



<https://www.biodiversitylibrary.org/>

Proceedings of the Royal Physical Society of Edinburgh.

Edinburgh :The Society,1858-1955

<https://www.biodiversitylibrary.org/bibliography/16183>

v.12 (1892-1894): <https://www.biodiversitylibrary.org/item/84619>

Article/Chapter Title: some new oligochaeta

Author(s): beddard 1894

Subject(s): oligochaeta

Page(s): Title Page, Page 30, Page 31, Page 32, Page 33, Page 34, Page 35, Page 36, Page 37, Page 38, Page 39, Page 40, Page 41, Page 42, Page 43, Page 44, Page 45

Holding Institution: Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Sponsored by: Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Generated 3 January 2021 1:26 PM

<https://www.biodiversitylibrary.org/pdf4/124014900084619.pdf>

PROCEEDINGS
OF THE
ROYAL PHYSICAL SOCIETY
OF
EDINBURGH.

VOL. XII.

1892-94.



EDINBURGH:
PRINTED FOR THE SOCIETY, AND PUBLISHED AT
THEIR ROOMS, 18 GEORGE STREET.

S_m MDCCCXCIV.

original endorsement still on the stand. An examination of the specimen leaves no room for doubt that it is an old male of *Muscicapa parva*, Bechstein, and that it is not referable to *Muscicapa albicilla*, Pallas (= *M. leucura*, Gmelin), with which it has hitherto, though doubtfully, been associated.

Muscicapa parva is, however, only a winter visitor to the plains of the Indian peninsula and China, spending the summer in Turkestan and southern Siberia. It is also a summer bird in central and south-eastern Europe, being fairly common, but local, in north-eastern Germany and central and southern Russia, and farther east in the Caucasus and northern Persia. The winter range of the European birds extends to Nubia; and it may, perhaps, occur irregularly at that season in southern Spain.

Since Professor Jameson's days the Red-breasted Flycatcher has become a member of the British avifauna, inasmuch as it has occurred as a rare straggler in England and Ireland in the autumn and winter, being first recorded in the year 1863.

One more point remains for notice regarding this bird, namely, that in synonymy it is usually quoted as *Erythaca Tytleri*. I am not aware that Professor Jameson ever applied the generic name of *Erythaca* to his species.

It may be of interest to note, that in the latest work published on the avifauna of India, Mr Oates ("Fauna of British India," Birds, ii., p. 9) remarks that he has not seen an example of *Siphia* (= *Muscicapa*) *parva* from any portion of the Himalayas.

V. *Some New or Little Known Oligochæta*. By FRANK E. BEDDARD, M.A., F.R.S.S.L. & E., Prosector to the Zoological Society of London.

(Read 15th March 1893.)

I propose in the present paper to offer to the Royal Physical Society some notes which I have gathered together during the last few years upon Oligochæta from various parts of the world. I describe three new species and give some additional notes upon two others, of which one has been

incompletely described by Dr Michaelsen, while the other is well known. I am able, however, in the present paper to record a wider distribution. The species that I deal with now are the following:—

1. *Pontodrilus hesperidum*, n. sp.
2. *Microscolex nova zelandiae*, n. sp.
3. *Fridericia antarctica*, n. sp.
4. *Henlea ventriculosa*, d'Udek.
5. *Cryptodrilus spatulifer*, Mich.

I. *Cryptodrilus spatulifer*, Mich.

Cryptodrilus (?) *spatulifer*, W. Michaelsen, Jb. Hamb. wiss. Anst., vi.

I have examined a single specimen of a worm which I refer to this species in spite of a few discrepancies between my own observations and Michaelsen's statements.

The specimen was collected some few years ago by Mr Lane, who was sent out by the late Mr Berkeley James to Chili for the purpose of collecting birds.

The *colour* of the preserved specimen was, as Michaelsen has remarked, of a dark purple-red dorsally; it measured 60 mm., and consisted of 93 segments.

The *prostomium*, however, is different from that as described by Michaelsen; in the worm examined by myself it was complete, *i.e.*, it completely divided the buccal segment, reaching as far as the boundary line between this segment and the one behind.

The *setæ* are strictly paired, and are visible on all the segments of the clitellum.

