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REPORT

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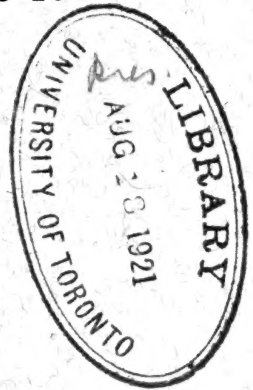
CANADIAN ARCTIC EXPEDITION 1913-18

VOLUME IX: ANNELIDS, PARASITIC WORMS,
PROTOZOANS, ETC.

PART E: ACANTHOCEPHALA

By H. J. VAN CLEAVE

SOUTHERN PARTY—1913-16



OTTAWA
J. de LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

Issued April 7, 1920

Report of the Canadian Arctic Expedition 1913-18.

VOLUME IX: ANNELIDS, PARASITIC WORMS, PROTOZOANS, ETC.

Part A: OLIGOCHAETA.

Lumbriculidae. By Frank Smith.

Enchytraeidae. By Paul S. Welch..... (*Issued September 29, 1919*).

Part B: POLYCHAETA. By Ralph V. Chamberlain..... (*In press*).

Part C: HIRUDINEA. By J. P. Moore..... (*In preparation*).

Part D: GEPHYREA. By Ralph V. Chamberlain..... (*In press*).

Part E: ACANTHOCEPHALA. By H. J. Van Cleave..... (*In press*).

Part F: NEMATODA. By N. A. Cobb..... (*In preparation*).

Part G: TREMATODA. By A. R. Cooper..... (*In preparation*).

Part H: CESTODA. By A. R. Cooper..... (*In preparation*).

Part I: TURBELLARIA. By A. Hassell..... (*In preparation*).

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Part K: SPOROZOA. By J. W. Mavor..... (*In preparation*).

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Part M: FORAMINIFERA. By J. A. Cushman..... (*Issued February 6, 1920*).

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Acanthocephala of the Canadian Arctic Expedition, 1913-1918*

H. J. VAN CLEAVE.

(With 2 Plates).

INTRODUCTION.

The acanthocephalan fauna of the Arctic regions has received little attention from investigators, as evidenced by the meagre references to it in literature. Records of some of the early expeditions contain references to the occurrence of Acanthocephala in the Arctic but most of the descriptions are too vague to be of value in any consideration of the taxonomy of the group. Species described by some of the early explorers have become the objects of much conjecture on the part of present-day investigators. Under the name *Sipunculus lendix*, Phipps (1774) described from an eider duck what is obviously a species of Acanthocephala. Soon afterward, Goeza (1782:141) called attention to the fact that this species of Phipps' is in reality an acanthocephalan. Since that time various investigators have endeavoured to determine the correct disposition of this species within the group, but all of their attempts appear to be mere guesses ostensibly fostered by the desire to distribute all of the species names into groups which would at least give the appearance of a completely worked out synonymy.

A considerable number of species of Acanthocephala have been described by European parasitologists from hosts of arctic or sub-arctic range. Most of the species have been found in whales and other marine mammals. Very little evidence is available regarding the Acanthocephala of arctic birds and fishes. Von Linstow (1905) published a report on the parasitic worms obtained by the Russian Polar Expedition of 1900-1903 in which he gave descriptions of three species of Acanthocephala representing the fauna of West Tajmirland. Of these, a new species, *Echinorhynchus pupa*, was described from the King Eider, *Somateria (Erionetta) spectabilis*; while the two remaining species *Corynosoma strumosum* (= *E. strumosus*) and *E. reductus*, n. sp., were from the seal, *Phoca foetida*.

In so far as the present writer is aware there are no published records of the occurrence of Acanthocephala in the arctic fauna of North America. The collections obtained by the Canadian Arctic Expedition thus offer an opportunity of making a start toward the study of this interesting faunal region.

MATERIALS AND ACKNOWLEDGMENTS.

