

PLATE XIII.

- Fig. 38. *Limnocaridina spinipes* (p. 197), female. Cephalothorax from the side.
 39. " " " female. Antennal scale.
 40. " " " " Peræpod of first pair.
 41. " " " " Peræpod of second pair.
 42. " " " " Peræpod of third pair. 42 a. Dactylus of same, further enlarged.
 43. " " " " Peræpod of fifth pair. 43 a. Dactylus of same, further enlarged.
 44. " " " " Tail-fan.
 45. *Caridella cunningtoni* (p. 199), female. Cephalothorax from the side.
 46. " " " female. Peduncle of antennule.
 47. " " " " Antennal scale.
 48. " " " " Peræpod of first pair.
 49. " " " " Peræpod of second pair.
 50. " " " " Peræpod of fourth pair, terminal part. 50 a. Dactylus, further enlarged.
 51. " " " " Peræpod of fifth pair, terminal part.
 52. " " " " Tail-fan.
 53. *Caridella minuta* (p. 200), female. Cephalothorax, from the side.
 54. " " " female. Peræpod of first pair.
 55. " " " " Peræpod of second pair.
 56. " " " " Peræpod of fifth pair. 56 a. Dactylus, further enlarged.

PLATE XIV.

- Fig. 57. *Atyella brevisrostris* (p. 201), female. Cephalothorax, from the side.
 58. " " " female. Peduncle of antennule.
 59. " " " " Antennal scale.
 60. " " " " Peræpod of first pair.
 61. " " " " Peræpod of second pair.
 62. " " " " Peræpod of third pair. 62 a. Dactylus of same, further enlarged.
 63. " " " " Peræpod of fifth pair. 63 a. Dactylus of same, further enlarged.
 64. " " " " Tail-fan.
 65. *Atyella longirostris* (p. 202), female. Cephalothorax from the side.
 66. " " " female. Peduncle of antennule.
 67. " " " " Antennal scale.
 68. " " " " Peræpod of first pair.
 69. " " " " Peræpod of second pair.
 70. " " " " Peræpod of third pair. 70 a. Dactylus of same, further enlarged.
 71. " " " " Peræpod of fifth pair. 71 a. Dactylus of same, further enlarged.
 72. " " " " Tail-fan.

3. Zoological Results of the Third Tanganyika Expedition, conducted by Dr. W. A. Cunnington, 1904-1905.— Report on the Oligochæta. By FRANK E. BEDDARD, F.R.S., Prosector to the Society.

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The Oligochæta brought back by Dr. Cunnington from Lake Tanganyika, and which have been submitted to me for study, belong to four new species, which I name *Ocnerodrilus (Ilyogenia) cunningtoni*, *Alluroides tanganyikæ*, *Metschaina tanganyikæ*, and *Stuhlmannia inermis*. Of these the first two are types which are

among those Oligochaeta lying on the border-line between the purely aquatic forms, like the Lumbriculidæ, and the purely terrestrial earthworms, such as *Lumbricus*. Both these species have been obtained either from the depths of the lake or from the roots of plants growing on its margin. The two remaining species are Eudriline genera, like the majority of Ethiopian terrestrial Oligochaeta; and, like the earthworms of Tropical Africa generally, they are semiaquatic in habit, dwelling in very wet places not far from the shores of the lake.

Stuhlmannia inermis, sp. n.

A number of specimens of a worm dug up in the close neighbourhood of the shores of the lake from sandy mud seem to me to belong to an undescribed species of the genus *Stuhlmannia*.

The salient character of this species, viz., the occasional absence or, if present, feeble development of penial setæ, has suggested its name. At the same time none of the considerable number of examples collected by Dr. Cunningham is fully mature; so that it is conceivable that the penial setæ are as yet undeveloped. Nevertheless this view seems to me to be unlikely. The penial setæ are often visible in earthworms when other parts of the sexual organs are in a comparatively undeveloped state. On the latter view therefore I venture to regard the species as new, for it seems hardly likely that of three individuals selected at random for anatomical study the penial setæ should be fortuitously absent or lost in the course of the dissection or the preparation of microscopic sections. In one specimen, however, they were present, but feebly developed. They are hollow in transverse section.