The *clitellum* extended from the xiiith to the xvth segment.

The *nephridiopores* open in front of the dorsal pair of *setæ*.

The *male pores* are upon the xvith segment.

There is a *gizzard* in segment vi.; the *intestine* begins in segment xvii. or perhaps in xviii.; after the xvith segment it gradually increases in calibre until a little way after the beginning of the xviiith segment.

The first *septum* divided segments vi./vii.

The *testes* seem to be present to the number of a single pair only; in any case I could only discover a single pair of

funnels in segment x. As there was only a single pair of sperm sacs—racemose in character—in segment xi., there is an increased probability of the presence of only a single pair of testes. Michaelsen did not observe the testes or sperm sacs or funnels.

The *atria* are lobate, they resemble in fact those of *Perichæta*; they are very solid in appearance, not being of the loose texture often seen in *Perichæta*. Michaelsen is somewhat indefinite about the structure of the atria; he describes them as “zwei lange kolbige Prostata-drüsen.” These open on to the xviiith segment; they are provided with *penial setæ*. There is no need for me to give any description of the penial setæ, since my observations agree fully with those of Michaelsen.

There is but one pair of *spermatothecæ*; these are large, and lie in segment ix. Each consists of a pouch, which is somewhat bifid, and which communicates with the exterior by means of a thick-walled duct; into this opens a diverticulum, which is as long as the pouch. It also consists of a duct and a distal swollen end, which is mulberry shaped. The diverticulum lies in the segment in front of that which contains the pouch, as is so often the case in earthworms.

The only difference of importance between the above description and that of Michaelsen is in the prostomium; it is possible that imperfect preservation may account for this. The close similarity in the penial setæ, and the fact that there is but one pair of spermatothecæ, seems to remove all doubt as to the identity of the species described by myself with that described by Michaelsen. It is, however, doubtful whether the worm should be referred to the genus *Cryptodrillus*. The principal objection to including it in that genus is the position of the male pores; in *Cryptodrillus* they are on segment xviii. If other species turn up in which the male pores are upon the same segment, and which have lobate atria, I should separate them as a distinct genus; at present a single instance of a divergence in the position of the male pores may be fairly regarded as an exception, and the worm may be left in the genus to which Michaelsen doubtfully assigned it. The specimen was collected in Valdivia.

II. *Microscolex nova zelandiæ*, n. sp.

Length, 42 mm.; *breadth*, 2 mm.; *number of segments*, 76.

The *prostomium* is continued over about half of the buccal segment.

The *clitellum* extends over segments xiii.-xvii., and is complete save for a small ventral tract posteriorly. The clitellum is marked posteriorly by a triangular notch having the form and extent shown in the accompanying illustration (Fig. 1), which is occupied by the male genital pores and by certain papillæ. The *male pores* are small orifices with an obvious and thick chitinous lining. They are situated about half way from either end of the layer of unmodified epidermis, which here invades the clitellum close to its margin. They are exactly on a line with the innermost seta of the ventral pair. These setæ, as already mentioned, are absent from the xviith segment which bears these pores. In front of the male pores is a single median *papilla*; behind them are a pair of similar papilla, which lie somewhat to the inside of the male pores. The seta are in four series of pairs, the individual setæ of each pair being not very close together. They are unornamented.

