

RUWENZORI EXPEDITION REPORTS.

3. VERMES.*

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[Text-figures 3-8.]

THE following pages relate to a number of species of Eudrilidæ collected by the Ruwenzori Expedition which I received from the Natural History Museum through the kindness of Mr. W. R. Ogilvie-Grant. They were collected upon Mt. Ruwenzori along with a number of other species of Oligochæta belonging to the genera *Benhamia* and *Alma*. These latter genera have been lately investigated by Signor Cognetti de Martiis †, upon material collected by H.R.H. the Duke of the Abruzzi from the same locality. I have therefore limited myself to the description of the Eudrilidæ, of which specimens must, I should presume, have been collected by the Italian expedition; but, so far as I am aware, they have not up to the present been described. All the species are new, but are referable to genera already defined, which genera are in every case East African in range.

Suborder OLIGOCHÆTA.

POLYTOREUTUS RUWENZORII Beddard.

Polytoreutus ruwenzorii Beddard, P. Z. S. 1907, p. 415.

Of this species the collection contained but a single example, and that in a not very good state of preservation for dissection. I have, however, been able to ascertain, as I think without doubt, that the species is new and allied to a small group of species of this genus of which all the members hitherto known have been described by Michaelsen ‡. This group—which includes the species *P. kirimaensis*, *P. usindjaensis*, and *P. sylvestris*—is limited to the shores of Victoria Nyanza, Albert Nyanza, and the neighbouring country; and the occurrence therefore of an ally upon Mt. Ruwenzori is not surprising. The likeness of these four forms is to be seen chiefly in the peculiar relations of the diverticula of the spermathecal pouch and, in three of them at any rate §, in the existence of paired copulatory pouches debouching to the exterior on

* Mr. Beddard's Memoir is reprinted from P. Z. S. 1907, pp. 415-431.

† Boll. Mus. Zool. Torino, vol. xxi. notes i. and iii.; vol. xxii. note xiv.

‡ "Regenwürmer," in Deutsch-Ost-Afrika, 1896.

§ Apparently not in *P. usindjaensis*.

either side, and independent, of the penis. The present species, the exact locality of which within this area I fix by means of its specific name, is represented by a fully mature example which measures 77 mm. in length by 5–6 mm. in breadth. It is therefore a rather stout and comparatively short worm.

The *setæ* of *Polytoreutus ruwenzorii* are disposed like those of other species of the genus: *i. e.* the ventral *setæ* are much wider apart than the lateral *setæ*. The distance between each seta of the ventral pair is something like three times that which separates the individual *setæ* of the lateral pair. I have endeavoured to make an exact study of the distribution of the *setæ* upon the clitellar segments, concerning which there is some but not exhaustive information, on some other species of the genus already described; for this character seems to be one of probably systematic value. On these segments I could only find one of the two *setæ* of the lateral pair, and the seta present was the innermost. I ought to mention that these statements depend upon a microscopic examination of the entire cuticle stripped from the body, and not merely upon an inspection of the entire worm with a lens. The apertures through which the *setæ* are protruded are so obvious that the failure to find one is strong evidence of its absence. The ventral *setæ*, on the other hand, were present upon the clitellar segments with the exception of the xviiith, where only the outer seta of the pair was present. Ventrally the clitellum is not so strongly developed as it is laterally and dorsally, which facts may be related to the presence or absence of *setæ*.

The *clitellum* of *Polytoreutus ruwenzorii* is, like that of *Polytoreutus sylvestris* and some, but not all, other species, best developed laterally and dorsally. Ventrally it is not so well-developed, and here the intersegmental furrows are plainer than they are laterally. It embraces segments xiii. to xvii., which is the usual extent of the clitellum in this genus.

The *nephridiopores* lie in front of the lateral pair of *setæ*, in front of each *pair*, but not definitely opposite either of the pair. They commence apparently in the fourth segment. A notable fact with reference to these pores is that when the cuticle is stripped off—and I have mapped the pores by this means—a considerable strip of the (as it would therefore appear) chitinous lining of the duct of the nephridium is also stripped off and protrudes from each aperture. I have not noticed anything of this kind in other Oligochæta.

The *oviducal pores* are quite conspicuous and lie upon the xivth segment behind and to the outside of the nephridial row and the lateral seta of that segment. The single *male pore* is on the border of segments xvii./xviii. and the *spermathecal pore* behind it upon the interval xviii./xix.

The internal anatomy of this species, so far as concerns the alimentary and circulatory organs, seems to agree with that of the next species to be described and with the members of this genus generally.