The genus *Stuhlmannia* is one of the most prevalent African genera of Eudrilidæ, and the present species does not differ from the numerous examples of other species which I have had the opportunity of examining in the general outward appearance. It is a long thin worm of about the size of *Stuhlmannia variabilis*. The largest example measured 138 mm. All of the specimens were immature and showed neither clitellum nor a penis. The spermathecal and the atrial pores were, however, plainly visible and separable from each other by their characters as well as, of course, by their position. The spermathecal pore on the xiiiith segment was on a raised protuberance. The atrial pore on the boundary-line of segments xvii./xviii. was a raised protuberance with a crater-like depression in the middle. The ventral setæ of the xviiith segment were missing, otherwise both pairs are present in the genital region as elsewhere. The oviducal pores are to the inside of the lateral pair of setæ on the xivth segment. The setæ are closely paired and upon the ventral surface of the body.

The colour of the worms (in formol) is a dark bluish purple, so general a hue among earthworms and the Eudrilidæ in particular.

The gizzard lies in segment v. The calciferous glands, which have the same rudimentary character as in other members of this

subfamily of the Eudrilidæ (*Pareudrilacea*)*, extend from segment vi. to xii. inclusive.

The septa which lie between segments v./xii. are very thick; those which divide the two following segments are moderately thick and are at least distinguishable by their size from those which follow. It is noteworthy that the septa which enclose segment xiii. approach each other very closely in the middle of the body in immature examples which I have examined in glycerine after dividing them longitudinally. This is not infrequent in the ovarian segment of earthworms.

Although the female reproductive organs were more or less fully developed in two out of the five examples which I studied of this species, I am not able to give a complete account of their structure. There is, however, a median spermathecal sac which opens upon the thirteenth segment to the exterior. This is connected with an egg-conducting apparatus, as in other species of the genus.

It is largely the asymmetry of the female generative apparatus which leads me to refer the present species to the genus *Stuhlmannia*; though it is, of course, not this feature alone which has influenced me. There are obviously other points of similarity. In his account of both *Stuhlmannia variabilis* and *S. gracilis* Michaelsen has not noticed the asymmetry†. In examples of a species which I regarded as belonging to that species‡ I commented upon the fact that the receptaculum ovorum of one side of the body was rudimentary. In a more recent and more exhaustive account of the female reproductive system of the genus, and as I thought of the same species, viz. *S. variabilis*, I described at length§ the same series of facts. Still later I found|| in a third species of the genus, viz. *S. michaelsoni*, the same asymmetry.

There is some discrepancy in the three accounts given by me of the asymmetry which possibly are not real discrepancies. I have described in some cases the left and in others the right side of the apparatus as partly rudimentary. In the species which forms the subject of the present communication there is no doubt that it is the right side which is fully developed and the left receptaculum ovorum which is rudimentary. This agrees with my account of *Stuhlmannia michaelsoni* and with my earlier statement as to the matter contained in the "Monograph." If there is an error I am not now able to rectify it. But I can say positively that in *Stuhlmannia inermis* I found the receptaculum to be rudimentary upon the left side of the body. The median spermathecal sac gives off a branch upon each side which passes

* Beddard, Quart. Journ. Micr. Sci. vol. xxxvi., n. s.

† "Beschreibung der von Herr Dr. Fr. Stuhlmann auf Sansibar und dem gegenüberliegenden Festlande gesammelten Terricolen," Jahrb. Hamb. wiss. Anst. ix. (1891), and "Die Regenwürmer Ost-Afrikas," in Deutsch Ost-Afrika, Bd. iv.

‡ A Monograph of the Order Oligochaeta (Oxford, 1895).

§ "On some Earthworms from British East Africa," P. Z. S. 1901, vol. i. p. 361.

|| "On a new Genus and Two new Species, &c.," P. Z. S. 1903, vol. i. p. 212.

round the intestine; but whether the two unite above or not, I am unable to say. The "bursa copulatrix," or terminal chamber of the spermathecal sac which opens directly on to the exterior, may or may not communicate directly with the chamber containing the ovaries. I have no evidence of the communication if it exists. But in any case the sac in which the ovaries lie is different from what is to be found in *S. variabilis* *.