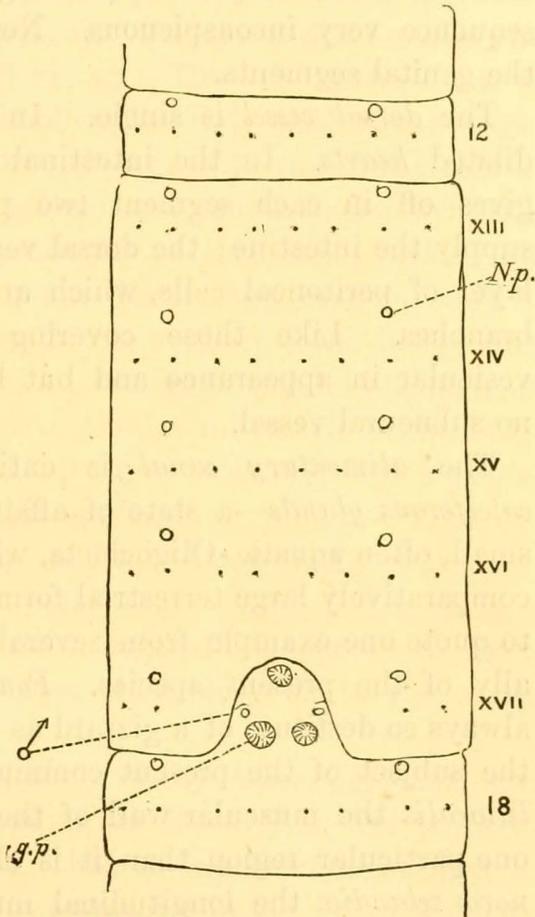


Fig. 1.

Ventral view of segments in neighbourhood of genital orifices. The clitellar segments are numbered with Roman numerals; *N.p.*, nephridiopores; ♂, male pores; *g.p.*, genital papillæ.

The *nephridiopores* are in front of seta 3.

The *nephridia* of this worm are paired organs. From and including the second segment of the body, the nephridia open by a large muscular sac. This sac appears to be capable of contraction and expansion, as in the nephridia of some segments the lumen was almost obliterated; in others, on the contrary, it was very spacious. In the case of the nephridia of the ivth segment, the terminal sac was greatly reduced, and the external aperture (in longitudinal sections) in consequence very inconspicuous. Nephridia are present in all the genital segments.

The *dorsal vessel* is single. In segments x., xi., xii. are dilated *hearts*. In the intestinal region the dorsal vessel gives off in each segment two pairs of branches, which supply the intestine; the dorsal vessel is here clothed with a layer of peritoneal cells, which are also continued on to its branches. Like those covering the intestine, they are vesicular in appearance and but little stained. I observed no subneural vessel.

The *alimentary canal* is entirely *without gizzard or calciferous glands*—a state of affairs commonly met with in small, often aquatic, Oligochæta, whose nearest relatives are comparatively large terrestrial forms. The same is the case, to quote one example from several, with *Pontodrilus*, a nearly of the present species. *Pontodrilus*, however, is not always so destitute of a gizzard as is the worm which forms the subject of the present communication. In *Pontodrilus littoralis* the muscular wall of the œsophagus is thicker in one particular region than it is elsewhere. In *Microscolex novæ zelandiæ* the longitudinal muscular layer of the œsophagus in segment v. is rather more pronounced than in any other part of the œsophagus; this region is also wider, and it seems undoubtedly to represent the gizzard of other forms. As, however, the epithelium which lines this part of the œsophagus does not differ in appearance from that which lines the rest of the tube, and as there is no chitinous layer thrown off by this epithelium, this part of the œsophagus cannot be termed a gizzard. In segments xi., xii., and xiii. the œsophagus is widened out in each segment, but constricted where it passes through the septa. The intestine

begins in segment xvi. It has the merest trace of a typhlosole in the shape of a convexity just below the dorsal vessel.

None of the intersegmental *septa* of this worm are very greatly thickened. Those separating segments viii./ix., ix./x., x./xi., xi./xii., xii./xiii. are somewhat thicker than those which follow or precede them. The septal glands are found as far back as in the viiith segment.

The *testes* and the *sperm duct funnels*, of which there are two pairs, lie in segments x., xi. The *sperm sacs* are also two pairs, occupying segments xi., xii. The two sperm ducts of each side pass side by side along the body wall to the neighbourhood of the atrial pore; they pass to the distal side of the muscular duct of the atrium, and penetrate the body wall close together, but independently of each other and of the atrial duct. The two sperm ducts then become one; in longitudinal sections through this region of the body, three tubes can be seen in section forming together a triangle, of which the apex is nearest to the lateral margin of the body. The apex is formed by the atrium; anteriorly is the penial seta sac and posteriorly the sperm duct; all three tubes are of approximately the same calibre. They finally open on to the exterior by a common pore.

The *ovaries* lie in the xiiiith segment. Opposite to them are the oviducts, which open externally on to the xivth. There are no egg sacs.