The *sperm-sacs* are like those of *Polytoreutus* generally (but not *P. bettonianus*) in

being exceedingly long, and at their commencement and for a long way back of much less diameter than they are more posteriorly. The sacs extend for more than 30 segments back from their point of origin. That of the right side is fifteen segments longer than the shorter sperm-sac of the left side. The difference in length in this species is more pronounced than in that next to be described. The dilated chambers at the beginning of the *sperm-duct* immediately after it leaves the funnel are conspicuous in this as in the next species. The *spermiducal glands* are peculiar in form and do not altogether agree with those of *P. sylvestris*, to which they appear to come nearer in structure than to those of other species of the genus *Polytoreutus*. They agree, however, with the last-named species in the fact that the duct of the gland instead of emerging, as is the rule among these worms, from the end of the spermiducal gland, leaves the gland some little way in front of the proximal end. Each gland is rather bent in form, but otherwise lies straight. It is of firm consistency, but is not covered with a sheath of muscle appreciable to the naked eye or through a lens. The slight bending of the corresponding glands in *Polytoreutus sylvestris* figured by Michaelsen is rather exaggerated in the present species; they appear also to be rather longer in *P. sylvestris* than in *P. ruwenzorii*. Michaelsen does not mention in that species a character which is very noteworthy in *P. ruwenzorii*. He describes the "prostate" glands indeed merely as being "unregelmässig eingeschnürte." In the specimen of *P. ruwenzorii* reported upon here the surface of the gland was much marked by furrows, and the appearance given was that of a very long gland tightly coiled up with some condescence between the individual loops of the coil. There is no indication of anything of the kind in the figures given by Michaelsen either of *P. sylvestris* or of its allies. The two copulatory chambers mentioned by Michaelsen * in *P. sylvestris* and *P. kirimaensis* are quite as large in *P. ruwenzorii* as in those species.

As in several species—for example, *Polytoreutus kirimaensis* †,—the present species of *Polytoreutus* is to be characterised by a very slender *spermathecal sac* which lies beneath the nerve-cord, than which it is no thicker. It is thus difficult to see, and, as Michaelsen has remarked, is apt to escape the eye. Particularly was this the case with the worm described in the present communication. For the contents were very slight in certain regions of the sac, which rendered it even more difficult of observation. It is certainly no wider than the nerve-cord, which overlies it. It is largely by virtue of the different forms which the spermathecal sac shows in this genus that the species of *Polytoreutus* are discriminated.

The species which I name *Polytoreutus ruwenzorii* is quite different in details, so far as concerns this organ, from any other species of which descriptions have been published. It comes nearest to *Polytoreutus* ‡ *kirimaensis* so far as I can gather, but shows obvious differences from that species.

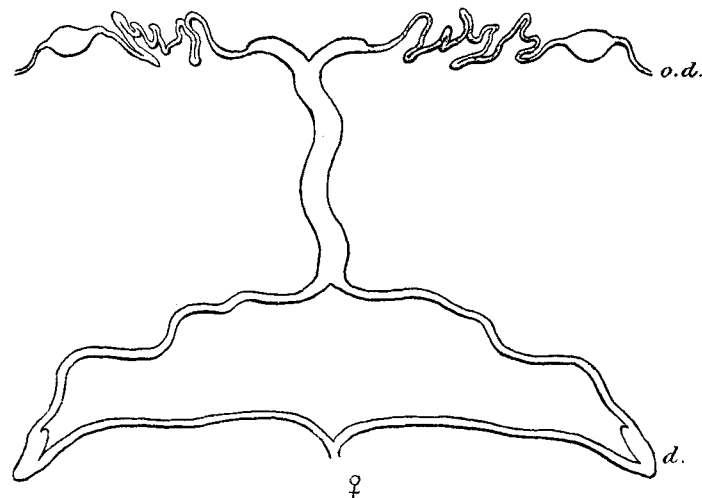
* *Loc. cit.*

† Michaelsen, "Die Regenwürmer Ost-Afrikas," in *Deutsch-Ost-Afrika*, vol. iv. 1896, p. 16.

‡ *Loc. cit.* pl. ii. fig. 21.

The median spermathecal sac is slender as in that species and is straight or nearly so in its course beneath the nerve-cord, not much convoluted as in the allied *Polytoreutus sylvestris* *. Anteriorly the sac passes into the fourteenth segment near to the anterior wall of that segment without any change. Arrived there it ends in two diverticula of short extent. These diverticula are apparently of much shorter extent than in any of the species *Polytoreutus kirimaensis*, *P. usindjaensis*, and *P. sylvestris*, whose spermathecal apparatus is built upon the same plan as that of *P. ruwenzorii*. Michaelsen, as a matter of fact, does not differentiate, except in the case of *P. usindjaensis*, between each diverticulum and the oviduct with which it becomes continuous, which in fact opens into it according to my interpretation of these various structures in the genus *Polytoreutus* †. In the figure annexed hereto this arrangement is rendered plain. The

Text-fig. 3.

Spermathecal sac of *Polytoreutus ruwenzorii*.

d. Diverticulum of sac. o.d. Oviducal pore. ♀. Spermathecal pore.

sudden diminution of the cæcum of the spermathecal sac (text-fig. 3) where it is continuous with the oviduct is obvious. Moreover, the oviduct is extremely long as compared with that of some other species, and is much coiled. Much more so is this the case with *Polytoreutus ruwenzorii* than with any of the three species mentioned as coming nearest to it in respect of the spermathecal sac and its forward diverticula. But apparently these three species do agree with *P. ruwenzorii* in having a much longer oviduct than in many other species of the genus. There is a further point of agreement between the new species described in the present paper and the three East-African

* Where, however, it is also occasionally less convoluted, perhaps in less mature individuals (Michaelsen, *loc. cit.* pl. ii. fig. 23).