Through the kindness of Dr. A. R. Cooper the writer has received for study the collection of Acanthocephala taken by Mr. F. Johansen, naturalist on the Canadian Arctic Expedition. This collection is not extensive, either with regard to the number of host species represented or in the regions represented. Nevertheless, since it represents the first arctic collection of these parasites from the American continent it seems worth while to publish the results of this investigation. Most of the specimens were collected in the vicinity of Bernard harbour (Dolphin and Union strait), Northwest Territories, where

*Contributions from the Zoological Laboratory of the University of Illinois, No. 147.

the members of the expedition made their headquarters for a considerable period. One lot of specimens was obtained from fish specimens taken by Dr. R. M. Anderson on the east shore of Banks peninsula, Bathurst inlet, Northwest Territories. The collection comprises nine lots of specimens from six host species, each lot including from a few to numerous individuals and representing, in some instances, several host individuals. Three species of fresh-water fishes, two marine fishes, and one bird constitute the entire list of acanthocephalan hosts recorded by the expedition. In all, these harboured four species of Acanthocephala. *Echinorhynchus salvelini* and *E. coregoni* are characteristic species from North American fresh-water fishes, though the present records greatly extend the known geographical range of both. *Echinorhynchus gadi*, the only species found in marine fishes by the expedition, is a species common to marine hosts of both Europe and America. A new species of the genus *Filicollis* from the King Eider stands intermediate between the European and the North American species of this genus, but in some respects shows much closer relationship with the previously described American species. Data concerning these four species are given in the following paragraphs.

Filicollis arcticus, n. sp.

(Plate I, Figs. 1 to 5).

Color: orange (Johansen's notes).

SPECIFIC DIAGNOSIS.—With the characters of the genus as emended by Van Cleave, 1916. Body of fully mature individuals preserved in alcohol, large, thick, approximately cylindrical in cross section, much folded or wrinkled, especially in posterior region, due to contraction; about 20 mm. long and 5 mm. in maximum diameter. Anterior portion of body wall covered with delicate cuticular spines, visible only in cleared portions of the body-wall. Proboscis ovoid, 0.77 mm. long, and 0.73 mm. in diameter, armed with twenty-two longitudinal rows of seven or eight hooks each. Four or five hooks nearest base of each row more delicate than those anterior to them and supplied with less prominent roots. Anterior hooks provided with prominent posteriorly projecting roots longer than the hook proper. Hooks range in length from 89 to 118 μ . Heavier hooks of anterior proboscis region are 35 μ thick at point of emergence from proboscis wall, while those of posterior region range from 18 to 24 μ thick. Neck approximately cylindrical, 1.2 mm. long by 0.44 mm. in diameter. Proboscis receptacle inserted at base of proboscis and extending through neck and into body cavity, entire length 2.5 mm. Embryos within body cavity of gravid female 126 to 155 μ long by 30 to 41 μ in diameter, most frequent size about 150 by 41 μ .

Type host, King Eider, *Somateria spectabilis* (Linnæus), in intestine.

Type locality, Bernard harbour, Northwest Territories, Canada.

Collected by Mr. F. Johansen, June 16, 1916.

Cotypes are deposited in the Victoria Memorial Museum, Ottawa, Canada, and in the collection of the writer at Urbana, Illinois.

The above species description is based upon the examination of four specimens. In all of these the proboscis was completely retracted within the body. The data concerning the proboscis and its associated structures such as the hooks and the proboscis receptacle are from a single fully mature female from which the writer dissected out the proboscis. This dissection was stained and cleared in the usual manner and mounted as a permanent mount in damar. Portions of the body wall of this same individual were in like manner cleared and mounted to permit of a study of the body spines which are unrecognizable in surface view of alcoholic specimens. These spines recall those previously described by the writer for *Filicollis botulus* in that in the gravid female they are very poorly developed, appearing as very slight elevations of the cuticula in which spines are observable only through close observation (see fig. 3).