The *atria* are tubular, as in many other Cryptodrilidæ. They are short, not extending far back from the point of opening on to the exterior; this, as has been mentioned in describing the external characters, lies in the xviiith segment. The atria reach back to the end of the xviiiith segment. As is usual, the atrium is partly glandular and partly muscular; it is in fact constructed upon the plan which characterises *Acanthodrilus* and other genera with tubular atria. The sac of *penial setæ*, to which reference has been already made in describing the sperm duct, contains two or three setæ. These are longer than the ordinary setæ, but in some instances at anyrate have the same S-shaped curvature. The free extremity, moreover, is not ornamented.

There is only a single pair of *spermatheca*. These lie in

the ixth segment, and open on to the internal viii./ix. Each has two diverticula, one directed forwards and the other backwards. They arise of course from opposite sides of the duct of the spermatheca.

The arrangement of the species belonging to the family Cryptodrilidæ is not by any means easy. This is doubtless partly due to imperfect knowledge. Fletcher,¹ for example, has not always described in a manner sufficiently clear the characters of the atria, which I believe to be of some importance in the grouping of the species. The species placed by him and by Spencer² in the genera *Megascoides* and *Cryptodrilus* evidently require some rearrangement. I do not, however, propose to offer here any amendments as far as concerns those genera. *Rhododrilus*³ differs principally in that the male pores are upon the xviiith instead of the xviiiith segment. It evidently comes near to *Microscolex*. The description of the new species seems to me to reduce the distance to such infinitesimal proportions that *Rhododrilus* must be merged in *Microscolex*. I defined⁴ *Microscolex* in terms which must now be slightly altered so as to include *Rhododrilus minutus*. The amended definition may run thus:—

MICROSCOLEX, Rosa.

Microscolex, D. Rosa, Boll. Mus. Torino, vol. ii., No. 19.

Rhododrilus, F. E. Beddard, P.Z.S., 1889, p. 380.

Setæ eight per segment. Clitellum xiii. (xiv.)–xvi. (xvii.), complete ♂ pores on xvii. No dorsal pores. Alimentary canal with or without gizzard, without calciferous glands; no typhlosole. Nephridia paired, commencing in one of segments ii.-v. Atria tubular, with or without penial setæ; spermatheca one or four pairs, with a diverticulum.

Distribution.—Italy, Madeira, Algeria, Argentine, Australia, New Zealand.

¹ In his series of papers upon Australian Earthworms in the Proceedings of the Linnean Society of New South Wales.

² Proc. Roy. Soc. Vict., 1892.

³ F. E. Beddard, On the Oligochæteous Fauna of New Zealand, etc.—P.Z.S., 1889, p. 380.

⁴ On the Earthworms collected in Algeria and Tunisia by Dr Anderson—P.Z.S., 1892, p. 36.

III. *Pontodrilus hesperidum*, n. sp.

The large and important family Cryptodrilidæ has, so far as we know at present, very few representatives in the New World. Besides several species of *Ocnerodrilus* and *Microscolex*, the former of which is certainly, the latter probably, indigenous to that part of the world, the following species only have been recorded from America and the West Indies:—

Cryptodrilus spatulifer, Mich., Chili.

Gordiodrilus dominicensis, F. E. B. Dominica.

Plutellus heteroporus, Perr. Pennsylvania.

„ *perrieri*, Benh. British Columbia.

Pontodrilus arenae, Mich. (= *P. bermudensis*, F. E. B.). Bermudas.

I have therefore less hesitation in giving a somewhat imperfect description of a new species from Jamaica, which is certainly not identical with any of the above. The single specimen which I had at my disposal is immature.

The single specimen of this worm was of small size, an inch or so in length, and not more than 1.5 mm. in diameter. The specimen being immature, there was no clitellum visible.

The *setæ* are paired, but the individual *setæ* of each pair are at some distance from each other. On the xviiiith segment the outermost of the two ventral *setæ* is absent, its place being occupied by the male reproductive pores. The oviducts open a little to the inside of the ventral *setæ* on each side.

