~~1028/66/15~~ CUS417/66.14

The Rectory, Dundas, Oct. 6th 1870.

Willie has gone to Montreal, to McGill College, where the hospital advantages are greater than at Toronto.
I wish to give him every advantage that is in my power though it is very expensive.

Featherstone Osler to his sister Elizabeth in Falmouth.

(1870)

It is interesting that he says "a student with Prof. Bovell" rather than a student at the Toronto Medical School, and it is characteristic also that he links Zimmerman's name with his own, for it is evident from the personal ~~his~~ notes in his list of entozoa that the discovery was his own.

22/II/70. No IV. While dissecting the arm of a man who died in the Toronto General Hospital I found numerous Trichinae in the Biceps muscle, and further examination showed them to be scattered freely throughout the muscles. From 3i of the muscles, from the long head of Biceps I obtained 150 cysts, the greater number of them containing healthy-looking Trichinae.

29/III/70. No V. In the subject following the one above, and also brought from the Toronto General Hospital numberless cysts were found in all parts of the body. The parasites in this case are not as old, none of them beginning to undergo degeneration.

An interest in the entozoa had been awakened some time before. Indeed when he was still at Trinity, the earliest specimen which he records being under the date "7/II/68;" but it was not until Jan. 1st of 1870 that he began systematically to record the specimens ~~with explanatory notes~~ in a blank book and a few explanatory notes. It was quite consistent with what was still under way in the study of the diatomaciae and fresh-water polyzoas, but it illus-

trates the formative stage of his habit of ~~mind in~~ observing, collecting, recording and tabulating, specimens or cases, and thus preparing material for future publications.

Many of the specimens are ~~taken~~ carried or sent to Johnson, whose interest is obviously aroused, though the preparations all appear to ~~be those~~ have been mounted by ~~from~~ his young friend who is rapidly forging ahead of him.

#1314. 8/XII/69. Trichina spiralis (Encysted) From a subject (on the table) at New York; shows the calcareous deposit.

#1315. Entozoa from mucous stomach of a bat. Both given me by W. Osler; put up by him Nov^b 1869.

#1316. Jan/5/70. Tenaea; ova bearing segment taken from a dog. Given me by W. Osler. Balsam.

#1390-1. 22/IV/70/. [Easter Recess] Trichina spiralis from man at the Toronto G. H. from Osler. Gly.

#1392. Tenaea elliptica head protruded. from W. Osler. Gly.

#1403. 6/June/70. Echinorkyneus? from the Catfish both male and female. Given me by W. Osler Glycerine (See Cobbold).

It is easy to trace the source of these and other entries in Johnson's note-book. Thus:

[Johnson had trouble with his spelling]

(Johnson had troubles with his spelling)

#1388. 22/IV/70. Parasites on fins, body &c of little fish in my aquarium. They seem to have a chelinous horseshoe shaped piece inside, & are large brown looking things with powers of locomotion & short cilia all round the edges. Gelatinous mass destroyed by drying (Boil)

Whereas in Osler's note-book ~~is~~ are the following three entries, On the Finns of Chub, ~~the first of these made at the end of the Easter recess~~:

21/~~4~~ IV/70. ~~ON THE FINNS OF CHUB.~~

On the finns of chub in the Rev. W. A. Johnson's aquarium were noticed several round white spots. These on examination proved to be some sort of Entozoa. In addition to these, some yellow spots were seen which seem to be a more advanced condition of the parasite. (see slide * * *)

2/V/70. Numerous Flukes attached to the intestine of a small chub. (see slide no. * * *)

12/V/70. Examined three chub: from the intestine of one two Echinorhynchus were obtained, a male and female.

This Ofsie visit to Johnson must have been during the Easter recess, (verified)

during which, it appears, he subsequently visits his relatives at their summer home on the Island, and later goes to Dundas, if one may judge from the first two of these following entries on the Entozoa in Pike.

23/4/70. In a pike 2 ft. 7 in. long caught at the Island, I obtained 68 specimens of Taenia and two or three small Ascaridae.

