

N. m.

PROCEEDINGS

OF THE

GENERAL MEETINGS FOR SCIENTIFIC BUSINESS

OF THE

111

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1892.

PRINTED FOR THE SOCIETY,
AND SOLD AT THEIR HOUSE IN HANOVER-SQUARE.

LONDON:
MESSRS. LONGMANS, GREEN, AND CO.
PATERNOSTER ROW.

three other processes and a membranous expansion on the posterior aspect of the appendage. Length up to 13 millim., width 1.6.

Closely allied to, if not identical with, *B. proximus* of Latzel from the Azores.

Hammam R'irha.

This is probably the species that Lucas records as *Polydesmus complunatus*.

STRONGYLOSOMA GUERINII, Gerv.

Strongylosoma guerinii, Gerv. Ann. Soc. Ent. Fr. iv. p. 686.

Hammam R'irha.

This species was originally described from Madeira, whence the British Museum has examples. It is widely distributed in the Atlantic Islands, occurring both in Teneriffe and the Bermudas.

I suspect that this is the species which Lucas identified as *S. pallipes* (Oliv.).

Fam. IULIDÆ.

IULUS FUSCO-UNILINEATUS, Lucas.

Kherrata, Hammam R'irha, Constantine.

IULUS DISTINCTUS, Lucas.

Constantine.

The synonymy of these two species of *Iulus* requires reinvestigation.

Fam. POLYZONIDÆ.

DOLISTENUS SAVII, Fanz.

Hammam R'irha.

This interesting Millipede is a great rarity. It has been found in Italy, but is new to the African shore of the Mediterranean. The repugnatorial pores begin on the fifth somite.

3. On the Earthworms collected in Algeria and Tunisia by Dr. Anderson. By FRANK E. BEDDARD, M.A., Professor to the Society.

[Received January 5, 1892.]

As nothing appears to be known of the Earthworms of the northern part of the African Continent, excepting Egypt, I am very glad to have had the opportunity, afforded me by Dr. Anderson's kindness, of examining a small collection made by him during the spring of last year in Algeria and Tunisia.

Earthworms show in so very plain a manner the effect of barriers to dispersal in their distribution, that I had expected to find the Algerian forms identical with or closely allied to those of Europe. The Earthworm-fauna of Central and South Africa is evidently very

rich, though at present but little known ; but the Sahara has proved here, as it has in the case of other animals, to be a barrier preventing the northward range of these forms. Only in Egypt are there any genera found also in Tropical Africa ; the very remarkable genus *Siphonogaster* occurs in Egypt and in the neighbourhood of Lagos, W. Africa. But the banks of the Nile, or even the river itself (for many species of Earthworms can withstand a prolonged immersion in fresh water), have furnished, no doubt, the opportunity of migration.

Mr. Alvan Millson, Colonial Secretary at Lagos, kindly collected for me a number of Earthworms in Egypt ; all these species were members of the genera *Lumbricus* and *Allolobophora*.

Besides Levisen's paper upon *Siphonogaster* and *Digitibranchus* (= *Alma*) we do not possess, I believe, any further information upon the Oligochæta of Egypt than that which has been given in the preceding sentence.

Dr. Anderson's collection contains examples of two recognizable species, *Allolobophora complanata* and *Microscolex modestus*. Besides these, there are two or three immature forms of the genus *Allolobophora* which are not old enough for identification.

ALLOLOBOPHORA COMPLANATA (Dugès).

Lumbricus complanatus, Dugès, Ann. Sci. Nat. t. viii. pp. 17, 22.

This species is a well-known South-European form, having been met with in S. France, Italy, Portugal, and the Balearic Islands. I now add Algeria to the list of localities whence it has been obtained. The principal information as to the structure of this species is to be found in Dugès's memoir upon the Earthworm, in Rosa's account of the Lumbricidæ of Piedmont¹, and in a paper by myself devoted to this species². In neither of two specimens belonging to Dr. Anderson which I dissected was there any trace of the peculiar diverticula of the spermathecæ which I described in the paper last referred to.

As neither Dugès nor Rosa observed anything of the kind, it is possible that the individual I described should be regarded as a variety of the more typical form, the occurrence of which in Algeria I here record.

MICROSCOLEX ALGERIENSIS, n. sp.

There is only a single specimen of this species, which I investigated by means of longitudinal sections of the head end. The structure of the posterior segments was examined by mounting portions of the body in glycerine after having been cut open.