Considering the small size of the worm, the thickness of some of the anterior septa is not a little remarkable. The present species is hardly larger than *Rhododrilus parkeri*, but those septa that are thickened are enormously more so. It must be recollected, however, that the present is apparently purely terrestrial in habit, and it cannot be doubted that there is some relation between the thickness of the septa and the terrestrial habit. There are eight thickened septa, the last of which divide segments xii./xiii. Of these the 5th, 6th, and 7th are decidedly stouter than the rest. There is one delicate septum in front of the first thickened septum, which therefore bounds segments iv./v. The middle septa of the

series are quite twice as thick as the body wall in their immediate neighbourhood.

The *alimentary canal* is chiefly remarkable for the total absence of gizzard and calciferous glands. Almost immediately after it leaves the pharynx, the œsophagus widens out; in the viith segment it narrows; it is again dilated in the xith and xiith segments. The intestine begins in the xvth segment.

In the anterior segments of the body there are quantities of floating corpuscles.

The *nephridia* are paired structures, but are not furnished with a large end sac; the absence of this has prevented me from discovering the external pore.

The *hearts* are large and very conspicuous in longitudinal sections. There are valves where they open into the ventral vessel, but apparently not along their course. The last pair of them are in segment xiii. The first pair, showing a specially enlarged condition, are farther forward than is usual, viz., in segment ix. Underneath the intestine and œsophagus is a vessel which receives blood from its walls and has the same relation to it thus far below that the supra-intestinal has above; I have not made out its relations, if any, to the other longitudinal trunks; it seems to correspond to the lateral vessels of other earthworms.

The *testes* are two pairs, lying attached to the anterior circle of segments x., xi.; each is broader at the base and tapers towards its free extremity. Opposite to the testes are the funnels of the sperm ducts. The two sperm ducts of each side of the body fuse early to form a single tube, which seemed to me to be of unusual thinness; it runs in the somewhat thick layer of peritoneum which covers the ventral body wall towards the xviiiith segment. It opens into the atrium at some little distance from the external aperture of the latter. The atrium has the tubular form found in so many *Cryptodrilidæ*; it is also, as is usually the case, divisible into a glandular and a muscular section; the glandular part lies chiefly in segments xviii. and xix. A number of muscular strands are attached to the integument just at the aperture of the atrium, which they

doubtless serve to protrude and retract. There are no *penial setæ*. The *atrium* is lined throughout by a single layer of cells, which are taller and narrower away from the external pore. A thick layer of tissue of fibrous appearance, with nuclei and interspersed blood-vessels, surrounds the lining epithelium. I do not at present lay any stress upon the fact that the atrium is lined by a single layer of cells only. The fact is, of course, very important if it really characterises the species, and is not due to immaturity.

The racemose *sperm sacs* hang from the anterior septa of segments xi., xii. The *ovaries* are in xiii.; the oviducts open opposite to them and on to the exterior in segment xiv. There were no egg sacs.

There are two pairs of *spermathecae*, placed respectively in segments viii. and ix. They are probably not fully mature, though of fair size; each is an oval pouch with a single cylindrical diverticulum.

The above description, necessarily incomplete though it is in several particulars, leads me to place this species in the genus *Pontodrilus*. At present this genus is only known by two species; the type species is, of course, *Pontodrilus littoralis* of Grube,¹ which is probably the same as Perrier's² *Pontodrilus marionis*. More recently the genus has been shown to inhabit the New World by Michaelsen and by myself. Michaelsen³ described a second species of the genus under the name of *Pontodrilus arenae*, which species is identical with that called by myself *Pontodrilus bermudensis*.⁴ I am inclined, moreover, to refer to the same genus Giard's species⁵ *Photodrilus phosphoreus*. Rosa⁶ has called attention to the great similarity that exists between the two genera;

¹ Ueber neue oder wenig bekannten Anneliden—Arch. f. Nat., Bd. xli., p. 127.

² Etudes sur l'organisation des Lombriciens terrestres: iv. Organisation des *Pontodrilus* (E. P.)—Arch. Zool. Ezp., t. ix., p. 175.

³ Terricolen der Berliner Zoologischen Sammlung, ii.—Arch. f. Nat., 1892, p. ~~11~~ 209.

⁴ Abstract of some Investigations into the Structure of the Oligochaeta—Ann. Mag. Nat. Hist., Jan. 1891, p. 96.

⁵ Sur un nouveau genre, etc.—Compt. Rend., 1887.