A comparison of *F. arcticus* with other known members of the same genus discloses some interesting facts regarding the geographical distribution of the members of this genus. *F. anatis* is the common European representative of *Filicollis* while *F. botulus* occurs in the Eiders in the United States. *Filicollis arcticus*, n. sp., differs in definite manner from both the previously mentioned species but shows a distinctly closer relationship to *F. botulus*. Embryos within the body cavity of the gravid female of the last named species range from 71 to 83 μ in length while those of *F. arcticus* vary from 126 to 155 μ . The two American species also differ in the number of hooks on the proboscis. In *F. botulus* there are but sixteen longitudinal rows of hooks while for *F. arcticus* the writer has found twenty-two. Both of these American species lack the spherical enlargement of the proboscis characteristic of the European species.

The King Eider, the host of *F. arcticus*, though circumpolar in its distribution, evidently does not carry the same acanthocephalan infestation throughout its range. From the West Tajmirland peninsula, von Linstow (1905:3) described *Echinorhynchus pupa* from this same host species. Unfortunately his description and his figures of this species fail to give a full enough account of the structure to enable anyone to place it with certainty in any of the genera recognized in modern taxonomy of the Acanthocephala. In his figure of a peculiarly coiled specimen the first loop posterior to the proboscis fails to show any connection with the rest of the body. No mention is made in the text of any peculiarity in the structure of the neck or anterior body region so it seems probable this is not a unique structure but is simply an error in the execution of the drawing. No evidence is presented, either in his description or in his figures, which would make it seem probable that his species belongs to the genus *Filicollis*. Thus on opposite sides of the arctic circle the King Eider apparently is parasitized by Acanthocephala representing two distinct genera.

Echinorhynchus salvelini Linkins, 1918 (In Ward and Whipple).

(Plate II, Figs. 6 to 9).

Color: orange or greenish yellow (Johansen's notes).

SPECIFIC DIAGNOSIS.—With the characters of the genus. Anterior portion of body-proper rather conspicuously enlarged, especially in the females. Males 7 to 12 mm. long and 0.8 to 2 mm. in maximum diameter. Females 10 to 20 mm. long and 1.2 to 2.25 mm. in maximum diameter. Proboscis cylindrical, armed with sixteen to eighteen longitudinal rows of about thirteen hooks each. Basal hooks about 39 to 50 μ long, hooks on middle and anterior regions of proboscis 44 to 68 μ long, some with a root about 83 μ long. Lemnisci short, little longer than proboscis receptacle. Embryos within body cavity of gravid female 115 to 165 μ long by 20 to 25 μ broad, middle membrane forming a prolongation at each pole more than twice as long as it is broad, frequently characteristically curved.

Arctic hosts: *Cristivomer namaycush* (Walbaum) and *Salvelinus malma* (Walbaum). More detailed data of the occurrence of this species is given in the following table:—

RECORDS OF THE OCCURRENCE OF *E. SALVELINI* IN HOSTS OF ARCTIC AMERICA.

Host.	Locality.	Date.	Remarks.
<i>Cristivomer namaycush</i>	Lake at Bernard harbour . .	October, 1915	<i>E. salvelini</i> only.
	“ “ “	June 15, 22, 26, 1915 . .	<i>E. coregoni</i> also.
	“ “ “	April, 1916	<i>E. coregoni</i> also.
<i>Salvelinus malma</i>	Creek at Bernard harbour .	July 13, 1915	<i>E. coregoni</i> also

Individuals of this species from the arctic are of considerably larger size than those examined by the writer from hosts of The Great Lakes. The fully mature females frequently reach a length of 20 mm. and show a very prominent enlargement of the anterior portion of the body (fig. 6). This enlargement is not of the type commonly occurring in gravid females of other species, involving a practically uniform distention of the body, but is restricted chiefly to the dorsal surface thereby giving the individuals a distinctly humped appearance. In males this anterior enlargement occurs only rarely (fig. 8). The males of this species bear a slight resemblance to those of *E. gadi*, in that the cement glands are arranged in approximately linear order in the posterior region of the body, though frequently those near the end of the chain in *E. salvelini* overlap one another.