This tape-worm is about a foot long, and exhibited curious undulatory movements which continued for more than twenty-four hours after removal from the intestines. It is very extensible and may be stretched to almost double its ordinary length. The head is flattened, club-shaped when the worm is dead, but during life is generally extended, giving to it the shape of a flint arrow-head. Five suctorial disks are plainly seen but no hooklets. The segments taper very gradually, being exceedingly small at the neck, larger towards the end of the body, they are about twice as broad as they are long. The Water vascular system is most distinctly seen in this worm, consisting of four channels, two on each side. At the head and for a considerable distance down the neck these tubes connect by means of inosculating branches, these about the head form a dense net-work. (see sketch).

30/4/70. From a pike caught in the canal basin at Dundas I obtained 28 Taenia and numerous small Ascaridae. In the stomach of this fish were 52 smaller ones, principally little bass and perch.

30/6/70. From the intestines of two pike obtained at the Fish-market, Toronto. In one 84 Taenia were found and in the other 53 not counting numerous small undeveloped ones, - looked like freshly eaten scolices. A few Ascaridae were found in the stomach of one.

23/6/70. From intestine of a pike obtained in Fish-market, Toronto, 56 Taenia; most of these were of a large size and longer than the usual ones from this fish.

Despite this new and consuming interest in Entozoa, he is not forgetting the diatomaciae as is apparent from these entries in the special note-book devoted to them:

"March 20, '70. Went out to Humber Bay with Rev. W. A. J. and obtained gathering from Grenadier Pond and its outlet."

"Mar. 23. Humber Pond eight varieties. Grenadier Pond nineteen."

"Mar. 24. Went out again and obtained another gathering from the same place. The Diatomes were all alive and moving freely. Many types of Ocellatoria were mingled with them and gave the gathering a rather greenish appearance. From the pond on the right hand side of the bridge the following Diatomes were obtained" - and there follows a list of twenty-five varieties, some of which are described and pictured.

"April 2. [He is evidently devoting to the microscope] "The endochrome in this [drawing of specimen] is rolled up into four balls the middle ones the largest. While watching it the two centre ones coalesced and spread themselves throughout the cell pressing the smaller ones against the apices. This was in Nav. affines and seen with 1/20."

"April 21st. Out at Weston, In a gathering from the G. T. Railway numbers of Nitzschia amphioxys and Mendian curellare??"

There can be little doubt but that had William Osler at this time come under the influence of Huxley or Agassiz or possibly of Leidy that he would

have gone on with his biological studies and have abandoned medicine. Aside from his opportunities in the dissecting room it would appear that the school was not proving a great success, and his lecture notes, with their "James Bovell M.R.C.P." scribblings, would indicate that his mind was not captured by the lecturers. There is possibly one thing that might have deterred him, his ineffectiveness with his pencil, for though many of his drawings are probably accurate enough they are lacking in any artistic quality. Years later ~~in Philadelphia~~, when he finally came in contact with Joseph Leidy at the Biological Club in Philadelphia, it was Leidy's superb drawings that especially provoked his enthusiasm. This was shown as late as 1915 when on adding to his library a copy of Leidy's great quarto on Rhizopods he wrote to Joseph Leidy, Jr., to ask for one of his father's sketches to insert in the volume, where it may be found.

However this may be, he persisted in sketching what he saw under the microscope as best he could, and the notes given above, with their accompanying illustrations, are comparable to those accompanying the notes on the entozoa, and later on those made in Montreal and London when he was poring

over blood specimens, those made in Philadelphia when absorbed in the malarial parasite, and those made during the first year in Baltimore on the amoebae of dysentery which practically ended his days with the microscope. The method of the pursuit in each instance was the same, and though occasionally he ventured to reproduce some of his own sketches in his early papers, the art of illustration was not his long suit.

In all these extra-curricular pursuits, though his name infrequently appears, Bovell probably figured largely, and it is apparent that they kept on office together on Spadina Avenue near Queen Street. Tradition has it that this venture was entered upon at Osler's suggestion with the object of starting a consulting practice for Bovell and of making him collect his fees. The partnership is said to have continued for about a year and apparently the business methods of the senior prevailed. In the end. W. R. B. Nevitt who entered Trinity as one of Osler's contemporaries, writes that "he brought there no marked reputation except that he was a good fellow and held the distance record for throwing a cricket-ball." He says further:

"Bovell's office was on Spadina Avenue. One afternoon I had some engagement with W.O. and called for him at the office. The room was a large bare room with a few chairs and a small deal table - like a kitchen table. Osler opened the drawer of the table - Dr. B. had gone out - and said 'Look here! This drawer has been filled to overflowing with bills two or three times this afternoon and now look.' One solitary bill lay in the drawer. As the patients paid their fees Osler placed them in the drawer. A needy patient came along and Dr. B. reversed the process and handed money out so that the sick man might get his medicine and the food and other things he required."