⁶ Sui Generi *Pontodrilus*, *Microscolex*, e *Photodrilus*—Boll. Mus. Tor., V. iii.

they agree in the form of the atria, in the fact that the nephridia do not commence until the xiiith or xivth segment, in the absence or rudimentary condition of the gizzard, in the absence of penial setæ at the male pore, which is in both upon the xviiith segment, and in a number of minor points.

I believe that it is necessary to add a fifth species to the four above enumerated; this is *Cryptodrilus insularis* of Rosa.¹

Although the species is referred by Rosa to the genus *Cryptodrilus*, this is only done provisionally. As Rosa justly remarks, the genera of this family require revision.

I place *Cryptodrilus insularis* in the genus *Pontodrilus* for the following reasons:—It has

1. Setæ in eight rows.
2. No dorsal pores.
3. Rudimentary gizzard.
4. No nephridia until the xiiith segment.
5. Tubular atria, and no penial setæ.

This assemblage of characters distinguishes the genus *Pontodrilus* from any other genus; it comes nearest, of course, to the genus *Megascolides*; but differs in the fact that the nephridia do not commence at once (*i.e.*, in the i^{ind} or ii^{ird} segment). In the same point it differs from the genus *Microscolex*. It is true that the difference may not appear to be a very great one; but it is, considering the very large number of *Cryptodrilids*, and their similarity to each other, a good deal to have got one character running through a number of species, which also agree in other particulars. The five species may be thus distinguished:—

Setæ ornamented.	<i>P. arenae.</i>
Setæ not ornamented.	
Gizzard completely absent.	
Two pairs of spermatothecæ.	<i>P. hesperidum.</i>
One pair of spermatothecæ.	<i>P. phosphoreus.</i>
Gizzard rudimentary.	
Setæ irregular behind.	<i>P. insularis.</i>
Setæ regular throughout.	<i>P. littoralis.</i>

¹ Die exotischen Territolen des k. k. naturhist., etc.—Ann. k. k. nat. Hofmus., Bd. vi., 387.

SOME NEW ZEALAND ENCHYTRÆIDÆ.

I am indebted to Mr W. W. Smith for two tubes containing Enchytræids. The only record, so far as I am aware, of the existence of this family in New Zealand is a mere notice by myself contained in a paper upon the development of an earthworm. I am now for the first time able to describe more accurately the species which are met with in New Zealand,—those forwarded to me by Mr Smith were sexually mature. One of these species proves to be new, and is described below as *Fridericia antarctica*; the other is the well-known *Henlea ventriculosa*. The latter was collected at the edge of a swamp near the Tengawai river, South Canterbury. I have been able to make sure that it is the species mentioned above, as I have been able, through the kindness of Dr Michaelsen, to examine specimens identified by him as *Henlea ventriculosa*. So many writers have dealt with the structure of this Enchytræid, including Dr Michaelsen himself, that I have not found myself able to add anything to our knowledge of its anatomy. I can confirm, especially with regard to the salivary glands, Dr Michaelsen's statements. I received a few years since, through the kindness of Mr Bateson, examples of this same worm which he collected in his expedition to the territory of the Khirgese Tartars. The species has therefore a very wide range.

IV. *Fridericia antarctica*.

Of this species I have examined a number of examples collected at the edge of a spring near Ashburton, New Zealand.

The *colour* of the worm during life is stated to have been a "pale pink." It is a long thin Enchytræid, consisting of 46-63 segments. The following figures relate to three specimens which I selected for measurement and external description:—

	Length.	Number of Segments.
A.	18 mm.	63
B.	15 mm.	47
C.	16 mm.	45

The *setæ* are 4-6 in each bundle, generally 4 or 6, occasionally 5. The innermost pair were, as is usual with this

genus, very much smaller than the setæ on either side of them. In the last five or six segments of the body there were only a pair of setæ to each bundle. As many as six setæ in a bundle were only found in the anterior region of the body (the first twenty segments or so) in both bundles; farther back the number of setæ was almost constantly four in the lateral bundles, and the innermost pair were not markedly different in size from the others as they are anteriorly. The absolute size also, particularly as regards thickness, was greater in the case of the setæ borne by the last few segments of the body than in the case of those borne by the first few segments.