In the original description of this species the number of proboscis hooks was limited to sixteen longitudinal rows. The present writer has found individuals in the arctic collections possessing eighteen longitudinal rows of hooks but in all other details agreeing with the description of this species.

***Echinorhynchus coregoni* Linkins (in Van Cleave, 1919).**

(Plate II, Figs. 10 and 11).

Color: as the preceding species (Johansen's notes).

SPECIFIC DIAGNOSIS.—With the characters of the genus. Males 3 to 5 mm. long, with a maximum diameter at about the anterior fourth of the body, 0.8 to 1.05 mm. Females 3 to 10 mm. long, with maximum diameter of 0.6 to 1.7 mm. Proboscis cylindrical, carrying twelve to fifteen longitudinal rows of hooks, each with ten or eleven hooks. Hooks not crowded on proboscis. Basal hooks 28 to 53 μ long; those on middle of proboscis 65 to 80 μ long; those near anterior tip smaller and weaker than those on middle of proboscis. Ventral hooks slightly larger and stronger than dorsal. Lemnisci not longer than proboscis receptacle. Cement glands of male in a compact mass. Embryos within body cavity of gravid female 51 to 91 μ long by 17 to 20 μ wide, with a slight, approximately globular, prolongation of the middle membrane at each pole.

RECORDS OF THE OCCURRENCE OF *E. COREGONI* IN HOSTS OF ARCTIC AMERICA.

Host.	Locality.	Date.	Remarks.
<i>Cristivomer namaycush</i> ...	Lake at Bernard harbour..	June 15, 22, 26, 1915..	} also infested with <i>E. salvelini</i> .
	“ “ “ ..	April, 1916.....	
<i>Salvelinus malma</i>	Creek at Bernard harbour.	July 13, 1915.....	<i>E. salvelini</i> also. <i>E. coregoni</i> only.
	“ “ “ ..	June 28, 1916.....	
<i>S. oquassa marstoni</i>	Lake at Bernard harbour..	December, 1915.....	<i>E. coregoni</i> only. <i>E. coregoni</i> only.
	“ “ “ ..	October 1 and 2, 1915.	

In this species the nuclei of the subcuticula are very numerous and are distributed almost uniformly over the extent of the body wall. Each mass of nuclear material is surrounded by a comparatively distinct clear region, many of which have the appearance of belonging to the lacunar system (fig. 11). The writer has found the individuals of this species from arctic hosts to be considerably larger than individuals from the region of The Great Lakes.

Echinorhynchus gadi Müller, 1776.

Over fifty specimens of this species were obtained from fish specimens collected by Dr. R. M. Anderson at Banks peninsula, Bathurst inlet, Northwest Territories, May 18, 1916. A single large specimen was taken from the stomach of the Cod, *Gadus callarias* Linnaeus, at Station 48c (Banks peninsula). The remaining worms came from the California Tomcod, *Microgadus proximus* (Girard), at Station 48b (Banks peninsula, same date and place as above). As is customary in this species, the specimens vary greatly in size. Those of the present collection range from about 8 mm. to over 50 mm. in length.

This is one of the few species of Acanthocephala common to hosts both of Europe and of America. Under the name *E. acus* Rudolphi, this species has been reported frequently by Linton from numerous species of fishes from the Atlantic coast of North America, including *Gadus callarias*, and also from *Microgadus tomcod* which is closely related to *M. proximus*. The writer has also examined specimens from both of these last-named hosts and has compared them with individuals from European hosts and with the arctic representatives. Specimens from all three localities undoubtedly belong to the same species.