There are many like stories of Bovell, many of them probably more or less true and many of them have Osler as an appendage. The older man was adored by the students though it could never be foretold whether his lecture was going to be medical or theological, or indeed whether he would remember to come at all, and on a few occasions both at Trinity and the Medical School Osler gave his lecture for him. Just before Osler's entry to the school the row of houses on John Street and St. George's Square where Bovell had lived, were burned down and he had built the house called "The Hermitage" on Dennison Square; and it was here that he and W.O. kept all their rabbits.

¶ The two together were concerned in a famous murder trial of the day for medico-legal jurisprudence was one of Barlé's many interests around possibly by his earlier relation to the arrest of Burke and Hare. With the aid of the microscope they proved before the court that certain stains on a discarded coat were human blood and on this evidence the criminal was hanged. 38

mice, rats and other animals, including, alas!, to the scandal of the community, an occasional neighbour's cat which had ventured afield.

It was during the spring of 1870 too, despite all of these accumulating interests, that he begins visiting the veterinary hospital, possibly drawn there in the first place through interest in comparative parasitology and in the expectation of adding to his growing collection of entozoa - an expectation fully realized. Quite consistent with this were his subsequent associations with the veterinarians at McGill. But with all this he found time to complete his paper on the diatomaceae and to forward it to Principal Dawson of McGill who was at the same time President of the Natural History Society of Montreal. The paper was not presented before the Society until the October meeting, but was published in the June volume of the Transactions.

His evident powers of observation and ability in the presentation of a subject show forth in this his first appearance in print. He begins:

> "Among the many beautiful objects which the microscope has revealed to us, none, perhaps, are such general favourites (especially with the younger microscopists) as the Diatomaceae. Their almost uni-

From "1870" folder of "Curling material" ms. 8303 (2nd drawer).

Transcript made for custody of "NOTE-BOOK", ms. 7666 (c)

Cushing 8303 "1870" folder. (2nd drawer). CUS417/66.17

From W.O.'s Note book, Toronto, Jan. 1, 1870.

p.. 200.

slut = bitch W.W.F

Cf. Letter to John Todd July 3 1907 about dogs' Parasites

ENTOZOA in DOG.

I.

19/12/69.

From a young slut; three or four Taeniae elliptica, two Bothriocephalus cordatus (slide) and a number of Ascaridae. This animal had been about a butcher's shop.

II.

22/1/70.

From a slut, six months old, also got from a butcher's shop. 39 Taeniae elliptica, 25 Ascaris. In this dog there was but one species of Taenia. The Taeniae are collected towards the ileum, while the Ascaridae are usually in the duodenum and beginning of jenunum. Of the 39 Taeniae I obtained 18 with heads, the others came away without, breaking off close to the head. Besides the Strobilae, there were numberless mature free Proglottides. The eggs contained in these exhibited distinctly the six-hooked embryos-proscolices. Slides nos. , of head; nos. , of ova.

III.

7/2/70.

From a terrier slut about a year old, four Ascaridae. No Taeniae at all.

IV.

4/3/70.

From a dog about a year old which had on a former occasion (1/3/70) been fed with flesh from Case IV, p. 212, 4 Ascaris, and five Taeniae elliptica, all with heads, were obtained. No Trichinae were found either in the intestines or in the muscles, but on examining the kidneys, six or seven small white spots were seen about o that size (see slide); in each of these a small Nematode worm was observed not coiled up, and looking exceedingly like a Trichina spiralis.

V.

14/4/70.

From a pup about four months old, which had previously been fed with Trichina, 3 Ascaris were obtained.

14/2/76. Examined a fine St. Bernard's dog. No entozoa.

W.O.'s Note book, 1870.

p. 205. ENTOZOA in BAT.

15/11/69.
Obtained a curious encysted Nematode from the walls of the stomach of the New-York bat.

There were no other Entozoa, either free in stomach and intestines or encysted in the muscles. There were eight altogether, slides no. , see drawing.