In the present species of *Stuhlmannia* the entire bursa copulatrix lies within a large sac, which reaches from septum to septum of the xiiiith segment and completely roofs in the bursa. In this sac attached to the front wall of the segment I have found one ovary. There is no question here as in *S. variabilis* of a small sac enclosing the ovary and communicating by a slender duct with the spermathecal sac and its circumœsophageal diverticula. For this reason I regard *S. inermis* as a distinct species from *S. variabilis*.

Dr. Michaelsen's recently described species *Stuhlmannia asymmetrica* † is apparently not to be confused with the present species, as indeed the different habitat would lead one to infer. That species has no penial setæ at all. Considering that the specimens investigated by Dr. Michaelsen were in a more advanced stage of sexual maturity than those of *S. inermis*, penial setæ, if present, would have been surely visible in some at least of the many specimens in Dr. Michaelsen's hands. But there is, furthermore, the important difference that the asymmetry in Dr. Michaelsen's new species is carried to a greater extent than in that described here; for the oviduct, receptaculum, and ovary are entirely aborted on the left side of the body, the right hand efferent apparatus of the gonads alone remaining. This feature serves at once to differentiate the two species. Nor does there appear to be a sac surrounding the atrium of the spermatheca, and possibly derived from it, which contains the ovaries, as in the form which I name here *Stuhlmannia inermis*.

Michaelsen's species represents the last term in the series of species of *Stuhlmannia* in which asymmetry is developed.

Metschaina tanganyikæ, sp. n.

I feel obliged to form a new species for some specimens of an earthworm on account of various characters to which I shall refer in the course of the following description. It seems to belong to Michaelsen's recently instituted genus *Metschaina*.

This species is much like the *Stuhlmannia* just described, and, like that worm, was found in wet sand close to Lake Tanganyika. Its dimensions are rather less than those of the largest *Stuhlmannia inermis*, but quite as great as some individuals of the latter species. It has, too, the same bluish colour. I have examined this worm almost entirely by means of longitudinal

* See Beddard, P. Z. S. 1901, vol. i. p. 354, fig. 87.

† "Die Oligochaeten Nordost-Afrikas," Zool. JB. (Abth. f. Syst.) 1903, p. 467.

sections. The external characters were partly observed by the aid of a lens upon the uninjured worm. The species possesses—and this is quite unusual for an Eudrilid—dorsal pores. This peculiarity is, however, shared by *Platydrilus*, with which genus I cannot associate the present species. It is not mentioned in *Metschaima suctorica*. The setæ are strictly paired, and do not appear to differ in size anywhere. The male and female pores, each of them single, were quite obvious upon segments xiii. and xvii. The clitellum was undeveloped.

In the *alimentary canal* certain characters are to be noted which are useful in defining the species. The *gizzard*, as is so usually the case in the Eudrilidæ, lies in segment v. There are no additional gizzards at the commencement of the intestine, such as occur, for example, in *Lybiodrillus*. The intestine begins in segment xvi., and the transition between œsophagus and intestine is abrupt. The *intestine* is of greater calibre than the œsophagus. The development of the modified *calciferous glands* which characterise this section of the Eudrilidæ is very great, and I believe greater than in any species where they have been described. I find that they extend from segment v. to segment xv. inclusive. As to their structure, they would appear to be quite similar to those which I described in some detail a few years back*. In the type species of this genus, the only one known, the calciferous glands are less extensive, ending as they do in segment xii. The *anterior septa* are much thickened. The first of this series is that separating segments v./vi. The last separates xiii./xiv. The last two of these septa are not so very strongly developed as those lying in front of them; but they are, nevertheless, distinguishable from those which follow.

The last *pair of hearts*, as in the Eudrilidæ generally, but not apparently in *M. suctorica* †, lie in segment xi. It is, of course, by means of the *reproductive system* that the genera of Eudrilidæ are mainly to be distinguished. And it is for these reasons that I refer this earthworm to the genus *Metschaima*. Opening on to segment xiii. is a single median spermathecal pouch. This pouch extends back as far as the fifteenth segment, and the last bit of it has very thin walls, thus contrasting with the anterior thicker-walled portion. The pouch, as is generally the case, can really be separated into a terminal atrium which opens on to the exterior and the sac of thinner texture which follows upon this. This spermathecal sac seems to have no communication whatever with the rest of the female reproductive system. In this important point the present genus resembles *Eudriloides* only among other allied Eudrilids.