It is a small worm, measuring only an inch or so in length and composed of 80-90 segments. Being curled into a circle in the preservation, I am not able to give exact measurements, which are, however, not of very great importance.

¹ 'I Lumbricidi del Piémonte,' Turin, 1885.

² "Observations on the Structure of *Lumbricus complanatus*, Dug.," Proc. Roy. Soc. Edinb. xiii. p. 451.

The *prostomium* is large, being larger than the diameter of the first segment.

The *setæ* are disposed precisely as in *Microscolex modestus*: that is to say, the *setæ* are not in closely approximated pairs, and the distance between seta 1 and seta 2 is less than that between setæ 3 and 4. The diagram given by Rosa of the *setæ* of *M. modestus* would express, so far as I can make out, the relations of the *setæ* in *M. algeriensis* exactly. There is nothing noteworthy in the form of the *setæ*. As in other Earthworms, the four *setæ* of each side of the body in each segment are connected by muscular strands which favours, it may be supposed, their simultaneous movement. This muscle in *Microscolex* is easily overlooked, owing to its great thinness; it is not more than two fibres thick.

The *clitellum* is complete (forming, that is, a ring) and occupies segments xiv.–xvii. with a part of xiii. Its structure is like that of other Earthworms.

I could find no *dorsal pores*.

The *alimentary tract* is peculiar from the absence of a gizzard, of which traces appear to exist in other species of *Microscolex*; for in *M. dubius* Rosa speaks of “un ventriglio rudimentale, piatto, in forma di coppa;” as to the only other known form, *Microscolex modestus*, Rosa found that “il ventriglio esiste, ma così rudimentale da non potersene veder le traccie che nelle sezioni.” It is not always possible to detect the presence or absence of a gizzard without having recourse to section cutting. *Pontodrilus*, for example, is stated by Perrier to be without this special region of the *oesophagus*; but it is obviously present, though certainly much reduced, when the anterior region of the worm's body is examined by means of sections.

The *pharynx* ends in the third or fourth segment, and, as in other Earthworms, there are masses of glands upon the dorsal surface. These glands, which seem to represent a part of the system of septal glands in the lower Oligochæta, are not confined, in *Microscolex algeriensis*, to the pharyngeal region of the *alimentary tract*; they extend back as far as the ninth segment, and therefore suggest more clearly the septal glands, with which they must surely be homologous. It is interesting to recall the fact that these glands occur also in *Ocnerodrilus*, which is another form near to the border line between the terricolous and limicolous Oligochæta, though nearer to the latter than is *Microscolex*.

The *oesophagus* of *Microscolex algeriensis* is divided into two regions; up to the end of segment vii. it is not markedly vascular, and the living epithelium is composed of more densely packed cells, which gives it a more deeply stained appearance under the microscope. The rest of the *oesophagus* has a richly-developed vascular network, and the epithelium appears to have a looser texture, the cells being less tightly packed; from this circumstance the posterior region of the *oesophagus* looks paler in sections. In the xvth segment the *oesophagus* becomes much narrower and then suddenly widens into the intestine which commences in the xvth segment.

The *intestine* has no typhlosole. The *intersegmental septa* are first visible after segment v. Those separating segments vii./viii., viii./ix., ix./x., x./xi., xi./xii., xii./xiii. are thicker than the following ones. Their insertion ventrally does not correspond with the intersegmental furrows, and this absence of correspondence is found also further back. It is by no means unknown in other Earthworms, and is, as a rule, limited to the anterior segments. *Microscolex algeriensis* has *nephridia* in all segments of the body commencing with the second. They are paired and open in front of and a little to the outside of the third seta. In dissection the nephridia are seen to lie between the second and third setæ on each side. There is a long muscular end-sac, which in section was invariably much crumpled owing to the thinness of its walls.

The series of nephridia in this species is more complete than in either of the other two species of the genus. It is important to notice that after the xviiiith segment the nephridia have a thickish coating of peritoneal cells. A difference of this kind often exist between the anterior and posterior nephridia in Earthworms, though nothing of the kind has been mentioned by Rosa in this particular genus.

With regard to the *vascular system* the most noteworthy point is the presence of three pairs of "hearts" in segments x., xi., and xii. There are pericæsoophageal vessels in some of the segments anterior to the xth, but these are not so well developed as those of the three segments mentioned. The hearts of segment xii. are by far the stoutest; their diameter is at least twice that of the preceding vessels, which are themselves of rather greater calibre than those of segment x. There is no sub-nervian vessel.

