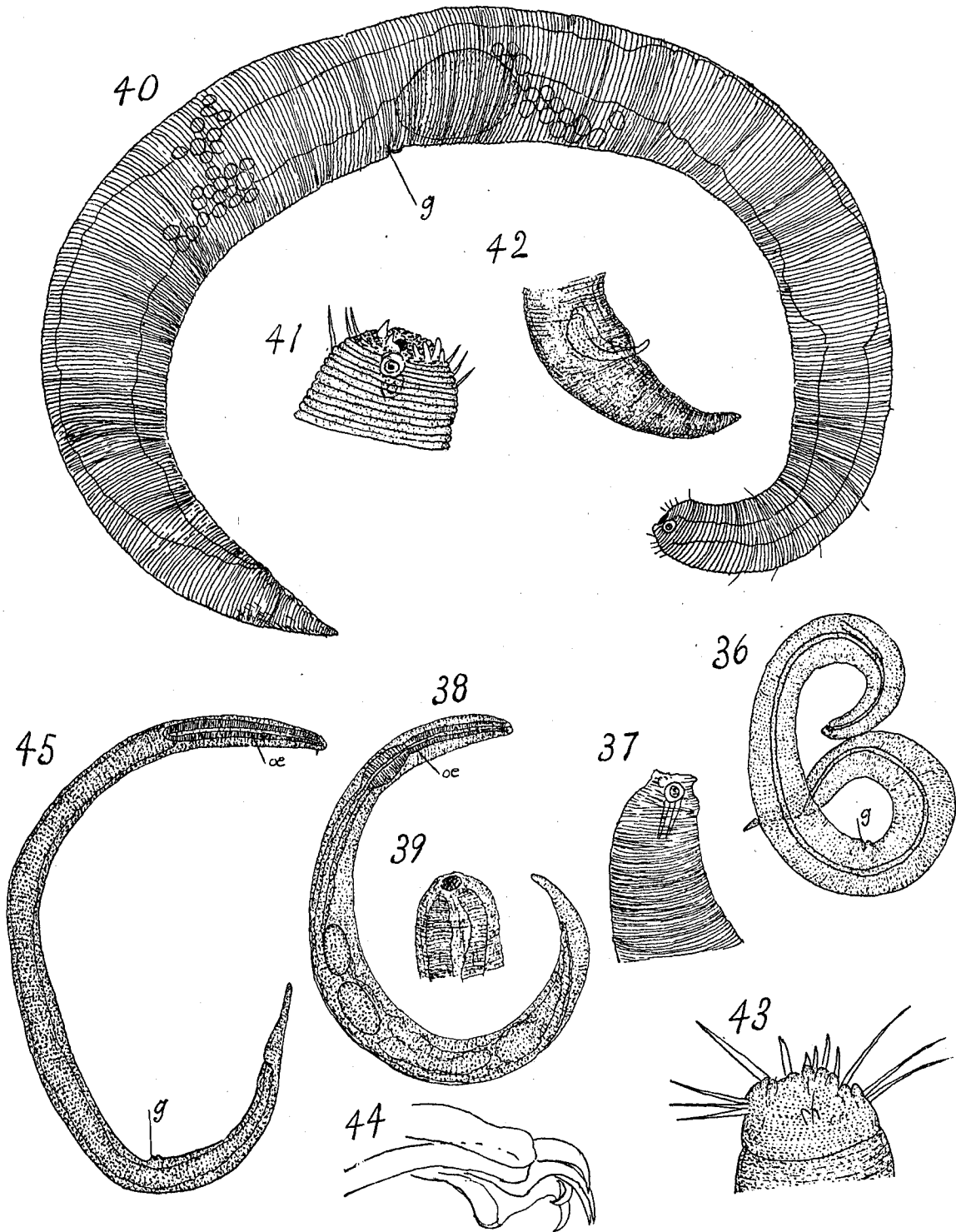


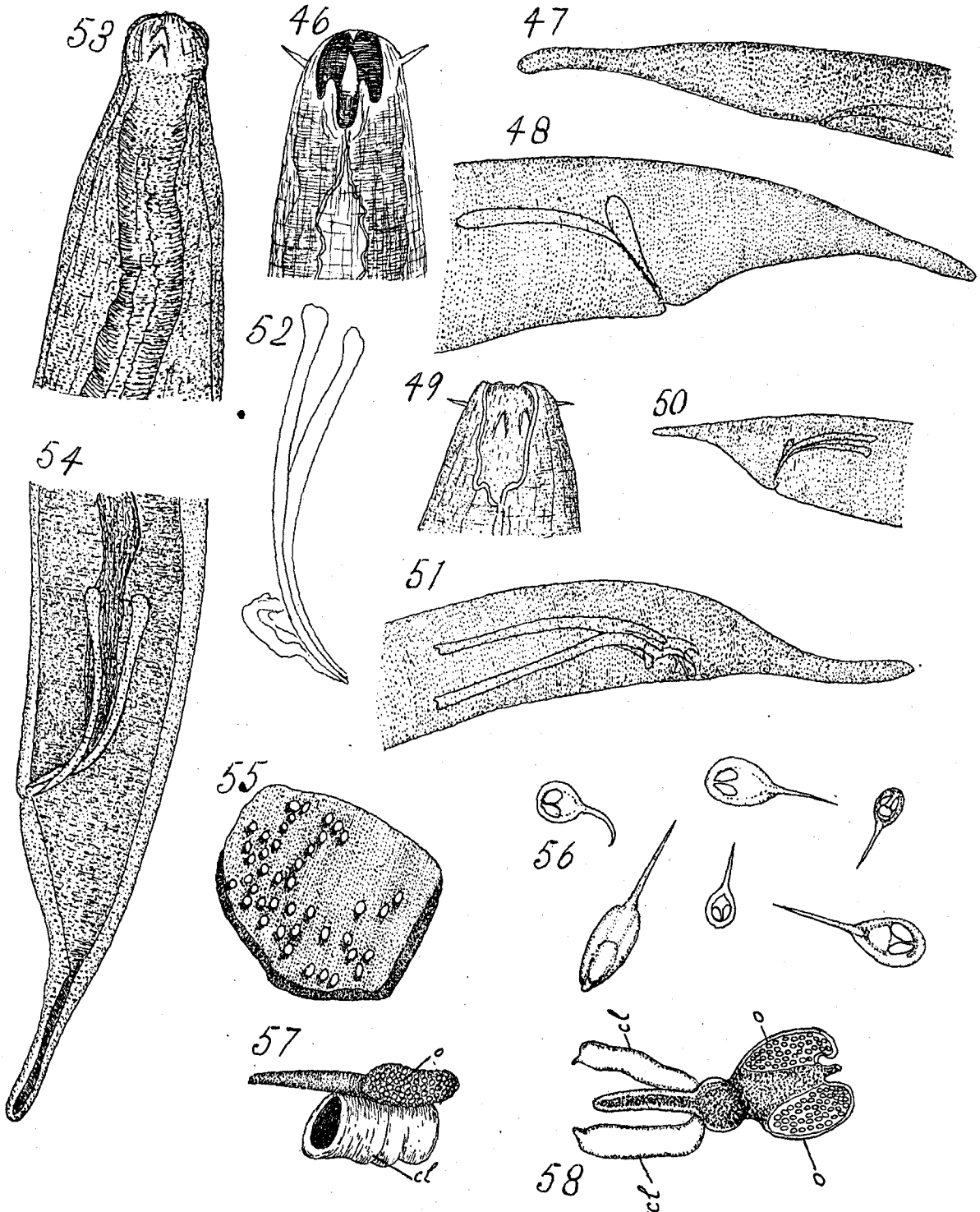
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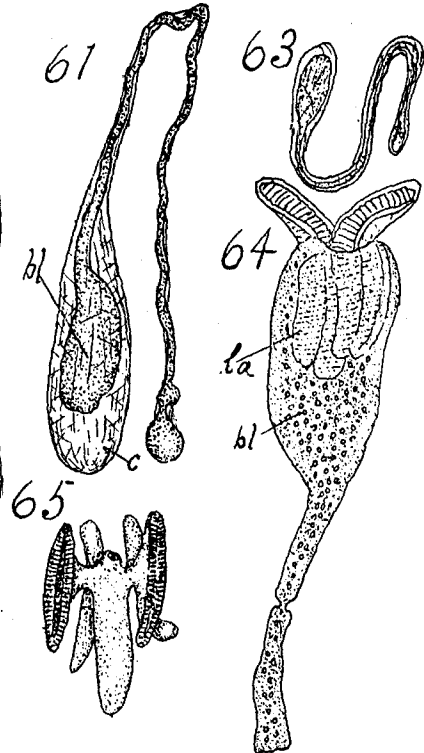
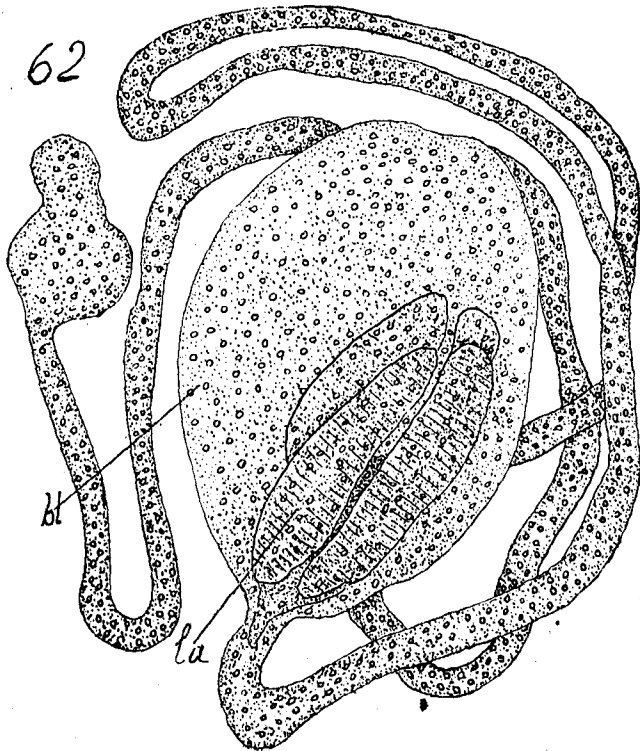
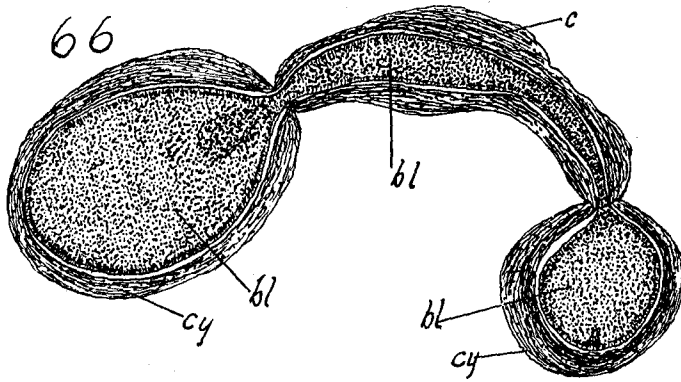
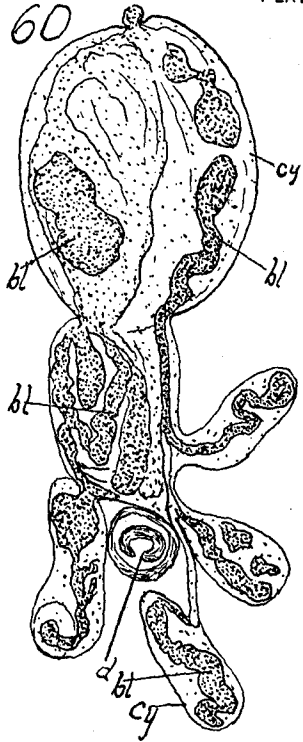
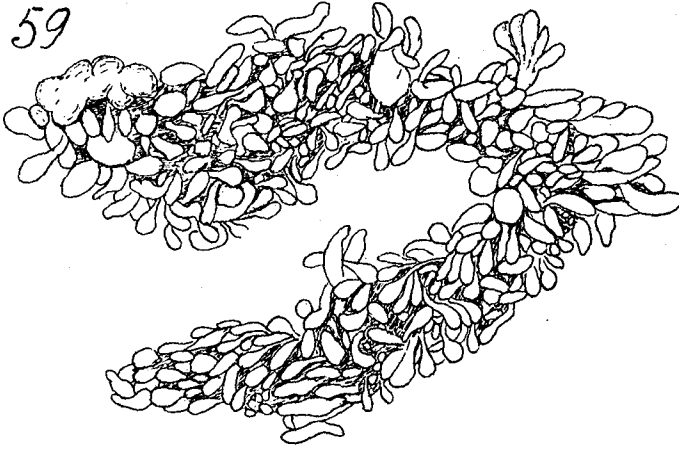