In front of the spermathecal sac and attached to the front wall of segment xiii. lies the *ovary* or ovaries. I noted only one. A remarkable fact about this gonad, as compared with the ovaries of at least some other earthworms, is the fact that the ripe or

* "Oligochæta of Eastern Tropical Africa," Quart. J. Micr. Sci. *loc. cit.*

† Michaelsen, Zool. Jahrb. Abth. f. Syst. xviii. 1903, p. 465.

nearly ripe ova are not all to be found at or near the free edge of that gonad. I noted cells far on the way to become ripe ova at some distance in the interior of the gonad, and in front of these was a thick layer of germinal cells not far advanced along the same road.

The oviducts, as in *Eudriloides* also, open freely into the cavity of the xiiith segment. This, however, is a character also shared by *Platydrilus*. But the present genus (if it be rightly elevated to distinct generic rank) does not show the connection between the oviduct and the spermathecal sac which exists in *Platydrilus**. The oviducal funnel is very extensive, more so than in a large number of Oligochæta. The upper lip is very long, extending dorsally into actual contact with the dorsal blood-vessel as it traverses the septum. The lower lip of the funnel is pushed into and, as it were, tucked away into the receptaculum ovarum, which lies on the opposite side of the septum in segment xiv.

The oviduct itself, instead of running a straight course to the oviducal pore in the xivth segment, projects forward into the cavity of segment xiii. as a loop enclosed in a continuous muscular sheath. This U-shaped region of the oviduct differs in no way in structure from the rest of the tube, which runs an approximately straight course. The oviduct, therefore, is like the sperm-duct of certain Eudrilids (e. g., *Stuhlmannia*), in that it passes through the septum xiii./xiv. and, instead of opening into segment xiii. and facing forwards, turns back and for the most part at least faces back again into segment xiv. We have, however, to consider the long tract of cubical epithelium which lies along the anterior face of septum xiii./xiv., extending up to the level of the dorsal vessel. That this is continuous with the actual indipping of the funnel of the oviduct is without doubt. At the same time it seems possible to compare this tract of epithelium with the egg-conducting apparatus of other Eudrilids. It represents, as I think, potentially part of the egg-conducting apparatus (the so-called spermatheca) of *Eudrilus* †. I have lately shown that the large sacs in that genus are a development of the septum dividing segments xiii./xiv., and that primitively the epithelium of the oviducal funnel is continuous with a layer of equally cubical epithelium which with the muscular wall behind it is evaginated into the xivth segment to form the sac in question. In early stages such as I studied it is not possible to draw a distinct line between oviducal funnel and the epithelium of this sac. An earlier stage still (which I did not find in *Eudrilus*) would be, I should imagine, a continuation of the epithelium over the septum without a trace of the evagination. This state of affairs is precisely what we have in the Eudrilid which forms the subject of the present remarks. I do not think, however, that it is a temporary stage, and that the ultimate product would be a sac or sacs like those of *Eudrilus*, and for the following reasons:—

* Here I confirm Michaelsen, who queries the fact.

† "The Gonad of *Eudrilus*," P. Z. S. 1902, vol. ii. p. 89.

Firstly, *Metschaina tanganyikæ* has a definite spermathecal sac which I have already described; secondly, the worms which I have examined are near to maturity, and not in the very young stages described by me in *Eudrilus*. Thirdly (perhaps), there is no trace of any sac involving the ovaries. This argument will be clear if the comparison be made with the developmental figures in my paper upon *Eudrilus* quoted.

In comparing more exactly the female reproductive system of this genus with that of *Eudriloides*, to which it obviously bears a closer likeness than to that of any other genus of Eudrilid, there are differences to be noted. In *Eudriloides durbanensis*, for example, the oviduct, although, as in the present species, it perforates the septum dividing segments xiii./xiv. twice, depending, therefore, as a loop into segment xiii., has no muscular sheath and is a delicate tube as in so many earthworms. In the present species the oviducal tube is thickly ensheathed with muscular fibres. The *male organs* furnish the principal reason which leads me to refer this worm to the genus *Metschaina*. There are, contrary to what is found in *Eudriloides**, *two pair of testes*, which lie, of course, in segments x. and xi. The funnels are opposite to them. The funnels face the opposite wall of the segments into which they open. There is no turning round and facing back into the segment behind such as occurs in several Eudrilidæ. The sperm-ducts retain their individuality, and after perforating the sheath of the atria on each side open into the cæcal extremity of that gland.