CONCLUSIONS.

The Acanthocephala collected by the Canadian Arctic Expedition comprises two typically North American species of the genus *Echinorhynchus* parasitic in fresh-water fishes, one species of *Echinorhynchus* common to marine fishes of both Europe and America, and a fourth species of the genus *Filicollis* from the King Eider which shows distinctly closer affinities to the previously described North American representative of the genus than to the European. There is no evidence indicating any tendency toward a mixing of American and European species of Acanthocephala in the arctic regions. The evidence is too fragmentary to permit of any statements of the general distribution of members of this group within the arctic circle.

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EXPLANATION OF PLATES.

All figures were drawn with the aid of a camera lucida from hexatoxylin stained mounts in damar, except figure 1, which was from an alcoholic specimen. Magnification is indicated by a projected portion of a stage micrometer accompanying each drawing, values of these scales are given in a footnote.

PLATE I.*

Filicollis arcticus, n. sp.

- Fig. 1. Female, showing general body form. It was from this individual that the proboscis was later removed for study.
2. Profile of proboscis of fully mature female.
 3. Surface view of a portion of the body wall from mature female, showing cuticular spines.
 4. Proboscis of same individual shown in fig. 1.
 5. An embryo from body cavity of gravid female.

* The scale indicating magnification accompanying Fig. 1 has the value of 1 mm.; scales accompanying all other figures of this plate have the value of 0.1 mm.

