

NOTES ON TREMATODE PARASITES OF BIRDS

By EDWIN LINTON

Of the Zoological Laboratory, University of Pennsylvania

With two exceptions the hosts from which the trematodes described in this paper were obtained belong to the Woods Hole, Mass., region.

Unless otherwise designated, all material obtained in the months of September to June, inclusive, was collected by the late Vinal N. Edwards. Notes on living material, as well as notes resulting from a preliminary examination of formalin material, were made in the course of successive summers at the laboratory of the United States Bureau of Fisheries, Woods Hole, Mass.

List of trematodes referred to in these notes with their hosts.

Parasite	Host
<i>Haematotrephus fodiens</i> , new species-----	<i>Gavia immer</i> .
<i>Psilostomum lineatum</i> , new species-----	<i>Larus argentatus</i> .
<i>Psilostomum plicatum</i> , new species-----	<i>Larus argentatus</i> .
<i>Psilostomum varium</i> , new species-----	<i>Gavia immer</i> .
<i>Petasiger nitidus</i> , new species-----	<i>Colymbus auritus</i> .
<i>Himasthla elongata</i> (Mehlis)-----	<i>Larus argentatus</i> .
	<i>delawarensis</i> .
	<i>marinus</i> .
	<i>philadelphia</i> .
	<i>Nycticorax nycticorax naevius</i> .
<i>Himasthla incisa</i> , new species-----	<i>Oidemia deglandi</i> .
<i>Mesorchis pseudoechinatus</i> (Olsson)-----	<i>Larus argentatus</i> .
	<i>atricilla</i> .
	<i>delawarensis</i> .
	<i>marinus</i> .
	<i>philadelphia</i> .
	<i>Colymbus holbölli</i> .
	<i>Gavia immer</i> .
<i>Aporchis rugosus</i> , new species-----	<i>Sterna paradisea</i> .
<i>Stephanochasmus</i> sp-----	<i>Ceryle alcyon</i> .
<i>Cryptocotyle lingua</i> (Creplin)-----	<i>Butorides virescens</i> .
	<i>Gavia immer</i> .
	<i>Larus argentatus</i> .
	<i>atricilla</i> .
	<i>delawarensis</i> .

Parasite	Host
<i>Ascocotyle plana</i> , new species	<i>Butorides virescens</i> .
<i>Levinseniella adunca</i> (Linton)	<i>Crocethia alba</i> .
<i>Parorchis avitus</i> Linton	<i>Larus argentatus</i> .
<i>Galactosomum cochleariforme</i> (Rudolphi)	<i>Fregata magnificens</i> .
<i>Minuthorchis sanguineus</i> , new genus and species	<i>Larus atricilla</i> .
<i>Distomum</i> sp. A	<i>Oidemia perspicillata</i> .
<i>Distomum</i> sp. B	<i>Oidemia perspicillata</i> .
<i>Ornithobilharzia</i> sp.	<i>Larus argentatus</i> .
	<i>philadelphia</i> .
	<i>Nycticorax nycticorax naevius</i> .
	<i>Oidemia deglandi</i> .
<i>Proalaria indistincta</i> (Guberlet)	<i>Larus argentatus</i> .
	<i>atricilla</i> .
<i>Alaria</i> sp.	<i>Larus delawarensis</i> .
<i>Strigea bursigera</i> (Brandes)	<i>Larus argentatus</i> .
	<i>atricilla</i> .
	<i>delawarensis</i> .

HAEMATOTREPHUS FODIENS, new species

Figures 1-6

Free in intestine and encysted in pancreas of a loon (*Gavia immer*).

Body of free worm nearly linear, narrowing slightly toward the anterior end; anterior half finely rugose; mouth small, terminal; anterior tip of body a subtriangular, muscular disk—the oral sucker; no ventral sucker certainly made out. Pharynx near mouth, pyriform; esophagus about twice the length of pharynx; intestinal rami extend to posterior end, where they appear to unite. Testes two, roundish, diagonally placed near the posterior end, and separated from each other by a space equaling or exceeding the diameter of a testis; seminal vesicle on the left side of the genital pore, which is on the median line at about the anterior sixth of the body. Ovary somewhat lobed, in front of the anterior testis and nearly on the median line. The seminal receptacle lies on the right posterior border of the ovary, and on the left anterior border of the first testis. The shell-gland lies along the anterior side and to the right, of the ovary. The uterus is very voluminous and fills the greater part of the interior of the body as far forward as the genital pore. Ova small and very numerous. The vitellaria lie between the lateral margins of the body and the intestinal rami, and extend from about the anterior fifth to near the posterior end.

Dimensions of free specimen in balsam: Length 11 mm.; breadth, at genital pore 1.40, at middle 1.85, at second testis 1.68, length of triangular head 0.21, breadth at base 0.35; pharynx, length 0.24, breadth 0.15; length of esophagus 0.45; ovary, length 0.22, breadth 0.70; first testis, length 0.35, breadth 0.56; second testis, length 0.40, breadth 0.52; ova 0.024 by 0.012.

Forms which were obtained from pedicelled cysts on the serous coat of the pancreas, although differing greatly in appearance from the free form, appear to belong to the same species. This form (fig. 3) is attenuate anteriorly, tapering from near the posterior end, where the breadth in one specimen was 0.80 mm. to a breadth of 0.05 mm. near the anterior end. The entire length of this worm was 15 mm. In this specimen the genital sucker is about 1.20 from the anterior end, and is 0.06 in diameter. The breadth of the body at the level of the genital pore is 0.12. In one of these attenuated forms the pharynx is 0.045 from the anterior end, length 0.045, breadth 0.03. The breadth of the body at the pharynx is 0.07. The testes are variable in shape, in some cases being distinctly lobed. The rami of the intestine, on account of their opaque contents, could be traced in a few cases to the posterior end of the worm, where they appeared to unite, although the actual continuation of the lumen from one to the other was not satisfactorily demonstrated. In the best preparation, although the terminations of the rami are contiguous, they did not appear to unite. The contents of each ended abruptly a short distance from the point of contact (fig. 6). Others removed from cysts, and more or less degenerated, did not show the contents of the intestinal rami approaching as closely as in the case figured. Ova in the free form, in the degenerate forms from cysts, and in cysts which contained only ova, are essentially similar in form and size.

On July 7, 1915, a loon (*Gavia immer*) was examined. It had been taken in a fish trap in Buzzard's Bay, and had been kept in the pool of the United States Bureau of Fisheries for a week before it died. The bird was reported by Vinal N. Edwards to have been "sick" when it was taken. The stomach and intestine were empty.

The pancreas was thickly peppered with dark brown cysts from 1 to 4 mm. in diameter, not of any uniform shape, but mostly rounded or subangular. They occurred on the surface under the serous coat, and also in the substance of the pancreas. The whole pancreas was affected, but not uniformly. At the point where the cysts were most abundant there were about 25 in a space 10 mm. square. When crushed these cysts were found to be filled with small ova. There was some variation in size but the dimensions in sea water were about 0.028 by 0.014 in the two principal diameters. It was noted that some of the ova had a cap at the smaller end. This feature has also been recognized in the mounted material. The maximum dimensions of ova in balsam are about 0.024 by 0.013.

The genital pore in the free form (fig. 1) has become indistinct in the mounted specimen on account of the encroachment of anterior folds of the uterus due to compression.

Type.—Cat. No. 7915, U.S.N.M.; paratype, Cat. No. 7916.

PSILOSTOMUM LINEATUM, new species

Figure 8

Two distomes collected from the intestine of a herring gull (*Larus argentatus*) at Woods Hole by Vinal N. Edwards, January 22, 1915, are here considered.

The longer of the two in formalin measured 5 mm. in length. In balsam the lengths are 3.78 and 2.66, respectively. They are nearly linear throughout with a breadth of about 0.5 mm.

Neck short, evidently much shortened by contraction in these specimens; ventral sucker much larger than oral; pharynx much smaller than oral sucker and contiguous with it; esophagus not plainly seen, but apparently very short; intestinal rami extend to the posterior end. The genital aperture was a little removed from the anterior edge of the ventral sucker and slightly to the left of the median line. In the specimen shown in Figure 8 the neck was somewhat distorted, so that the genital pore is thrown farther from the median line than it would be in an undistorted specimen. The cirrus-pouch is dorsal to the ventral sucker, and has rather weak walls; seminal vesicle relatively long, extending behind the ventral sucker. The two testes are on the median line and separated from each other by a space a little longer than the diameter of a testis. They are relatively large and nearly circular in outline. The anterior testis is a little way back of the middle of the length of the body. The ovary is about on the median line and near the anterior edge of the first testis. It is somewhat pestle-shape, with an elongated anterior lobe, while the broader posterior end is three lobed. There appears to be a seminal receptacle near the anterior edge of the ovary. The uterus lies between the ovary and the ventral sucker, the metraterm passing dorsal to the ventral sucker. The vitellaria are very diffuse, filling the body back of the testes, and extending in rather broad lateral bands as far forward as the posterior margin of the ventral sucker in one of the specimens, and to the level of the middle of the ventral sucker in the other. A vitelline reservoir was visible immediately in front of the ovary, and apparently ventral to the seminal receptacle.

Dimensions of larger specimen in balsam: Length 3.78 mm.; breadth 0.5; diameter of oral sucker 0.20; pharynx, length 0.14, breadth 0.10; diameter of ventral sucker 0.32; ovary, length 0.28, breadth of anterior lobe 0.10, at posterior end 0.15; first testis, length 0.38, breadth 0.30; second testis, length 0.46, breadth 0.38;

ova, collapsed and difficult to determine the exact diameters, longer diameter from 0.06 to 0.08, shorter diameter from 0.03 to 0.04.

Type.—Cat. No. 7917, U.S.N.M.

PSILOSTOMUM PLICITUM, new species

Figure 7

The following description is based on a single specimen mounted in balsam. It is from the intestine of a herring gull (*Larus argentatus*) and was collected at Woods Hole, but the date of collecting is missing.