W.O.'s note book, 1870.

p. 207.

ENTOZOA in CAT-FISH.

12/5/69.
Procured two small Taeniae from intestine, length about half an inch; head devoid of hooklets.

7/5/70.
From a cat-fish caught in the canal 10 Taeniae were obtained. This Cestode is from ¼ to ½ an inch in length andvery extensible. Suctorial disks prominent, can be seen with the naked eye, they are four in number; no hooklets were seen. The water vascular system is beautifully seen in this species. At the head it may be seenterminating in a plexus (whose branches are as large as the primary trunks) situated betweenthe disks.

Two Distomes werealso found in the intestine;encysted Nematodes in the liver. A Cysticercus in the kidney.

29/5/70.
From the intestines of Cat-fish speared at the Island. 3 Taeniae,very small, and 4 Echinorynchidae (see slide) accessory claspers of the male - well seem in this species.

W.O.'s note book 1870.

p. 209.

ENTOZOA in PIG.

5/6/69.

Obtained from Dr. Maddock of Hamilton a small portion of the heart of a measley pig; contained about a dozen of Cysticercus Allulosa. See slides No.

C. Johnson ordered some 20 VI 69 No slides

W.O.'s note book, 1870.

ENTOZOA in MAN.

p. 211.

7/2/68.

I.

Trichina spiralis.

Obtained a piece of muscle from a man who died of the disease in Illinois State, very numerous, not encysted. Two families living on different flats of the same house bought a barrel of pork between them. One flat cooked the pork and escaped the disease, the other ate theirs raw and nine were sickened; of these nine, four died

27/2/69.

II.

The family of a Mr. Getz in Hamilton consisting of himself, wife and daughter, partook of an uncooked ham. All three were laid up with the disease. Miss Getz died first , in her the parasites were numerous and unencysted. Mrs. Getz died some two weeks after her daughter; in her they were just beginning to be encysted. The husband was attacked but not so severely and escaped, most probably from being drunk for some days at the commencement of the attack. See slides Nos.

20/12/69. III.

Obtained a piece of muscle from a woman in New York. In her the disease was not suspected during life, the students on dissecting the body found (as in the original discovery of the parasite) great difficulty in cleaning the muscles, and on examination they were found to be packed with Trichinae, all encysted. See slides Nos.

22/2/70.

IV.

While dissecting the arm of a man, who had died at the Toronto General Hospital, I found numerous Trichinae in the Biceps muscle, and further examination showed them to be scattered pretty freely throughout the muscles. From 3T of the muscle, from the beginning of the long head of Biceps I obtained 150 cysts, the greater number of them containing healthy-looking Trichinae.

29/3/70.

V.

In the subject following the one above, and also brought from the Toronto General Hospital, numberless cysts were found in all parts of the body. The parasites in this case are not as old,

1870 (continued)

none of them beginning to undergo degeneration.

ENTOZOA in MAN.

p. 214.

15/3/68.

Taenia solium.

Ten feet passed by a bank-clerk, a patient of Dr. Russell's. See slides Nos.

23/2/71.

Taenia mediocanellata. Obtained three specimens of this cestode from a man (Earle) who died of heart disease in Montreal Gen. Hospital. He stated during life that he had been suffering from Tape worm for 14 years, got it at Malta while station there with his regiment. He stated that he had been under treatment for it innumerable times and had passed many yards of the worm. While in Hospital during the end of last year and the beginning of this, he was treated with the male shield fern, which brought away several long portions. On opening the small intestines the worms were found extending from the lower part of the duodenum through the jejunum and seeming completely to fill the intestine in the empty condition. The heads were all within 1½ inch of each other and deeply imbedded in the mucous membrane, between the valvulae conniventes. The bodies were convoluted and twisted, extending down the intestine for about 3½ feet, and lower down in the bowel several detached portions were found, consisting of from six to eighteen proglottides. The worms still retained some little vitality, but the movements were very feeble. While in the intestine, the water-vascular system in one of them was beautifully seen, extending up each side of the worm. The length was of each respectively 76.50 and 65 inches, and the number of segments amounted in each to between 275 & 350, falling at least 100 short in the longest one of the fully mature sexual segments. This however is not be wondered at as it is not more than six weeks ago since he passed several yards. The chief differences betweenthis form and T. solium appear to be as follows. The head is larger, abruptly terminated, and lacks the rostellum and consequently the hooklets. It is surrounded by a dark zone of calcareus corpuscles which form a striking contrast to the white segments of the neck. The segments are broader, thicker and not as long. The generative orifice is a little below the centre, and the lateral branches of the uterus appear more numerous and closely packed together. There appears also to be a difference in the shape of the ova in the two species, that in Taenia solium being round, while in T. marganata they are rather oval and somewhat larger.