The *brain* is situated in the second segment, near to its posterior boundary; the forward position of the brain is of interest.

The *generative system* conforms to the general type met with among the Cryptodrillidæ. The testes are two pairs in segments x. and xi. Opposite to them are the not remarkably large funnels of the vasa deferentia; the testes of segment xi. are partly attached to the vas deferens just where it perforates the segment. The sperm-sacs are in segments xi. and xii.; they involve neither the testes nor the funnels. The two vasa deferentia of each side of the body remain perfectly distinct from each other up to their point of opening on to the exterior. The two tubes run side by side in a rather sinuous course, just below the peritoneum. In the xviiiith segment are a pair of "prostates," or, as I prefer to call them, atria. They are of the tubular form, and, as usual, are separated into a glandular and a muscular portion. The minute structure of this tube is precisely as in *Acanthodrilus*, *Pontodrilus*, &c. The atria are not long, and are entirely contained within the xviiiith segment, instead of being, as is frequently the case, prolonged into adjoining segments. The exact mode in which the vasa deferentia open, I have not been able to ascertain. In any case the two tubes, still retaining their individuality, bore their way into the body-wall a little in front of the point where the atrium opens; they then pass

beyond the atrium, and, I imagine, open just at the atriopore, as in *Ocnerodrilas*; but I am not certain about this. The atriopore is situated just to the outside of the ventralmost seta, which is not modified in any way; there are, in fact, no penial setæ, such as occur in the other two species of the genus.

The ovaries are in segment xiii. The oviducts open by funnels into this segment opposite to the ovaries, and open to the exterior on segment xiv. Receptacula ovarum are present, and are of considerable size relatively to the sperm-sacs.

There is a single pair of spermathecae present in segment ix.; each opens on to the exterior just behind the septum which separates this segment from the one in front and in a line with the ventral seta. Each spermatheca consists of an oval pouch and a single narrow diverticulum opening into it in front.

MICROSCOLEX POULTONI, n. sp.

It may be permissible to append to this paper the description of a fourth species of *Microscolex*, of which a number of examples were kindly collected for me in Madeira by Mr. E. B. Poulton, F.R.S. They measure, when preserved, about an inch in length; they are of a brown colour, the clitellum being orange.

The *clitellum* is variable in extent, always, however, including segments xiv.-xvi.; in some specimens a part or the whole of segments xiii. and xvii. belonged also to the clitellum. Segments xiv.-xvi. were much broader than those immediately adjoining.

The *setæ* are disposed as in other species of the genus; but upon the clitellum the ventral pair of setæ of each side get very much closer together.

On segments xiv., xv., xvi., and xviii. the ventral setæ (see drawing, fig. 1, p. 33) are separated from each other by a distance which is less than half that which separates the corresponding setæ of segment x. From segment xix. backwards, and from segment xiii. forwards, the distance between the two ventral setæ of each side gradually increases.

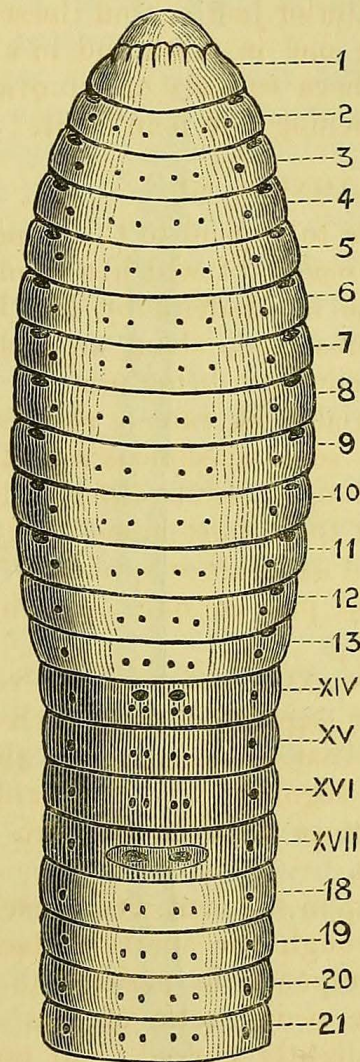
The *male pores* are upon segment xvii.; each is situated upon an oval elevation, and through the aperture itself protrudes a single penial seta, which corresponds in position to the innermost seta of the ventral pair. The penial setæ of this *Microscolex* are (see fig. 2, p. 34) long, slightly curved, and not ornamented at the free extremity; when examined under a high power they show a faint transverse striation which marks the successive deposits of chitinous matter in the formation of the seta. There is a slight notch some little way in front of the distal extremity.