Body elliptical in outline, longer than broad; margins of neck folded ventrally and projecting in front of the ventrally placed oral sucker; ventral sucker at about the anterior third and of about the same size as the oral sucker; pharynx relatively large, adjacent to oral sucker; esophagus none; rami of intestine begin at anterior edge of ventral sucker and extend to the posterior end; genital pore in front of ventral sucker, about at the level of the posterior end of the pharynx; cirrus-pouch at left side of ventral sucker, somewhat elongate, its posterior end functioning as a seminal vesicle; testes two, at about the posterior third, contiguous. The posterior testis is about on the median line, the anterior, for the most part, to the right of the median line. The ovary is at the antero-median border of the first testis. It is made up of small, rounded lobes, which give to it a morulalike effect. Near its postero-median border there is a seminal receptacle. The vitellaria fill the greater part of the body from the posterior end as far forward as the level of the middle of the ventral sucker. The uterus is between the ventral sucker and the ovary. The metraterm, dorsal to the ventral sucker, appears to have rather thick, muscular walls; ova few.

Dimensions in balsam: Length 1.68 mm; maximum breadth, about the middle, 0.84; diameter of oral sucker 0.20, of pharynx 0.13, of ventral sucker 0.18; ova 0.06 by 0.04.

Type.—Cat. No. 7918, U.S.N.M.

PSILOSTOMUM VARIUM, new species

Figure 9

A single distome, found in the inetstine of a loon (*Gavia immer*), at Woods Hole, September 1, 1911, is here described.

The following color notes were made on the living worm: General color effect purple. When the specimen was compressed the testes and ovary were seen to be a very brilliant magenta; the cirrus-pouch faint pink; rami of intestine throughout faint reddish; the very voluminous vitellaria dull, opaque magenta.

Dimensions, life, uncompressed: Length 1.68 mm.; breadth, anterior 0.21, middle 0.65; diameter of oral sucker 0.28, of pharynx 0.19(?), ventral sucker 0.42; ova 0.088 by 0.064. Length after compression 1.96.

Dimensions in balsam: Length 1.54; maximum breadth 0.70; diameter of oral sucker 0.21, pharynx 0.13, ventral sucker 0.33; ova 0.08 by 0.05.

Body more or less fusiform, bluntly rounded at extremities; ventral sucker much larger than oral, and placed at about the anterior third. It is provided with a sphincter, but does not appear to be as muscular as the oral sucker. Pharynx adjacent to oral sucker; esophagus none; rami of intestine extend to posterior end of the body. The cirrus-pouch is relatively large, thin-walled, long-pyriform, its posterior portion acting as a seminal vesicle. It is dorsal to the ventral sucker and extends for a short distance in front of the anterior border of the ventral sucker. The genital pore is about on the median line near the posterior border of the oral sucker. The testes are broader than long (length 0.13, breadth 0.27), contiguous, one following the other on the median line, about half way between the ventral sucker and the posterior end; ovary oval-elliptical in outline, a little to the left of the median line in front of the testes and near the ventral sucker, length 0.15, breadth 0.13. The vitellaria fill all the space back of the testes and extend in a broad band, approximately equal to one-third the breadth of the body, along each lateral margin to the level of the pharynx. The uterus lies between the first testis and the ventral sucker. It passes along the dorsal side of the ventral sucker a little to the right of the median line, and parallel with the seminal vesicle, to the genital pore. The ova are large, and, considering their size, rather many—approximately 75.

The most conspicuous feature in the mounted specimen is the widely diffused, brownish red vitelline gland. In life the most striking characteristic was the differential coloration.

Type.—Cat. No. 7919, U.S.N.M.

PETASIGER NITIDUS, new species

Figures 10-16

From intestine of horned grebe (*Colymbus auritus*).

Small, fusiform; head reniform with 19 spines in a single circle uninterrupted dorsally; length of spines at ventral angles of head 0.14, elsewhere 0.12; neck concave ventrally, densely covered with small spines becoming sparingly scattered on the body; ventral sucker near the middle of the length, much larger than the oral sucker; pharynx longer than broad, separated from the oral sucker by a short prepharynx; esophagus long; rami of the intestine begin

at about the level of the anterior border of the ventral sucker and extend to the posterior end of the body. The genital pore is at the anterior border of the ventral sucker a little to the left of the median line. Testes two, contiguous, diagonally placed, about half way between the center of the ventral sucker and the posterior end; cirrus-pouch and seminal vesicle dorsal to the anterior border of the ventral sucker. Ovary subglobular, at right anterior border of testes; uterus in front of ovary and testes, the ova relatively few and lying mainly between the testes and the ventral sucker, but a few usually in the metraterm dorsal to the ventral sucker, about 0.084 by 0.054 in the two principal diameters. The vitellaria are diffuse and extend from the level of the genital pore nearly to the posterior end. Excretory vessel behind the testes spacious.

From a series of transverse sections the following interpretations were made: In one section near the posterior edge of the ventral sucker, the opening of Laurer's canal was seen on the dorsal side of the section. In the next two sections the canal is seen passing ventrad along the right side of the first testis. It then turns to the dorsal side of the testis, and, proceeding dorso-sinistrad, enters the shell-gland, which lies for the most part on the left side of the ovary. In the fourth section the germ duct and the vitelline duct from the transverse vitelline reservoir, which lies along the dorsal side of the testis, between it and the postero-ventral border of the ovary, were seen entering the shell-gland. In the first of these four sections an ovum was observed in the oviduct still within the shell-gland.

The neck in all the preserved material is strongly flexed ventrad, and measurements are consequently rather difficult to make.

Following are dimensions of a specimen in balsam: Length 1.96 mm.; maximum breadth (at ventral sucker) 0.63; breadth of head, excluding spines, 0.28, of neck 0.21; oral sucker, length 0.105, breadth 0.063; ventral sucker, length 0.31, breadth 0.34; pharynx, length 0.096, breadth 0.051; ova 0.09 by 0.05. The ventral sucker is 0.7 mm. from the anterior end and the testes 0.5 from the posterior end. In another specimen the oral spines had the following dimensions: Spines at ventral angles of the head, length 0.144 to 0.150, breadth 0.024; lateral spines, length 0.105 to 0.120, breadth 0.018.

Type and paratype.—Cat. No. 7920, U.S.N.M.

RECORD OF COLLECTIONS

Colymbus auritus.

1905, December 25. 60. Uniformly short and plump. Dimensions in formalin: Length 1.47; breadth, anterior 0.33, middle 0.56, posterior 0.16; diameter of oral sucker 0.09, of pharynx 0.05, of ventral sucker 0.30; ova 0.088 by 0.054.

- 1915, January 7. 104. Dimensions in formalin: Length 2.25; diameter of head, including spines, 0.45, of neck 0.30, of body at middle 0.70, near posterior end 0.22.

HIMASTHLA ELONGATA (Mehlis)

Figures 17-20

1831. *Distomum elongatum* MEHLIS, Isis, p. 177.
1892. *Echinostomum elongatum* (Mehlis) STOSSICH, Boll. Soc. adriat. Sc. nat. Trieste, vol. 13, p. 39.
1909. *Distomum elongatum* (Mehlis) DIETZ, Zoolog. Anzeig., vol. 34, p. 184.
Himasthla elonga (Mehlis) DIETZ, Die Echinostomiden d. Vogel. Inaug. Diss., Konigsberg, p. 16.
1910. DIETZ, Zoolog. Jahrb., Suppl. 12, pp. 360-363, pl. 13, fig. 25.

Larus argentatus, *L. marinus*, *L. ridibundus*.

Woods Hole, Mass.: *Larus argentatus*, *L. delawarensis*, *L. marinus*, *L. philadelphia*, *Nycticorax nycticorax*, intestine.

These distomes, while they vary considerably in size and proportions, appear to belong to the same species, and are in such close agreement with *H. elongata* that it seems best to refer them to that species in spite of the difference in the number of circum-oral spines.

H. elongata is characterized by having 29 circum-oral spines, of which the two which are situated at each angle of the oral disk are smaller than the others. In all the specimens in which they could be distinctly seen in the Woods Hole material, the number of oral spines was found to be 31, arranged as shown in Figure 18. Furthermore, there is little difference in the length of the spines. The apparent difference in the camera lucida sketches is due to foreshortening.

Body slender, nearly linear, neck spinose, concave on ventral side; oral sucker ventro-terminal, small, surrounded by a reniform, spine-bearing disk. The circle of spines is interrupted below so as to have a somewhat horseshoe shape. The number of oral spines is 31, of which 27 are around the border and 2 at each posterior angle of the disk. The spines differ little in size, the length being about 0.054, breadth 0.014. Pharynx near the oral sucker, longer than broad; esophagus slender; rami of intestine begin at anterior border of ventral sucker and extend to the posterior end of the body; ventral sucker much larger than oral, in some cases nearly circular in outline, in others longer than broad. Genital pore on median line at anterior border of ventral sucker; cirrus long and covered with spines; cirrus-pouch elongate and posterior to ventral sucker, with a spacious seminal vesicle at its posterior end. In a series of

tangential sections the seminal vesicle is 0.56 mm. in length and 0.20 in diameter. Testes near the posterior end of the body, one following the other, in most cases elliptical in outline and much longer than broad; ovary subglobular, nearly on the median line, or a little to the right, a short distance in front of the first testis, from which it is separated by the rather conspicuous shell-gland and vitelline reservoir, and beginning of the uterus. Laurer's canal was traced from its opening on the dorsal surface, at the level of the ovary, to the vicinity of the beginning of the uterus, which appeared to contain sperm and germ cells associated with ova while still enveloped by the shell-gland. The vitellaria begin a little in front of the base of the seminal vesicle and extend along the lateral margins to the level of the posterior end of the second testis. Back of this point the vitellaria in most cases fill the body. In transverse sections the excretory vessel is seen to divide at the second testis into a right and left branch, which could be traced forward to the ovary, but are difficult to distinguish in sections through the uterus, where, with the exception of a small area at each side occupied by the vitellaria, the interior is filled with ova. The uterus fills the central region of the body from the ovary to near the seminal vesicle. Thence forward it is a straight duct, the metratrem, which passes on the dorsal side of the ventral sucker and opens at the genital pore immediately in front of the cirrus. The ova measure from 0.08 to 0.11 mm. in the longer, and from 0.05 to 0.06 in the shorter diameter.

Following are tabulated measurements of balsam mounts from different hosts.