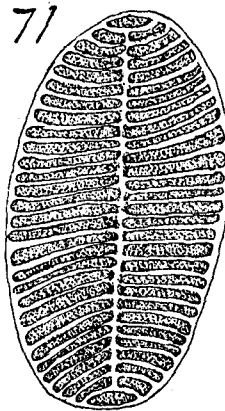
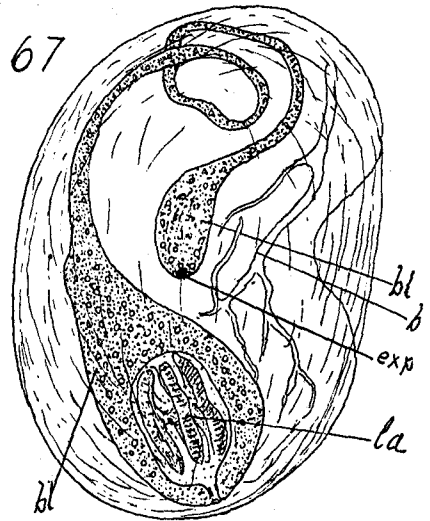
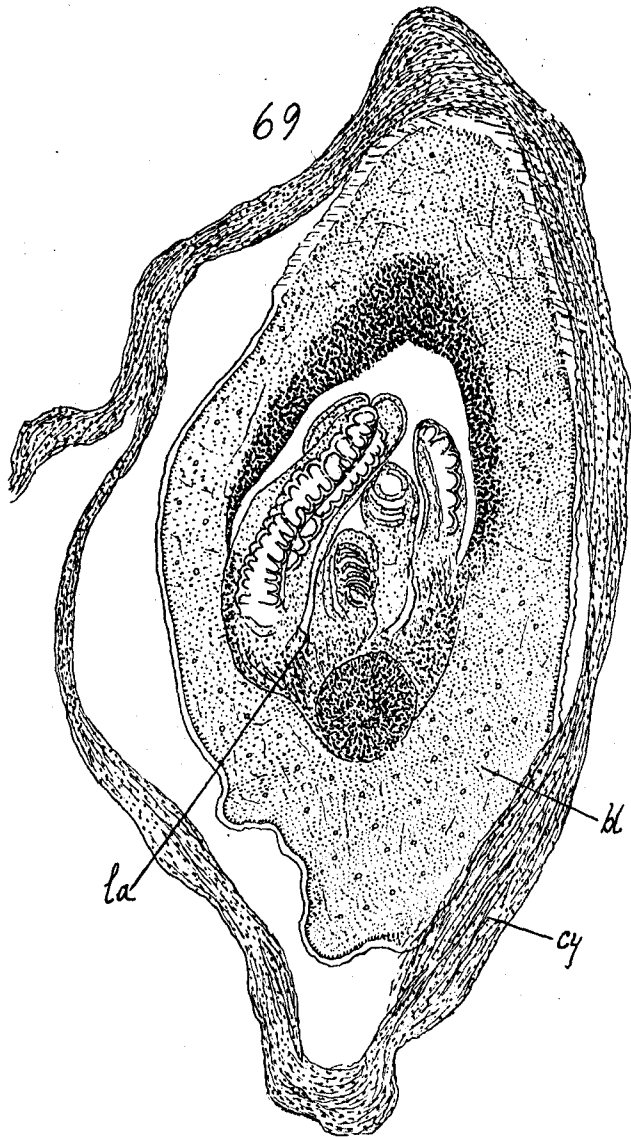
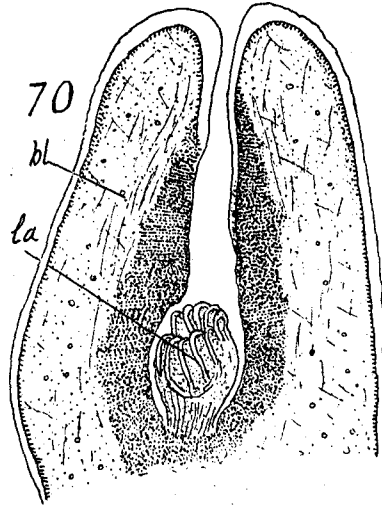
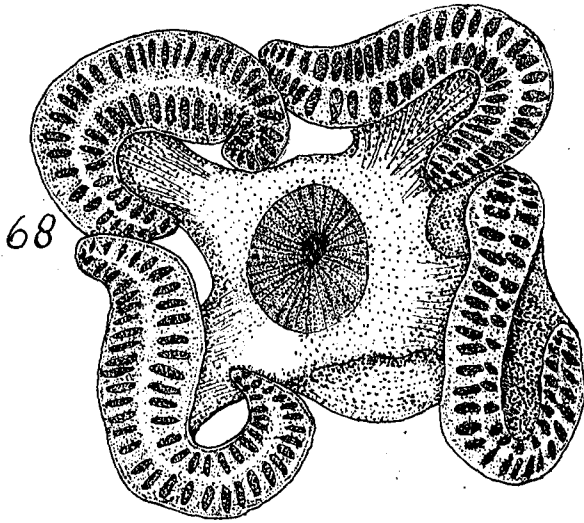


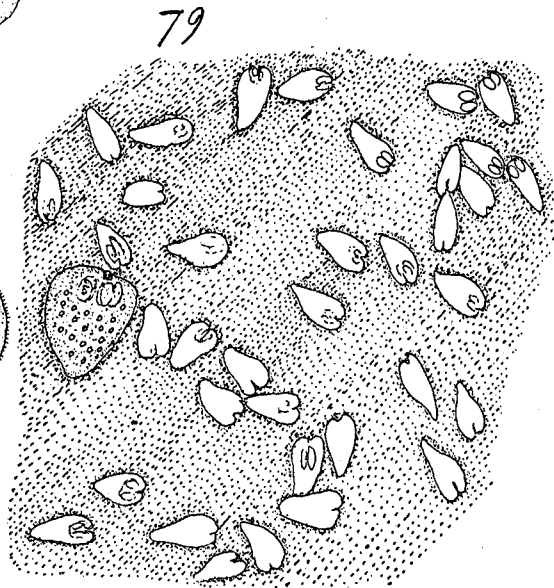
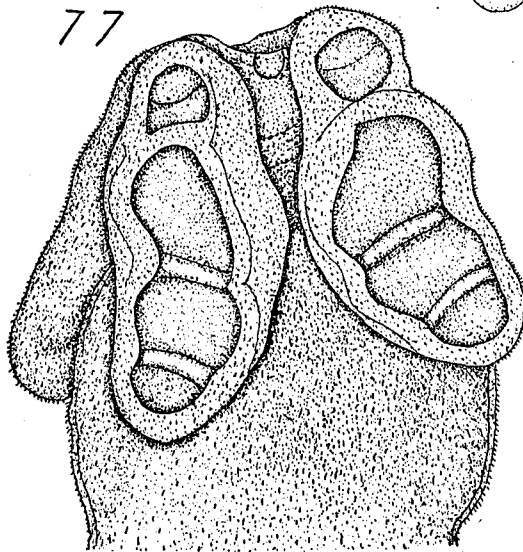
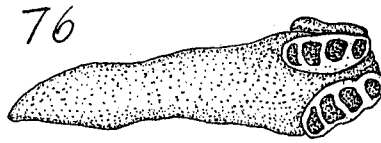
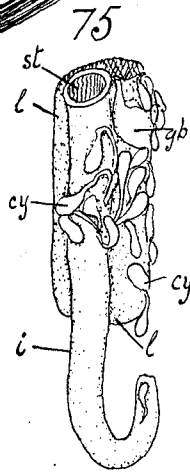
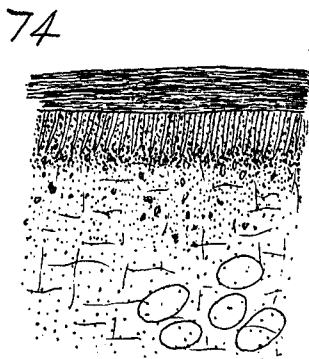
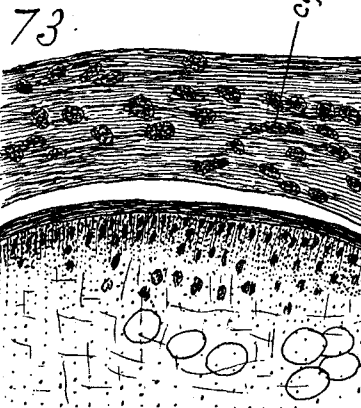
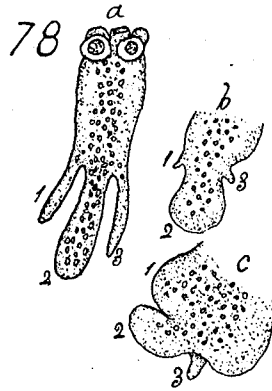
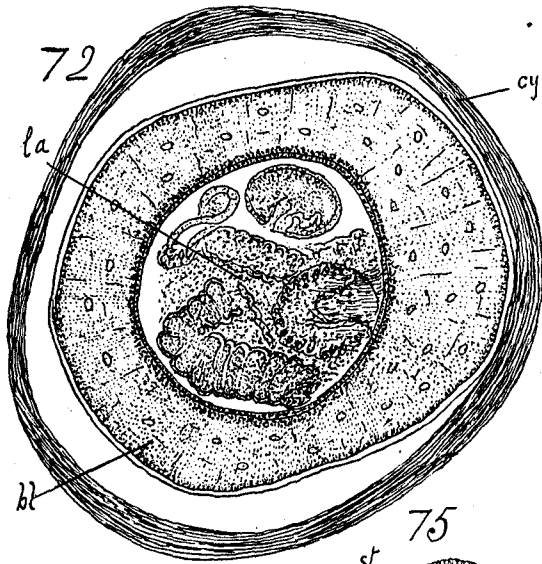


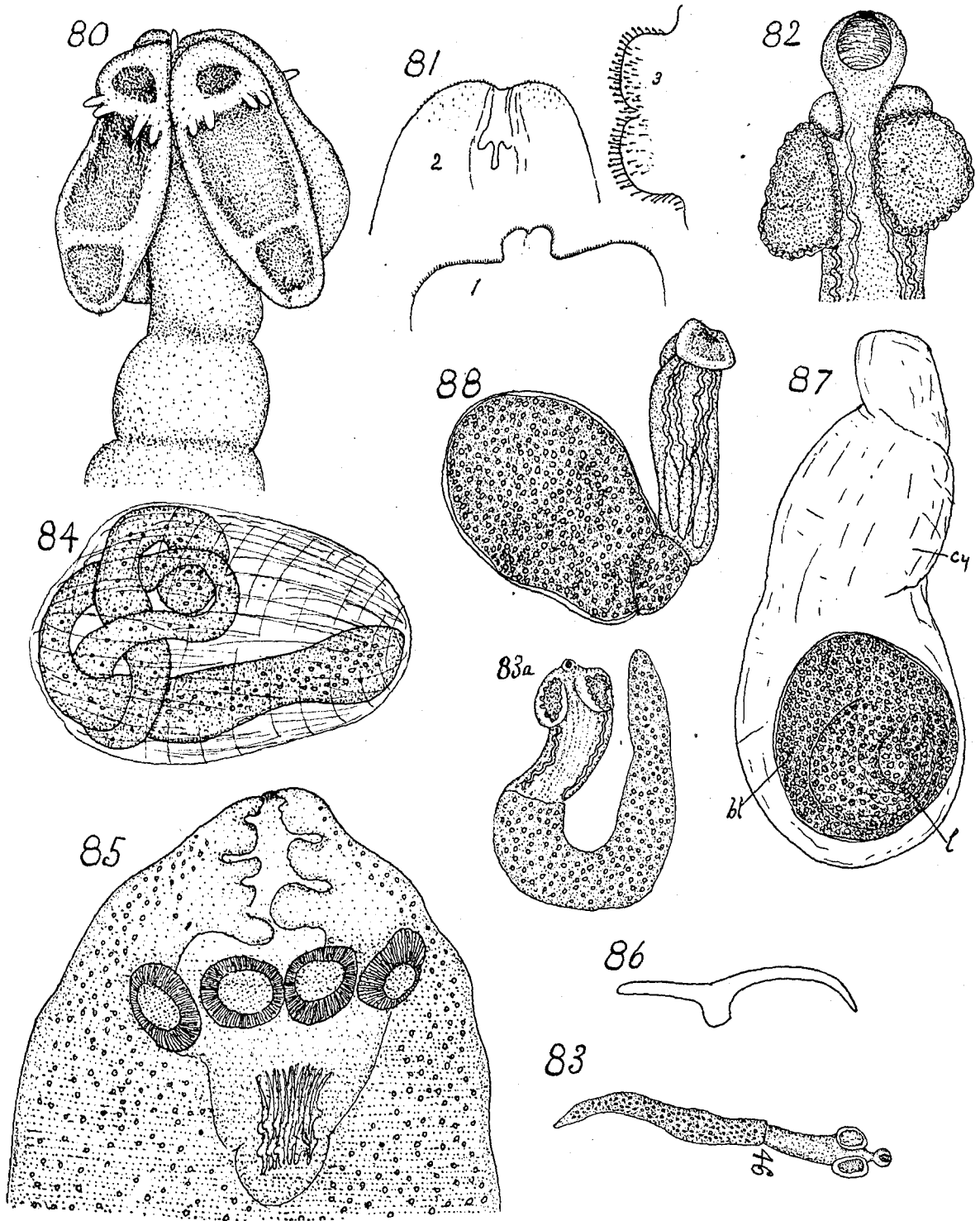


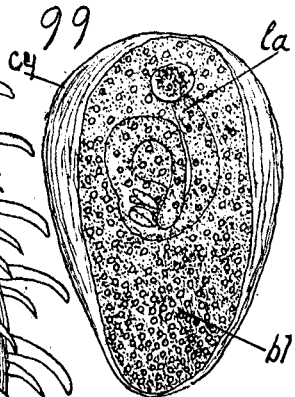
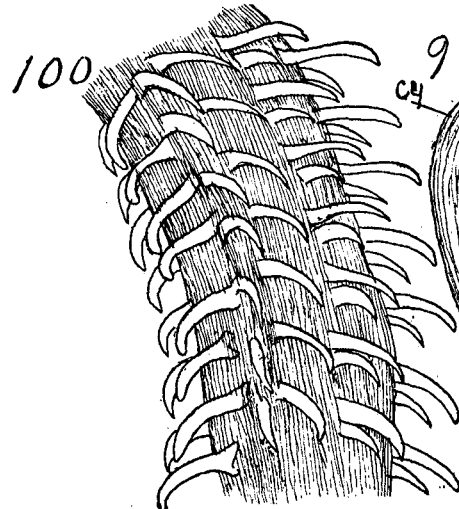
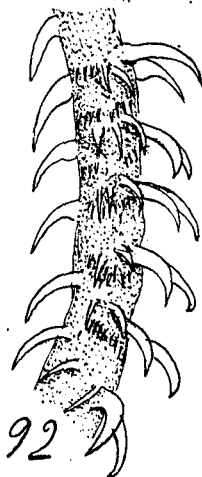
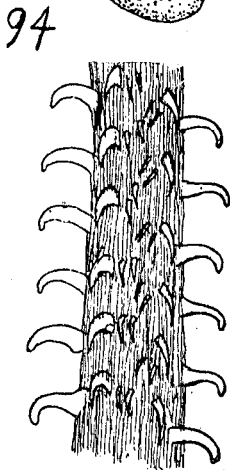
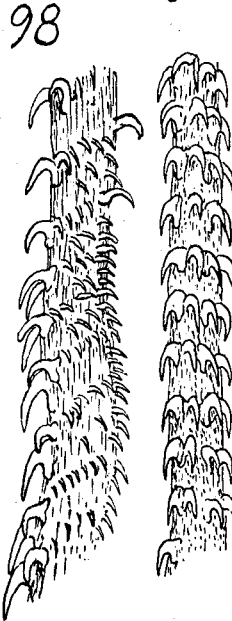
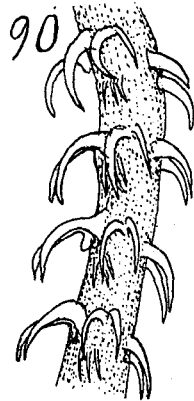
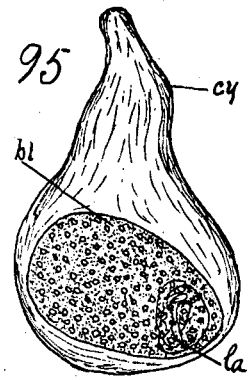
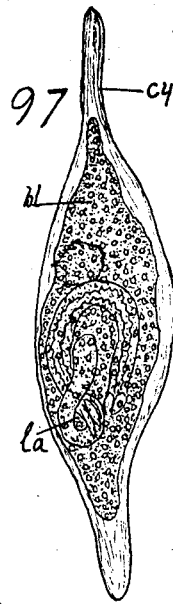
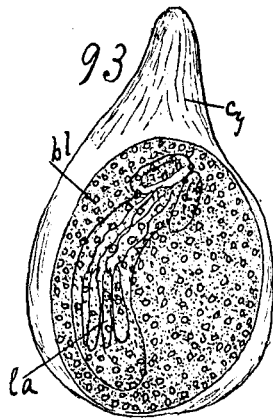
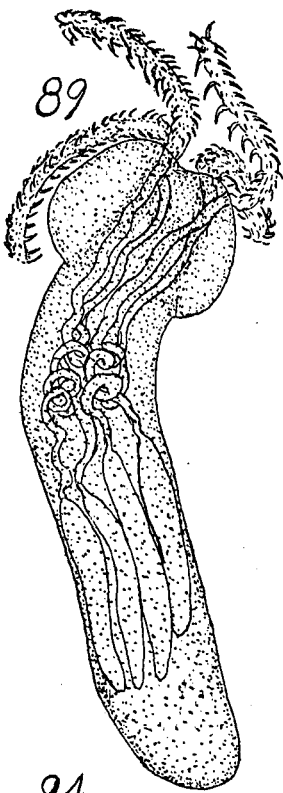