W.O.'s note book, 1870.

p. 223 ENTOZOA in PERCH.

23/4/70. In the liver of a perch taken from the stomach of a pike (see p. 219) were numerous encysted Nematodes (see slide no.).

13/5/70. From four Perch caught in the canal I obtained the following:-

A Cysticercus from the liver, the head of which bears a remarkable resemblance to the head of the Taenia of the pike and most probably is its scolex. Encysted Nematodes from the liver.

Four species of Echinorhynchus from the rectum.

In the intestine there was a curious entozoön with a bell-shaped retractile head furnished with small finger like processes (see sketch and slide).

Coiled around the base of the aorta was a large distoma. The upper thrid is outlined in this sketch.

W.O.'s note book, 1870.

p. 227.

ENTOZOA in EEL.

9/5/70. One solitary tape-worm in the duodenum about four inches long No generative organs seen, no ova, water-vascular system distinct, no head discovered.

Two species of Echinorhynchus both female, length ¾ to 1 inch, moved freely, retracting and pushing out the hooked proboscis. Eleven rows of hooklets, recurved like the barb of a harpoon. The two Lemnisci were distinct as also the 3 or 4 muscular retractors of the proboscis. Cysts containing ova occupied the rest of the body. Two or three slight constrictions existed.

12/7/70. From a large silver eel caught at Burlington canal obtained one large Distome from stomach.

W.O.'s note book, 1870.

p. 229.

ENTOZOA in SQUIRREL.

12/5/70.

Eight small Ascaridae from the duodenum of the redsquirrel.

W.O.'s note book, 1870.

p. 230.

EXPERIMENTS WITH ENTOZOA.

23/1/70.

I.

Fed two rabbits with mature Proglottides of Taenia elliptica, from dog no. 2, six segments to each rabbit. These will in all probability give negative results as the scolices of Taenia elliptica are not produced in the rabbits.

THESE FAILED.

23/2/70. II.

Fed a rabbit with about 3ᵐᵐ of Trichinous flesh from man in whom I found them while dissecting.

1/3/70. III.

Fed a cat and dog with Trichinous flesh. 3/3/70. Repeated the dose to dog.

In these cases the juices of the stomach were in all probability not strong enough to dissolve the cyst and free the parasite.

30/3/70. IV.

Fed a rabbit and a young pup with muscle from Case V. 31st repeated the dose to pup. 1st again.

14/4/70.

Killed the pup. No traces of Trichinae; the cysts were probably too dense for the juices of the stomach to dissolve.

21/4/70. Killed the rabbit fed with the Trichinous flesh on 30th Mar. Numerous Trichinae in a young immature condition were observed in the muscles. Many of them exhibited sluggish movements. They were more numerous in the abdominal and thigh muscles than in any other.

W.O.'s note book, 1870.

p. 250.

ENTOZOA in PICKEREL.

3/6/70. From the intestine of a Pickerel in the Fish-market I obtained 8 Taenia. This is a comparatively stout Cestode, length from 10-12 inches, breadth of posterior segments about ¼ of an inch. Head square, no neck, but a gradual tapering to the head. Disks four, large, no hooklets observed.

23/6/70. From Pickerel (one foot and one half long) in Fish-market Toronto. 18 large Taenia were obtained.

W.O.'s note book, 1870.

p. 276. ENTOZOA in DOREY

22/10/70. Examined a dorey in Montreal fish market. One small tape-worm, one Borthriocephalus and about two dozen small Echinorynchidae were found. The Borthriocephalus occupied the entire cavity of one of the numerous caeca given off at the pylorus. The Taenia was in the duodenum and the Echinorynchidae move towards the rectum. This fish I find is the Pickerel.
see. p. 250.

W.O.'s note bk, 1870.

p. 278.

ENTOZOA in BAR -FISH.