	Larus argentatus			Larus delawar- ensis	Larus mar- inus	Larus philadel- phia	Nycti- corax nyc- ticorax
Length-----	10.00	3.64	6.58	5.46	7.00	8.00	6.50
Maximum breadth-----	.42	.63	.63	.35	.63	.84	.50
Diameter of head-----	.30	.32	.39	.20	.27	.28	.28
Diameter of oral sucker-----	.08	.11	.11	.11	.09	.10	.09
Length of pharynx-----	.09	.09	.11	.11	-----	.15	.08
Breadth of pharynx-----	.05	.06	.07	.08	-----	.10	.06
Diameter of ventral sucker-----	.28	.28	.35	.27	.28	.35	.28
Length of first testis-----	.72	.25	.42	.42	.65	-----	.29
Breadth of first testis-----	.25	.25	.35	.20	.35	-----	.21
Length of second testis-----	.80	.24	.49	.39	.70	-----	.39
Breadth of second testis-----	.25	.28	.35	.20	.20	-----	.23
Diameter of ovary-----	.15	.17	.20	.13	.18	-----	.13
Distance of ventral sucker from anterior end-----	.30	.45	.73	.56	.30	.42	.64
Distance of second testis from posterior end-----	.63	.31	.59	.28	.56	-----	.77
Ovum, longer diameter-----	.105	.09	.10	.11	.105	.10	.096
Ovum, shorter diameter-----	.06	.05	.05	.06	.063	.54	.051

RECORD OF COLLECTIONS

Larus argentatus.

- 1912, February 16. 25.
 17. 28.
 19. 2.
- 1913, January 30. 30. 10 mm., more or less.
 November 3. 1, and fragment.
 17. 1.
 21. 4. Two of these were exceedingly slender, 15
 and 20 mm. in length respectively, filiform
 for a good part of the length.
- 1914, January 10. 1.
 22. 12.
 September 10. 385. The largest, in sea water, measured 8
 mm. in length and 0.65 in breadth. A small
 immature specimen measured 1.27 in length
 and 0.60 in breadth.
 December 16. 3. Maximum length, in formalin, 8.5.
 23. Number not recorded, slender, linear from 5 to
 15 mm. in length.
- 1915, January 22. 267, young and adult.
 February 18. 4, young.
 September 29. 1. Length in formalin 5.25, maximum diam-
 eter, at level of testes, 0.56.
 November 10. 4, maximum 7 mm.
- 1916, January 8. 11. Attenuated, longest 11.5 mm.
 February 17. 1 and fragment.
 March 9. 69 and a few fragments.
- 1917, January 18. 11 and fragments.
- 1920, December 18. 129, largest, in alcohol, length 7 mm. Collected
 by R. A. Goffin. (Cat. No. 7921, U.S.N.M.)

Differences in length of adult worms are due mainly to the degree of development of the uterus.

This is shown by the following measurements made on four specimens in which ova had made their appearance in the uterus, which is limited to the space between the ventral sucker and the ovary.

Length	Distance from anterior end to posterior end of ventral sucker	Distance from ventral sucker to ovary	Distance from ovary to pos- terior end
9.14-----	0. 60	5. 88	2. 66
7.37-----	1. 05	3. 78	2. 54
3.68-----	. 84	1. 82	1. 02
3.15-----	. 77	1. 43	. 95

Larus delawarensis.

1914, January 24. 11. These distomes are rather more slender than are those from the other species of gull. In a series of sections the cirrus appears to be smooth. The ova are large, 0.11 by 0.06 in a whole mount, and from 0.08 by 0.04 to 0.12 by 0.05 in sections. (Cat. No. 7922, U.S.N.M.)

Larus marinus.

1922, January 10. 1. (Cat. No. 7923, U.S.N.M.)

Larus philadelphia.

1913, April 13. 1, fragment, posterior end missing.

Nycticorax nycticorax naevius.

1914, September 11. 1. (Cat. No. 7924, U.S.N.M.)

HIMASTHLA INCISA, new species

Figures 21-33

From intestine of white-winged scoter (*Oidemia deglandi*).

Head reniform and surrounded by a circle of about 27 spines uninterrupted dorsally; neck short, concave beneath, densely covered with minute spines set in transverse rows. Margins of neck finely serrate, the serrations becoming more marked posteriorly, the body from a level a little back of the ventral sucker to near the posterior end being transversely and sharply corrugated. Body nearly linear, and rather slender. Oral sucker nearly circular; pharynx longer than broad, near oral sucker; ventral sucker circular and much larger than oral. In sections there appeared to be a short esophagus, although none could be seen in the whole mount. The intestinal rami extend to the posterior end of the body. The genital pore opens immediately in front of the ventral sucker; cirrus-pouch and seminal vesicle extend far back of the ventral sucker; in the mounted specimen the posterior end of the seminal vesicle was 1.25 mm. back of the ventral sucker. The testes are oval-elliptical, one following the other, and near the posterior end of the body. The subglobular ovary is situated a little to the right of the median line in front of the first testis, from which it is separated by the relatively large shell-gland, vitelline reservoir, and beginning of the uterus. The vitellaria are abundant and extend from the posterior end of the body to within a short distance (0.5 mm. in the mounted specimen) of the ventral sucker. The uterus fills the central space between the vitellaria from the ovary nearly to the seminal vesicle, from which point the metraterm leads to the genital pore; ova rather numerous, about 0.112 by 0.057 in the two principal diameters. Some details

of the anatomy are shown in the figures. Laurer's canal opens dorsally on the median line on a level with the posterior border of the ovary. It passes laterad along the dorsal border of the ovary, then turns medio-ventrad to the uterus, the earlier portions of which contain sperm. The excretory vessel behind the second testis is spacious. It divides at the posterior end of the second testis. The exact number of oral spines could not be made out in the balsam mount. There are at least 27. There is a single row, except at the lateral angles. (Fig. 23, sketched from a transverse section.) The longest spine measured 0.051 in length and 0.018 in breadth, shorter spine 0.039 in length and 0.012 in breadth. A striking character in the structure of the body wall is the layer of longitudinal muscle fibers. These are indicated in the sketches of transverse sections. (Figs. 32, 33.)

Dimensions of specimen mounted in balsam: Length 9 mm.; breadth, at level of ventral sucker 0.63, at ovary 1.17, 1 millimeter from posterior end 0.91; oral sucker, length 0.11, breadth 0.10; pharynx, length 0.09, breadth 0.056; ventral sucker, diameter 0.38; distance of anterior border of ventral sucker from anterior end 0.35; diameter of ovary 0.28; first testis, length 1.12, breadth 0.35; second testis, length 1.05, breadth 0.40. In a series of sections: Diameter of oral sucker 0.12; pharynx, length 0.10, breadth 0.08; diameter of ventral sucker 0.31.

Type.—Cat. No. 7925, U.S.N.M.

RECORD OF COLLECTION

Oidemia deglandi.

1914, June 2. 2. The living worms red, according to record of Vinal N. Edwards, collector.

MESORCHIS PSEUDOECHINATUS (Olsson)

Figures 34-42

- 1876. *Distomum pseudoechinatum* OLSSON, Svensk, Vetensk. Akad. Handl., vol. 14, p. 21, pl. 4, figs. 45-49.
- 1892. *Echinostomum pseudoechinatum* OLSSON STOSSICH, Boll. Soc. adriat. Sc. nat., Trieste, p. 166 (p. 24 of reprint).
- 1898. ——— MUHLING, Arch. Naturg., Jg. 64, vol. 1, p. 21.
- 1899. *Echinostomum pseudoechinatum* OLSSON STOSSICH, Boll. Soc. adriat. Sc. nat., Trieste, vol. 19, p. 13.
- 1899. *Echinostomum pseudoechinatum* (Olsson) LOOSS, Zoolog. Jahrb., vol. 12, Syst., pp. 685-686, pl. 25, figs. 11, 12, 15a.
- 1909. *Echinostomum* (*Mesorchis*) *pseudoechinatum* (Olsson) DIETZ, Zool. Anz., vol. 34, p. 183.
- 1909. *Mesorchis pseudoechinatus* (Olsson) DIETZ, Inaug. Diss., Königsberg, p. 31.
- 1910. ———, Zool. Jahrb. Sup. 12, p. 451-452.

Larus marinus.

Woods Hole, Mass.: *Larus argentatus*, *L. atricilla*, *L. delawarensis*, *L. marinus*, *L. philadelphia*, *Colymbus auritus*, *C. holböllii*, *Gavia immer*, intestine.

These distomes from the intestines of five species of gull, two species of grebe, and the loon appear to be the same species as that described by N. C. Gilbert from the loon.¹ They agree in the following characters: Oral sucker small, head reniform, surrounded by a single circle of spines interrupted on the dorsal side. The number of spines in the oral circle is 22, and they are of nearly equal size, length 0.065 to 0.07, breadth 0.015 to 0.020. The postero-median spines on each side are a little smaller than the others. Neck and anterior part of the body spinose; neck, except in relaxed and partly macerated specimens, rather short and more or less tapering; body usually nearly linear, but in some cases thickening in the vicinity of the testes or ventral sucker. There is a short prepharynx; pharynx longer than broad, its length approximating the diameter of the oral sucker; esophagus longer than pharynx; intestinal rami begin a short distance in front of the ventral sucker and extend to the posterior end of the body; ventral sucker from two to three times the diameter of the oral sucker. Testes two, following one another, either contiguous or separated, and either oval-elliptical, quadrilateral, or subtriangular in outline, depending on age and condition. In many cases the first testis is quadrilateral and the second subtriangular. In a few cases the testes were slightly diagonal, apparently not due entirely to distortion of the body. Those cases in which the testes were oval-elliptical, and separated from each other, were more or less flaccid, some of them even showing signs of maceration. They had lost both oral and body spines. The cirrus-pouch and seminal vesicle are short and at the antero-dorsal surface of the ventral sucker. The ovary, usually subglobular, is a little way in front of the first testis, from which it is separated by a short space in which lie the transverse yolk reservoir, the shell-gland, and the beginning of the uterus. The uterus lies between the ovary and the ventral sucker. Ova not numerous, in balsam measuring from 0.081 to 0.09 in the longer, and from 0.048 to 0.054 in the shorter diameter. The vitellaria are massed in the posterior end of the body, which is more or less elongated, behind the testes, and extending forward, in some cases not beyond the posterior margin of the second testis, in others extending to different levels on one or both sides of the testes, but not extending in front of the first testis. In older individuals there is a clear space on the median line back of the testes separating the vitellaria into two lateral masses. In young, robust individuals

¹ Occurrence of *Echinostomum spinulosum* Rudolphi, Amer. Nat., vol. 39, pp. 925-927.

the post-testicular region is filled completely with the vitellaria. Usually the testes are situated a little in front of the middle of the post-acetabular region of the body.