The *two atria* or *spermiducal glands* are quite separate, though opening by the same external pore. The *penial seta* of each side is long and runs obliquely through two segments. I am unable to describe its pattern, as I could not reproduce the whole of it from the sections.

The *sperm-sacs* of this Eudrilid are, as is so often the case, attached to the front walls of segments xi. and xii.

The above-given account of this species justifies me, as I think, in regarding it as a new species of *Metschaina*. I do not, however, think it desirable to draw up a diagnosis for comparison with that given by Michaelsen for the other species of the genus, since I am unable to speak positively upon certain features of importance for systematic purposes. The principal points characterising the present species which I have ascertained appear to be the following:—The calciferous glands are more numerous. There are dorsal pores present. The actual form of the oviduct also is not as Michaelsen has described and figured it for *Metschaina suctorica*.

Ocnerodrilus (Ilyogenia) cunningtoni, sp. n.

Of this species several examples were preserved. They were

* It must be recalled, however, that occasionally two pairs of testes have been found in an apparent *Eudriloides* (cf. Beddard, Q. J. M. S. xxxvi., n. s. p. 212).

found "swarming in great numbers round roots of water-weeds in shallow water." It will be obvious in the course of the following description that the worm is either rightly referred to this genus and subgenus or that it requires a new genus or subgenus for its reception on account of certain peculiarities which will be duly noted.

A specimen which I have selected as the type (as regards external characters) measured 38 mm. in length and consisted of 96 segments. The *setæ* appear of considerable length in proportion to the diameter of the body. They are of the usual shape, but distinctly bifid at the tip, though it often happens that the upper half of the cleft extremity is worn down and the seta thus appears to be merely hooked. I believe that the existence of uncinatæ setæ is new to this particular group of Oligochæta.

The *clitellum* is not very extensive, occupying as it does segments xiv.-xviii. and commencing or ending, as the case may be, towards the middle of each of these segments. The clitellum is saddle-shaped. The *generative pores*, the actual orifices, are not very plain on the mounted specimen. But from serial sections I have ascertained that the *spermathecal pores* lie between segments viii./ix. and the *male pores* upon segment xvii.; the latter nearly in line with the ventral setæ, and the former near the lateral setæ. It is to be noted that both setæ of the ventral as well as the dorsal pair are present upon segment xvii. and that they are not in any way modified. The male pore on each side is just to the outside of the pair of setæ, and is borne upon a prominent flap which is not invaded by the clitellar epidermis. Its structure will be dealt with later.

The *alimentary canal* is without a gizzard. In the ixth segment the *oesophagus* is provided with a *ventral pouch*, which whether single or paired is so characteristic of the subfamily Ocnero-drilinæ. In the present species, however, this pouch, which is single, is greatly reduced in size and bifurcates into two after its emergence from the gut. Indeed, if it were much larger there would be, in view of the large size of the spermathecæ, hardly room for it in the ixth segment. It is a smallish sac lying ventrally to the oesophagus and narrowing at its junction with the oesophagus very anteriorly in the ixth segment. It has not a specially glandular appearance, and the lining epithelium is merely folded. There is no such complicated folding as occurs, for example, in *Gordiodrilus*. The ventral pouch of this species appears to be either an incipient or a degenerating structure. A largish blood-vessel is attached to the posterior end of each bifurcation. The *septal glands* of the present species extend back into the viiith segment.

The *vascular system* is noteworthy on account of the extreme vascularity of the integument, which is equally obvious in the specimen mounted entire and in sections. This was especially plain in the anterior region of the body. If the capillaries do not actually penetrate the epidermis, they only cease just below

it. But they appear to me distinctly to enter the epidermis itself.

As in other species, there are two pairs of strongly muscular hearts in segments x. and xi.