† P. Z. S. 1902, vol. ii. p. 206 *et seq.*

species with which I have compared it in the nature of the spermathecal diverticula. The slender spermatheca just in front of the terminal section of the male efferent apparatus divides into two branches, which diverge at right angles and run dorsally, this portion of the spermatheca forming a tube more than 5 mm. in length. Towards the dorsal median line the tube of each side turns back upon itself after emitting a very short but slightly swollen diverticulum; the recurrent branch runs alongside of the outgoing branch, the two forming a loop which suggests at first sight a nephridium. It is indeed not very much thicker than the nephridia. The returning branch then, having arrived at the level of the point whence it departed, dorsally turns at right angles and joins its fellow a little in front of the external aperture, which is quite inconspicuous. This peculiar origin of the diverticulum on each side is exactly matched in the three species to which the present is evidently allied, viz. *Polytoreutus usindjaensis*, *P. kirimaensis*, and *P. sylvestris*. But in all of the three species mentioned the diverticulum itself is of some considerable calibre. *Polytoreutus kirimaensis* comes nearest to the present species in that the diverticulum is smaller than in the other two. But even in that species it is much larger than in *P. ruwenzorii*. There is thus no difficulty in discriminating *Polytoreutus ruwenzorii* by the structure of the female efferent and copulatory apparatus. It is very interesting to notice that *Polytoreutus ruwenzorii* also shows points of resemblance to *P. sylvestris* and *P. kirimaensis* (but apparently not to *P. usindjaensis*) in the structure of the male efferent apparatus, which has been already described. There seems to be no doubt that these four species form a little group of *Polytoreutus*; but it is not possible in my opinion to separate them off from the other species as a genus or even a subgenus, at least at present.

It is clear from the above account that *Polytoreutus ruwenzorii* comes nearest to *P. sylvestris* of Michaelsen. It is only, as I think, with this species that we have to reckon in determining the distinctness or otherwise of the *Polytoreutus* which I regard as new.

The most plain differences from this species are to be seen in the small size of the spermathecal diverticula and the very reduced length in front of the undivided portion of the posteriorly fused spermathecal sacs. It may be thus defined:—

POLYTOREUTUS RUWENZORII.

Length 70–80 mm.; breadth 4–5 mm. Distance between setæ of ventral pair three times that between setæ of lateral pair. Outer seta of lateral pair absent on clitellar segments. Clitellum saddle-shaped. Male pore xvii./xviii.; spermathecal pore xviii./xix. No genital area behind pores. Spermathecal sac bifurcate for a short distance in front; posterior diverticula very small; oviduct between spermathecal sac and receptaculum very long. Right sperm-sac longer than left. Spermiducal glands giving off duct in front of proximal end gland, much furrowed. Copulatory chambers present.

POLYTOREUTUS GRANTI Beddard.

Polytoreutus granti Beddard, P. Z. S. 1907, p. 420.

In describing some years since* several species of this genus from East Africa, I found among a collection from Mt. Kenya two closely allied species, which, however, were plainly to be differentiated upon a careful study. It is interesting to find upon Ruwenzori the same presence of two closely allied species of *Polytoreutus*, not—it may be remarked—specially related to their congeners of Kenya. To find closely related species in the same comparatively restricted area is rather more remarkable than would have been the existence of more remotely allied examples of the same genus. This species, which I have named after Mr. Ogilvie-Grant, F.Z.S., comes nearer to *Polytoreutus kirimaensis* than does *P. ruwenzorii*. It is represented by a single specimen, not fully mature as to the clitellum, but apparently quite fully mature as to the sexual organs. One of the two copulatory chambers and the penis were protruded. The size and the external characters generally agree with those of *P. ruwenzorii*.

The worm is a trifle more slender. The *clitellum* was not developed, and upon the segments to be included in it I observed no deficiency of setæ such as occurs in *P. ruwenzorii*. The relations between the distances which separate the two setæ of each pair are much as in *P. ruwenzorii*. In the same way I observed a long tube of chitin to be extruded from the nephridiopores. I do not like to assert positively that there is a difference between the two species in the segment which contains the first pair of *nephridiopores*. But in the present species I noted a pair of these apertures in the third segment, *i. e.* a segment further forwards than I observed the same pores in *P. ruwenzorii*. The internal anatomy seems to agree with that of *P. ruwenzorii* and other species of *Polytoreutus* in the alimentary canal with its appended calciferous glands and in the situation of the last heart (eleventh segment). It may be mentioned, however, that *P. granti*, like *P. ruwenzorii*, has the dorsal vessel doubled in the twelfth segment. This doubling of the dorsal vessel is known in the genus *Polytoreutus*—for example, in *P. gregorianus* †.

The *male organs of reproduction* are much like those of *P. ruwenzorii*, and yet show differences in minutiae. As in that and other species of the genus, there is but a single *vas deferens* on each side, ending in front in an elongated chamber (“Samenmagazine”) behind the funnel. The *sperm-sacs* are but a single pair. They are elongated and not so markedly thin anteriorly as in *P. ruwenzorii* and other species. The right-hand sac, as in that species, is longer than the left, but the difference is not quite pronounced. The length of the longer sac is 21 mm. The two sacs are not joined at

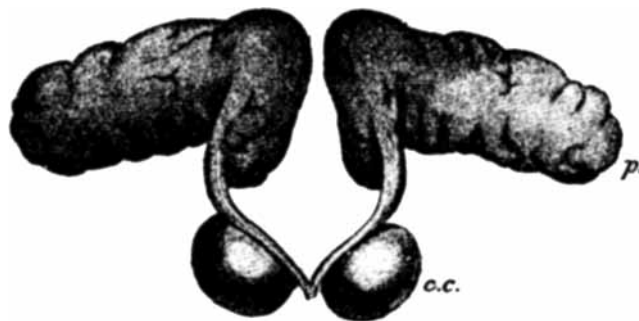
* “On some new Species of Earthworms belonging to the Genus *Polytoreutus*, &c.,” P. Z. S. 1902, vol. ii. p. 190.