Average length of 24 specimens in balsam 3.93, average maximum breadth of same 0.43. Of these the longest measured 6.13 in length and 0.49 in breadth; the shortest, 1.44 in length and 0.22 in breadth; the broadest, 2.52 in length and 0.68 in breadth; the narrowest, 1.44 in length and 0.22 in breadth. Transverse diameter of oral sucker, average of 18 in balsam, 0.11, of pharynx 0.06, of ventral sucker 0.27; length of pharynx, 0.10.

Dimensions of testes, average of 13, in balsam: First testis, length 0.32, breadth 0.32; second testis, length 0.39, breadth 0.33; shortest first testis, length 0.14, breadth 0.42; longest first testis, length 0.55, breadth 0.34; shortest second testis, length 0.20, breadth 0.38; longest second testis, length 0.67, breadth 0.42.

Anterior limits of vitellaria in 30 mounted specimens: Anterior edge of first testis 6; between the middle and anterior edge of first testis 13; between posterior edge and middle of first testis 10; posterior edge of second testis 1. Distance of posterior margin of second testis from anterior end, average of 29, 2.04; same from posterior end 1.54, a ratio of 4 to 3. Departures from this ratio were: 2.10 to 2.59, or a ratio of 4 to 5, and four cases where the ratio was 2 to 1. The greatest departure from the ratio 4 to 3 is the example from the loon (fig. 42), where the ratio is 1.74 to 0.36, or nearly 5 to 1. This specimen suggests Dietz's *Monilifer spinulosus* (Rudolphi).

RECORD OF COLLECTIONS

Larus argentatus.

- | | | | |
|---------------|-----|-----|--|
| 1913, April | 8. | 14. | Note on formalin material: Anterior half of body white, posterior filled with vitellaria, bluish; larger example, length 5.80, breadth 0.64; smaller example, length 3.80, breadth 0.38. |
| 1915, August | 13. | 5. | (Cat. No. 7926, U.S.N.M.) |
| September | 1. | 1. | |
| 1917, January | 17. | 1. | |
| | 18. | 28. | In the younger individuals the testes are contiguous, the anterior more or less quadrangular, the posterior somewhat triangular in outline. In the older specimens the testes are elliptical in outline and are separated by a short interval. Dimensions in balsam: Length 3.5; diameter of head 0.30; maximum diameter, a little way back of ventral sucker, |

0.56; diameter of oral sucker 0.10, of pharynx 0.06, of ventral sucker 0.24; length of pharynx 0.10; ovum 0.08 by 0.05; length of oral spines about 0.07, breadth about 0.02.

1927, August 13. 1.

Larus atricilla.

1904, August 12. 2 gulls examined, 2 distomes from one, 1 from the other; ova 0.080 by 0.058.

1911, July 24. 2. Dimensions, balsam: Length 3.32; maximum breadth 0.46; diameter of head 0.22, of oral sucker 0.11, of pharynx 0.07, of ventral sucker 0.25; length of pharynx 0.09; ovary, length 0.16, breadth 0.21; first testis, length 0.29, breadth 0.31; second testis, length 0.59, breadth 0.38. (Cat. No. 7927, U.S.N.M.)

Larus delawarensis.

1914, January 24. 9. Note on formalin material: Slender, flaccid, and slightly macerated; most of the oral spines and all of the body spines missing. Dimensions in balsam: Length 6.45; maximum breadth 0.39; diameter of oral sucker 0.09, of pharynx 0.06, of ventral sucker 0.27; length of pharynx 0.09; diameter of ovary 0.14; first testis, length 0.36, breadth 0.25; second testis, length 0.67, breadth 0.24; ovum 0.087 by 0.051. (Cat. No. 7928, U.S.N.M.)

Larus marinus.

1914, April 28. 2. Length, in balsam, 4 mm. As nearly as can be made out there are 22 spines around the mouth, 0.069 in length and 0.018 in breadth. The neck is thickly beset with stout spines arranged in diagonal rows. There is a space on the neck of about 0.15 between the oral spines and the neck spines which is smooth. The spines become sparse toward the base of the neck, but may be seen along the margin of the body back to a point opposite the middle of the posterior testis. The testes are situated at about the middle of the length of the body, contiguous with each other in one, separated by a short space in the other. In ventral view the anterior testis is elliptical in outline, but with its anterior border nearly straight, breadth 0.49, length 0.25; posterior

testis somewhat triangular in outline, breadth 0.49, length 0.35. In lateral view the testes are somewhat quadrilateral in outline. (Cat. No. 7929, U.S.N.M.)

Larus philadelphia.

1912, November 15. 1. Length in balsam 4.62.

December 21. 5. From 3 to 4 mm. in length. (Cat. No. 7930, U.S.N.M.)

1914, November 13. 8. Slender, longest about 4 mm.

Colymbus auritus.

1905, December 25. 2. Length in formalin 4.5 mm.

Colymbus holbölli.

1914, February 18. 2. Lengths approximately 2.5 and 4 mm. In each the diameter of the oral sucker is 0.14, of the ventral sucker 0.28; ovum 0.08 by 0.05; length of oral spines 0.07. One of the worms is slender, length 4 mm.; maximum breadth, at level of testes 0.38; first testis, length 0.28, breadth 0.24; second testis, length 0.35, breadth 0.24. The other is fusiform (fig. 41), length 2.5 mm.; maximum diameter 0.64; first testis, length 0.14, breadth 0.42; second testis, length 0.24, breadth 0.29. (Cat. No. 7931, U.S.N.M.)

Gavia immer.

1911, July 24. 5. These distomes, while differing considerably in the proportions of the body behind the testes, agree in all essentials with those from the herring gull. Lengths, in balsam, from 1.50 to 3.15 mm., breadths from 0.21 to 0.38. The ratio of the portion of the body behind the testes to that in front of the testes varies from 1:1 to 2:1. The vitellaria extend to the anterior edge of the first testis in one, to the posterior edge of the first testis in another, and to about the middle of the first testis in the others: ova 0.09 by 0.054. (Cat. No. 7932, U.S.N.M.)

September 1. 1. This specimen differs from those of the foregoing date in the relatively short post-testicular region. (Fig. 42.) Dimensions in balsam: Length 2.20; breadth 0.70; diameter of oral sucker 0.13, of pharynx 0.08, of ventral sucker 0.30; length of pharynx 0.10, of ven-

tral sucker 0.24; ova 0.087 by 0.054; oral spines about 0.06 in length and 0.018 in breadth. (Cat. No. 7933, U.S.N.M.)

This specimen suggests Dietz's *Monilifer spinulosus* Rudolphi (Zool. Jahrb. Sup. 12, pp. 465-470, pl. 15, fig. 51) and Looss's *Echinostomum euryporum* Looss (Zool. Jahrb. 12, pp. 686-7, pl. 25, figs. 16, 17).

1913, December 31. 1. In formalin, length 2.85, breadth 0.55. Dimensions in balsam: Length 1.96; maximum breadth, at level of testes, 0.45; diameter of oral sucker 0.12, of pharynx 0.07, of ventral sucker 0.28; length of pharynx 0.10; ova 0.078 by 0.054.

APORCHIS RUGOSUS, new species

Figures 43-49

A distome from the intestine of an Arctic tern (*Sterna paradisea*) at Woods Hole, August 17, 1912, although no oral spines were present, is referred to Fuhrmann's genus *Aporchis*.

Dimensions in life: Length 17 mm.; breadth, anterior 0.22, at ventral sucker 0.44, about middle of length 0.73, towards posterior end, maximum, 1.12; ovum, exclusive of the long filament, 0.11 by 0.03.

Body elongate, slender, tapering gradually to the anterior end from a point near the posterior end, which is very slightly narrowed and bluntly rounded. Mouth subterminal, head reniform; no oral spines present, but what were interpreted as faint indications of evanescent spines were seen. Neck covered with blunt, papillate spines in close, transverse rows. Spines on anterior part of the body rather irregularly placed, becoming sparse at level of anterior limits of the vitellaria. On the lateral margins these papillate spines are very irregular (fig. 47), and show a tendency to slough off. The posterior third of the body is distinctly serrate on the lateral margins. (Fig. 48.)

Dimensions in balsam: Length 16 mm.; breadth of head 0.17, at level of ventral sucker 0.35, at middle of length 0.70, near posterior end 0.80; diameter of oral sucker 0.09, of pharynx 0.05, of ventral sucker 0.22; ovary, length 0.14, breadth 0.26; first testis, length 0.22, breadth 0.39; second testis, length 0.25, breadth 0.35; ova from 0.08 to 0.11 in length, excluding the long filament, and about 0.03 in the shorter diameter; distance of anterior border of ventral sucker from anterior end 0.35.

The pharynx is pyriform, a little longer than broad, and contiguous to the oral sucker. The esophagus extends to the anterior border of the ventral sucker; rami of intestine reach to the posterior end of the body; genital pore at the anterior border of the ventral sucker, a little to the left of the median line. The cirrus appears to be smooth; cirrus-pouch slender, on the dorsal side of the left border of the ventral sucker, about 0.5 in length, not including its continuation into the seminal vesicle, which is about 0.17 mm. in length. Testes two, near together on the median line, and near the posterior end of the body; second testis 0.6 mm. from the posterior end. Ovary oval, with the longer diameter transverse, in front of testes, most of it to the right of the median line. The ovary is separated from the first testis by a short space in which lie the shell-gland, seminal receptacle, vitelline ducts, and the beginning of the uterus. In front of the testes, for a distance of about 8.5 mm. the folds of the uterus, crowded with ova, fill the body between the marginal vitellaria. For a considerable distance behind the ventral sucker the uterus is somewhat tortuous in its course to the genital pore. Near the ventral sucker it lies dorsal and median to the cirrus-pouch. The vitellaria are lateral and lie in a narrow line along each lateral margin from a point near the middle of the length to a short distance in front of the ovary.

A distinctive feature of the stained and mounted specimen is the occurrence of strong longitudinal muscle bundles from the level of the ventral sucker to the posterior end. Behind the testes about 24 of these bundles could be seen. The peculiar papillate spines are also a conspicuous character. The filament, attached to an ovum, is very long. The example illustrated (fig. 49) was lying isolated from other ova in the metraterm, and the filament was traced with the aid of a camera lucida.

Type.—Cat. No. 7934, U.S.N.M.