The *spermathecae* are very large thin-walled sacs, occupying a large portion of the interior of segment ix. The duct of the spermatheca is very narrow and moderately long. I could find no diverticulum. The *testes* (two pairs) lie in segments x., xi. opposite to the conspicuous sperm-duct funnels. They are both unenclosed by sperm-sacs. These segments contain masses of developing spermatozoa, which suggest at first sight sperm-sacs. They are, however, unenclosed by any membrane.

The *sperm-sacs* lie in segments ix. and xii., and, as in other worms, are developed from the posterior and anterior walls of those segments respectively.

The male efferent apparatus conforms to the type seen in other species of this genus. The male pore, as has already been mentioned, is upon segment xvii. This pore is situated upon a prominent hemispherical papilla, which has not the structure of the adjacent clitellum, but consists of tall non-glandular cells, much taller than the cells of the non-clitellar regions of the integument and between which are no glandular cells. Both of the ventral setæ are present, and it is to the outside of these that the actual pore is to be found. There is a common pore for the atrium and the sperm-duct; but the two tubes are confluent only within the thickness of the body-wall. The atria extend back for a considerable distance behind their point of opening, for at least ten segments. The minute structure of the atria needs apparently no description; for they do not seem to differ from those of other species. It must be remarked, however, that the atria are distinctly divisible into the distal glandular region and a proximal thick-walled duct. There is a sharp differentiation between these two regions.

The *ovaries* occupy the usual position in the xiiiith segment against the anterior wall of that segment. Opposite to them lie the funnels of the oviducts. The oviducts themselves perforate the body-wall and open to the exterior on the ventral side of the body, as already mentioned. It is noteworthy that an appreciable region of the oviduct is clearly formed by an invagination from the exterior; for it is distinctly lined with cuticle continuous with the cuticle covering the body. There is no receptaculum ovarum, and this absence I rather presume to be characteristic of this genus and not merely distinctive of this and other species. But although there is no receptaculum ovarum there is an incipient trace of the complicated system of sacs which involve the female reproductive organs in the more highly developed Eudrilidæ. This fact is important to note, inasmuch as there are some grounds for looking upon this primitive family or subfamily of Oligochæta, as Michaelsen regards it (which includes the genera *Kerria*, *Nannodrilus*, *Ocnerodrilus* and some others), as lying at the base

of the Megascolecid series and as thus possibly effecting a junction with the highly specialised Eudrilids, which are regarded by Rosa and Michaelsen as forming one family with the Megascolecidæ. This point of view, to which I have not myself adhered in the past, is, I admit, strengthened by certain facts which I shall proceed to describe.

The ovary does not lie absolutely freely in the cavity of segment xiii. A sheath of delicate muscles is prolonged forwards as a tube which possesses a narrow lumen and opens finally by a mouth into the cavity of segment xiv. The lower edge of this mouth is thickened by an increased development of muscular fibre and calls attention to the tube. It appears to me that this tube is the equivalent of the delicate sac and tube leading from it which occurs in *Eudrilus* and in *Stuhlmannia* &c. (see my figure of the female reproductive system of *Eudrilus* in P. Z. S. 1902, vol. ii, p. 93, and of *Stuhlmannia* *ibid.* 1901, vol. i. p. 354). This tube leads from the sac which involves the ovary to the spermathecal sac. As the latter is developed at least in *Eudrilus* out of the intersegmental septum, and presumably in *Stuhlmannia* and other Eudrilids, there is no difficulty in comparing an open tube in *Oconerodrilus* with a tube opening into a sac in *Eudrilus* &c.

I may conclude with a definition of this new species* :—

OCNERODRILUS (ILYGENIA) CUNNINGTONI, sp. n.

Length about 38 mm. Setæ strictly paired, bifid at extremity. Clitellum saddle-shaped, xiv.–xviii. Esophageal pouch but little developed, bifid at end. Last pair of hearts in xi. Dissepiments v./xii. thickened. Sperm-sacs in ix. and xii.; masses of sperm in x. and xi. Atria rather long, extending in the direction of the tail, with a distinctly separated muscular duct. Male pores opening upon a papilla near to ventral pair of setæ, which are not aborted. Oviduct without receptaculum ovarum. Spermathecae large and oval, with narrow duct, sharply marked off from pouch.