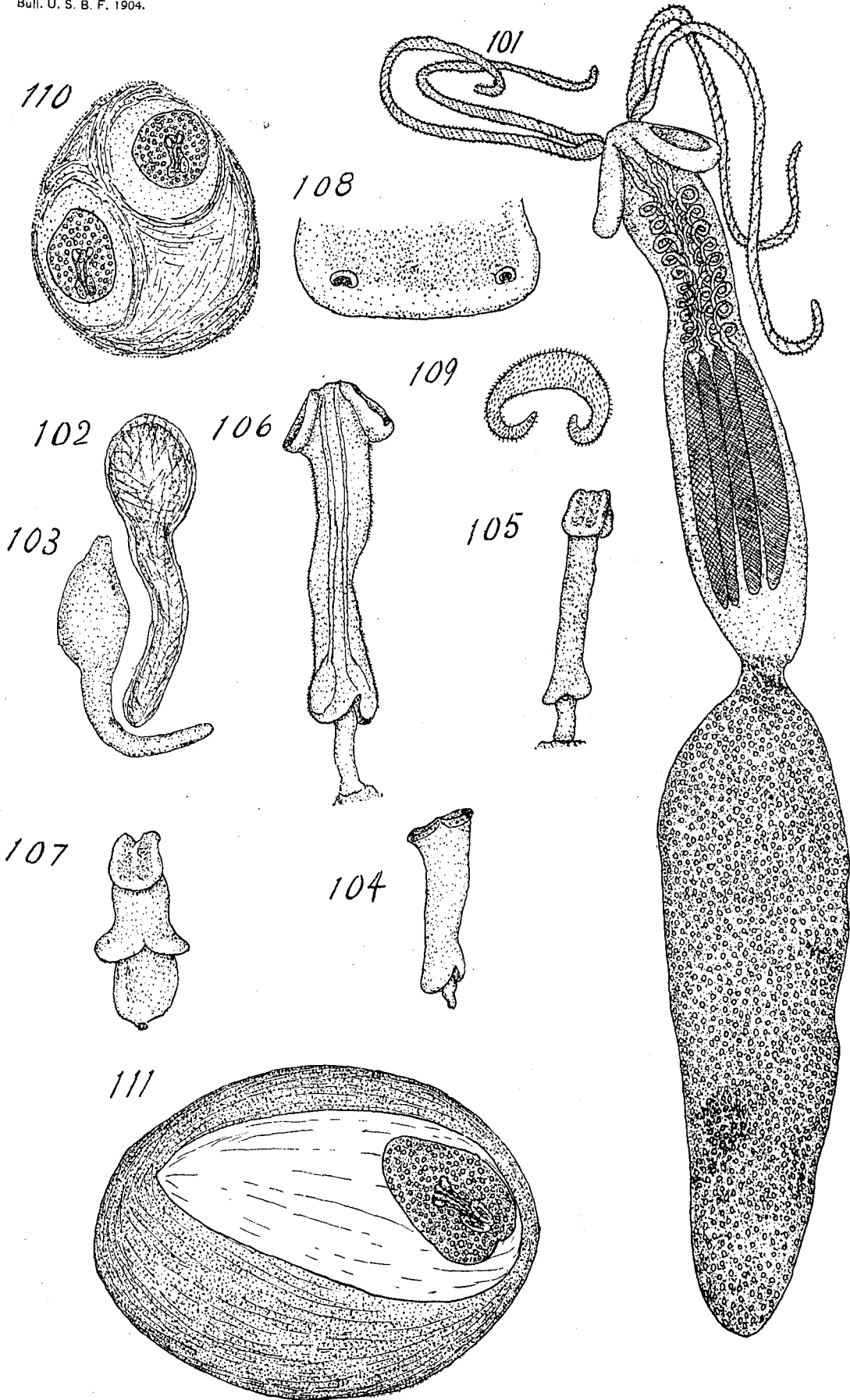




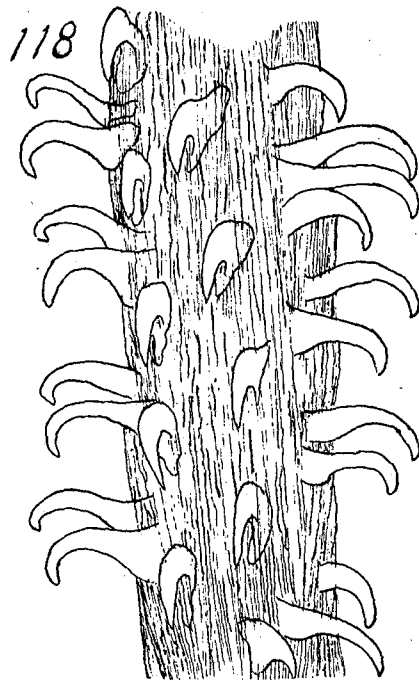
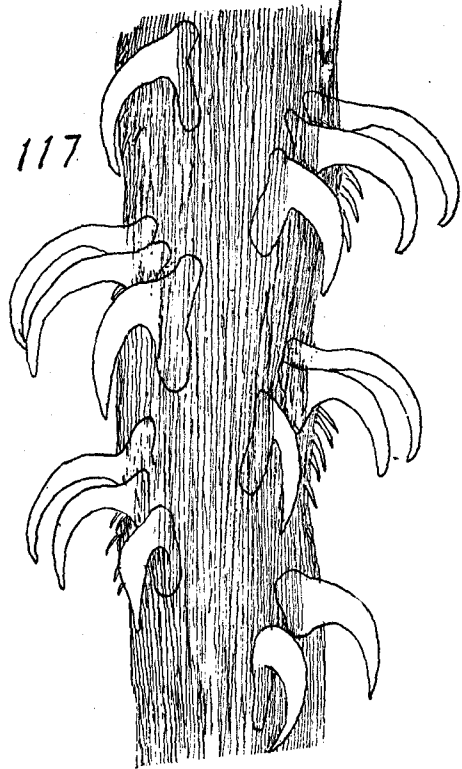
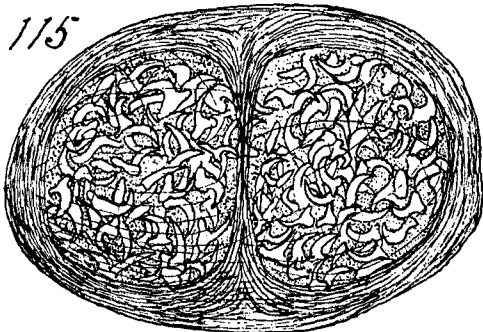
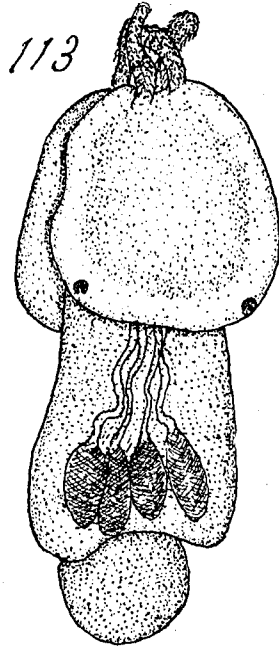




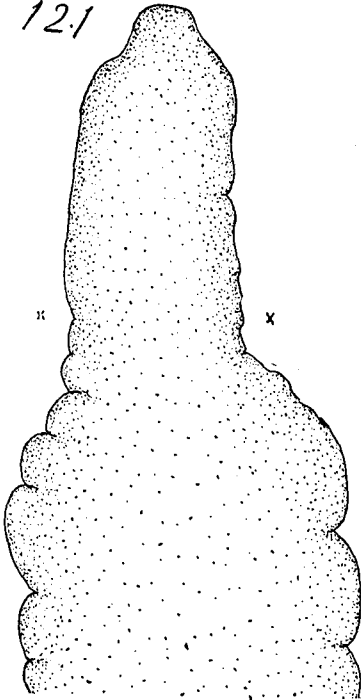




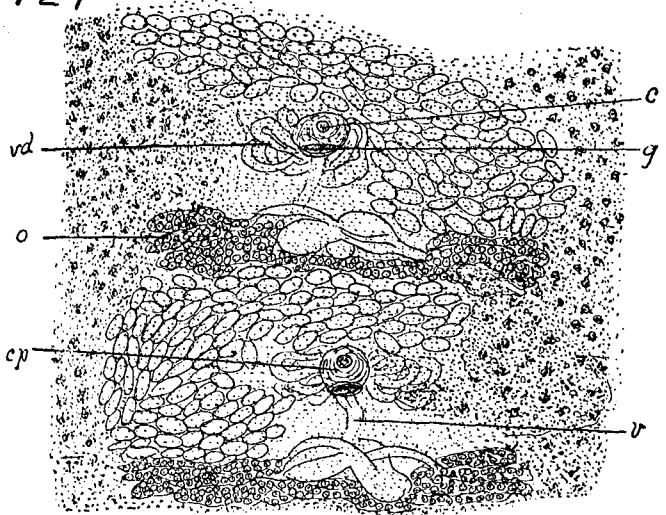
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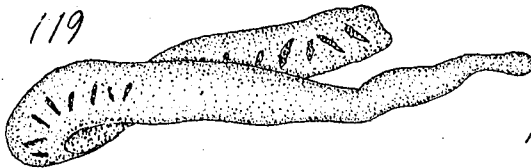
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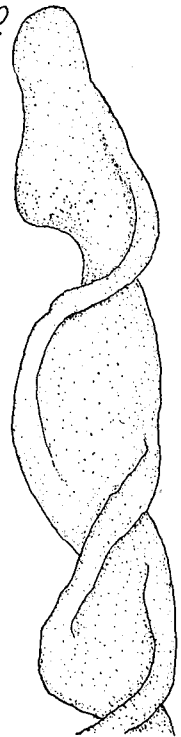
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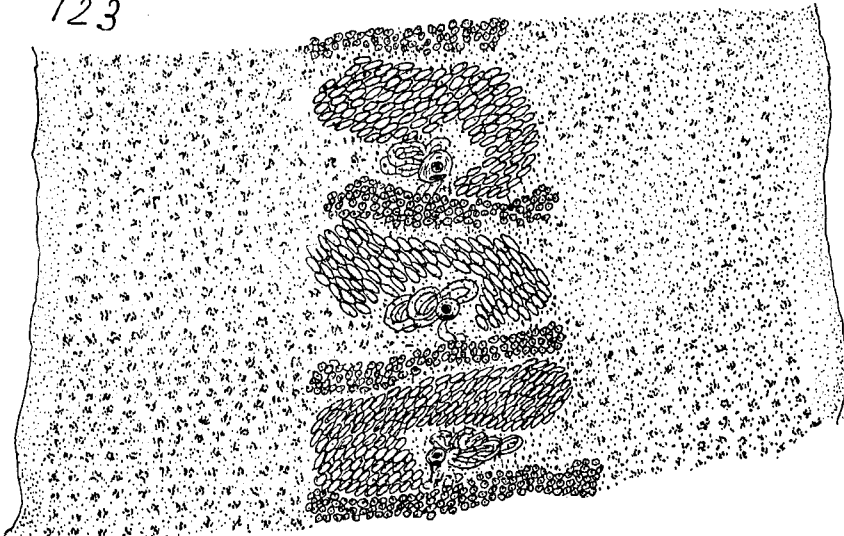
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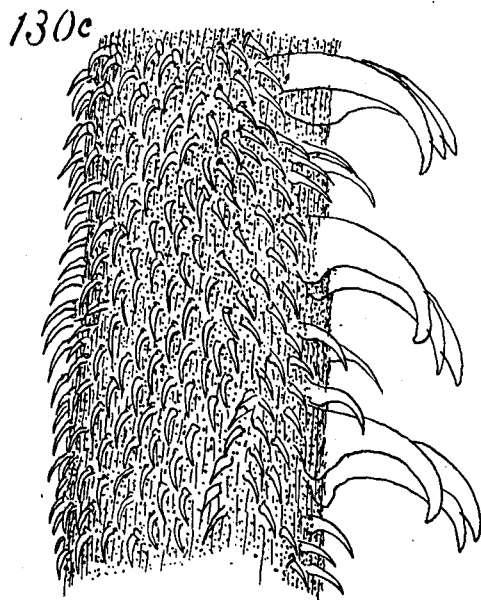
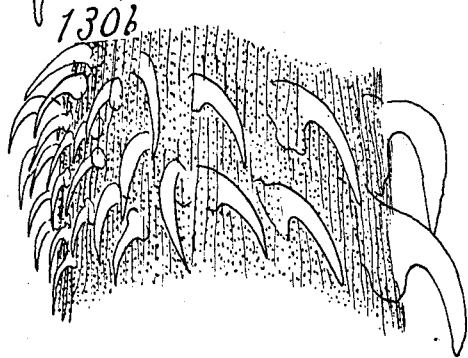
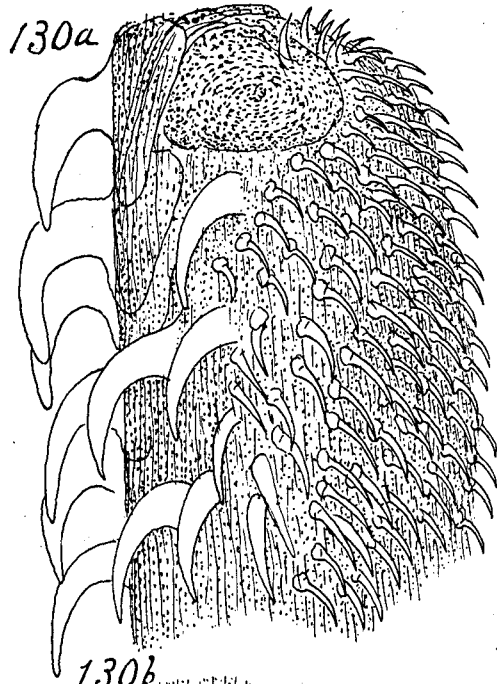
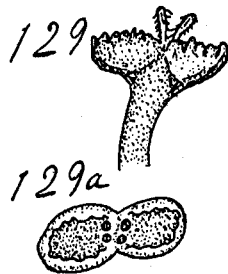
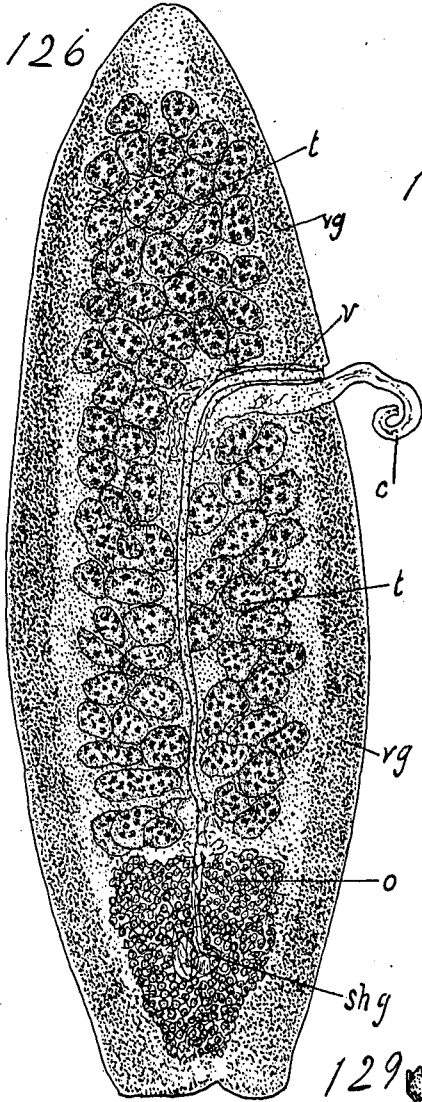
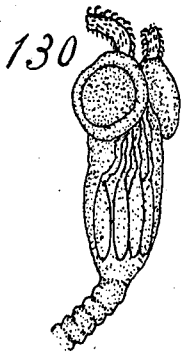
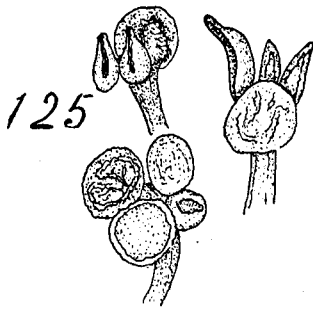


