

No. 4.— *Reports on the Scientific Results of an Expedition to the South-western Highlands of Tanganyika Territory*

IV

Oligochaeta

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The following pages contain an account of the Oligochaeta obtained by Mr. A. Loveridge on his recent expedition to Central Africa. The worms here mentioned were taken in Tanganyika Territory and at Albertville in the Belgian Congo.

The localities do not indicate any extension of the hitherto known range of the several genera, and the results are therefore not of very great zoo-geographical interest. But nearly all the forms obtained are new, and the investigation demonstrates how very far from complete our knowledge of the Oligochaeta of Central Africa still is; it is quite certain that rich harvests will be gathered in this region for very many years to come.

My thanks are due to Mr. Loveridge for kindly sending me his collection for examination, and to the authorities of the British Museum (Natural History) for the facilities which they have placed at my disposal. The types of the new species are deposited in the Museum of Comparative Zoölogy, Harvard.

Family MEGASCOLECIDAE

Subfamily Diplocardinae

Genus DICHOGASTER Beddard

DICHOGASTER FLAGELLIFERA sp. nov.

Albertville, Belgian Congo. 21.v.30. Four specimens, all with sexual marks.

External Characters. The largest specimen measures 92 mm., with 108 segments, a second 72 mm., with about 101 segments (not countable over part of the body), the shortest (also with sexual marks) 48 mm., with 105 segments; average diameter 3 mm., maximum 4 mm. Colour a darkish brown, the ventral surface slightly paler. No distinct secondary annulation.

Prostomium epilobous $\frac{1}{2}$, tongue small, with parallel sides; a transverse groove not at the hinder end of the tongue but a little way in front of this.

Dorsal pores from furrow 5/6.

The setae are closely paired; in the middle of the body and behind the clitellum $aa = 4-5ab = bc = 4-5cd$, while $dd = \text{ca. } \frac{2}{3}$ of the circumference; in the preclitellar segments aa is less,—distinctly less than bc , while $dd = \frac{3}{4}$ of the circumference, all the setal bundles being closer together on the ventral surface.

The clitellum covers segms. XIII–XX (= 8), and is saddle-shaped, or at least thinner and lighter in colour along a midventral strip.

The prostatic pores, on XVII and XIX, are in line with the ventral setae, possibly with b rather than with a . The seminal grooves are straight, and bounded by slightly swollen walls on each side.

The female pores were not seen.

The spermathecal apertures are two pairs, in furrows 7/8 and 8/9, rather close together, in line with setae ab .

Internal Anatomy. No septa are notably thickened,—12/13, 13/14 and 14/15 slightly so, and perhaps one or two more very slightly. The thin septum behind the pharyngeal mass is probably 4/5; 5/6 I think is represented by extremely delicate strands running obliquely forwards in front of the anterior spermatheca, and 6/7 by one or two strands in the ventral part of the body-cavity associated with blood-vessels which pass off the gut on to the body-wall; an extremely delicate septum, 7/8, envelopes the hinder gizzard; septum 8/9 is distinct, and 9/10 forms the anterior boundary of the testis sacs.

The gizzards, in VI and VII, are large, and separated only by a slight constriction. The calciferous glands occupy XV–XVII, the first two pairs opaque white, the last pair dull brown; there is not much difference in size,—in one specimen the last pair were rather smaller than the others, but in another specimen this was scarcely noticeable (the gland on the left side of XVII perhaps a little smaller).

The last hearts are in segm. XII. The micronephridia are distributed as a single row of not very minute organs (in each segment behind the clitellum), about a dozen on each side, smaller and less regularly arranged at the inner (lower) end of the row.

The testis sacs include the whole contents of segms. X and XI,—alimentary canal, dorsal vessel, hearts, seminal vesicles of XI, as well as the seminal funnels and much coagulum; the sacs appear in the dissection as a single opaque white mass, a membranous sac, divided internally into anterior and posterior portions by a partition (= septum 10/11), and projecting forwards some distance ventrally beneath and ventrolateral to the gut. The anterior wall of the sac represents

septum 9/10, the posterior wall 11/12; but there is no connection between the sac walls and the parietes ventrally or laterally. Testes were not seen,— they had probably dissolved into the mass of genital cells which filled out the sacs; the seminal funnels were however large and obvious.

The seminal vesicles are small, in segms. XI and XII; in one specimen they were lobed, those in XI indeed being divided down as far as their base; in the second dissected specimen the vesicles were almost smooth.