STEPHANOCHASMUS species

On August 15, 1913, a kingfisher (*Ceryle alcyon*) was examined at Woods Hole. The only parasite found was an encysted distome in the stomach. The stomach of the bird was filled with small fish (*Menidia notata*).

Since the worm was still enclosed in its cyst, and associated with recently ingested food, with which it was probably introduced, it will be best not to regard the kingfisher as a final host of this parasite.

Diameter of cyst in sea water 1.12 mm. Dimensions in balsam, specimen compressed: Diameter of cyst 1.16; length of distome 1.96; diameter, lateral view, anterior 0.14, at pharynx 0.21, at ventral

sucker 0.29, near posterior end 0.58; oral sucker, length 0.11, diameter 0.11, pharynx, length 0.17, diameter 0.13; ventral sucker, length 0.29, diameter 0.21. There is a double row of spines around the mouth. The neck is covered very densely, and the body less densely with short spines. (Cat. No. 7935, U.S.N.M.)

CRYPTOCOTYLE LINGUA (Creplin)

1825. *Distoma lingua* CREPLIN, Observationes de entozois, pp. 47-48 (in *Lurus marinus*, var. *maximus*).
 1899. *Tocotrema lingua* (Creplin), Looss, Zool. Jahrb. Syst., vol. 12, p. 586.
 1903. *Cryptocotyle lingua* (Creplin), FISCHÖEDER, Zool. Jahrb. Syst., vol. 17, p. 548.
 1905. *Dermocystis ctenolabri* STAFFORD, Zool. Anz., vol. 28, p. 682 (in gills and skin of *Ctenolabrus adspersus*).
 1918. *Hallum caninum* WIGDOR, Journ. Amer. Vet. Med. Assn., Baton Rouge, La., pp. 254-257 (intestine of dog).
 1920. *Cryptocotyle lingua* (Creplin, 1925) FISCHÖEDER, 1903, Ransom, Proc. U. S. Nat. Mus., vol. 57, pp. 544-548; bibliography, pp. 570-573.

Woods Hole, Mass.: Adult stage in intestine of *Butorides virescens*, *Colymbus auritus*, *Gavia immer*, *Larus argentatus*, *L. delawarensis*, *Nycticorax nycticorax*, *Sterna dougalli*, *S. hirundo*. Encysted in gills, fins, and skin of *Ctenolabrus adspersus*, *Tautoga onitis*, and other species of fish.

This distome has already been made the subject of a report (Linton. *Tocotrema lingua* (Creplin), Jour. Parasit., March, 1915, vol. 1, pp. 128-134, text figures 1 to 3B).

RECORD OF COLLECTIONS

In the report cited a list of the hosts, in which this worm was found in the alimentary canal, was given. Following are additions to the record of collections reported in 1915:

Butorides virescens.

- 1912, August 2. 1, young; length 0.40, breadth 0.18. The stomach of the heron was filled with nearly digested fish, among which a cunner (*Tautogolabrus adspersus*) was noted. Plainly the distome had survived the removal of the cyst in which it had doubtless been enclosed when introduced with the food.

Gavia immer.

- 1915, July 7. Few.
 August 11. Very numerous. The intestine of the loon, throughout almost its whole length, was thickly peppered with these worms, visible as minute, dark specks, on account of the clusters of dark brown eggs in the uterus.

- 1916, July 4. Many; 602 counted.
Larus argentatus.
 1914, January 22. Many; 1,504 counted.
 1915, January 22. Many; 357 counted.
 February 18. 1.
 October 5. 25.
 1916, January 6. 1.
 8. 23.
 1917, January 18. 104. Vinal Edward's note was: "Many small worms."
 1927, August 13. 113, from intestines of 2 gulls.
Larus atricilla.
 1911, August 15. Recorded, but number not given, adult. (Cat. No. 7938 U.S.N.M.)
Larus delawarensis.
 1914, January 24. 2, adult with ova; length 1.33 breadth 0.46; ova 0.04 by 0.02. (Cat. No. 7939, U.S.N.M.)

ASCOCOTYLE PLANA, new species

Figure 50

Two small distomes, collected from the intestine of a green heron (*Butorides virescens*), at Woods Hole, September 11, 1912, although they are devoid of the circle of spines around the oral sucker, and of spines on the body, which are characteristics of Looss's genus *Ascocotyle*,² are in such close agreement in other respects with that genus that it seems best to regard the spines as an evanescent character.

Outline of body ovate, tapering to the anterior end, bluntly rounded posteriorly, broadest at about the posterior third. Oral and ventral suckers small, about equal, each a little broader than long; pharynx nearly cylindrical, a little longer than broad; prepharynx ample, somewhat saclike; esophagus slender; intestinal rami short, reaching barely to the level of the anterior border of the ventral sucker, which is situated at about the middle of the length of the body. Genital aperture on median line at anterior edge of ventral sucker; cirrus-pouch dorsal and to the left of the ventral sucker; seminal vesicle large, on median line behind ventral sucker, from which it is separated by a space greater than the diameter of the ventral sucker. The two testes are situated at the posterior end, transversely placed, their inner ends closely apposed at the median line, their transverse diameter much greater than the longitudinal; ovary a little to the right of the median line, between the right testis

² Zool. Jahrb., 1899, pp. 698-9, pl. 26, fig. 23.

and the seminal vesicle. There is a small seminal receptacle at the postero-median edge of the ovary. The vitelline glands are at the postero-lateral margins of the body. They are somewhat irregular in outline, rather compact, the length of each a little less than half the length of the post-acetabular region. The uterus occupies practically all the space in front of the testes and vitellaria as far as the level of the anterior border of the ventral sucker, except what is taken up by the ovary and seminal vessels. The ova, which fill this space, are golden yellow, except in the vicinity of the ovary, where they are thin-shelled, and have taken the stain. The mass of ova prevents the making out of further details of structure.

Dimensions of larger specimen, life: Length 0.75 mm.; maximum breadth 0.34; breadth of oral sucker 0.051, of ventral sucker 0.054; pharynx, length 0.05, breadth 0.03; ova 0.02 by 0.01.

Dimensions in balsam: Length 0.67; maximum breadth 0.32; oral sucker, length 0.03, breadth 0.04; pharynx, length 0.030, breadth 0.027; ventral sucker, length 0.036, breadth 0.045; prepharynx, length 0.09, breadth 0.03; esophagus, length 0.075, breadth 0.012; testes 0.096 by 0.054 and 0.090 by 0.045; ovary, length 0.072, breadth 0.063; ova 0.020 by 0.012.

Type.—Cat. No. 7940, U.S.N.M.

LEVINSENIELLA ADUNCA (Linton)

Figure 51

1905. *Distomum aduncum* LINTON, Bull. U. S. Bureau of Fisheries, vol. 24, p. 409, figs. 195-197, intestine of *Opsanus tau*.

Following are a few details, mainly from notes made at the time of collecting, of a small distome from the intestine of a Sanderling (*Crocethia alba*) shot near Cape Lookout, N. C., by Dr. John D. Milligan of the steamer *Fish Hawk*, August 15, 1902. It was noted that the distome appeared to be identical with a species found in the toad fish (*Opsanus tau*), at Beaufort, N. C. The specimen had lain in sea water over night before it was examined and the ventral and genital suckers were rather faintly shown.

Dimensions in sea water, compressed: Length 0.8 mm.; breadth, anterior 0.09, at posterior third, maximum, 0.35; diameter of oral sucker 0.06, of pharynx 0.04, of ventral sucker 0.05, of genital sucker 0.056; ova 0.018 by 0.012.

An examination of the stained specimen showed the testes and vitellaria, and they were added to the sketch which had been made of the worm while it was in sea water. The mounted specimen is in poor condition, and but little of the anatomy is shown. (Cat. No. 7941, U.S.N.M.)

PARORCHIS AVITUS Linton

This distome, from the cloaca of the herring gull (*Larus argentatus*), was reported in 1912.³ (Cat. No. 7942, U.S.N.M.)

Prof. William Nicoll has written me suggesting that this is the same as *Zeugorchis acanthus* (renamed by Nicoll *Parorchis acanthus*), found by him in the bursa Fabricius and cloaca of the herring gull.⁴ I hesitate, however, at present to make any change in my classification for the following reasons:

Braun in 1901 gave the name *Distomum pittacium* to a distome, represented by a single specimen from *Tringa interpres*.⁵ The main difference between *D. pittacium*, on the one hand, and *P. acanthias* and *P. avitus* on the other, is the absence of spines and of a circumoral collar. The absence of spines is an unimportant difference, as they may be more or less evanescent. The absence of a circumoral collar is harder to account for, but, since Braun had only the one specimen, and that possibly not in the best state of preservation, it is certain, in view of the very close resemblance in details of anatomy in these three differently named distomes, that they are very closely related, if not identical species.

Nicoll notes the remarkable resemblance between *D. pittacium* and *P. acanthias*, but indicates certain points in which they differ. Thus the ratio of the diameter of the oral sucker to the ventral sucker in *D. pittacium* is 1:3, while in *P. acanthias* it is nearly 1:2. In *P. acanthias* the pharynx is slightly larger and the testes much smaller than in *D. pittacium*. The convolutions of the uterus are much more extensive in *D. pittacium* than they are in *P. acanthias*, extending, as they do, to the lateral margins of the body, as well as anteriorly to about the level of the middle of the ventral sucker, and posteriorly to a level behind the testes.

A reexamination of four specimens mounted in balsam shows that with respect to the uterus *P. avitus* is in almost exact agreement with *D. pittacium*. In all of them the convolutions of the uterus extend to the lateral margins. In all of them, also, convolutions lie on each side of the ventral sucker from about its posterior fourth to the posterior third of its length. In two of the four specimens convolutions of the uterus extend back to the middle of the testes, in one they extend to the posterior end of each testis, and in one they extend a little way back of the testes, as they do in the type specimen.

Measurements of four specimens mounted in balsam, all more or less compressed.

³ Proc. U. S. Nat. Mus., vol. 46, pp. 551-555.

⁴ Ann. Mag. Nat. Hist., vol. 17, pp. 519-522, figs. 4-7.

⁵ Zool. Jahrb., 1902, p. 146, fig. 89.