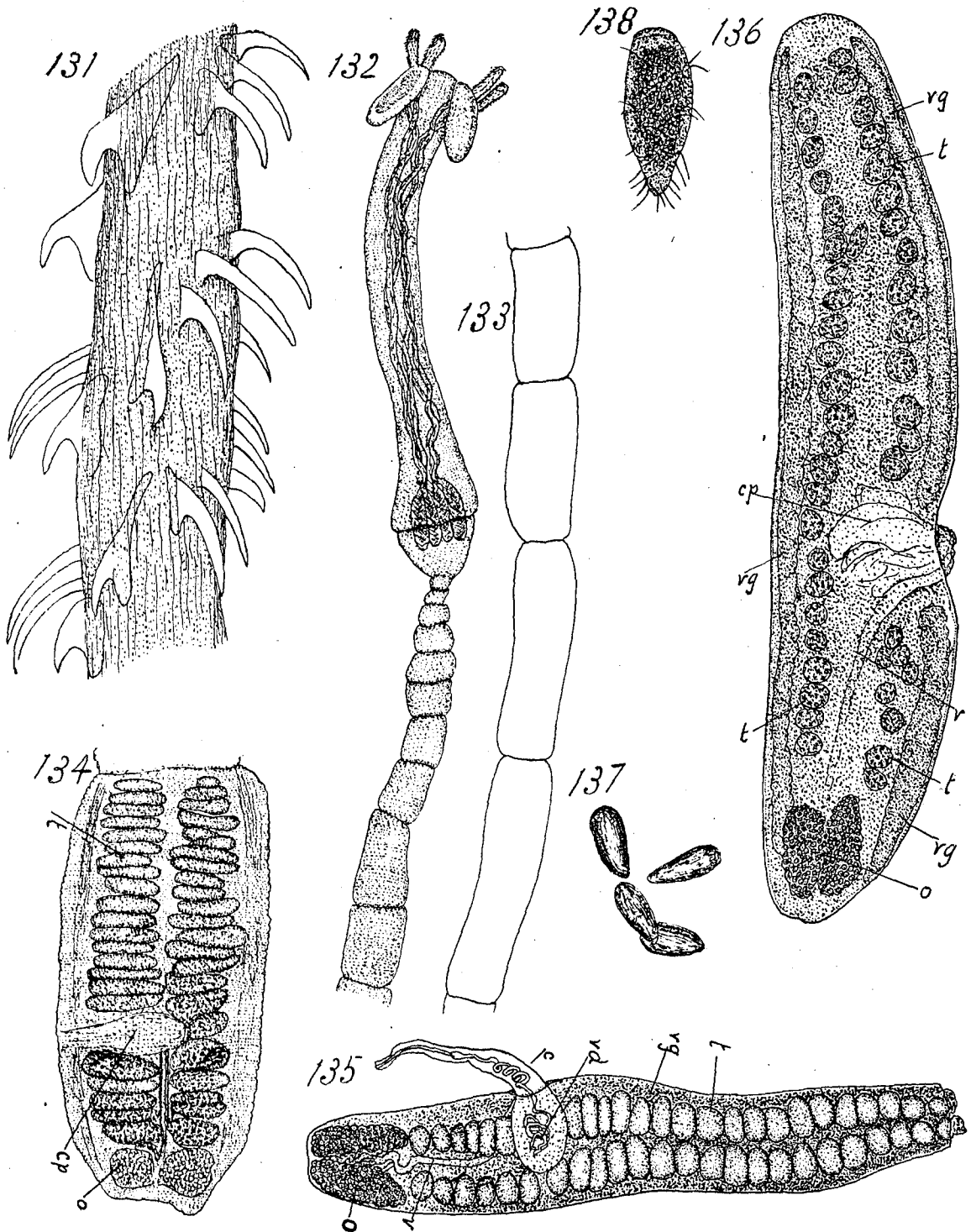
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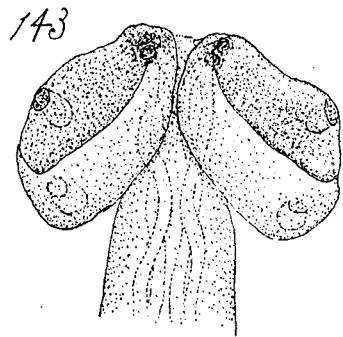
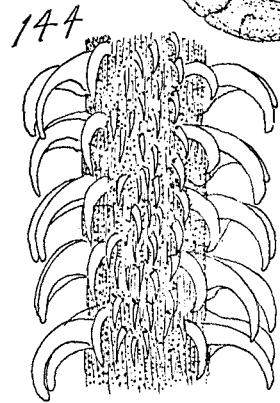
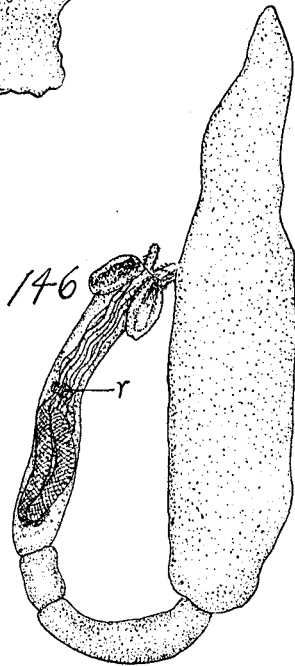
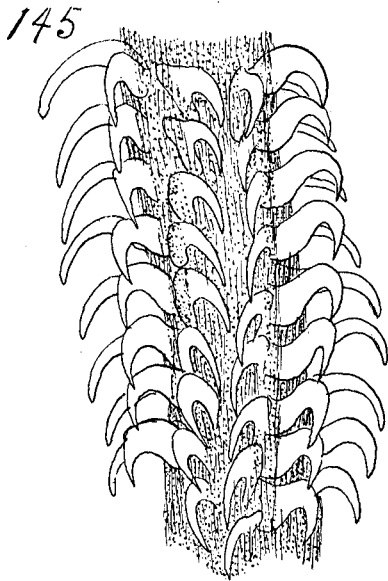
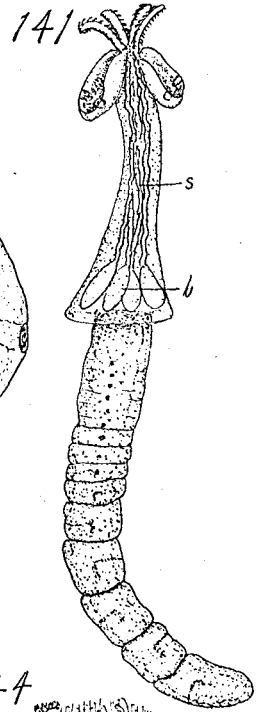
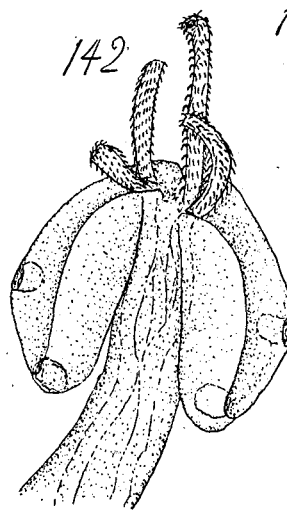
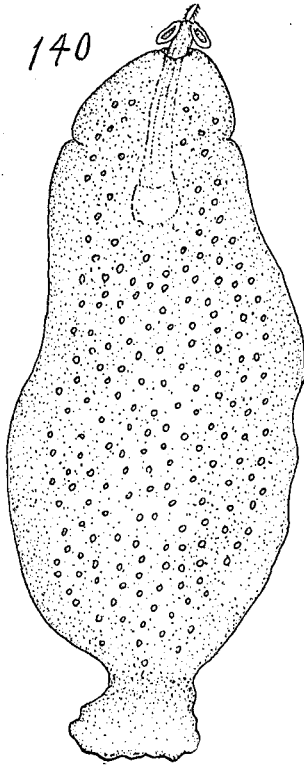
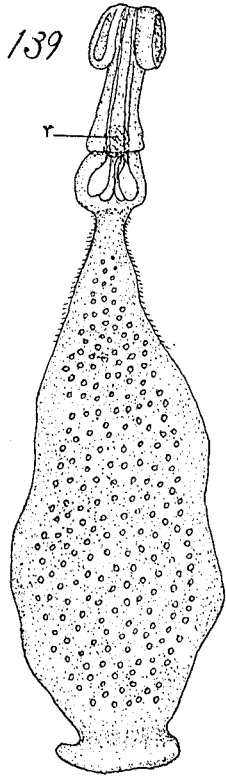