1/11/70.
Examined one of the above-named fish, and found in the peritoneal cavity some half dozen Nematode worms. Each worm is about half a line in thickness and from three to four inches in length, dark in colour, annulated towards the anterior extremity, which is blunted and thick. The posterior extremity is pointed and presents the vaginal and rectal orifices. The ovaries extend the whole length of the body.

10/11/70.
Found more of the same kind in the peritoneal cavity packed about the rectum, nothing in the intestines.

ENTOZOA in CAT. *

p. 280.

3/1/71.
Examined intestines of cat, found one Ascaris mystax(?) and one Taenia.

probably belongs to a neighbor

W.O.'s note book, 1870.

p. 282.

ENTOZOA in LYNX.

5/3/71.

Examined the intestine of an animal obtained by the Nat. History Society of Montreal. In the duodenum were Ascaridae and lower down in the bowel 25 Taeniae. The animal had been dead a long time and the intestines had been thrown out and exposed to the cold for two nights. The greater part of a racoon was found in a semi-digested state in the stomach. The other organs were not examined.

15

W.O.'s Note book, 1870.

p. 284.

ENTOZOA in RAT.

8/3/71.

From a rat obtained at Montreal General Hospital I obtained 5 Taeniae. They were situated low down in the intestines, approaching the faeculent matter. This is a small, fine species 2½ to 3 inches in length. Head very small, no hooklets seen. The water vascular system is very distinct.

W.O.'s note book, 1870.

p. 217.

21/4/70. ON THE FINNS OF CHUB.

On the finns of chub in the Rev. W. A. Johnson's aquarium were noticed several round white spots. These on examination proved to be some sort of Entozoa. In addition to these, some yellow spots were seen which seem to be a more advanced condition of the parasite. (see slide ××× .)

2/5/70. Numerous Flukes attached to the intestine of a small chub. (see slide no. ×××)

12/6/70. Examined three chub: from the intestine of one two Echinorhynchus were obtained, a male and female.

W.O.'s note book, 1870.

p. 219.

ENTOZOA in PIKE.

23/4/70.

In a pike 2 ft. 7 in.. long caught at the Island, I obtained 68 specimens of Taenia and two or three small Ascaridae.

This tape-worm is about a foot long, and exhibited curious undulatory movements which continued for more than twenty-four hours after removal from the intestines. It is very extensible, and may be stretched to almost double its ordinary length. The head is flattened, club-shaped when the worm is dead, but during life is generally extended, giving to it the shape of a flint arrow-head. Five suctorial disks are plainly seen but no hooklets. The segments taper very gradually, being exceedingly small at the neck, larger towards the end of the body, they are about twice as broad as they are long. The Water vascular system is most distinctly seen in this worm, consisting of four channels, two on each side. At the head andfor a considerable distance downthe neck, these tubes connect by means of inosculating branches, these about the head form a dense net-work. (see sketch).

30/4/70. From a pike caught in the canal basin at Dundas I obtained 28 Taenia and numerous small Ascaridae. In the stomach of this fish were 52 smaller ones , principally little bass and perch.

30/6/70. From the intestines of two pike obtained at the Fish-market, Toronto. In one 84 Taenia were found and in the other 53 not counting numerous small undeveloped ones, - looked like freshly eaten scolices. A few Ascaridae were found in the stomach of one.

23/6/70. From intestine of a pike obtained in Fish-market, Toronto. 56 Taenia; most of these were of a large size and longer than the usual ones from this fish.

W.O.'s note book, 1870.

p. 254.

ENTOZOA in MENOBRANCHUS lateralis.

6/6/70. From a specimen of the above, caught at the Island I obtained numerous Polystomes , some of which were attached to the branchiae others to the upper surface of the mouth. This Nematode presents four disks, two at each extremity. Of these the smaller one situated about the middle of the upper fourth of the body, is the mouth, which leads directly into the intestines. These consist of two simple tubes, which unite about the middle of the lower fourth of the body. The water vascular system is well developed. It appears to commence in a ramification of vessels about the anterior disk, these unite to form two vessels, which run the whole length of the body, join below and open somewhere between the posterior disks. Cilia is to be seen distinctly in the water vascular system, especially at the junction of the tubes below. At the upper third of the body on a level with the generative opening, on each side is seen a curious pulsating organ which is undoubtedly connected with the water vascular system. The pulsations occur about every minute and a half. The external generative orifice is seen a little below the oval disk, this leads into a narrow, slightly curved vagina. The ova occupy the general cavity of the body between the digestive tubes. A bundle of specules (Penis?) are to be seen close to the vulva. Close to the caudal disks two large hooks are placed. These hooks are bifurcate and to one extremity a band of fibres is attached. Besides these numerous small hooklets are to be seen scattered about the posterior disks. The attached extremity of these is trifurcate.