† Beddard, P. Z. S. 1901, vol. i. p. 191. Michaelsen has not referred to the condition of the dorsal vessel in the species with which the present is particularly compared.

their distal extremity. The terminal apparatus of the male efferent ducts is quite like that of *P. ruwenzorii*. In precisely the same way (text-fig. 4) the *spermiducal gland* is almond-shaped, and somewhat bent upon itself at the point whence its duct emerges; the surface is not, however, quite so strongly furrowed. The copulatory chambers seem to be exactly as in *P. ruwenzorii*.

The *female organs of generation* (text-fig. 5, p. 32), on the other hand, show greater differences from the same organs in *P. ruwenzorii*. There is the same slender median *spermathecal sac* which underlies the nerve-cord and is hardly convoluted in its course. Nor is it of any greater diameter than the nerve-cord. Anteriorly this sac divides into two, but there is no marked division near to the point of bifurcation of the sac between the spermathecal sac and the oviduct which opens into it. This break is very clear in *P. ruwenzorii*. And in that species the diverticula * of the spermathecal sac are

Text-fig. 4.

Terminal male organs of *Polytoreutus granti*.

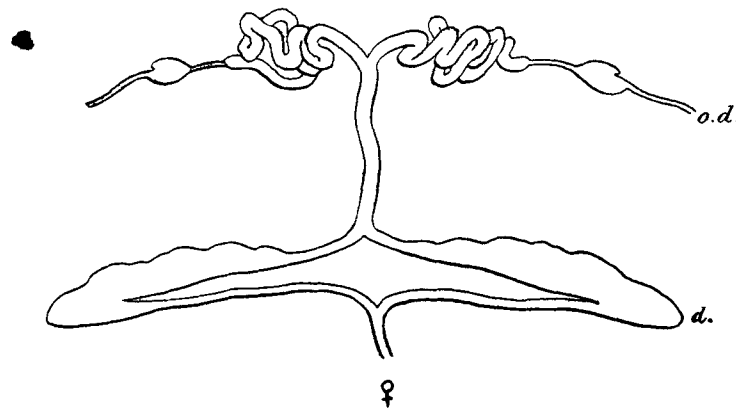
c.c. Copulatory chamber. p. Spermiducal gland.

short, the greater part of the coiled tube intervening between the unpaired spermathecal sac and the receptaculum being the oviduct. In the present species I could not ascertain the precise spot where the oviduct debouched into the diverticula of the spermathecal sac, but this point is at any rate very far removed from the point of bifurcation of the spermathecal sac; the greater part of the coiled tube, therefore, which intervenes between the unpaired spermathecal sac and the receptaculum being referable to the diverticula of the spermathecal sac. This important difference between these two species, otherwise very nearly allied, is remarkable. It is apparently correlated with another structural feature in which they differ. In examining microscopically this part of the reproductive apparatus in glycerine after removal from the body, I noted in addition to the receptaculum, called by Michaelsen the "Eitrichterblase," a spherical chamber which obviously corresponds to what Michaelsen calls the

* The word "diverticulum" is, of course, not strictly correct. The two spermathecæ are fused in the middle and separate at both ends.

“Ovarialblase,” and which is believed by him to contain the ovary. In *Polytoreutus caeruleus** this Ovarialblase forms the end of the branch of the spermathecal sac into which it opens on the one hand, and is connected on the other with a narrow tube communicating with the Eitrichterblase, which is, I think, part of the funnel of the oviduct pulled out by the retreating spermathecal sac. I cannot be certain that the spherical chamber in *Polytoreutus granti* has the same connections, but I cannot help regarding it as the homologous structure. I have not represented it in the figure (text-fig. 5). Now this appears to be wanting in *Polytoreutus ruwenzorii* altogether, as it is, for example, in *Polytoreutus magilensis*. Where it does occur it appears to mark the boundary between the oviduct and the spermathecal sac; if so, then the present species has, as I have already suggested, a very long diverticulum to the spermathecal sac and a short oviduct †.

Text-fig. 5.

Spermathecal sac of *Polytoreutus granti*.

Lettering as in text-fig. 3.

Polytoreutus granti differs from its ally *P. ruwenzorii* in possessing, like *P. kirimaensis* and *P. sylvestris*, considerable appendages to the spermathecal sac posteriorly. These measured in my example 6 mm., and were therefore just a trifle shorter than the spermiducal glands, which measure 7 mm. in length. The proportions, in fact, are not very different from those of *P. sylvestris*; but in the present species the length of both structures seems to be considerably less than in *P. sylvestris*, where they extend very much further back in the body. As in that species, however, the spermathecal diverticulum on each side receives or emits the duct leading to the exterior from the side and not from the end. The relationships of the diverticulum to the thread-like regions of the spermathecal sac which enter and leave it were precisely like those

* Michaelsen, JB. Hamb. wiss. Anst. ix. Taf. iv. fig. 30.