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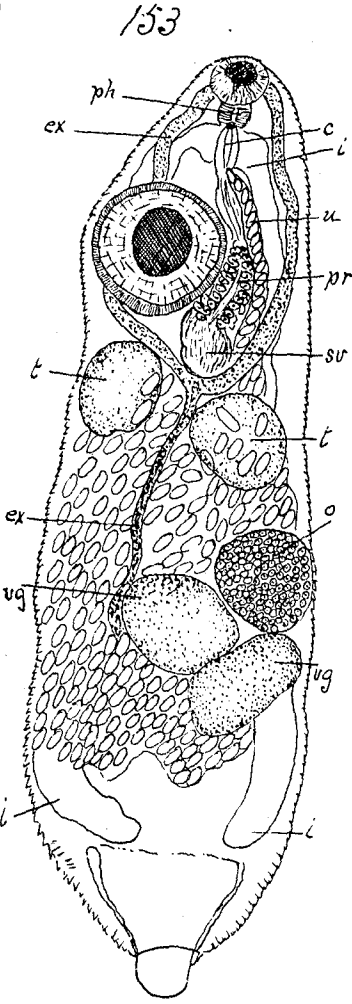
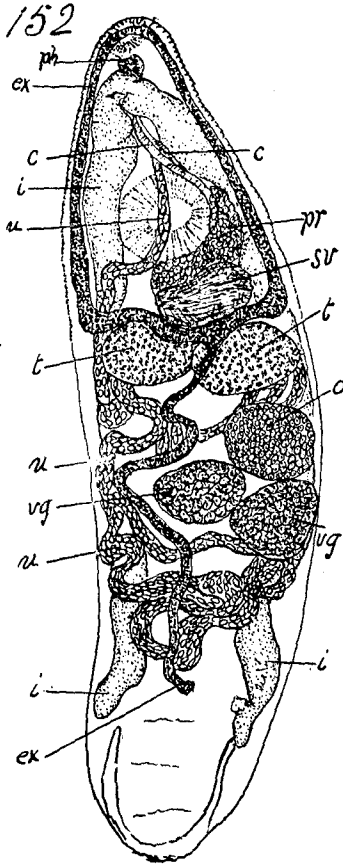
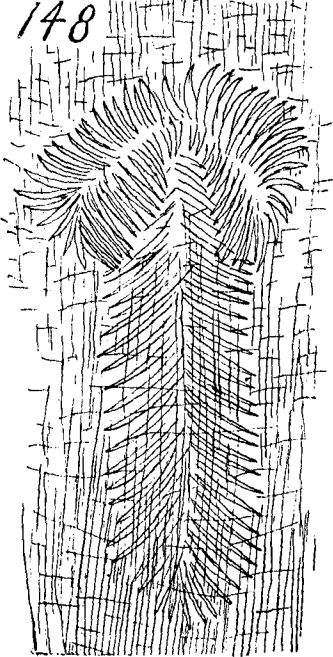
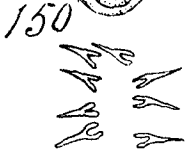
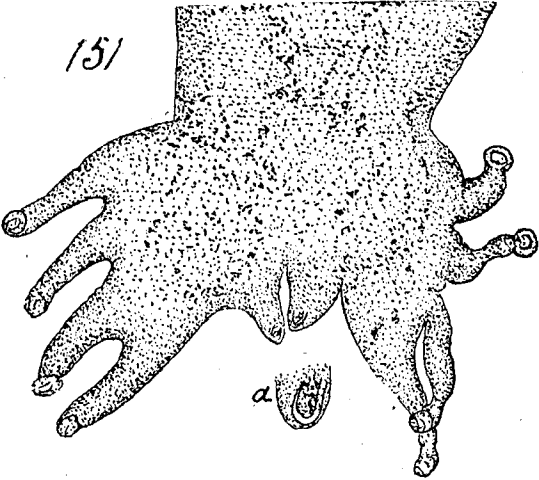
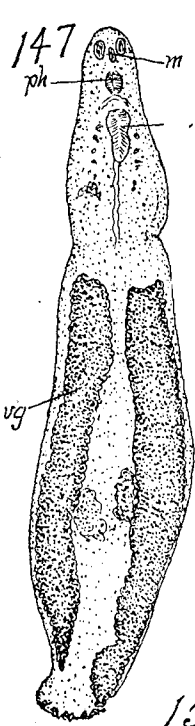


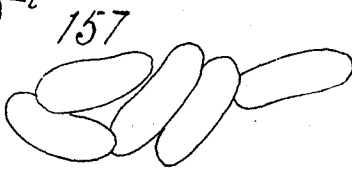
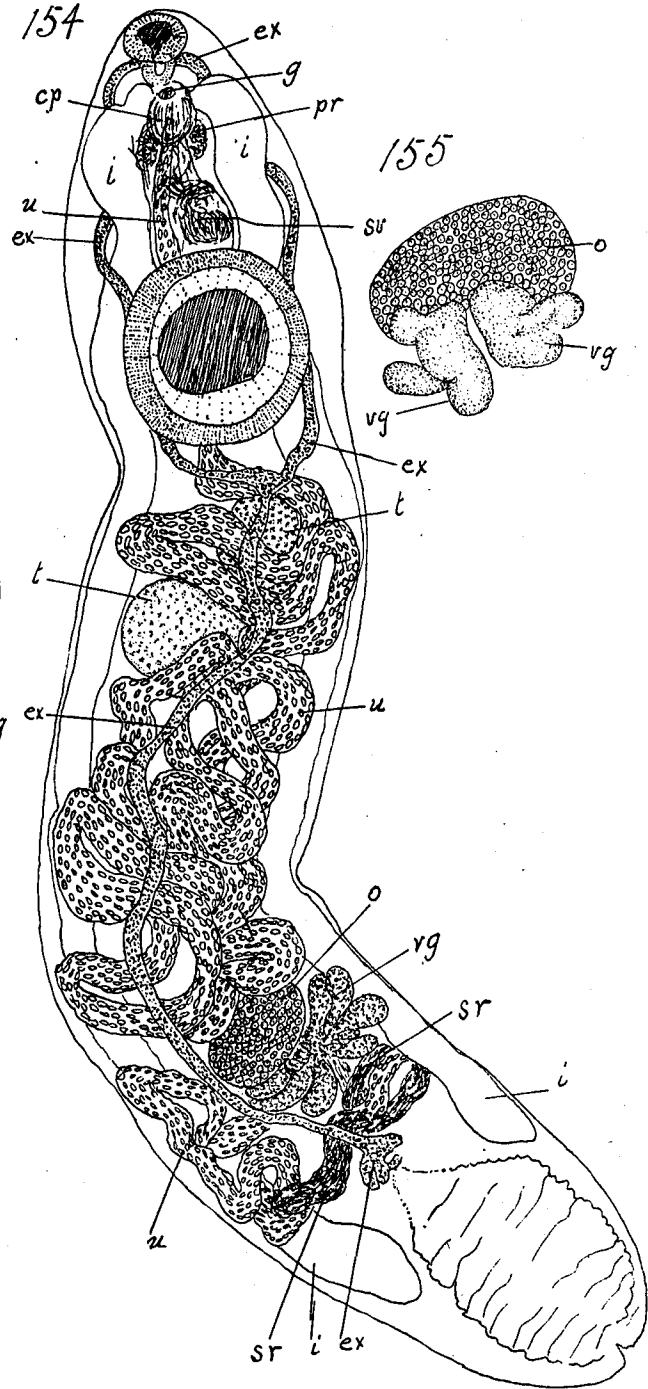
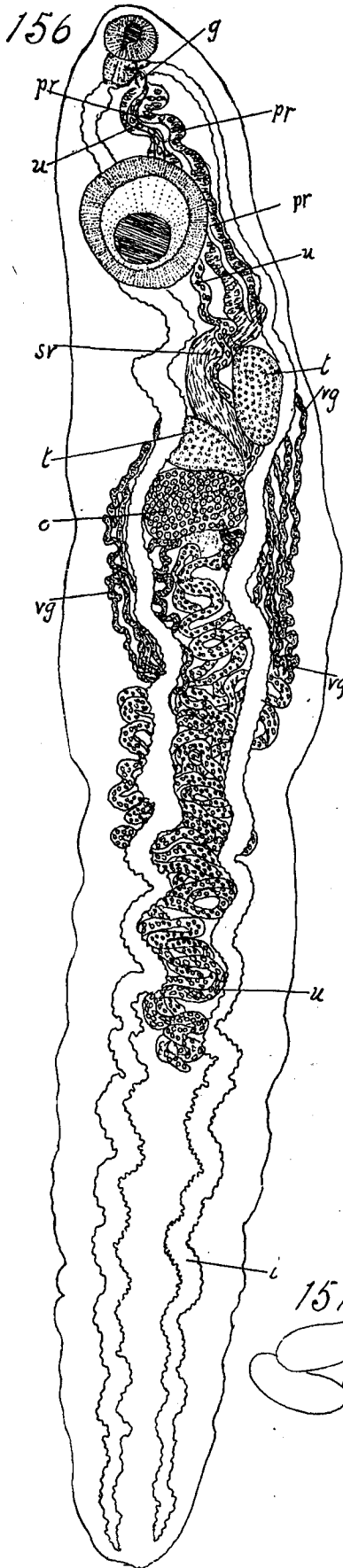


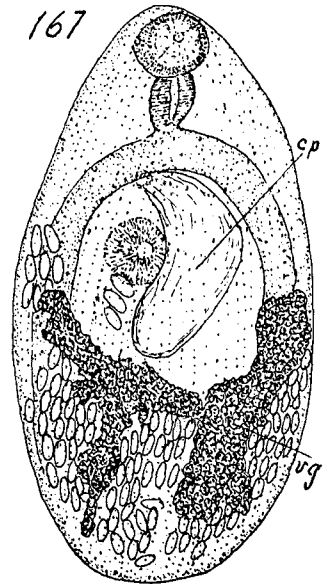
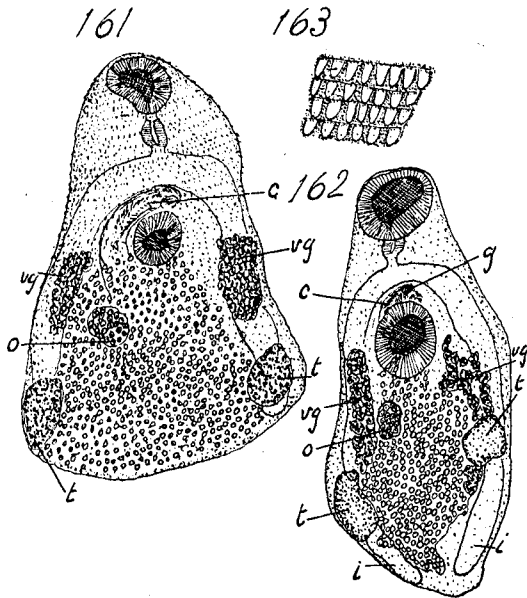
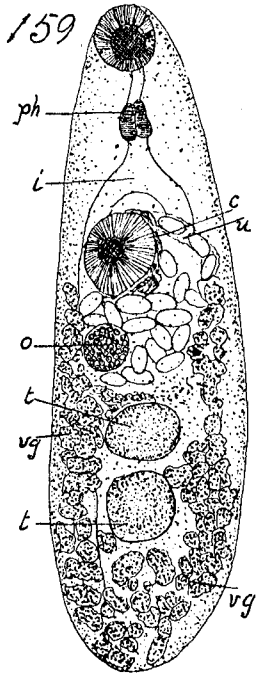
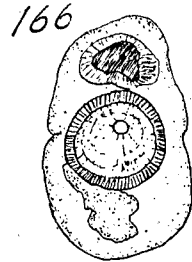
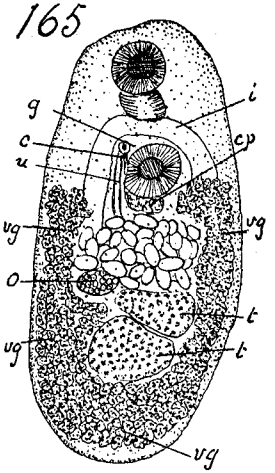
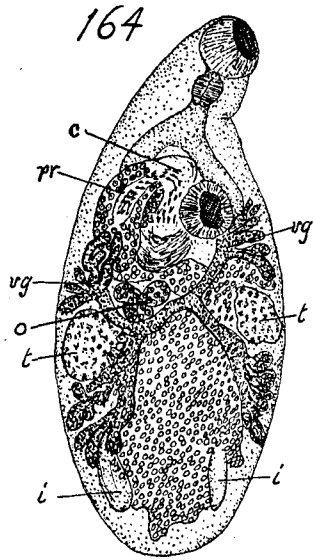
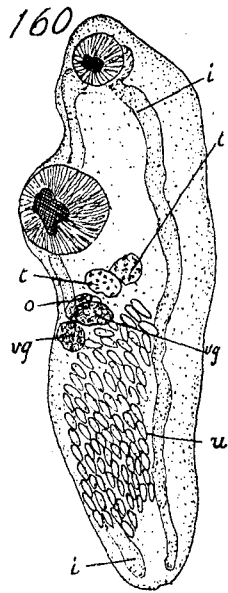
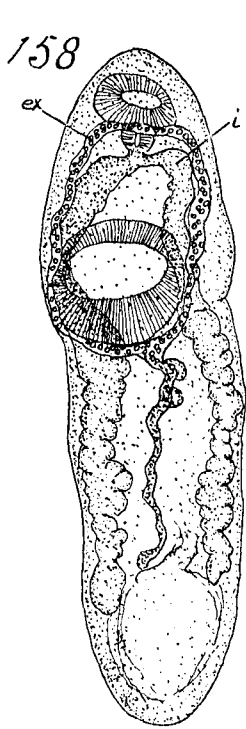