Hab. Lake Tanganyika.

Alluroides tanganyikæ, sp. n.

Of this new species I am able to give but an incomplete account, as the collection contains but a single individual. This was mounted entire upon a slide in Canada balsam, and I can only therefore give an account of external characters and of a few internal features which were visible through the thin body-wall. I refer it to my genus *Alluroides* † by reason of the position and the structure (so far as I could make it out) of the reproductive organs, and it possesses no character which militates against this placing, as will be evident from the following details which I am able to

* I do not mention generic and subgeneric characters as defined by Michaelsen. I suspect, however, that the position of the last heart is a generic character, though not used by him.

† "A Contribution to our Knowledge of the Oligochæta of Tropical Eastern Africa," Quart. Journ. Micr. Sci. vol. xxxvi., n. s. p. 244.

give of its external and internal organisation. There will be equally no doubt from the facts which I shall relate that this Tanganyika worm is specifically distinct from *A. portagei*.

Alluroides tanganyikæ is a more purely aquatic species than the type species of the genus; for it was dredged from about ten fathoms of water, whereas *A. portagei* was found in the mud of a swamp. So far as I am aware, nothing further has been discovered about this genus since the publication of my own paper referred to above*. Dr. Michaelsen has, however†, from a consideration of the facts made known by me, placed the genus in a separate family, Alluroididæ. The new species to be described here necessitates no alterations in the family characters as given by Michaelsen, and a very slight change in the generic characters, which will be attended to after the description of *Alluroides tanganyikæ*.

This species is a small, slender, rather transparent worm, suggestive of a Lumbriculid, and, so far as I can recollect the latter, not very different in size from *Alluroides portagei*. The single specimen is about 30 mm. long and not more than 1.5 mm. broad in the widest part of the body (anteriorly). It consists of 60 segments. The thinness and transparency of the worm, when viewed as a microscopic object, is distinctly that of a Limicolous Oligochæte.

The *prostomium* is rather long and pointed; it is divided by a constriction into an anterior and posterior half. It is longer than the first segment of the body, but is hardly to be separated from it dorsally. The first-marked constriction on the body separates the first two segments from each other.

The *setæ* are plain and of the ordinary pattern without a cleft extremity. They are strictly paired and present upon all the segments of the body with the exception of the first and that which bears the male pores, where the ventral pair are absent.

The boundaries of the *clitellum* were not distinguishable.

There is no external *penis*, but the partial immaturity of the specimen may be the cause of this. I only use it doubtfully therefore as a specific character.

It is mainly by reason of the position of the *generative apertures* that I place this species unhesitatingly in the genus *Alluroides*. The most anterior of these is a single widish aperture upon the boundary-line of segments viii./ix. The worm is sufficiently transparent to allow it to be seen that this orifice is continuous with a closed thick-walled sac, which seems to me to be obviously the spermatheca. The main fact to be considered about the *spermathecal pore* is that it is single and dorsal median in position. I believe that this state of affairs is unique. We find, however, frequent cases of the coalescence of two ventral pores to form one medianly situate ventral pore and a further coalescence of two spermathecae, or, it may be, the disappearance of one. In comparing

* See also 'A Monograph of the Order Oligochæta' (Oxford, 1895), p. 224.

† Oligochæta in 'Das Tierreich' (Berlin, 1900), p. 106.

the present species with *Alluroides pordagei* we find that an analogous concrescence would appear to have taken place dorsally; for in that species the paired spermathecal orifices are placed close together and well to the dorsal side of the lateral setæ. The spermathecal pore has a tumid periphery and is very conspicuous.

The *male pores* are upon segment xiii. and upon the ventral surface of the body. They are in line with the ventral setæ, which are, however, absent upon that segment. These pores also are large and conspicuous. It will be observed that their position differs from that of the corresponding pores in *Alluroides pordagei*, which correspond to the lateral setæ and not to the ventral.

Concerning the *oviducal pores* I am unable to be certain, as I could not distinguish the oviducts themselves. I think, however, that I have detected them lying behind the male pores and in line with them upon the boundary-line of segments xiii./xiv.