Dimensions	1	2	3	4
Length.....	3. 75	3. 92	5. 03	6. 10
Breadth of oral sucker.....	. 35	. 35	. 36	. 42
Breadth of pharynx.....	. 13	. 13	. 18	. 22
Breadth of ventral sucker.....	. 80	. 80	. 91	1. 36
Length of right testis.....	. 32	. 42	1. 00	. 53
Breadth of right testis.....	. 38	. 28	. 77	. 56
Length of left testis.....	. 33	. 40	. 98	. 53
Breadth of left testis.....	. 40	. 33	. 88	. 47

GALACTOSOMUM COCHLEARIFORME (Rudolphi)

Figure 52

1819. *Distoma cochleariforme* RUDOLPHI, Entoz. Syn., pp. 681-682.

1902. *Microlistrum cochleariforme* (Rudolphi) BRAUN, Zool. Jahrb. Syst., vol. 16, p. 56.

1911. *Galactostomum cochleariforme* (Rudolphi) PRATT, Zool. Anz., vol. 38, pp. 143-148.

The immature trematode here described was collected from the intestine of a man-o-war bird (*Fregata magnificens*), at Bird Key, Tortugas, July 8, 1907, by Dr. J. B. Watson.

Dimensions in balsam: Length 2.3 mm.; breadth, at oral sucker 0.42, at middle of neck, maximum, 0.70, at genital sucker 0.49, at posterior third 0.51; oral sucker, length 0.15, breadth 0.19; genital sucker, length 0.08, breadth 0.08; pharynx, length 0.11, breadth 0.08.

The muscular neck is broader than the body and appears to be itself an organ of adhesion. The pharynx is pyriform. There is no esophagus, and the intestinal rami extend to the posterior end. The cirrus-pouch is dorsal and at the right of the genital sucker. Behind it, and probably continuous with it, is the relatively large and muscular seminal vesicle. Their exact relation is not clearly shown in the mounted specimen. The lobed testes lie on the median line, one behind the other, and separated from each other by a space about equal to the longer diameter of a testis. They are nearly equal, and about 0.13 in length and 0.17 in breadth. The small, nearly round ovary lies a short distance back of the seminal vesicle and a little to the right of the median line. Its length is about 0.07 and its breadth about 0.08. The vitellaria are lateral, between the rami of the intestine and the margins, and extend from near the posterior end forward to a point on a level with the ovary on the left side, and about to the seminal vesicle on the right side. The uterus is not shown plainly in the mounted specimen. It could be seen indistinctly, however. A diagrammatic representation of its apparent course is shown in Figure 52. Ova had not yet made their appearance. (Cat. No. 7943, U.S.N.M.)

MINUTHORCHIS, new genus

(Μινυθω, to diminish)

Body oval, thickish; oral sucker terminal; ventral sucker weak, close to oral sucker; pharynx adjacent to oral sucker; no esophagus; intestinal rami extend to posterior end of body. Testes near the lateral margins, transversely placed, and in the posterior half of the body; ovary behind testes, near the median line; vitellaria marginal; uterus voluminous, filling the interior of the body from the ovary to the genital pore, which is at the posterior edge of the oral sucker.

Genotype.—*Minuthorchis sanguineus*, new species.

MINUTHORCHIS SANGUINEUS, new species

Figures 53-56

This genus and species is based on a single distome found in the intestine of a laughing gull (*Larus atricilla*), July 18, 1911.

The living worm was oval in outline, thickish, upper surface firm, lower surface soft and yielding. The color was blood-red. The dorsal surface was covered with minute papillae. The papillae on the anterior portion of the body are pointed, posteriorly they are blunt. They are not distinguishable in the mounted specimen. With but the slight pressure of the cover-glass to affect the dimensions the length was 7 mm., the breadth 5. At first only one sucker, the anterior, was seen. Later the ventral sucker was distinguished. It lies close to, and is of about the same size as the oral sucker. The uterus was very conspicuous, its voluminous folds ventral, and extending from the posterior to the anterior end. The ova in the posterior folds were yellow, becoming increasingly darker anteriorly, those at the anterior end being dark brown. In the living worm the ova appeared to be long-elliptical, and about 0.11 by 0.04 in the two principal diameters.

Dimensions in balsam: Length 8.8 mm.; breadth 5.6; oral sucker, length, edge view, 0.24, breadth 0.46; ventral sucker, length 0.36, breadth 0.45; pharynx, length 0.24, breadth 0.18. Most of the ova are collapsed, and therefore much narrower than uncollapsed ones, the shorter diameter being less than half the longer. An uncollapsed ovum measured 0.088 by 0.047, and another 0.090 by 0.045 in the two principal diameters.

The mouth is directed anteriorly; the pharynx is pyriform with the smaller end anterior. In the mounted specimen the anterior half of the pharynx is embraced by the oral sucker. The ventral sucker is separated from the oral sucker by a distance approximating its own shorter diameter. It is elliptical in outline, the longer diameter transverse, with weak musculature. The intestinal rami

take their origin directly from the pharynx, are relatively slender, and extend to near the posterior end of the body. The genital pore is at the posterior border of the pharynx. The seminal vesicle is oval-elliptical, 0.31 by 0.15, its longer diameter transverse to the body. It lies on the left side with its inner end on the median line. It has muscular walls and is filled with spermatozoa. No cirrus was seen. The two relatively small testes are nearly symmetrically placed at about the posterior fourth, opposite, and about 2.8 mm. from each other. The right testis is 0.52 in diameter, and 0.7 from the right lateral margin; the left is 0.38 in diameter, and 0.56 from the left lateral margin. The right testis is about 2.38, and the left about 2.45 from the posterior end. Ovary, length 0.46, breadth 0.56, is on the median line, behind the testes, and 1.68 from the posterior end. The vitellaria are lateral, beginning about 1.4 from the anterior end, and are distributed along the lateral margins in clusters which approach a rosette-like structure.

Anteriorly these clusters form a single series, but in the posterior half of the body they lie in a double series. The uterus, filled with ova, occupies all the interior of the body from the ovary to the oral sucker. It is tubular, from 0.15 to 0.30 mm. in diameter, and lies in many irregular convoluted folds. The complex of genital ducts in the vicinity of the shell-gland is not clearly shown in the mounted specimen. The shell-gland lies at the antero-sinistral border of the ovary, the oviduct lying in many folds on the ventral side of its anterior border. A yolk duct, leading from the left marginal vitellaria to the posterior edge of the shell-gland was noted, and another from the right vitellaria was faintly indicated. These ducts led to a small yolk reservoir. No seminal receptacle was seen.

Type.—Cat. No. 7944, U.S.N.M.

DISTOMUM species

Two small distomes, belonging to different genera, from the intestine of the surf scoter (*Oidemia perspicillata*), are here noted. (Cat. No. 7945, U.S.N.M.)

A. Figure 57

This distome was collected July 12, 1913.

Dimensions, life: Length 0.32 mm.; breadth 0.17; diameter of oral sucker 0.033, of ventral sucker 0.048; ova 0.013 by 0.007.

Dimensions in balsam: Length 0.30; breadth 0.11; breadth of oral sucker 0.024, of pharynx 0.014, of ventral sucker 0.041; length of pharynx 0.027. Figure 57 is a sketch of this distome stained in haematoxylin and mounted in balsam. The anatomy is not shown satisfactorily. The ventral sucker is weak, and can be distinguished

only by careful focussing. It is a little in front of the middle, and larger than the oral sucker; pharynx adjacent to the oral sucker, longer than broad; esophagus about twice as long as the pharynx; intestinal rami traced as far as the testes, probably extend to the posterior end. The two testes are nearly transverse, a little nearer to the ventral sucker than to the posterior end. The cirrus-pouch is on the right of the ventral sucker, and the metraterm on the left; genital pore on the median line in front of the ventral sucker. The ovary is circular in outline and situated to the right of the median line in front of the right testis. A vitelline reservoir on the ventro-median border of the ovary, and a transverse yolk-duct, leading to it from the left side, and lying in front of the left testis were clearly shown. Vitellaria mainly marginal, from level of anterior border of testes to posterior end. The uterus contained but few ova, so distributed, however, as to indicate that it passes back between the testes to the posterior part of the body, and returning, passes along the left border of the ventral sucker to the genital pore.

B. Figure 58

After mounting the distome described under A, above, another small distome was found on the slide.

Dimensions in balsam: Length 0.24 mm.; breadth, at anterior end 0.09, at level of ventral sucker, maximum, 0.10; diameter of oral sucker 0.08, of ventral sucker 0.018; ova, maximum, 0.018 by 0.010.

Short, nearly linear, truncate in front, bluntly pointed at posterior end. Oral sucker nearly terminal, its diameter nearly equal to diameter of body. No muscular pharynx was seen, the oral sucker and the esophagus appearing to be funnel-like; ventral sucker much smaller than the oral, situated at about the posterior third. The intestinal rami begin near the middle of the body, and reach barely to the level of the ventral sucker. A conical structure on the ventral side of the bifurcation of the intestine has the appearance of being a diverticulum of the intestine. The genital pore was faintly indicated at the anterior border of the ventral sucker; testes two, at posterior end near lateral margins, nearly transverse; ovary ventral, and at anterior border of right testis. The vitelline gland is compact and close to the posterior border of the ventral sucker. Ova are widely distributed in the posterior half of the body. They lie along the lateral margins from the level of the anterior border of the testes to about the anterior third of the body. They also lie between the testes, and are scattered over the median region of the body both behind and in front of the ventral sucker.

ORNITHOBILHARZIA species

Figures 59-63

1912. ODHNER, Zoolog. Anzeig., vol. 41, p. 61.

From *Larus argentatus*, *L. philadelphia*, *Nycticorax nycticorax*, and *Oidemia deglandi*.

Although this distome is a blood parasite, all of the worms here considered appeared among material from the alimentary canals of their hosts. No search was made in the blood vessels or gall bladders, but in the process of removing and examining the viscera blood parasites might easily be liberated and appear in the washings from the alimentary canal.

In such characters as can be made out these worms from different specific hosts are in close agreement.

The female in all cases was enclosed in the gynaecophoric canal of the male. In most cases it was shorter than the male, but in one pair it appeared to be at least as long as the male. The oral and ventral suckers are rather prominent, nearly circular, near together, the ventral somewhat larger than the oral. There is no pharynx. The intestine, at first a single tube, bifurcates behind the ventral sucker, the two rami uniting toward the posterior end of the body. There is a tendency in the body of the male to coil helixwise. In the male the testes were indicated as many but they were not clearly defined. In the females only the vitellaria in the posterior part of the body could be distinguished.

On account of the unsatisfactory condition of the material specific allocation does not seem to be advisable.