W.O.'s note book, 1870. 19

p. 258.

ENTOZOA in SKUNK.

15/6/70.

From a large male skunk, about 30 Taeniae and 14 Ascaridae. Nmmerous small cysts were observed in the liver and spleen but nothing found in them. The Tape worms are small, from ½ an inch to 2 inches in length, broad in proportion, exhibiting very slight movements. A slight enlargement seems to exist about the neck, which disappears when the worm is much elongated. The segments seem but loosely joined together, breaking very easily. Four larger sucking disks exist at the head, no hooklets seen. The calcareous corpuscles are more numerous in this Cestode than in any I have yet examined. The water-vascular system is not easily seen on account of the dense layer of calc. corpuscles.

The Ascaridae are from ¾ of an inch to one inch in length. They move freely. Most of them were in the stomach, not in the intestines.

W. O. 's note book, 1870 20

p. 260.

ENTOZOA in SUN-FISH.

4/7/70.

Examined ten Sun-fish caught in the Canal; in all numerous Distomes were found. This fluke is probably in an immature condition, being encysted and not having its internal organs completely developed. The heart, liver and kidneys presented a swollen appearance from the numbers in them. They seemed only to be attached to the heart, while in the liver and kidneys they occupied the substance of those organs.

Encysted Nematodes were found in one liver and what appeared to me the scolex of one of the Echinorhynchidae, in another.

In the rectum of two, a few Echinorhynchidae were found.

W.O.'s note book, 1870.

ENTOZOA in SUN FISH.

p. 260.

4/7/70.

Examined 10 Sun-fish caught in the canal; in all numerous Distomes were found. This fluke is probably in an immature condition, being encysted and not having its internal organs completely developed. The heart, liver and kidneys presented a swollen appearance from the numbers on them. They seemed only to be attached to the heart; while in the liver and kidneys they occupied the substance of those organs.

Encysted Nematodes were found in one liver and what appeared to me the scolex of one of the Echinorynchida were found.

Echinorynchidae in another.

copy

15. a.

W.O.'s note book, 1870.

p. 264.

ENTOZOA in KING-FISHER.

1/7/70.

Examined one of these birds (a King Fisher), and much to my surprise found no Entozoa in it.

13/8/70.

Shot a King-fisher. A few small Distomes were found in the liver. The small fish which constitute the food of this bird seem not to share the common fate of fish, inasmuch as few or immature Entozoons are found in them.

W.O.'s note book, 1870.

P. 266.

ENTOZOA in BLACK SQUIRREL.

1/7/70.

Examined a large male animal. No Entozoa in him.

ENTOZOA IN BASS.

p. 268.

7/7/70.

b Examined a large black Bass caught in Burlington Bay. A solitary scolex of some tape-worm was found in the peritoneal cavity.

ENTOZOA in HAWK.

p. 270.

13/8/70.

8 Shot a Hawk; a single large Ascaris found in the duodenum.

p. 274. W.O.'s note book, 1870.

ENTOZOA in FOWL (Gallus).

9/9/70. Examined the intestines of three fowls, one a two-years' old rooster, the others this year's chickens. In the duodenum of the rooster numerous Taenia, from 2-6 inches long, were found; in the younger fowls a few smaller ones of the same kind occurred. The smaller ones were deeply imbedded in the mucous membrane, the larger ones not at all so.

4/1/71. Examined intestines of two fowls. Found in one mumerous Taeniae, same kind as above, and one Distome about half an inch long and 2 linesthick, very large posterior sucking disk. The fowl has been frozen so that the worms were dead and had begun to disintegrate. In the other a few small taeniae only were found. The generative organs in this species open by an orifice of considerable size along one margin onlyof the worm. The opening is more at the junction of the segments than at the centre.

6/11/71. Examined two fowls. One larges Ascaris only found. The fowls were grain-fed.