The prostates occupy parts of two segments, XVII and XVIII, or XIX and XX. Beginning in the anterior of the two segments, XVII or XIX, the gland pierces the septum, its larger portion then forming a

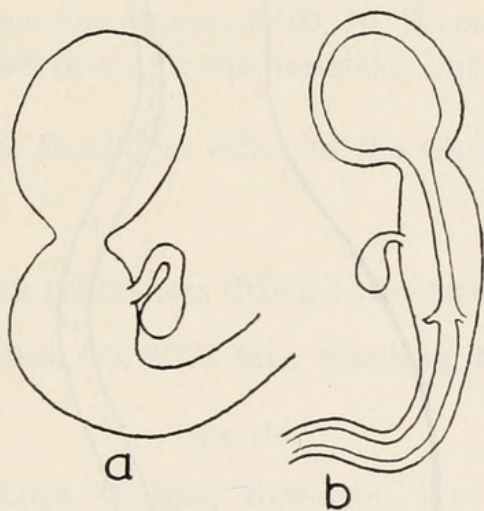


Fig. 1. *Dichogaster flagellifera*; a and b, spermathecae from different specimens.

loop with closely apposed limbs in the posterior of the two segments, XVIII or XX; passing forwards again and entering XVII (XIX) it becomes the duct, of some length, regularly or irregularly looped, thin and shining, the ental limb of the loop the thinner, the ectal limb being nearly twice as thick as the ental.

Ovaries and funnels are present in XIII; there is a small racemose ovisac on one side in XIV in the second dissected specimen.

The spermathecal ampulla (fig. 1) is sac-like, and constricted from the duct; this is longer than the ampulla, swollen in its ental half, which in some organs is almost as wide as the ampulla (fig. 1 a), narrower and tubular ectally and often somewhat curved; both the relative and absolute length of the duct vary. A comparison with other

forms suggests that the swollen part of the duct should more properly be considered as a middle section, a separate part of the apparatus, concerned in the production of spermatophores. The diverticulum is single, a small ovoid dependent chamber, attached by a stalk, which may be bent on itself, to the middle section of the apparatus not far below the ampulla.

The penial setae (fig. 2) are one per bundle, thin, the greater part of the shaft curved in the form of a gentle bow, a segment of a circle, and

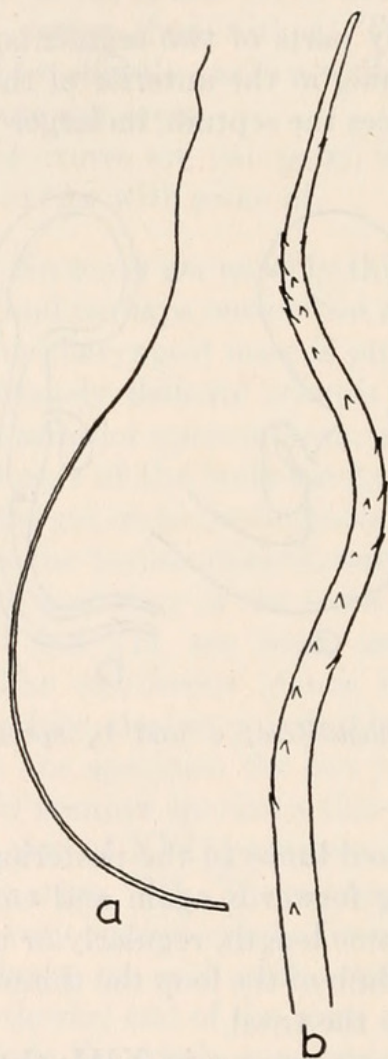


Fig. 2. *Dichogaster flagellifera*; penial seta. a, whole seta, $\times 25$; b, distal end, $\times 430$.

the distal end sinuous. In length they measure 3.3 mm., while the diameter at the middle of the shaft is only 10μ , towards the proximal end 18μ more or less, and towards the distal end 7μ ; hence the general

form is thread-like. The tip gradually tapers to a blunt point, the last 60μ being straight. The ornamentation consists of moderately large triangular teeth on the sinuous portion (about 0.25 mm.) near the distal end; these are somewhat irregularly distributed, yet with a tendency to a spiral arrangement; the terminal straight bit is almost free from the teeth.

Remarks. This species is rather like *D. aloysii sabaudiae* Cogn. ('09), especially in the spermathecae; that, however, is a much smaller worm, the testes and funnels are free, and though the penial setae have a faint resemblance, yet in reality they are quite distinct. *D. daemoniaca* Cogn. ('09) resembles the present form in the spermathecae, and also possesses testis sacs ('seminal pseudocapsules,' Cognetti, '09), though not quite of the same form (septa 9/10, 10/11 and 11/12 united peripherally at their insertion into the parietes); but the penial setae are distinctive.

The specific name *flagellifera* refers to the whip-like appearance of the penial setae.

DICHOGASTER ITOLIENSIS (Mich.) var. *minor* var. nov.

Benhamia itoliensis Mich. '92, Mitt. Mus. Hamburg, 9, ii, p. 31. Itoli, S.W. Victoria Nyanza.

see also

Dichogaster itoliensis Cogn. '09, Sped. Ruwenzori, 1, p. 360.

Kitungulu, Urungu, Tanganyika Territory (a little to the E. of the S. end of L. Tanganyika). 14. 30. Six specimens, two mature, larger than the rest but one incomplete behind (collector's note: "green rapidly soluble in alcohol").

External Characters. Length 132 mm.; diameter 4-5 mm. Colour (in the present condition) dark brown, somewhat lighter ventrally; the worms have apparently at some time, perhaps before preservation, become surface-dry and surface-hard,—hence probably the dark colour. Segments 147.

Prostomium indistinguishable in the present condition.