Some additional details are given in the record of collections from the several hosts.

RECORD OF COLLECTIONS

Larus argentatus.

1912, February 16. 6 pairs; lengths 5 mm., more or less.

1913, February 12. 2 pairs, the males 3.5 and 9 mm. in length, respectively. The larger male was roughly tuberculate for a distance of about 2 mm., beginning 0.7 mm. back of the oral sucker. (Fig. 59.) (Cat. No. 7946, U.S.N.M.)

April 17. 1 pair; length of male 5.5 mm.

1915, February 18. 2 males.

The above collections were made by Vinal N. Edwards.

1920, December 18. 5 pairs. Collected by Robert A. Goffin.

Notes on specimens from the herring gull: Diameter of oral sucker of male, average of 8 specimens, 0.19 mm., of ventral sucker, average

of 8, 0.31; maximum, oral sucker 0.25, ventral sucker 0.35; minimum, oral sucker 0.17, ventral sucker 0.22; maximum length of male, 7 mm., minimum 3 mm.; diameter of oral sucker of a female 0.050, of ventral sucker 0.056. In one male, length 4.62; oral sucker, length 0.24, breadth 0.22; ventral sucker, length 0.32, breadth 0.31. In most cases the intestine contained dark brown material. In one male measuring 3.9 mm. in length the intestine divided at a point about 1.4 mm. from the anterior end, and the two rami united about 1.4 mm. from the posterior end.

Larus philadelphia.

1912, December 21. 5; lengths from 4.5 to 5 mm. The males are rather plump; one, 4 mm. in length, has a maximum diameter of 0.52; diameter, lateral view, of oral sucker 0.13, of ventral sucker 0.17. In one specimen, length about 3.2 mm., the bifurcation of the intestine is about 0.77 from the anterior end, and the rami unite about 1.26 from the posterior end. The cuticle is missing from all, longitudinal muscle fibers appearing in the superficial layer. (Cat. No. 7947, U.S.N.M.)

Nycticorax nycticorax naevius.

1913, July 3. 1 pair. These were rather fragile, and in the process of examination the female was lost. Length of male, in balsam, 3.36 mm.; diameter of oral sucker about 0.10, of ventral sucker, very indistinct, about 0.11.

Oidemia deglandi.

1913, August 14. 1, male, length 5 mm.; maximum diameter 0.45; diameter of oral sucker 0.17, ventral sucker 0.21; distance of anterior edge of ventral sucker from anterior end 0.46. This specimen, in balsam, measures 4.2 mm. in length. The point of bifurcation of the intestine appears to be about 1.4 from the anterior end, and the point at which the rami unite, about 1.2 from the posterior end. (Cat. No. 7948, U.S.N.M.)

PROALARIA INDISTINCTA (Guberlet)

Figures 64, 65

1922. *Hemistomum confusum* GUBERLET, Journ. Parasit., vol. 9, pp. 11-12, figs. 4-9.
1923. *Alaria indistincta* (Guberlet), GUBERLET, Trans. Amer. Mic. Soc., vol. 41, p. 68.
1926. *Proalaria indistincta* (Guberlet), LARUE, Trans. Amer. Mic. Soc., vol. 45, p. 15.

Larus delawarensis, intestine.

Woods Hole, Mass.: *Larus argentatus*, *L. atricilla*.

The following description is based on the specimen from *L. atricilla*.

Dimensions, life: Length 1.30 mm.; anterior portion, length 0.60, breadth, 0.60; posterior portion, length 0.70, diameter 0.40.

Dimensions in balsam, compressed, and margins of anterior portion folded: Length 1.22 mm.; anterior portion, length 0.56, breadth 0.36; posterior portion, length 0.66, breadth 0.38; pharynx, length 0.045, breadth 0.036; oral sucker, length 0.054, breadth 0.051; ventral sucker, length 0.058, breadth 0.075; diameter of adhesive organ 0.15; ovum 0.092 by 0.061.

Anterior portion of body broader and slightly shorter than posterior portion; oral sucker and pharynx each longer than broad, ventral sucker broader than long; pharynx adjacent to oral sucker; accessory adhesive organ close to posterior border of ventral sucker. Two conspicuous organs, one on either side of the oral sucker, 0.045 by 0.072 mm. in the two principal diameters, have a rasplike appearance under high magnification. Each is crossed by about 12 transverse ridges. Upon focussing up and down, these structures appear to be the roughened edges of a series of plates set on edge and close together.

The rami of the intestine originate very close to the pharynx and extend to the posterior end of the body. The two testes lie on the left side, the anterior one near the middle and the posterior one at about the posterior third of the posterior division of the body. They are separated by a fold of the uterus. The ovary lies on the left side at the anterior border of the first testis. The vitellaria extend throughout the entire length of the posterior division of the body, and as far forward as the posterior border of the ventral sucker, and obscure the other structures to a great degree. The ova are relatively large, not numerous, and mainly on the right side, from the posterior edge of the accessory adhesive organ to the posterior end. A few lie between the testes. The dense vitelline glands make it difficult to see details of the anatomy. The genital pore is dorsal, about 0.06 mm. from the posterior end.

RECORD OF COLLECTIONS

Larus argentatus.

1927, August 13. 2, lengths 1.40 and 1.70 mm.

L. atricilla.

1913, August 15. 1, length 1.30 mm. (Cat. No. 7949, U.S.N.M.)

ALARIA species

Figures 66, 67

A single, somewhat damaged specimen from the intestine of a ring-billed gull (*Larus delawarensis*), January 24, 1914, is here noted.

The oral sucker and pharynx are missing, and the specimen is broken at the level of the anterior border of the accessory adhesive organ.

Dimensions, balsam: Length 2.17 mm.; anterior division, length 1.40, breadth 0.42; posterior division, length 0.77, breadth 0.42; diameter of ventral sucker 0.06; adhesive organ, length 0.17, breadth 0.10. The bursa is everted, length 0.14, breadth 0.22; cirrus exserted, length 0.14, diameter 0.05.

Ova have not yet made their appearance. The anatomy is not satisfactorily shown in the mounted specimen. Vitellaria extend from about the middle of the posterior division forward to the ventral sucker, and mask the anterior testis and ovary. (Cat. No. 7950, U.S.N.M.)

This distome suggests *Hemistomum gavium* (Guberlet).⁶

STRIGEA BURSIGERA (Brandes)

Figures 68-72

1890. *Holostomum bursigerum* G. Brandes, Zool. Jahrb., vol. 5, p. 592, figs. 15-18.

1909. *Strigea bursigera* (Brandes) Lühe, Parasitische Plattwürmer. I. Trematodes, Brauer's Suswasserfauna Deutschlands, Heft 17, p. 163.

Larus ridibundus.

Woods Hole, Mass., *Larus argentatus*, *L. atricilla*, *L. delawarensis*, intestine.

Length from 6 to 9 mm.; anterior division of the body more or less pyriform, posterior division subcylindrical, enlarging slightly to the posterior third, where the greatest diameter is attained in the vicinity of the testes. The anterior end is usually reflected dorsally. There are some variations from the above proportions, but they can usually be accounted for by different conditions of contraction. Oral sucker, pharynx, and ventral sucker all small, the ventral a little larger than the oral. The two testes are lobed and situated behind the middle

⁶ Journ. Parasit., vol. 9, pp. 9-11, figs. 10-13.

of the posterior division of the body, one following the other, but separated by a space in which lie the transverse yolk reservoir, the shell gland and oötype, and the beginning of the uterus. The ovary is situated close to the anterior border of the first testis. As seen in lateral view it is long-oval, the transverse diameter greater than the longitudinal, tapering at the median end, thus becoming somewhat pyriform. In a specimen from the laughing gull, mounted in balsam, the longer diameter is 0.28, shorter diameter 0.15. The first testis in this specimen had a maximum breadth of 0.45 and length of 0.24; second testis, breadth 0.59, length 0.36; distance of second testis from posterior end 1.40, or approximately one-fourth the entire length. In whole mounts of specimens from the ring-billed gull the ovary had the same dimensions as those given above; first testis, length 0.56, breadth 0.70; second testis, length 0.49, breadth 0.70; distance of second testis from posterior end approximately one-fifth the entire length in each. Behind the second testis there is a capacious seminal vesicle and a contorted, thick-walled ejaculatory duct. The copulatory bursa was invaginated in all cases. It is fairly well developed, as shown in Figure 71, which is somewhat diagrammatic, and occupies about one-half the distance between the second testis and the posterior end. The vitellaria are distributed mainly on the ventral side from near the constriction between the two divisions of the body to near the posterior end. In the specimens from the ring-billed gull and herring gull they were strongly developed, so much so as to mask much of the anatomy. The yolk reservoir is tubular. It originates on the ventral side and lies along the anterior border of the second testis. There is much variation in the number of ova. For example, in the specimen from the laughing gull there are relatively few ova, about 29, while two from the ring-billed gull contain the one 133 and the other 220, and one from the herring gull contains about 375. In one of the three series of sections the ova are few, in the others there are many. There is not much difference in the size of ova in the different examples. In the balsam mounts they do not vary much from 0.11 by 0.07 in the two principal diameters. The course followed by the uterus is in all cases from its origin between the testes forward towards the anterior end of the posterior division of the body, whence it returns on the ventral side to the posterior end. There is no seminal receptacle, but the early folds of the uterus were seen, in some of the series of sections, to be filled with sperm. In one series of sections the germ duct throughout its somewhat tortuous course, from near the ovary to the shell gland, as well as the earlier folds of the uterus, was filled with sperm.

Laurer's canal opens on the dorsal surface about on a level with the anterior border of the first testis. It is a small, somewhat con-

torted duct, and proceeds antero-ventrad to the postero-dorsal border of the ovary, where it turns caudad, and appears to join the germ duct. The germ duct lies along the dorsal side of the first testis. It enters the shell gland, where, near the middle of the intertesticular space, it becomes the rather thick-walled oötype. The short duct from the yolk reservoir joins it just before it expands into the oötype. The shell gland is relatively large and lies on the left side of the intertesticular space. Beyond the oötype the uterus is at first rather thick-walled and contracted. It then enlarges, becomes thin-walled, and lies in a number of folds between the testes on the right side. These folds were, in most cases, filled with sperm. The uterus passes along the ventral side of the first testis and continues forward to a point near the constriction between the two divisions of the body, where it turns abruptly, and, returning to the posterior end of the body, opens into the ejaculatory duct near the genital pore.