† Beddard, Quart. Journ. Micr. Sci. n. s. vol. xxxiv. pl. xxv. fig. 7.

depicted by Michaelsen for *P. sylvestris*, and not like those of *P. kirimaensis*; for in the latter species the spermathecal diverticulum simply bifurcates at its end into the incurrent and excurrent regions of the spermathecal sac.

The above account of the anatomy of *Polytoreutus granti* shows that it cannot be confused either with the species which I have just described or with any other known form. It comes nearest to *P. ruwenzorii* and to *P. sylvestris*. It differs most markedly from *P. ruwenzorii* by the characters of the spermathecal diverticula, and by the great length of the anterior undivided portion of the spermathecal sac. It differs from *P. sylvestris* mainly in the presence of a well-marked circular chamber at the end of the undivided spermathecal sacs, and by the shorter spermathecal diverticula and spermiducal gland. It may be thus defined:—

POLYTOREUTUS GRANTI.

Length 70–80 mm.; *breadth* 4–5 mm. *Distance between setæ of ventral pair three times that between setæ of lateral pair.* *Male pore xvii./xviii., spermathecal pore xviii./xix.* *Spermathecal sacs long and much coiled in undivided anterior region; posterior diverticula of some length.* *Oviduct between spermathecal sacs and receptaculum ovarum not long.* *Right sperm-sac longer than left.* *Spermiducal glands furrowed; duct arising before proximal end of gland.* *Copulatory chambers present.*

NEUMANNIELLA RUWENZORII Beddard.

NeumannIELLA ruwenzorii Beddard, P. Z. S. 1907, p. 423.

I refer two fully mature, moderately large individuals, as well as a number of smaller specimens, of an earthworm, apparently new to zoology, to the genus *NeumannIELLA**, for reasons which the following account of its structure will render plain. The principal distinguishing feature of the genus is thus described by its founder, viz.:—“Die für mehrere neue Arten aufgestellte Gattung *NeumannIELLA* unterscheidet sich von den verwandten Gattungen *Eminoscolex*, *Gardullaria* und *Teleudrilus* durch die vollständige Unpaarigkeit der Samentasche.” This is plainly to be seen in *NeumannIELLA ruwenzorii*. The larger of the two examples is 105 mm. long and measures 3 mm. in diameter. It is not strongly pigmented. The *prostomium* is very small and restricted within the peristomial segment.

The *setæ* have the usual arrangement met with in this genus. The individual *setæ* of the ventral pair are much wider apart than the closely paired *setæ* of the lateral pair. The distance between each seta of the ventral pair is fully five times as great as that which separates the two *setæ* of the lateral pair. The *setæ* are rather small. On some segments, at any rate, of the clitellum there are no *setæ* present at all. This is certainly the case with segment xiv., where the exact position of the lateral seta

* Michaelsen, “Die Oligochæten Nordost-Afrikas,” Zool. Jahrb. (Abth. f. Syst.) xviii. p. 501.

between the nephridiopore in front and the ovipore behind could be easily fixed. There is no trace upon the cuticle (which was stripped off and examined) of these setæ or of the orifices through which they protrude. In *Neumanniella siphonochæta* Michaelsen particularly notes that setæ *are* present* upon the clitellum. Nothing is said upon the matter in the case of other species. The absence of setæ upon the clitellum is well known to occur in certain species of *Pheretima*, while other species have them on the clitellum.

The *nephridiopores* are very plainly visible upon the clitellar segments only with the use of a lens; but they are not thus visible upon the other segments of the body. The reason for this is not wholly, if at all, the turgescence of the clitellar segments, which thus makes the pores obvious. When the cuticle is stripped off it is very distinctly to be noted that the pores themselves are smaller in size upon the pre-clitellar than upon the clitellar segments. The difference is very considerable. This can hardly be the result of stretching, and must indicate a larger nephridium, or, at least, a larger terminal duct to the nephridium. I observed the first nephridiopore upon the third segment. Michaelsen states (of the species † where he notes the point) that the nephridiopores lie in line with the pair of setæ *c d*. I found in *Neumanniella ruwenzorii* a decided relationship to seta *c*. These pores are, it should be added, near to the anterior dividing-line of their segment.

The *clitellum* of *Neumanniella ruwenzorii* is complete all round the body. It is as strongly developed upon the ventral as upon the dorsal side. Its yellow colour contrasts with the rest of the body. The clitellum shows some variation from species to species of this genus in the fact of being saddle-shaped or as in the present species. It begins upon the xiiiith segment, the posterior one-third of which is invaded by the clitellar epithelium. At the other extremity it ends upon the xviiiith segment, so that the dimensions are as in other species of the genus, and as in the Eudrilidæ generally. I have already remarked upon the apparent absence of setæ upon this region of the body; there are also no traces to be observed externally of penial setæ in the neighbourhood of the male generative pore or elsewhere.

The most anterior of the *generative pores* is the *spermathecal aperture*. This is very conspicuous in the middle line and just on the boundary-line of segments xiii. and xiv. It is rather a small orifice, but nevertheless quite evident. There is no modification of the integument in its neighbourhood. On the xivth segment are the *paired orifices of the oviducts*. These lie exactly behind the nephridiopores of that segment and not far from the posterior boundary of the xivth segment. The apertures are quite conspicuous, but not much (if at all) larger than the nephridiopores upon the clitellum, which, as already mentioned, are wider than those apertures upon the segments in front of the clitellum.