The *alimentary canal* of this Annelid was plainly distinguishable throughout its course. I could see no gizzard, but septal glands were obvious. The œsophagus in the ninth segment acquires a coating of brown pigmented cells, which continue to the end of the body. From the ninth segment to the eighteenth inclusive the œsophagus is moniliform. From the nineteenth segment it is less so and somewhat wider. This region I regard as intestine. The transition from one region to the other is abrupt.

The *vascular system* appears to me to be arranged on the simpler plan characteristic of the aquatic families of Oligochæta. The dorsal, which is the larger, and the ventral vessels are connected by a pair of looped vessels, quite as in *e. g.* the Tubificidæ. Anteriorly I am unable to say anything about its relations, except that I could not trace the dorsal vessel forward beyond the large intestine and was quite unable to detect the *nephridia*.

The *spermatheca* is an oval sac which reaches back quite to the end of the ninth segment.

The *atria* end posteriorly in oval expansions looking very like spermathecæ. There are naturally two of them. They are directed posteriorly to the pores upon the xiiiith segment.

In view of the facts brought forward here upon this new species of *Alluroides*, I venture to amend slightly the generic definition of Michaelsen and to distinguish the two species as follows:—

Genus ALLUROIDES Beddard.

Alluroides Beddard, Quart. Journ. Micr. Sci. vol. xxxvi. (n. s.) p. 252.

Small, slender, aquatic or semiaquatic Oligochæta with simple S-shaped setæ arranged in four pairs. Clitellum in neighbourhood of male pores. Alimentary canal without gizzard or glands. Meganephric with paired nephridia. Spermathecæ (or spermatheca) without diverticula opening between viii./ix. at or near median dorsal line. Male pores on segment xiii. more or less ventral in position.

Oviducal pores on xiii./xiv. Sperm-ducts connected with long and coiled atria.

(1) *ALLUROIDES PORDAGEI* Beddard, loc. cit.

About 25 mm. in length. Spermathecal pores double, opening near dorsal median line. Male pores opening on level with lateral setæ. A penial process present on each side near to pores.

Hab. Swamp on mainland opposite Mombasa, E. Africa.

(2) *ALLUBOIDES TANGANYIKÆ*, sp. n.

About 25 mm. in length. Spermathecal pore (and spermatheca) single, opening in middle dorsal line. Male pores opening on level with ventral pair of setæ, which are absent on this segment. No penial process (?).

Hab. Lake Tanganyika in 10 fathoms.

4. Zoological Results of the Third Tanganyika Expedition, conducted by Dr. W. A. Cunningham, 1904-1905.—
Report on the Porifera, with Notes on Species from the Nile and Zambesi. By R. KIRKPATRICK, F.Z.S.

[Received February 6, 1906.]

(Plates XV.-XVII.*)

Dr. W. A. Cunningham's collection of Freshwater Sponges includes eleven specimens, nine from Lake Tanganyika, one from the Victoria Nyanza, and one from Lake Nyasa.

The Tanganyika specimens, which are all in the form of thin incrustations on stones and shells, represent three species, viz. *Spongilla moorei* Evans, *Spongilla tanganyikæ* Evans, and a new species, which I have placed under *Spongilla*, and have named after Dr. Cunningham—*Spongilla cunningtoni*, sp. n.

The specimen from Victoria Nyanza belongs to *Spongilla carteri* Bowerbank, and that from Nyasa to *Spongilla biseriata* Weltner. Most of the specimens were obtained from quite shallow water, but some were dredged from 10 and 20 fathoms.

I would here take the opportunity of describing three other Freshwater Sponges from Africa, viz. a specimen from above the Victoria Falls, Zambesi, collected and presented to the British Museum by Mr. C. F. Rousselet, and belonging to a new species of *Spongilla*; a second one from the same locality, representing a new species provisionally placed under *Spongilla*, presented by Prof. A. Dendy; and, lastly, a new variety of *Ephydatia plumosa* Carter from the White Nile, presented by Mrs. H. Broun. Six species are now known from the Tanganyika area, four from the lake itself, viz. *Spongilla moorei* Evans, *S. tanganyikæ* Evans, *S. cunningtoni*, sp. n., and *Potamolepis weltneri* Moore; and two

* For explanation of the Plates, see p. 227.