The *pharynx* occupies the first 5 segments or so; there is not a great development of glands upon its upper surface, and there is no continuation of these septal glands into the œsophageal segments, such as occurs in *Microscolex algeriensis*. The *œsophagus* immediately following the pharynx has, perhaps, slightly thicker walls than the hinder part; but there is nothing that can be fairly termed a gizzard.

The epithelial lining of the *œsophagus* is folded; this folding is perhaps more marked in segments xi., xii., and xiii. In segment xv. the *œsophagus* forms a globular dilatation, the walls of which are perfectly smooth without any folding; a very narrow aperture puts this into communication with the intestine which commences in the xvth segment.

In the terminal dilatation of the *œsophagus*, the epithelium

Fig. 1.



Anterior segments of *Microscolex poultoni* from the ventral surface.

The segments are numbered consecutively, those of the clitellum in Roman numerals, the others in Arabic numerals. On the anterior thirteen segments the nephridiopores are shown in front of the dorsal setæ. The oviducal pores are on segment xiv., the male pores on segment xvii.

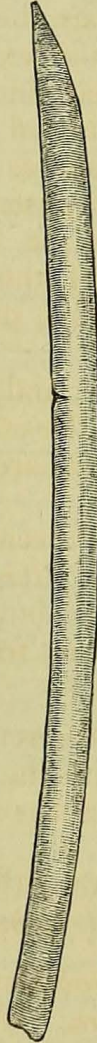
gradually gets higher until its cells are identical in appearance with the tall narrow columnar cells which form the lining membrane of the intestine. Just at the opening of the *œsophagus* into the intestine, the cilia are very long and conspicuous; but the *œsophageal* epithelium is also ciliated throughout the xvth segment; in front of

this point I could not be certain of the presence of cilia. The *intestine* has no typhlosole.

The *brain* is situated further back in the body than in the last species; it lies towards the posterior boundary of segment iii.

The first *intersegmental septum* separates segments v./vi.; the septa separating segments vi./vii., vii./viii., viii./ix., ix./x., x./xi., xi./xii., xii./xiii., xiii./xiv., xiv./xv. are shorter than those which follow, but there is not a very great increase of thickness in their

Fig. 2.



Penial seta of *Microscolex poultoni*.

muscular layers—not so much, for instance, as in the last species. The ventral insertion of the anterior septa does not coincide with the intersegmental furrows.

The *nephridia* commence in segment iii. Their structure appears to be identical with that of the last described species. The first

pair, although they lie chiefly in segment iii. in front of the nerve-cord, open on to the exterior between segments i. and ii. On account of the large terminal end sac, which is prolonged on both sides of the aperture, and may be thus said to have a cæcum, it is always easy to make out the external aperture. I am therefore able to be confident about this point, which distinguishes the present species from both *Microscolex dubius* and *Microscolex modestus*, and allies it with *Microscolex algeriensis*. The external pore is to the inside, and slightly in front, of seta 3¹.

The three strongly developed hearts of segments x., xi., xii. are present in *Microscolex poultoni*.

The *generative organs* show no great differences from those of other species. As in *M. algeriensis*, the true vasa deferentia retain their independence until close to the external aperture; they pass a short way beyond the muscular duct of the atrium, and unite to form one tube, which is surrounded with a thick layer of muscular fibres chiefly circular; this tube is quite indistinguishable in its structural characters from the muscular duct of the atrium; in a section the two tubes cannot be distinguished except by their position. In the thickness of the body-wall, and near to the external pore, they unite. The penial setæ have already been referred to.

The sperm-sacs are racemose, and occupy the same position as in *Microscolex algeriensis* and all the other species of the genus.

The funnels of the sperm-ducts are larger and more folded than in that species.

I could find neither spermatothecæ nor egg-sacs.

This latter character connects *Microscolex poultoni* with *M. dubius*, but it is quite clear from the above description that the species described here is perfectly distinct from *M. dubius*.