* *Loc. cit.* p. 502.

† *N. siphonochæta* and *N. tenuis*, *loc. cit.* pp. 502 & 505.

The *male pore* is a single aperture like the spermathecal pore. It lies exactly on the boundary-line of segments xvii. and xviii. It is considerably larger than the spermathecal pore, and the actual orifice is surrounded by an area having a rather transparent appearance. There is no protrusion of the Bursa propulsoria, nor is the orifice situated upon an area which is at all raised beyond the general level of the body. Apart from the slightly modified integument surrounding the male pore, which has no counterpart in the case of the spermathecal pore, the body of this species shows *no genital papillæ*.

With regard to internal structures I have no observations to make, save those based upon examination with a lens and a microscope in the case of detached pieces of certain organs and systems. I have not investigated this Eudrilid by means of sections on account of its poor state of preservation.

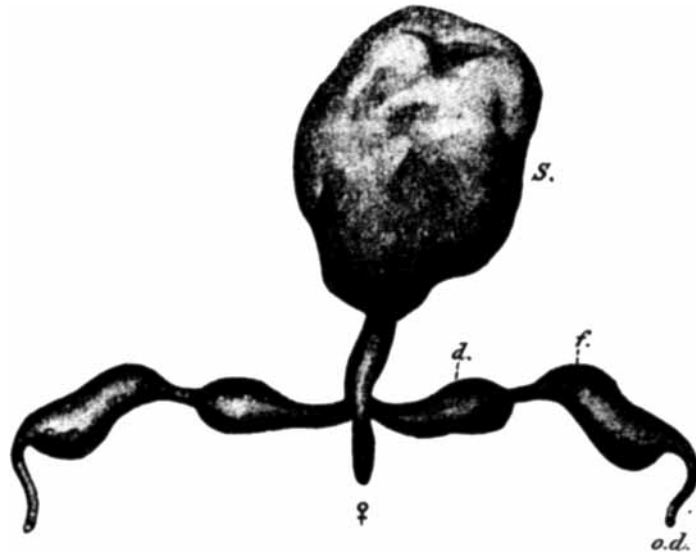
With regard to the alimentary tract, the paired calciferous glands seem to me to be rather further back than the thirteenth segment, but as the worm was much softened I should not like to be quite certain. The condition of the proximal swellings upon the sperm-ducts seems in this genus to offer systematic characters for the differentiation of the species. For in *N. tenuis* these "Samenmagazine" are hardly marked at all, and they are quite conspicuous in *N. siphonochaeta*. In the present species these structures are present, but rather different in their condition from those of some other Eudrilidæ. Each of these swellings upon the sperm-duct is of oval form, tapering towards each end; but instead of lying immediately after the funnel of the sperm-duct, there is a considerable stretch of narrow tubular sperm-duct before the funnel. The latter lies deep within the sperm-sac. I have observed the characters of these bodies in the smaller specimens, but not in that from which the present description of the species has been prepared.

The *terminal male efferent apparatus* is constituted as follows:—Each of the two prostate or spermiducal glands measured about 10 mm. in length, and each gland was folded only once upon itself, thus forming a **U**. The diameter of each gland was not more than, if indeed quite so much as, 1 mm. The (morphologically) posterior end of each gland lay further forwards in the body than the proximal or anterior end of each spermiducal gland. Anteriorly each tubular spermiducal gland suddenly narrowed to form a firm and slender duct; the two ducts running backwards soon join and form an unpaired tube which constitutes one limb of a **U**, the anteriorly directed limb being the *Bursa propulsoria*. The spermiducal glands have a soft opaque appearance; they are not hard and with a nacreous glitter as in some Eudrilids. On the other hand, the Bursa propulsoria has an almost metallic appearance to the naked eye. It is slender and fusiform. There are no penial setæ.

The *spermathecal gland* of this Eudrilid was unfortunately cut into when the animal was slit open along the back. It is more or less globular in shape, and occupies about the first half of the clitellum. It is quite dorsal in position, lying

immediately beneath the body-wall, and has pushed the dorsal blood-vessel to the left. The contents were an opaque white granular mass, in which could be detected nothing resembling a spermatophore, though the friable coagulated matter may have been the material out of which a spermatophore was to be constructed. The spermathecal sac (text-fig. 6), it should be said, widens out from its duct, which lies to the right side of the gut. I could see no indication of any communication between the spermathecal sac and the cavity of the intestine, such as occurs, for example, in *Parascolex*. The narrow duct of the spermathecal sac shows no nacreous glitter, nor

Text-fig. 6.