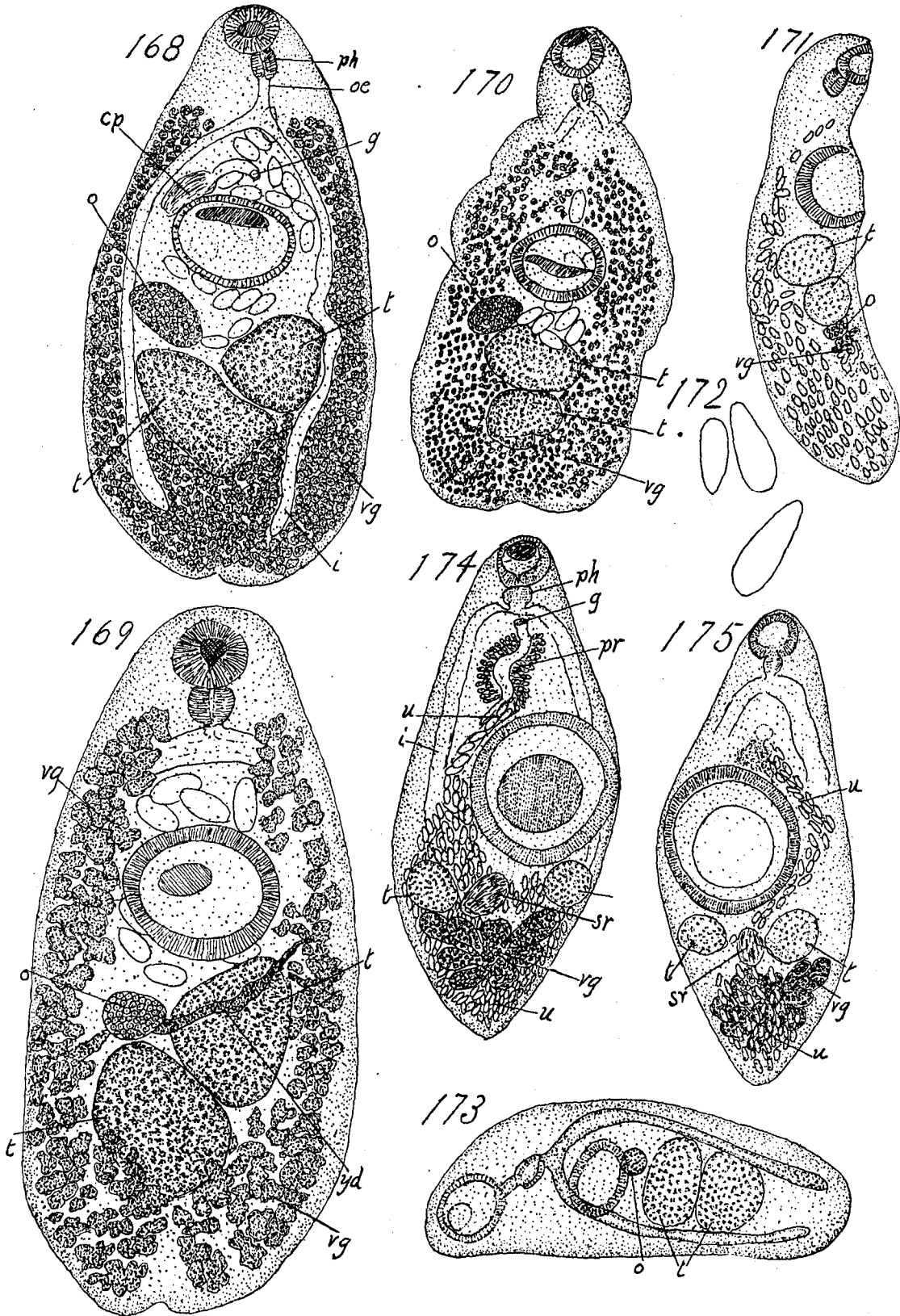


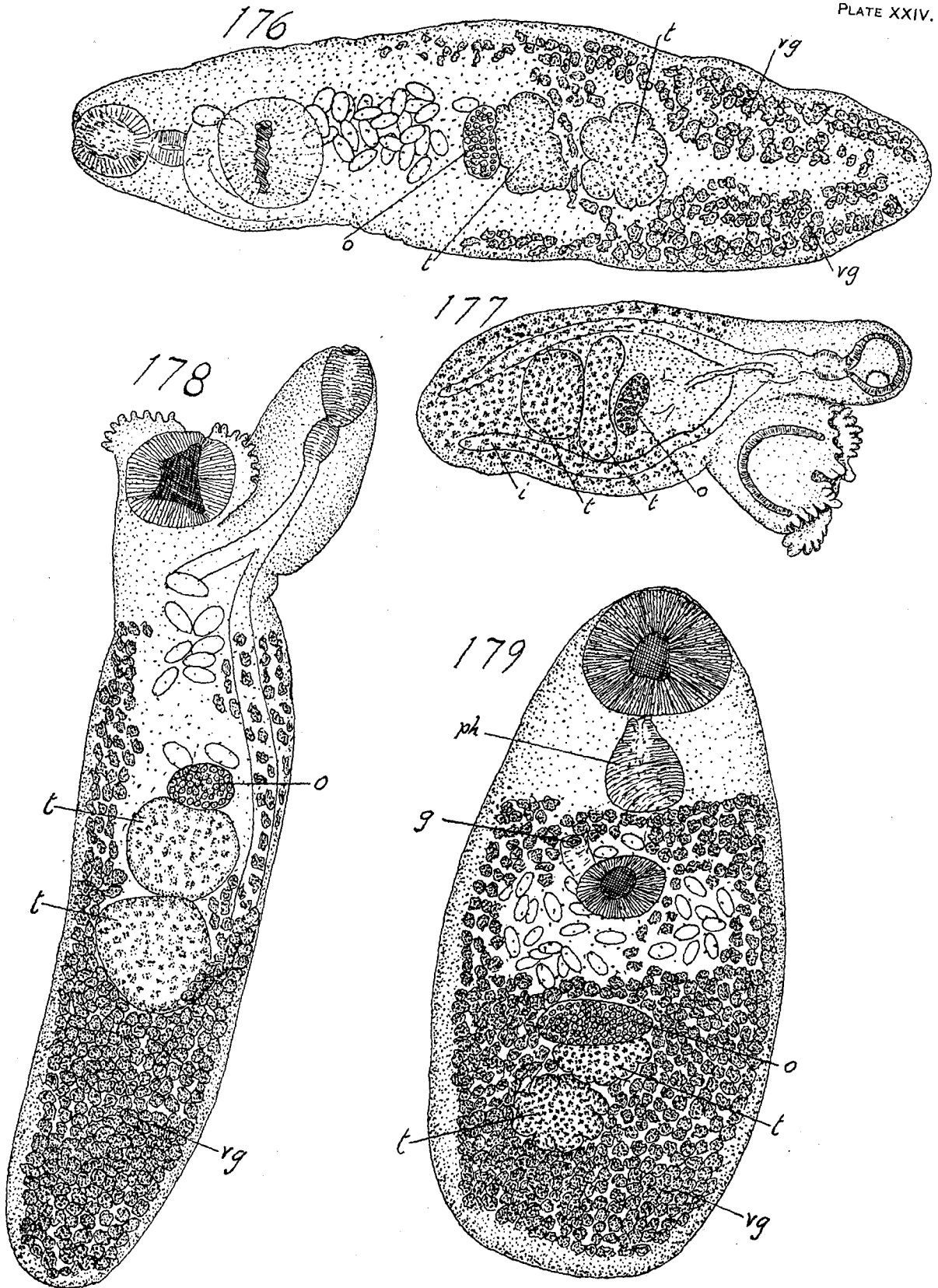
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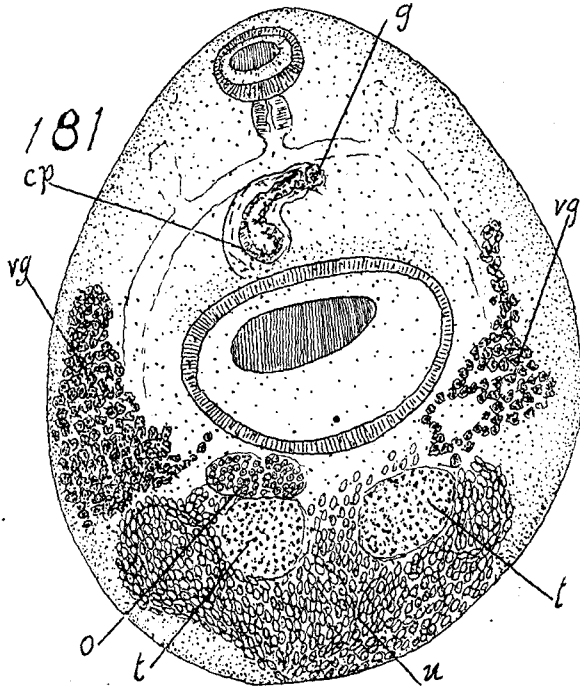
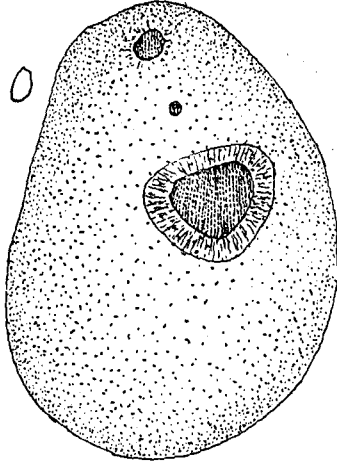




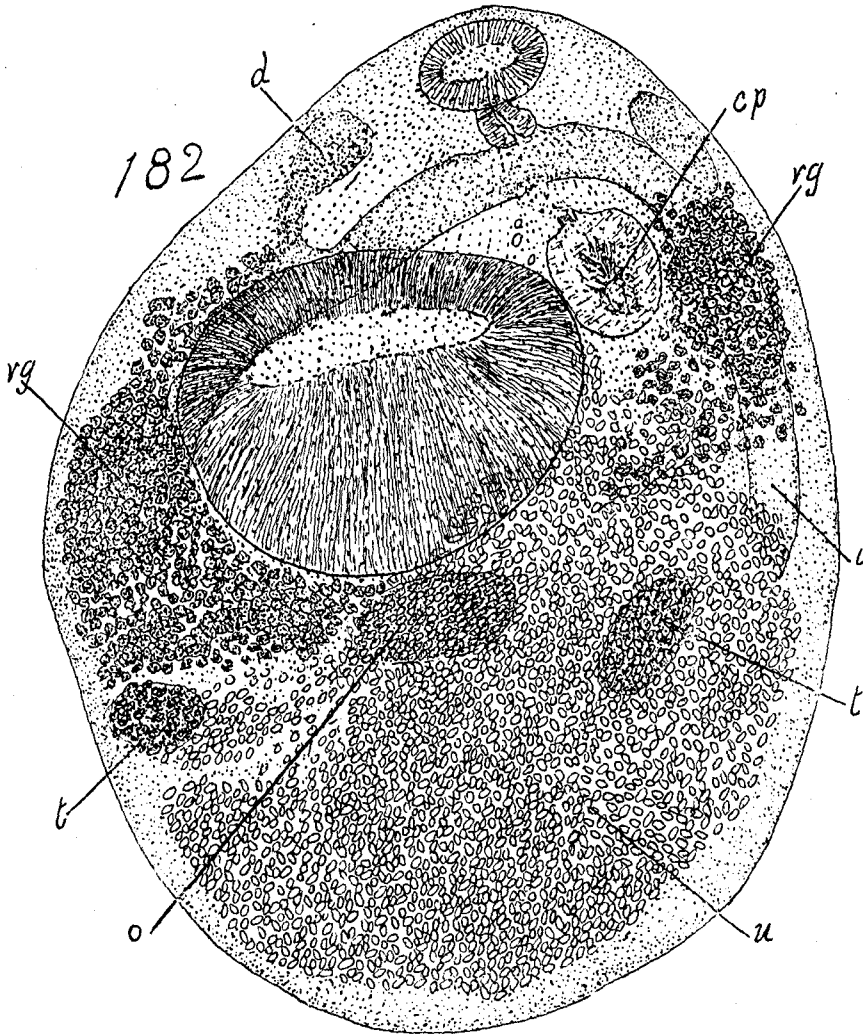


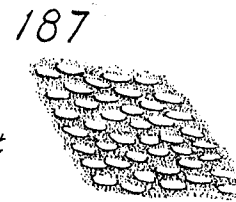
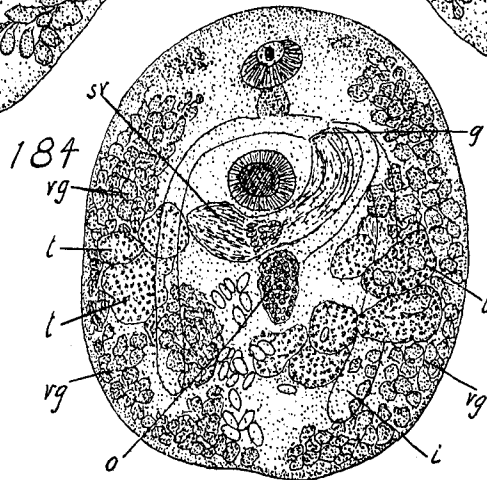
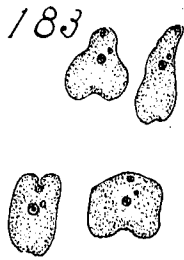
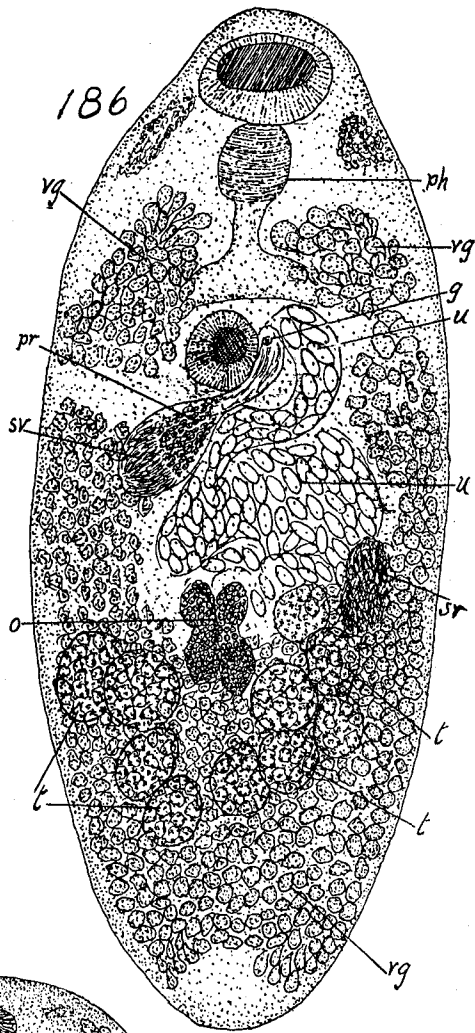
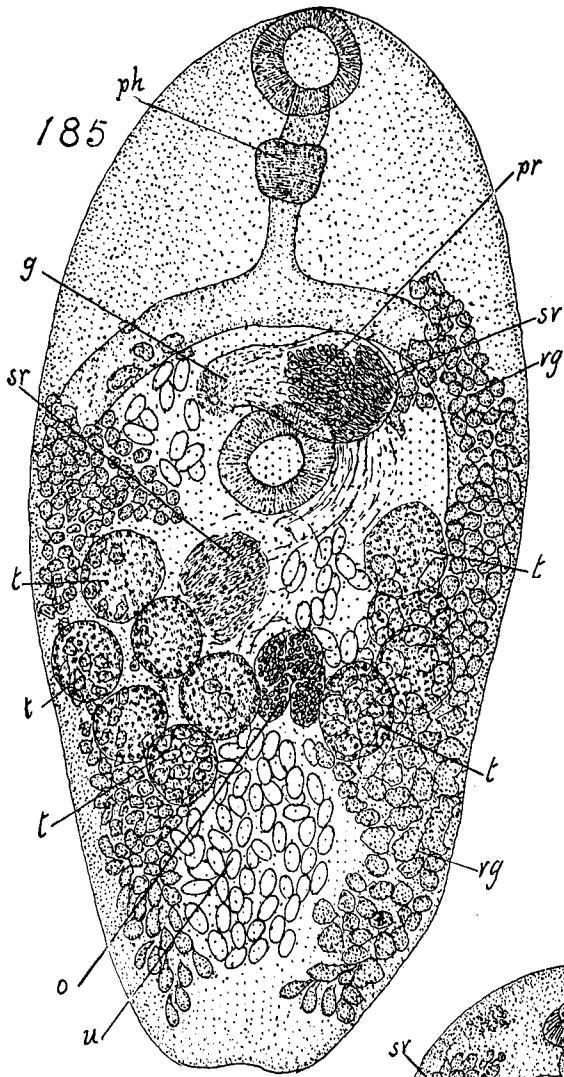