The principal differences are :—

- (1) The fusion of vasa deferentia in *M. dubius* to form one tube, which opens into the muscular tube of its prostate.
- (2) The commencement of the nephridia in the vth segment in *M. dubius*.
- (3) The absence of any alteration in the position of the seta on the clitellum in *M. dubius*.

It shows much the same resemblances to *M. dubius* that *M. algeriensis* shows to *M. modestus*. If Dr. Rosa were not so careful a worker as he has proved himself, I should be almost inclined to suspect an identity.

The genus *Microscolex* has been investigated by Rosa and Fletcher. It was first met with in Italy by Dr. Rosa², who, in a later

¹ The ventralmost seta on each side is seta 1, the next seta 2, &c.

² "*Microscolex modestus*, n. gen., n. sp.," Boll. Mus. Zool. Torino, vol. ii. no. 19 (3 cuts).

paper¹, surmised that Fletcher's² *Eudrilus dubius* would prove to be a *Microscolex*. This suggestion was later³ shown to be correct by the description of a species of *Microscolex* evidently identical with *Eudrilus dubius* from the Argentine. I received myself, some time since, a number of examples of a *Microscolex* from Madeira, through the kindness of Mr. E. B. Poulton, F.R.S., which are described above. The existing knowledge of the distribution of the genus is as follows:—

1. *Microscolex modestus*. Italy, Argentina.
2. *Microscolex dubius*. Australia, Argentina.
3. *Microscolex algeriensis*. Algiers.
4. *Microscolex poultoni*. Madeira.

The characters of *M. algeriensis* evidently necessitate a revision of Rosa's generic definition given on p. 511 (3 of sep. copy) of his memoir on the Argentine Earthworms.

The following points are, I think, sufficient to distinguish this genus from any other genera among the Cryptodrilidæ.

Genus MICROSCOLEX, Rosa.

Microscolex, Rosa, Boll. Mus. Zool. Torino, vol. ii. no. 19.

Setæ 8 per segment, distant. *Clitellum* on segments xiii., xiv., xv., xvi., xvii., complete. ♂ pores on xvii. No dorsal pores. *Subnervian vessel* absent. *Nephridia* paired, present in genital segments. *Hearts*, 3 pairs in segments x., xi., xii. *Gizzard* absent or rudimentary. *Intestine* without typhlosole. *Atria* tubular, with or without penial setæ. *Spermatheca* (if present) one pair in ix., with diverticulum.

The affinities of the genus have been discussed by Rosa, who compares *Microscolex* with *Photodrilus* and *Pontodrilus*. I may point out that the absence of penial setæ in *Microscolex algeriensis* lessens the distance between the genus and *Pontodrilus*.

The species which I describe here is quite clearly distinct from the two others. The table (on p. 37) indicates the principal resemblances and differences between the four species *Microscolex dubius*, *M. modestus*, *M. algeriensis*, and *M. poultoni*.

¹ "Sui generi *Pontodrilus*, *Microscolex*, e *Photodrilus*," *l. c.* vol. iii. no. 39.

² "Notes on Australian Earthworms," pt. iii., Proc. Linn. Soc. N.S.W. vol. ii. ser. 2.

³ "I terricoli Argentini raccolti dal Dott. Carlo Spegazzini," Ann. Mus. Civ. Genova, vol. ix. ser. 2.

	<i>M. dubius.</i>	<i>M. modestus.</i>	<i>M. algeriensis.</i>	<i>M. poultoni.</i>
<i>Clitellum</i>	On segments 13-17.	13-17.	13-17.	13-16 ¹ (17).
<i>Nephridia</i>	Commence in 5.	Commence in 4.	Commence in 2.	Commence in 2.
<i>Gizzard</i>	Rudimentary.	Rudimentary.	Absent.	Absent.
<i>Spermatheca</i>	Absent.	One pair.	One pair.	Absent.
<i>Vasa deferentia</i>	Unite to form one tube on each side, which opens into muscular tube of atrium.	?	Remain separate, and open into atrial duct just before (?) external pore.	Remain separate up to atria, when they fuse and become invested in a muscular sheath; the tube thus formed unites with atrial tube just before external aperture.
<i>Penial setæ</i>	Present.	Present.	Absent.	Absent.
<i>Receptacula ovarum</i>	Absent?	Present.	Present.	Absent.

¹ The line above or below the number indicates that a part only of the segment in question is included in the clitellum.