Spermathecal apparatus of *Neumannella ruwenzorii*.

d. Diverticula of spermathecal sac (*S.*). *f.* Funnel of oviduct. *o.d.* Oviducal pore.
♀. Spermathecal pore.

does it ultimately widen out into any structure that may be termed a Bursa copulatrix. On the contrary, the duct of the spermathecal sac just before its opening on to the exterior suddenly narrows to half its former calibre and becomes more muscular, with transverse and longitudinal fibres. At the point where this narrowing begins, two cæca, one on each side, are given off and slightly curled backwards. These arise therefore from what I have termed the duct of the spermatheca. These cæca are rather longer than the very narrow terminal chamber of the spermatheca, with a diameter half again the width of that chamber; each cæcum is about half the diameter of the wider part of the duct of the spermatheca. From the extremity of each cæcum arises a short tube with very weak muscular walls; this becomes a little wider, and at a short distance from the spermathecal cæcum contains the oviducal

funnel, which can be seen to fan out within the chamber so formed. The oviduct apparently also opens partly into the receptaculum ovarum; the short oviduct opens on to the exterior in the usual way. The receptaculum ovarum was full of eggs. I could find no ovary within the chamber into which the funnel of the oviduct opens, and suspect that the ovarian tissue has been entirely transferred to the receptaculum ovarum. In any case, the various sacs and ducts mentioned appeared to form a closed system in which the ovary, if persistent elsewhere, was not included. I am not clear how far this species agrees and disagrees with others of the genus. In three of the four species described by Michaelsen, that naturalist figures a tube which encloses the oviducal funnel at one end and opens at the other into the spermathecal sac. There is no indication of any diverticula of the spermathecal sac which receives the "Verbindungsschlauch," such as I find in *Neumanniella ruwenzorii*. Nor could I, as already mentioned, detect a special ovarian sac lodging the ovary and communicating with the rest of the egg-conducting apparatus, such as Michaelsen found. It should be observed that this bifurcation of the spermathecal sac anteriorly to receive the oviducts is exactly like the disposition of this sac in *Polytoreutus*. Its presence in the species *Neumanniella ruwenzorii* necessitates a revision of the generic characters used by Michaelsen, who uses as a generic character the fact that "Samentasche ganz unpaarig." This character alone therefore serves to discriminate the present species from all of those described by Michaelsen. It may be thus defined:—

NEUMANNIELLA RUWENZORII.

Length 105 mm.; breadth 3 mm. Distance between ventral setæ about five times that between dorsal setæ. Some of the setæ absent from clitellum. Clitellum complete, xiii./xviii. Male pore single, median, upon xvii./xviii. Spermathecal pore single, median, upon xiii./xiv. Spermiducal glands with well-marked narrow long duct, each of which joins its fellow to open into fusiform muscular terminal chamber. No penial setæ. Spermathecal sac with two diverticula, which receive oviducts at extremities, and a small narrow muscular Bursa propulsoria.

EMINOSCOLEX RUWENZORII Beddard.

Eminoscolex ruwenzorii Beddard, P. Z. S. 1907, p. 428.

I refer to a new species of the genus *Eminoscolex* a worm which is considerably softened, but in which the more important characters are nevertheless plainly visible. The completely paired condition of the male and female organs, coupled with the ventral calciferous pouches in segments ix., x., xi. and the paired glands in segment xiii., are decisive of its generic position.

The worm measures rather more than 200 mm. in length by 4–5 mm. in width and

is thus the largest species of the genus. The colour above is dark purplish brown. The clitellum was not developed. The *setæ* are paired; but the phrase descriptive of these structures in Michaelsen's amended definition of the genus*, viz., "Borsten ventral sehr weit, lateral enger gepaart," hardly applies to the present species.

The ventral *setæ* (text-fig. 7) are rather wide, much as in *Polytoreutus*, but the lateral *setæ* are only slightly more approximated, the proportions being about 5 : 6. It is remarkable that on the nine or ten anterior segments of the body the ventral *setæ* are very much larger, perhaps twice the size of the lateral *setæ*; this discrepancy

Text-fig. 7.



Ventral view of *Eminoscolex ruwenzorii*.
Some of the segments are numbered.

ceases after that point, and both pairs of *setæ* are equisized and small. The ventral pair of *setæ* of the xviiith segment are absent.

The *nephridiopores* lie in front of the lateral pair of *setæ*, and are not specially related to one or other of the pair. They appear to begin in the third segment.

The *oviducal pores* are upon the xivth segment, in line with the *nephridiopores*.

The *spermathecal pores* are paired as in other species of the genus. The pore of each side lies in front of the outer of the ventral pair of *setæ*. The pores are not very large.

* "Die Oligochæten Nordost-Afrikas," Zool. Jahrb. (Abth. f. Syst.) Bd. xviii. p. 482.

On the following intersegmental furrow (*i. e.*, xiii./xiv.) are two pairs of minute orifices, which lie on a level with each of the four ventral setæ. They are rendered more conspicuous by being surrounded with a yellowish area. This area is the expression of internal sacs, which probably correspond to the copulatory glands found in many Earthworms of the families Megascolicidæ and Geoscolicidæ, but not, I believe, hitherto recorded among the Eudrilidæ. These sacs, though small, are very easily to be seen when the septum separating segments xiii. and xiv. is pushed forward.

The *male pores* are very large and conspicuous, and lie between segments xvii. and xviii. in a straight line with the spermathecal pores. The flaps of skin surrounding the pores cause them to be rather obliquely set, as is shown in the accompanying figure (text-fig. 7). The hinder margin of each orifice is much thickened and forms a glandular pad; the two very nearly meet in the middle line behind.

The intersegmental septa are not very much thickened, and they cease to be at all thickened after that which separates segments xi./xii. The gizzard, which is well developed, though not very large, lies undoubtedly in segment v. The median calciferous pouches are in segments ix., x., and xi. The paired calciferous glands of segment xiii. have rather an unusual form. Each consists of a relatively narrow tubular coiled structure very much longer than it is broad. This lies coiled on each side of the gut in the xiiiith segment.