RECORD OF COLLECTIONS

Larus argentatus.

1915, September 1. 1; length 6.5 mm.; diameter, anterior division of body 1.35, posterior 1; anterior portion orange color, posterior yellowish. (Cat. No. 7951, U.S.N.M.)

1916, January 8. 3; length of longest about 6 mm.; diameter 0.75; anterior yellowish, posterior dark bluish-grey. Dimensions, balsam: Length 9.38 mm.; diameter, anterior 1.36, at level of testes 1.40; ova, longer diameter from 0.096 to 0.108, shorter diameter from 0.063 to 0.075, average 0.10 by 0.07. Measurements made from series of sagittal sections: Oral sucker 0.09; pharynx, length 0.075, breadth 0.09; ventral sucker, length 0.135, breadth 0.084; ova, average, 0.111 by 0.063.

Larus atricilla.

1911, July 19. 1; white, anterior portion tinged with orange. Dimensions, balsam, lateral view: Length 6.16 mm.; diameter, anterior, 0.65, at level of testes 0.77; oral sucker, length 0.090, breadth 0.075; pharynx, length 0.070, breadth 0.075; ventral sucker, length 0.112, breadth 0.089; ova, average of 6, 0.115 by 0.072. (Cat. No. 7952, U.S.N.M.)

Larus delawarensis.

1914, January 24. 3; lengths 8, 9, and 11 mm., in formalin. Dimensions, balsam: (1) Length 6.88; diameter, anterior 0.91, at level of testes 1.09; (2) Length 7.8; diameter, anterior 0.91, at level of testes 0.84; largest ova in each about 0.12 by 0.07. Measurements of sagittal sections: Diameter of oral sucker 0.081, pharynx 0.066; ventral sucker, length 0.114, breadth 0.075; ova, average, 0.114 by 0.072. (Cat. No. 7953, U.S.N.M.)

EXPLANATION OF PLATES

a. ventral sucker.	o. ovary.
b. bursa.	oe. esophagus.
c. cirrus.	ph. pharynx.
cp. cirrus-pouch.	sg. shell gland.
ej. ejaculatory duct.	sr. seminal receptacle.
ex. excretory vessel.	sv. seminal vesicle.
g. genital pore.	t. testis.
gd. germ duct.	u. uterus.
h. holdfast organ.	vd. vas deferens.
i. intestine.	vg. vitelline gland.
l. Laurer's canal.	yd. yolk duct.
m. metraterm.	yr. yolk reservoir.

Unless otherwise stated, sketches were made with the aid of the camera lucida from balsam mounts.

PLATE 1

Haematotrephus fodiens, new species, from *Gavia immer*

- FIG. 1. Ventral view of free individual; length 11 mm. The dark-brown, opaque material, which filled the intestine, is not represented in the sketch.
2. Anterior end of same, enlarged; length of pharynx 0.10 mm.
3. Worm from a pedicelled cyst on the serous coat of the pancreas.
4. Anterior end of same; length of pharynx 0.06 mm.
5. Portion of body of same in vicinity of genital pore; diameter 0.14 mm.
6. Posterior end of rami of intestine of same.

PLATE 2

Psilostomum plicatum, new species, from *Larus argentatus*

- FIG. 7. Ventral view; length 1.61 mm.

Psilostomum lineatum, new species, from *Larus argentatus*

8. Ventral view; length 3.78 mm.

Psilostomum varium, new species, from *Gavia immer*

9. Ventral view; length 1.54 mm.

Petasiger nitidus, new species, from *Colymbus auritus*

10. Ventral view; length 1.75 mm.

PLATE 3

Petasisiger nitidus, new species (continued)

- FIG. 11. Ventral view of head, in glycerine; diameter, including spines, 0.49 mm.
The recurved dorsal spines in this specimen seem to be exceptional.
12. Ventral view of another specimen; diameter, including spines, 0.42 mm.
13. Dorsal view of same.
14. Transverse section at level of ventral sucker; diameter 0.38 mm. *pr.* prostate gland.
15. Transverse section at level of ovary, diagrammatic.
16. Transverse section near posterior end; diameter 0.20 mm.

Himasthla elongata (Mehlis), from *Larus argentatus*

17. Ventral view; length 6.30 mm.
18. Ventral view of head in glycerine; diameter, including spines, 0.36 mm.
19. Postero-lateral spines, more highly magnified; length of spine 0.054 mm.
20. Female genitalia; diagrammatic, from transverse sections.

PLATE 4

Himasthla incisa, new species, from *Oidemia deglandi*

- FIG. 21. Ventral view; length 9 mm.
22. Anterior end of same; diameter at level of ventral sucker 0.6 mm.
23. Oral spines, foreshortened, sketched from a transverse section; Spencer 6x/4 mm.
24. Oral spines; longer spines 0.051 by 0.018, shorter 0.039 by 0.012 mm.
25. Transverse section near anterior border of ventral sucker; breadth 0.43 mm. The section in front of this contained the genital pore.
26. Transverse section at level of ovary; breadth 0.74 mm.
27. Transverse section immediately behind ovary; partly diagrammatic, about four consecutive sections used; breadth 0.8 mm.

PLATE 5

Himasthla incisa, new species (continued)

- FIG. 28. Transverse section at level of seminal vesicle; breadth 0.67 mm.
29. Transverse section near posterior end; breadth 0.38 mm.
30. Margin of body at anterior end of vitellaria; average length of serrations about 0.02 mm.
31. Margin of body at level of ovary; length of serrations about 0.04 mm.
32. Transverse section of body wall at level of seminal vesicle; Spencer 6x/4 mm.; *cg.* cuticular gland; *lm.* longitudinal muscle.
33. Transverse section of body wall at level of ovary; Spencer 6x/4 mm.

Mesorchis pseudoechinatus (Olsson), from *Larus argentatus*

34. Ventral view of body, lateral of head and neck; length 5.32 mm.
35. Dorsal view of slightly macerated specimen, from which all spines had disappeared; length 4.48 mm.
36. Ventral view of body, dorsal of head and neck; length 3.5 mm.
37. Ventral view of head, in glycerine; diameter, including spines 0.42 mm.

PLATE 6

Mesorchis pseudoechinatus (Olsson) (continued)

- FIG. 38. Dorsal view of head; diameter 0.32 mm., from *Larus argentatus*.
39. Dorsal view of median region of body; breadth 0.6 mm.
40. Sagittal section, median region; diameter of ventral sucker 0.22 mm.
41. Ventral view of specimen from *Colymbus holböllii*; length 2.56 mm.
42. Ventral view of specimen from *Gavia immer*; length 2.20 mm.

Aporchis rugosus, new species, from *Sterna paradisea*

43. Ventral view of anterior portion of specimen; diameter at ventral sucker 0.35 mm.
44. Posterior portion of same; diameter 0.77 mm. Uterus somewhat diagrammatic in this and the preceding figure.
45. Ventral view of anterior end; diameter at ventral sucker 0.35 mm. spines diagrammatic.

PLATE 7

Aporchis rugosus, new species (continued)

- FIG. 46. Camera lucida sketch of surface of body back of cirrus-pouch; breadth 0.28 mm.
47. Lateral margin at level of seminal vesicle; length of spines 0.03 mm.
48. Lateral margin at level of testes; average length of serrations about 0.07 mm.
49. Ovum; sketched from an ovum lying isolated from others in the metraterm; dimensions, exclusive of filament, 0.08 by 0.03 mm.

Ascocotyle plana, new species, from *Butorides virescens*

50. Ventral view; length 0.67 mm.

Levinseniella adunca (Linton), from *Crocethia alba*

51. Memorandum sketch made at time of collecting; tests and vitellaria added from stained specimen; length 0.8 mm.

Galactosomum cochleariforme (Rudolphi), from *Fregata magnificens*

52. Ventral view, uterus diagrammatic. length 2.3 mm.

PLATE 8

Minuthorchis sanguineus, new genus, and new species, from *Larus arcticus*

- FIG. 53. Ventral view, uterus somewhat diagrammatic; length 8.8 mm.
54. Anterior end of same; transverse diameter of oral sucker 0.46 mm.
55. Ventral view of ovary, etc., partly diagrammatic: ovary 0.56 by 0.44 mm.
56. Ova; longer diameter 0.09 mm.

PLATE 9

Distomum species, from *Oidemia perspicillata*. (See A, p. 25.)

FIG. 57. Ventral view; length 0.30 mm.

Distomum species, from *Oidemia perspicillata*. (See B, p. 26.)

58. Ventral view; length 0.24 mm.

Ornithobilharzia species, from *Larus argentatus*

59. Anterior end of pair, neck of male contracted; diameter of male at ventral sucker 0.6 mm.

60. Anterior end of female, dorsal view; diameter of oral sucker 0.05 mm.

61. Fragment of male with female; maximum diameter of male 0.52 mm.

62. Dorsal view of male showing intestine; length 3.9 mm.

PLATE 10

Ornithobilharzia species (continued)

FIG. 63. Lateral view of pair; length of male 3 mm.

Proalaria indistincta (Guberlet), from *Larus atricilla*

64. Sketch of specimen in alcohol, slightly compressed; length 1.33 mm.

65. Ventral view of mounted specimen; length 1.22 mm.

b. Lateral organ.

Alaria species, from *Larus delawarensis*

66. Fragment, anterior, ventral view; length 1.05 mm.

67. Fragment, posterior; length 1.05 mm.

PLATE 11

Strigea bursigera (Brandes)

FIG. 68. Lateral view of specimen from *Larus atricilla*; length 6.3 mm.

69. Ventral view of anterior end of specimen from *Larus delawarensis*; breadth 1 mm.

70. Sagittal section of anterior end of specimen from *Larus argentatus*; diameter 0.56 mm.

71. Sagittal section, posterior end, somewhat diagrammatic; diameter 0.56 mm.

72. Posterior end of mounted specimen; diameter 1.33 mm.





Linton, Edwin. 1928. "Notes on trematode parasites of birds." *Proceedings of the United States National Museum* 73(2722), 1–36.

<https://doi.org/10.5479/si.00963801.73-2722.1>.

View This Item Online: <https://www.biodiversitylibrary.org/item/53485>

DOI: <https://doi.org/10.5479/si.00963801.73-2722.1>

Permalink: <https://www.biodiversitylibrary.org/partpdf/52403>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Smithsonian

Copyright & Reuse

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.