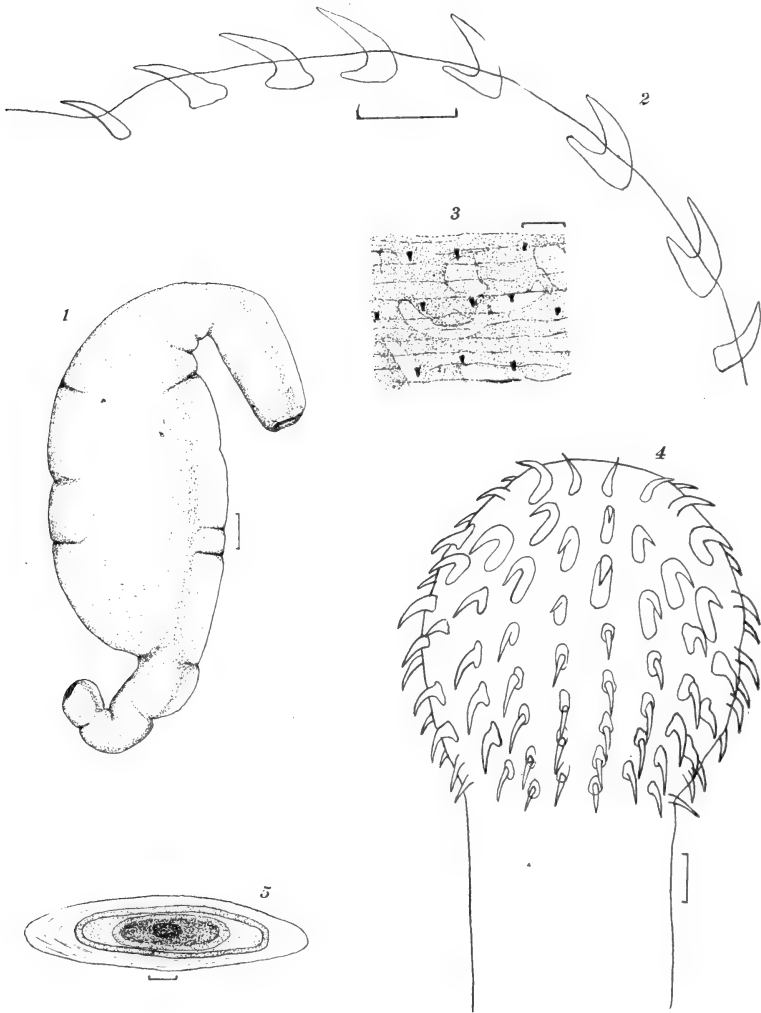
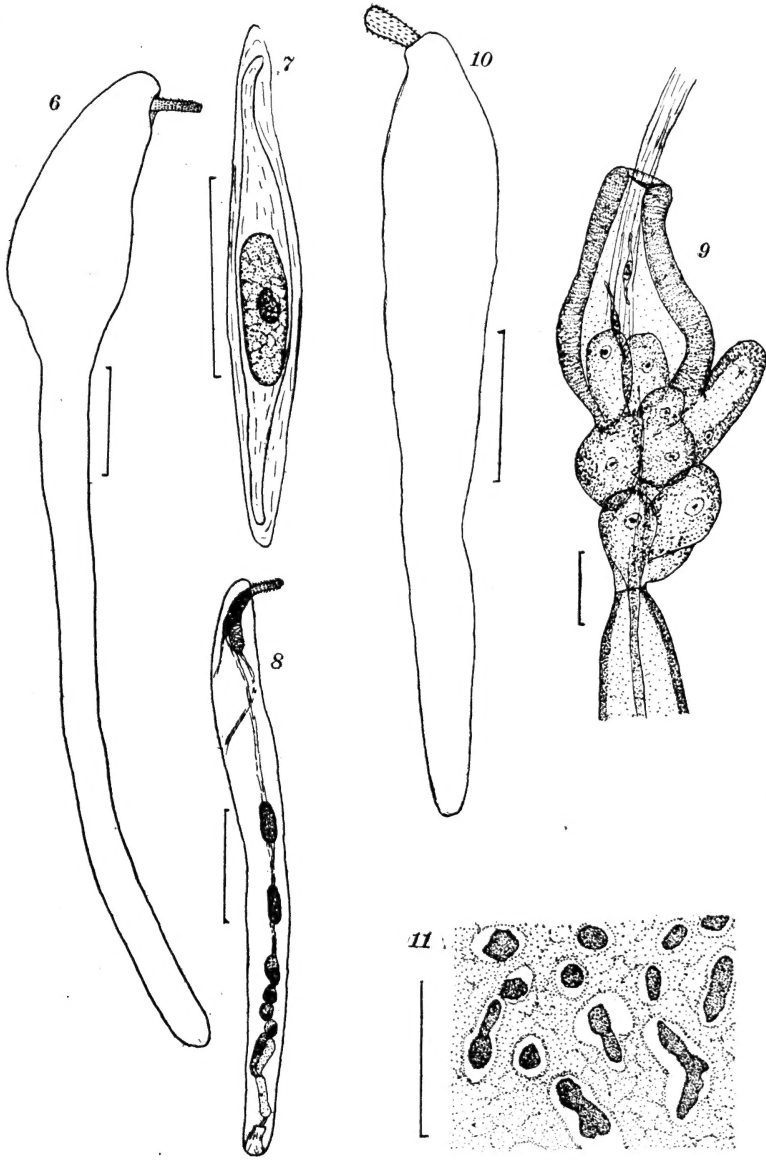
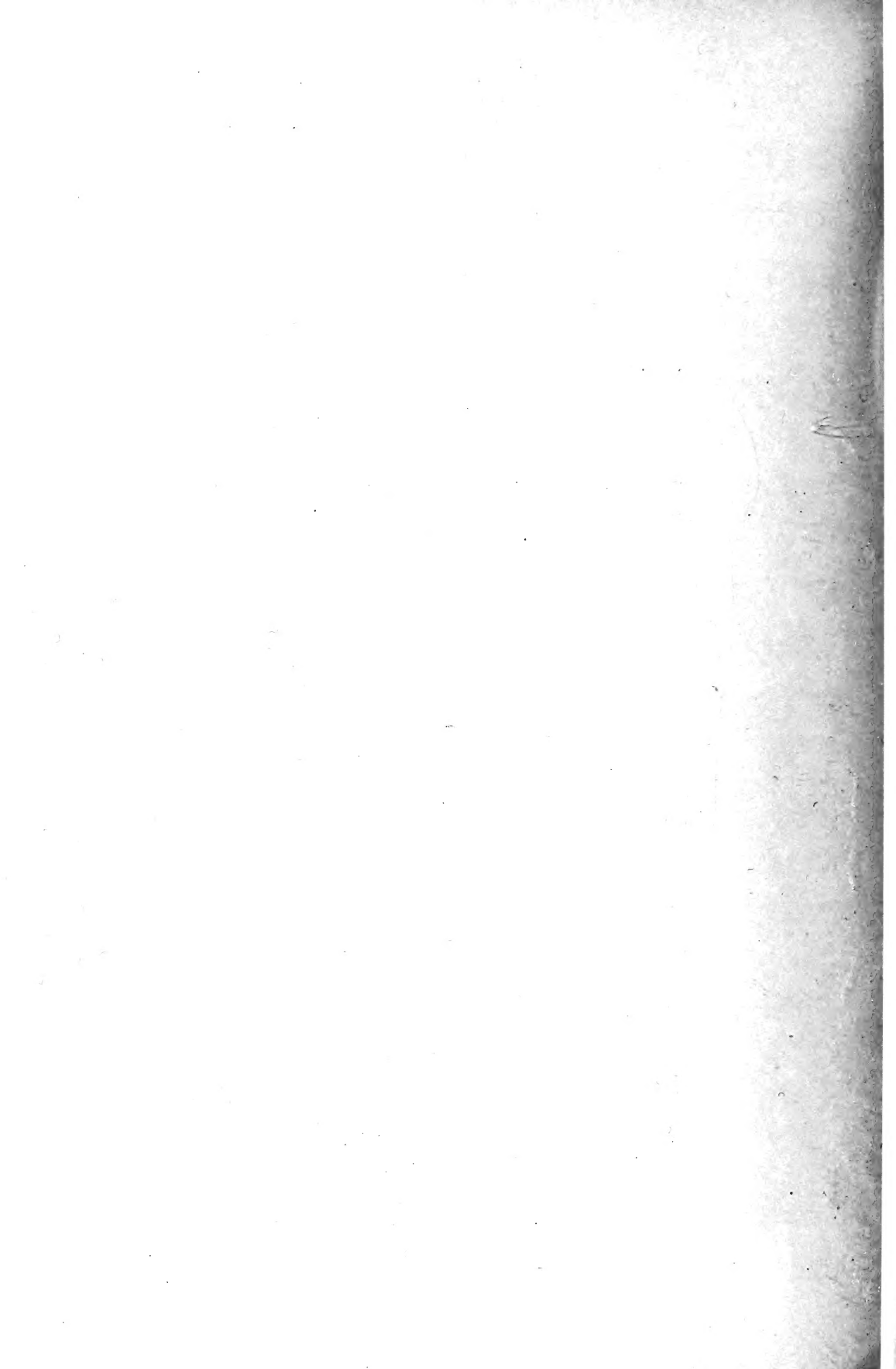


PLATE II.**

- Fig. 6. *Echinorhynchus salvelini*. Outline drawing showing general body form of mature female.
7. Embryo from body cavity of gravid female of *E. salvelini*.
8. Male of *E. salvelini* in optical vertical section.
9. Selective apparatus from genital tract of mature female of *E. salvelini*.
10. Outline drawing showing general body form of *Echinorhynchus coregoni*, female.
11. Portion of body wall of *E. coregoni*, showing numerous small subcuticular nuclei.

** Scales indicating magnification accompanying figures 6, 8, and 10 have the value of 2 mm.; those accompanying figures 9 and 11, 0.1 mm. and figure 7, 0.05 mm.





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