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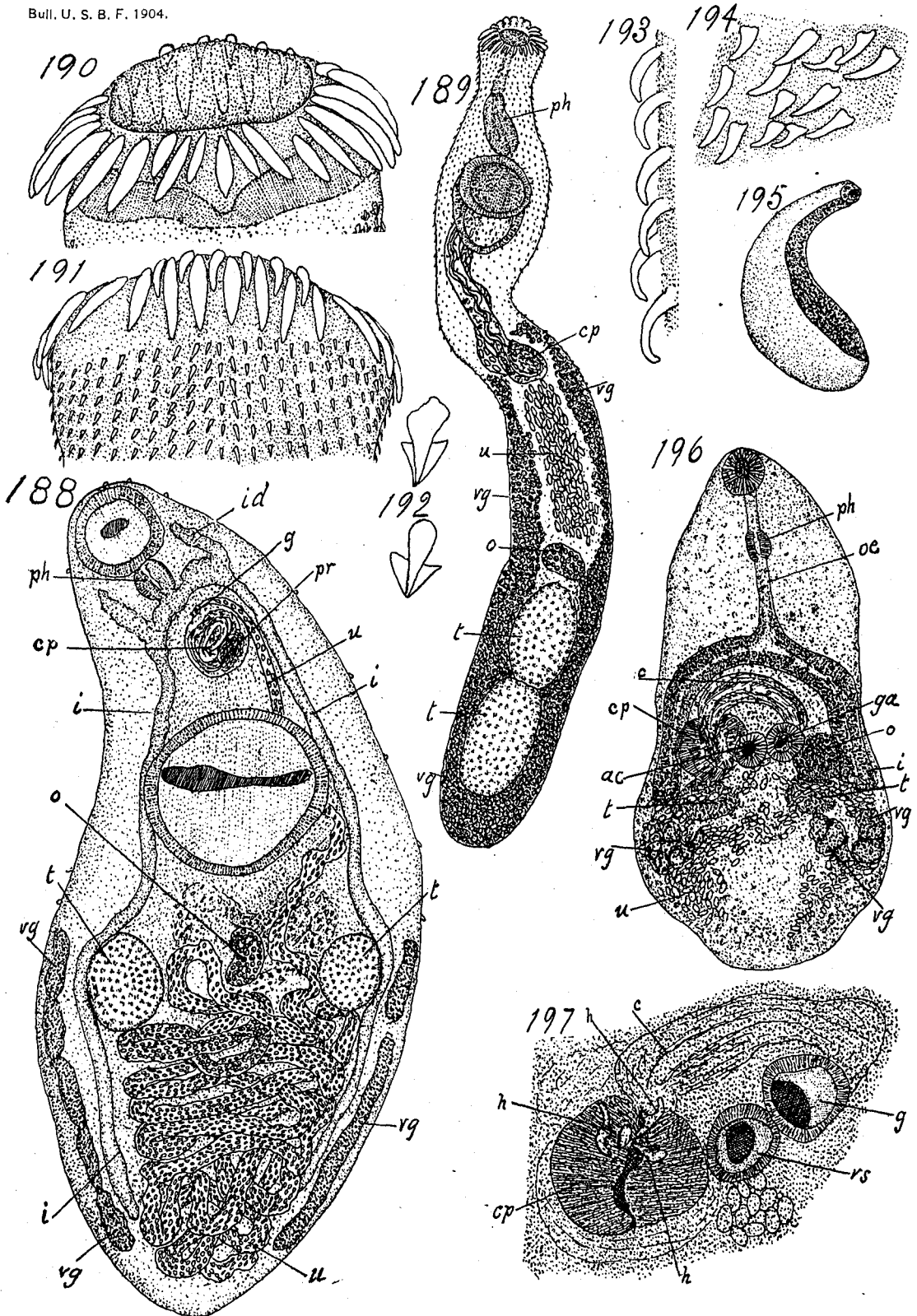


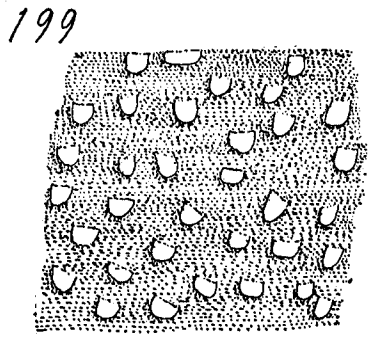
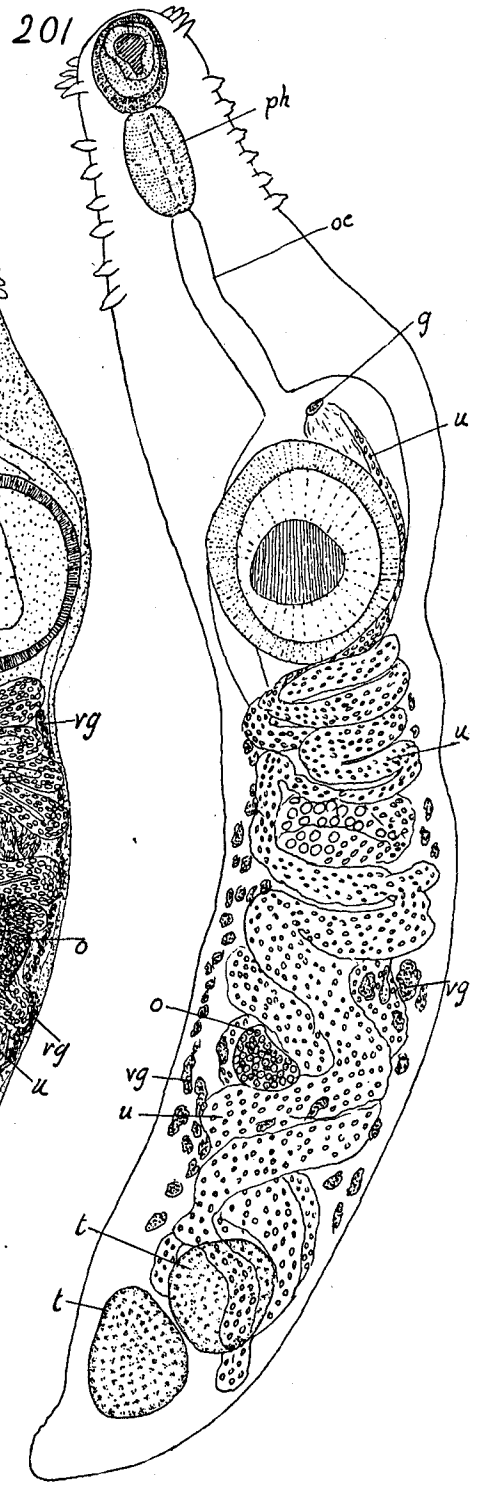
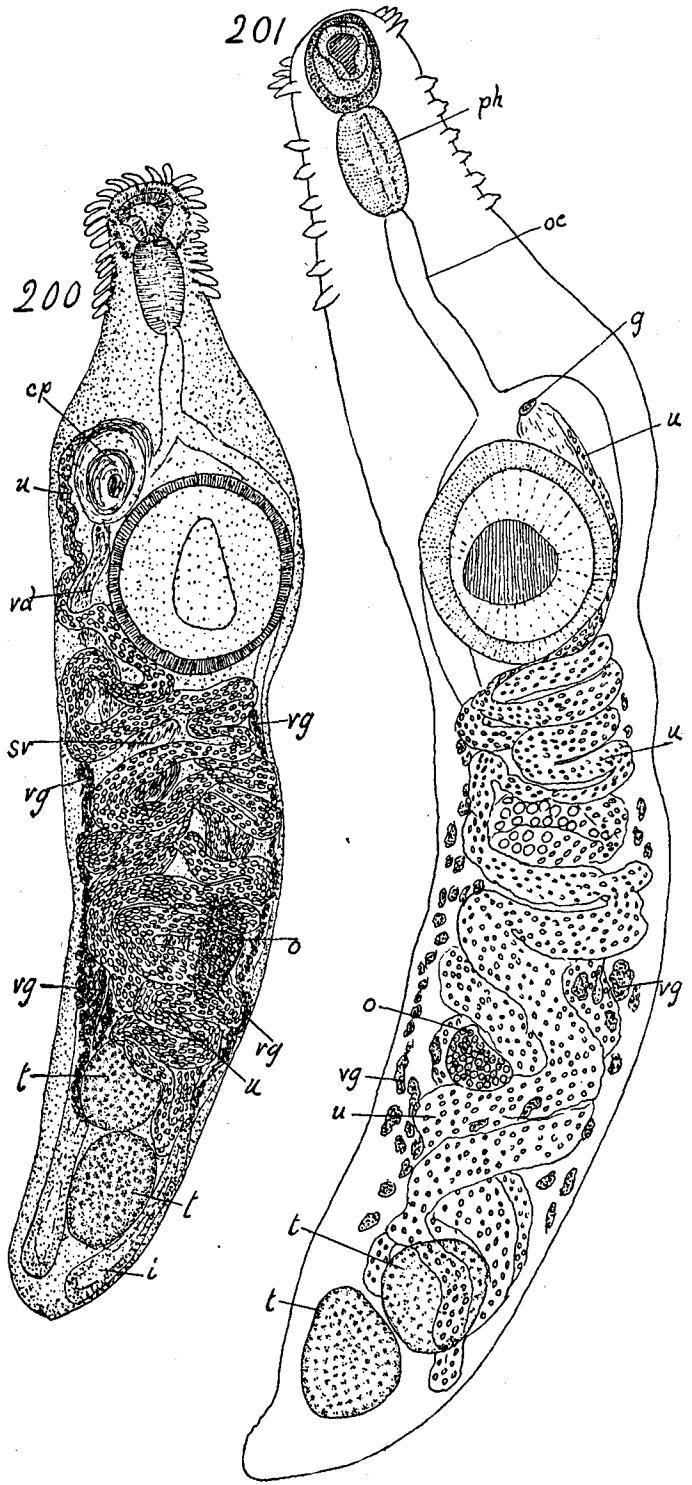
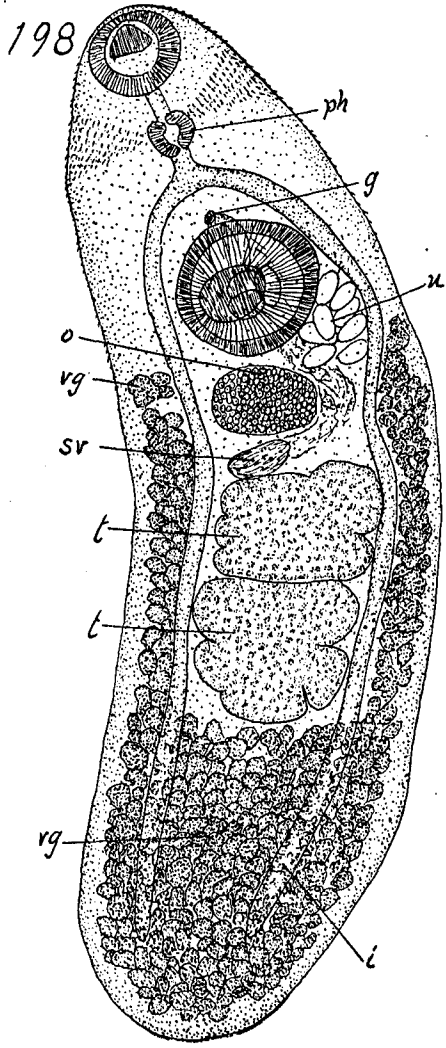
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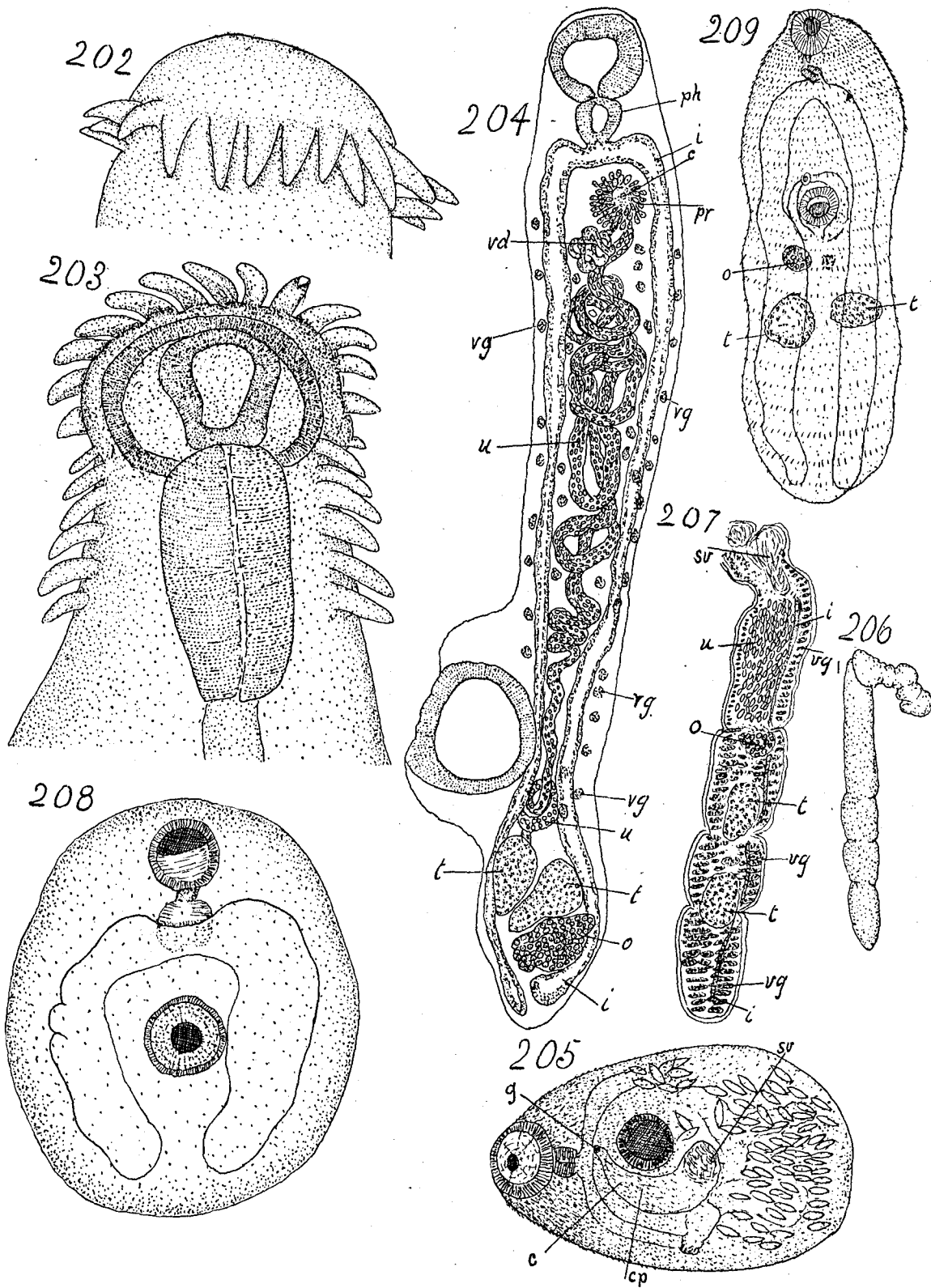