The *clitellum* is completely developed all round the body. It is not saddle-shaped. As is generally the case (subject to a few exceptions) in this family of Oligochæta, it has one set of setæ only, those belonging to the xiiiith segment. The clitellum also includes a portion of the xith segment.

The first *dorsal pore* lies, as appears to be invariably the case with the species of the genus *Fridericia*, between segments vii./viii. The dorsal pores were sometimes rendered very conspicuous by the extrusion of various bodies from the cœlom by the effects of the corrosive sublimate used in the preserving of the worms. These had frequently remained half inside and half outside the pore. In one case a ripe ovum was partially extruded; this fact is possibly of some interest in relation to oviposition. There is evidently no reason against the possibility of the ova being normally evacuated through the dorsal pores. The probability of this being a normal occurrence is increased by the fact that the ova are not always confined to the xiith segment, which contains the gonad.

The *salivary glands* have a wide main stem, which opens into the œsophagus a little way behind the pharynx. This gives off a few branches dorsally and ventrally, one of which runs forward. The branches themselves do not appear to undergo secondary ramifications. The intestine commences in segment xiv.

The *septal glands* extend back as far as the viiith segment, and commence in the ivth. The ante-septal region of the

nephridia is nearly as large as the post-septal, and has a convoluted duct. The duct leading to the exterior arises near to the septum. The dorsal vessel arises from the intestinal sinus in segment ix.

The *sperm duct funnel* is about three times as long as it is broad. The atrium does not seem to differ from that of other species. It is furnished with a few retractor muscles. The coiled *sperm duct* is supported by a sheet of muscular and connective tissue, which runs from the septum behind the funnel to the atrium itself.

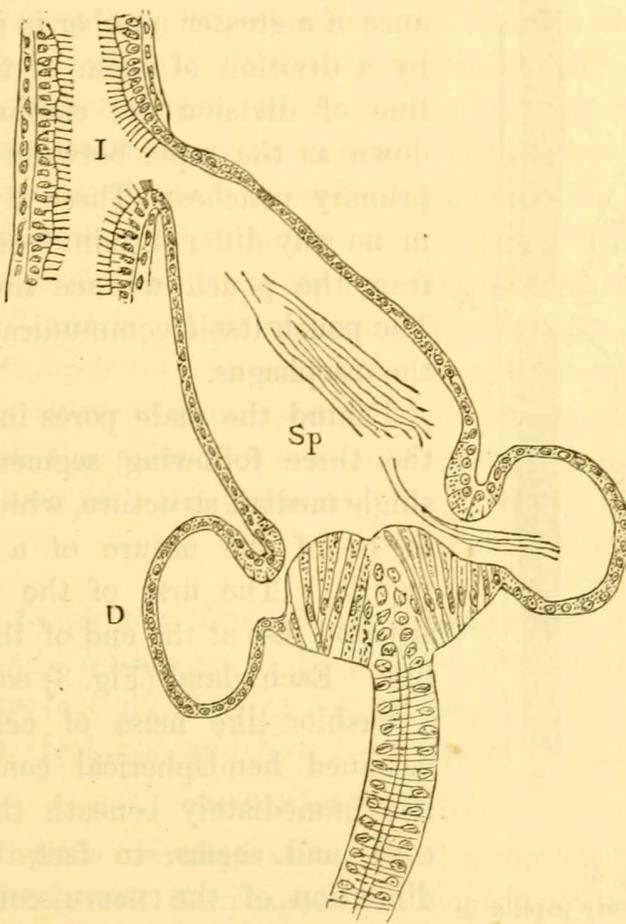


Fig. 2.

A spermatheca in longitudinal section. I, cesophagus, into which spermatheca opens; D, diverticula; Sp, bundles of spermatozoa.