The dorsal blood-vessel is nowhere double; the last pair of hearts is in segment xi.

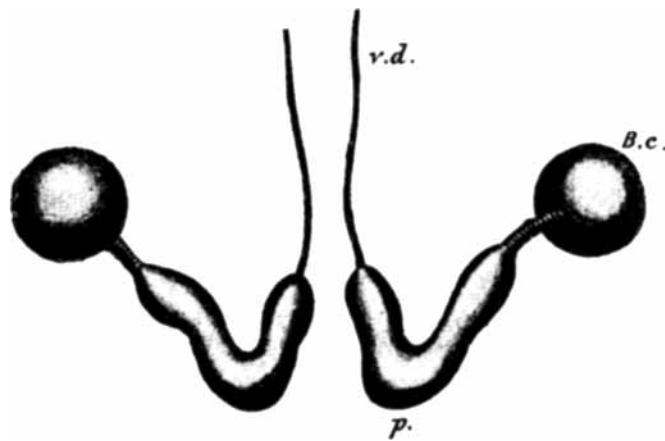
The *male organs* are much like those of other species of this genus. The present species is holandrous, and the sperm-sacs are two pairs, more or less tongue-shaped bodies, in segments xi. and xii. The ends of the sperm-ducts near to where they open into the sperm-sacs are, as in other Eudrilidæ, dilated into what Michaelsen has termed a "Samenmagazin." As in other species of *Eminoscolex*, the region of the sperm-ducts in question is not only widened but is of some length and coiled, forming a body of oval contour constituted by the closely approximated windings of the tube. It is conspicuous through its white colour as in other Eudrilidæ. The sperm-duct opens into the tip of the spermiducal gland (text-fig. 8, p. 40), which is in this species directed forwards; the entire gland is sausage-shaped and bent once upon itself. It ends in a narrow muscular duct which opens into the rather large Bursa propulsoria; the latter is of circular contour. There are no penial setæ.

The *female organs of generation* were so much softened that some details have probably escaped me. It is, however, plain that there are a pair of nearly spherical spermathecal sacs which are perfectly free from each other and do not communicate, as in some species of the genus, at the distal extremity with each other. The oviduct is very long and straight in its course; anteriorly it is seen to communicate with a rather small receptaculum ovarum, which lies close to the septum dividing the xiiiith from the xivth segment to the outside of the oviduct. In the other side is a slight swelling which appears to be fixed against the septum dividing the same segments,

which doubtless represents the "Eitrichterblase" and the "Ovarialblase." I am doubtful whether this chamber is also in communication with the spermathecal sac or surrounds it. It is not, however, necessary to settle this point for purposes of the identification of the species, which I believe is sufficiently distinguished from other species of the genus hitherto described. Of these there are ten species known.

A peculiarity of *Eminoscolex ruwenzorii* is the thickened fold which bounds the male pores posteriorly, and is comparable to a rudimentary penis or pair of penes. Of

Text-fig. 8.

Terminal male organs of *Eminoscolex ruwenzorii*.

B.c. Bursa propulsoria. *p.* Spermiducal gland. *v.d.* Vas deferens.

this structure there seem to be the equivalents in a few other species, viz., in *E. sylvestris* *, *E. barnimi* †, *E. neumanni* ‡, *E. viridescens*, and perhaps *E. toreutus* §. Although the mere thickening which I have figured in *E. ruwenzorii* is different from the projecting penis of *E. viridescens*, the immaturity of my specimen might account for the difference very easily.

But *Eminoscolex ruwenzorii* is to be distinguished from *E. sylvestris* and *E. barnimi* by the fact that the dorsal setæ are further apart than in those species, where the distance *a-b* is three times the distance *c-d*. It cannot be confused with *E. neumanni* by reason of the fact that in the latter species the spermathecal pores are opposite to the lateral setæ, whereas in *E. ruwenzorii* they are, as in the majority of species, in front of the ventral setæ. There remain *E. toreutus* and *E. viridescens*. In the latter species ||, however, the spermathecal pores are a segment further back and are placed

* Michaelsen, Zool. Jahrb. (Abth. f. Syst.) xviii, p. 486.

† *Id.*, MT. Hamb. wiss. Anst. xvii.

‡ *Id. ibid.* xiv.

§ *Id.*, "Regenwürmer," in Deutsch-Ost-Afrika, iv, p. 9.

|| *Id.*, Oligochæta in 'Das Thierreich,' Lief. 10 (Berlin, 1900), p. 407.

in a common depression; in *E. toreutus* the spermiducal glands appear to have a different form and the spermathecæ are larger. *Eminoscolex ruwenzorii* may be thus defined:—

EMINOSCOLEX RUWENZORII.

Length 200 mm. ; breadth 4–5 mm. Ventral setæ rather further apart than lateral, the proportions being 6 : 5. Ventral setæ of nine anterior segments enlarged. Male pores xvii./xviii. with thickened posterior margins (a penis?); female pores xii./xiii. in line with seta b. Copulatory-gland pores on xiii./xiv. Proximal ends of four spermiducts widened and twisted into a closely adpressed coil. Spermiducal gland of only moderate length, with narrow muscular duct. Spermathecæ more or less spherical, not conjoined.