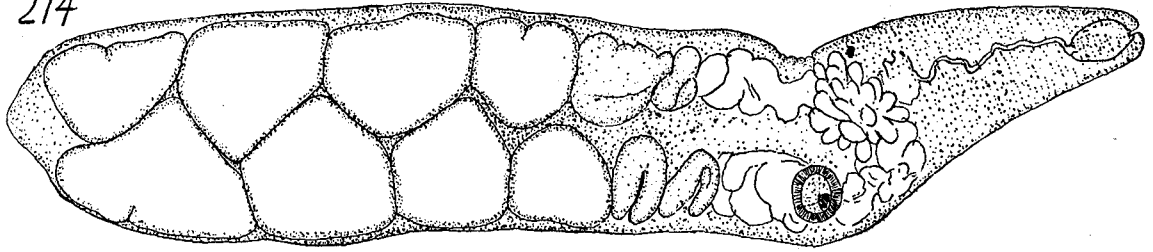
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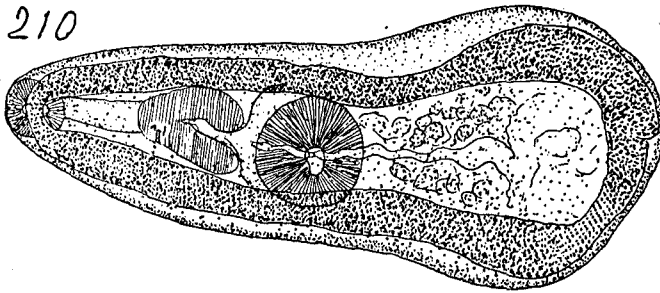




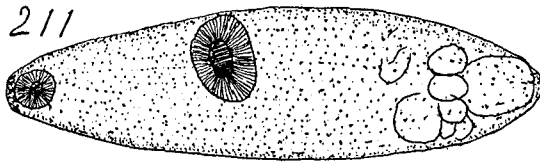
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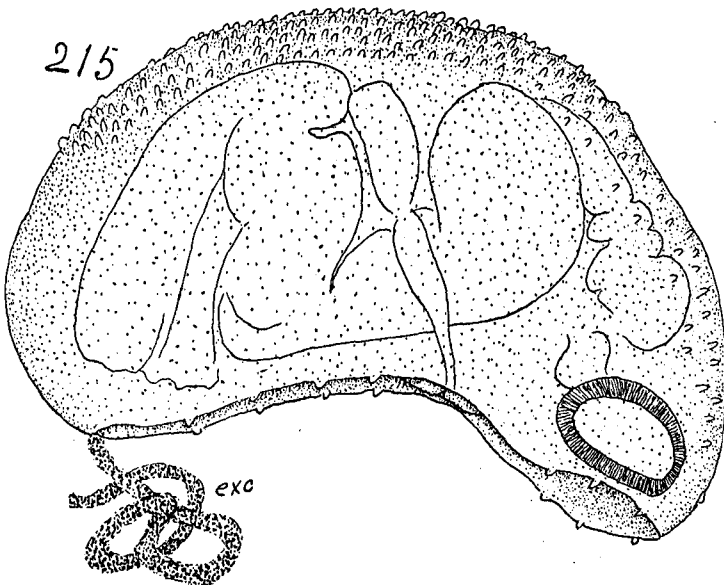
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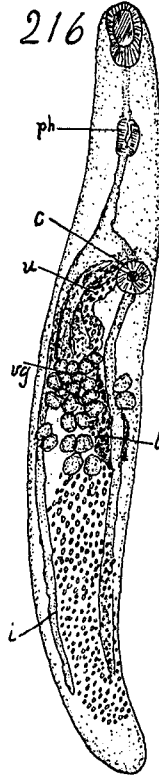
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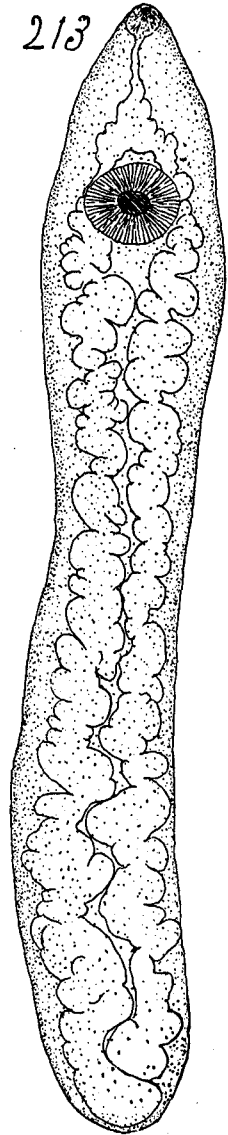
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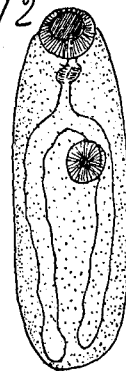
216

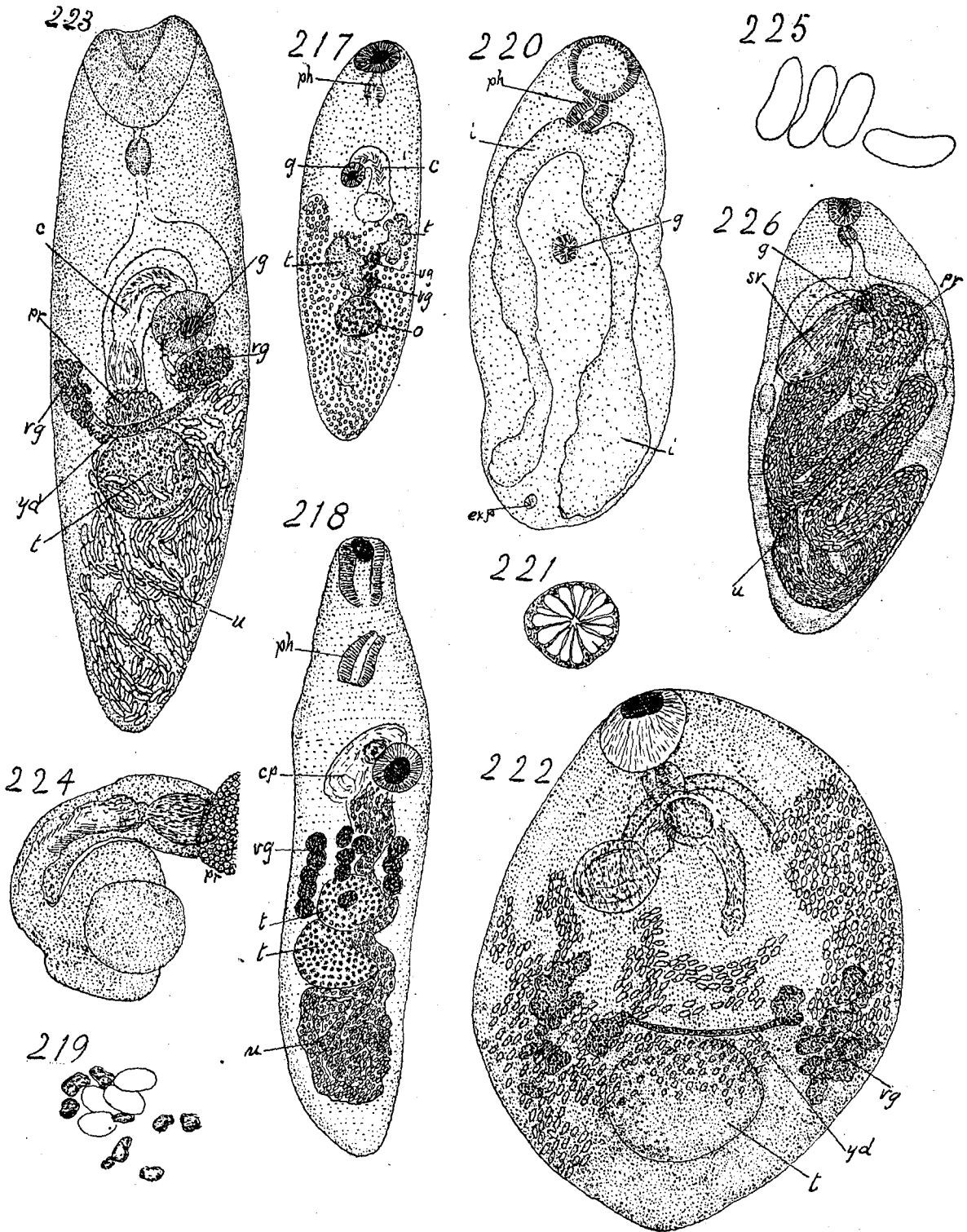


213

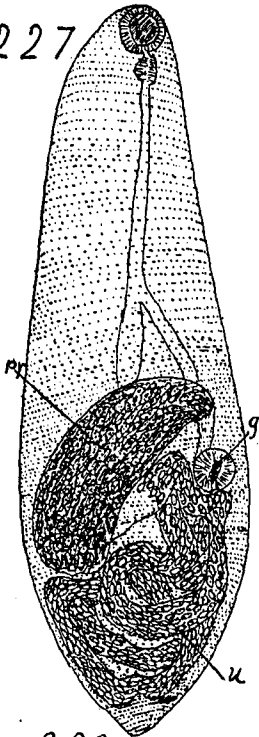


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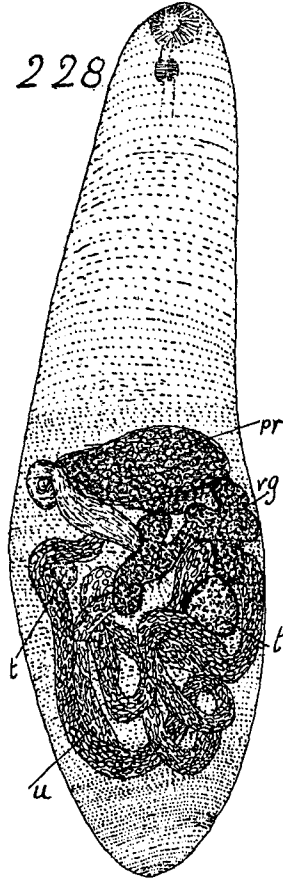




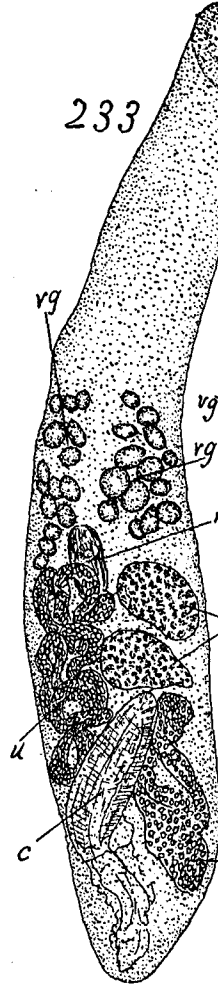
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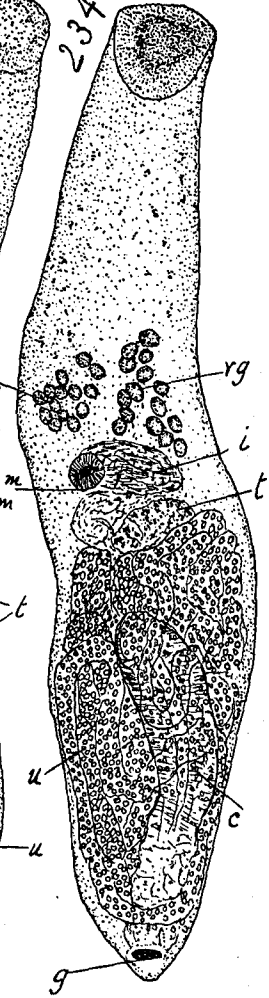
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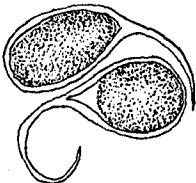
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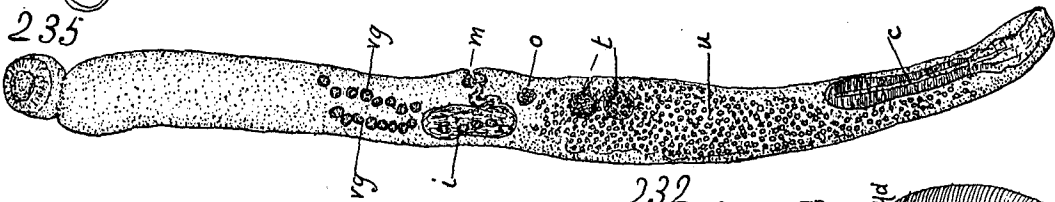
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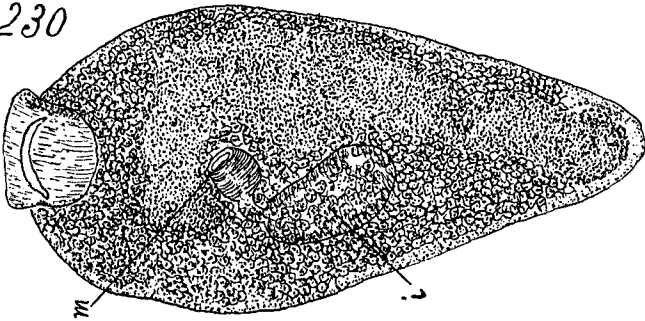
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