The *spermathecae* (Fig. 2) are a single pair in segment. The duct is long and narrow; relatively to the minute lumen its walls are thick. It opens into a wide, thin pouch, with numerous radially disposed outgrowths. The junction of the

narrow duct with the wide pouch is marked by a hemispherical elevation, consisting of columnar cells increasing in height towards the centre. In transverse section this papilla appears perfectly circular and marked peripherally by a highly refracting band, which looks like a layer of chitin; in the centre it is perforated by the minute duct. The comparatively spacious pouch into which the duct opens communicates with seven radially disposed pouches;

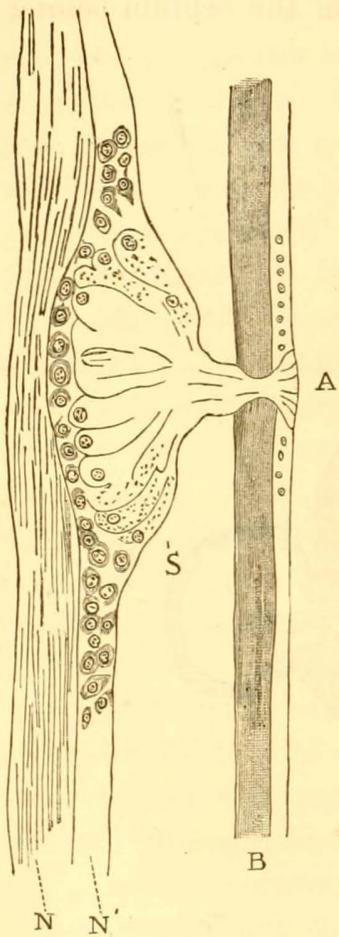


Fig. 3.

A ventral sensory papilla in longitudinal section. A, epidermis of body wall at point where the processes of the cells of the organ reach the exterior; B, body wall; NN', two layers of nerve cord.

possibly it might be considered more accurate to say four, since the appearance of a greater number is produced by a division of some of them, the line of division not coming so far down as the septa between the four primary pouches. These diverticula in no way differ in minute structure from the pouch whence they arise. The pouch itself communicates with the œsophagus.

Behind the male pores in each of the three following segments is a single median structure, which seems to be of the nature of a sensory papilla. The first of the three is situated just at the end of the clitellum. Each gland (Fig. 3) consists of a cushion-like mass of cells of a flattened hemispherical contour; it lies immediately beneath the nerve cord, and seems, in fact, to be a dilatation of the nerve cord. The lower part of the sheath of the nerve cord is continuous over the cells which form the organ referred to. The cells of which it is composed are large, pear-shaped, and granular;

towards the periphery they are more coarsely granular than centrally. The cells are ten or twelve times as large as those in other regions of the nerve cord. The processes of these

cells converge and perforate the longitudinal layer of the body wall; arrived at the epidermis, they spread out into a disc-shaped area, contrasting with the surrounding epidermis. This area appears to be composed of smaller pear-shaped cells, in other respects like those of the deeper lying organ. In front of and behind each of these papilla is a nerve arising from ventral cord, and penetrating the body wall. A cursory glance at these organs would undoubtedly lead to the inference that they were glandular bodies, serving perhaps as organs of adhesion during coitus; the prevalence of such organs among the Oligochæta would support this view of their nature. Their relations, however, to the nerve cord (their enclosure within its sheath, and the absence of any breach between their cells and those of the nerve cord) seem to indicate that they are specialised regions of the nerve cord connected with integumental sense organs. In this case they will in all probability be comparable to the "wing-like processes" which occur in several places upon the nerve cord of *Pachydriulus nervosus*, and one or two other species of *Pachydriulus*. The presence of these structures seems to distinguish the present species of *Fridericia* from any other that has been hitherto described.

VI. *The Land and Fresh-Water Crustacea of the District around Edinburgh.* Part II.—*The Ostracoda and Copepoda.* By THOMAS SCOTT, Esq., F.L.S., Cor. Mem. Glas. Geol. Soc. and Nat. Hist. Soc. of Glasgow.

(Read 19th April 1893.)

In a previous communication I gave a short account of the land and fresh-water Amphipoda and Isopoda of the Edinburgh district; in this paper I propose to notice two of the groups of the Entomostraca, viz., the Ostracoda and Copepoda. I intended to have given an account of these groups during the previous session of the Royal Physical Society, but want of time compelled me, reluctantly, to delay doing so till a more convenient season. One of the chief difficulties in dealing with the larger or "higher" Crustacea is to find the specimens, but the chief difficulty with the micro-forms—