There is a distinct dorsal pore in furrow 5/6 in one specimen, and then apparently two smaller ones (in 6/7 and 7/8) which give vent to a slight oozing on squeezing the worm. Thereafter for several segments nothing in the shape of pores can be detected; but the condition of the specimens has to be remembered.

The setae are paired; in the middle of the body *aa* is rather greater than *bc*, but in front of the clitellum *aa* is approximately equal to *bc*; *dd* is about two-thirds of the circumference.

The clitellum is not developed. The prostatic pores, on XVII and XIX, are in line with the ventral setae, probably with *b*, each on a small papilla surrounded by a groove which is especially marked on the anterior and outer (in the anterior) or on the posterior and outer (in the posterior papillae) parts of their circumference. The seminal grooves are straight, without marked walls.

The female pores were not seen. The spermathecal apertures, inconspicuous, are in furrows 7/8 and 8/9, in line with setae *b*.

Internal Anatomy. Septum 4/5, behind the pharyngeal mass, is somewhat strengthened; 5/6 is represented only by one or two strands of connective tissue; 6/7, which should be attached between the two gizzards, is indistinguishable in this specimen; 7/8 is thin, 8/9 perhaps faintly strengthened, 9/10 and 10/11 slightly thickened, 11/12-13/14 moderately strengthened, 14/15 and 15/16 slightly so.

The gizzards occupy segms. VI and VII; the division between them is marked by the course of a transverse bloodvessel, and by a narrow softer annulus, but scarcely by a constriction; the anterior gizzard is rather longer than the posterior, while both are broader than long. The calciferous glands, in XV-XVII, increase somewhat in size backwards.

The last hearts are in XII. There are about a dozen micronephridia on each side in the postclitellar segments.

Testes and funnels, in an early stage, are free in X and XI. The seminal vesicles are very small (? in an early stage) in XI and XII. The prostates are not fully developed, but each appears to extend into two segments (XVII and XVIII, or XIX and XX). Ovaries are present in XIII.

The spermathecae (fig. 3) are in an early stage of development, but the three parts of the adult organ are distinguishable,—the rounded thin-walled ampulla, the thicker-walled intermediate portion, from which the multiple-chambered diverticulum is given off, and the immensely thick-walled duct.

The penial setae, 3.7 mm. long, 86μ in diameter at the middle, are fully grown, since they possess the short right-angled curve at the proximal end,—the last part of the seta to be formed. The thick straight cylindrical shaft with characteristic transverse striation, and the bluntly pointed lead-pencil-like tip are those of *D. itoliensis*.

Remarks. Cognetti ('09) united with Michaelsen's *D. itoliensis* the *Benhamia moorei* and *johnstoni* of Beddard ('01), and Michaelsen ('10) added to these also Beddard's *Benhamia mollis*. I have recently been through all the literature on these forms, and have examined Beddard's types and a considerable amount of other material in the British

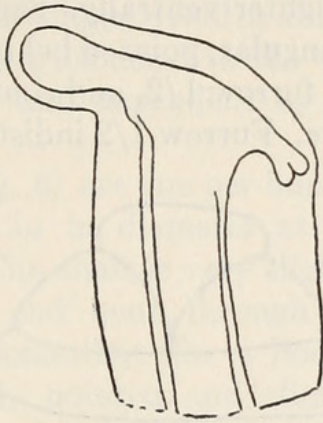


Fig. 3. *Dichogaster itoliensis*; spermatheca of young sexual specimen.

Museum, including co-types of *Dichogaster jaculatrix* Baylis ('15), and other examples labelled *Dichogaster itoliensis*, *Dichogaster johnstoni*, as well as a number of specimens of large Central African worms awaiting identification. I hope to publish shortly at somewhat greater length some further details of this investigation; the result, shortly expressed, is that all the forms mentioned belong to a single rather variable species in which it is impossible to distinguish separate varieties or even 'forms.' The length, in specimens so far examined, varies between 205 and 560 mm. (592 mm. in life), the diameter between 7 and 20 mm., and the number of segments between 170 and 226. Though the present specimens are so very much smaller than the largest, or even than the average, of the species, I am not thoroughly convinced that I am right in separating them even as a variety; there may exist, and may later be found, examples which fill up the interval between the present specimens and the smallest (205 mm.) previously known. It may be that in this species growth in size continues till long after sexual maturity is reached, or even goes on throughout life, and that the very considerable differences in size represent merely differences in age. Testis sacs of the kind found in *D. itoliensis* were not noted in the specimen dissected; but it was in quite an early stage of sexual maturity, and just possibly the sacs might have developed later, though it is not very easy to understand how.

DICHOGASTER KIGOGOANA sp. nov.

Forest, Kigogo, Uzungwe Mts., Tanganyika Territory. 16.i.30. Two specimens, one in two pieces.

External Characters. Length 30 mm.; maximum diameter 3 mm. Colour brownish, rather lighter ventrally. Segments 91.

Prostomium (fig. 4) triangular, pointed behind, the point reaching to within a short distance of furrow $1/2$, and continued backwards to the furrow by a median groove. Furrow $1/2$ indistinct, almost obliterated.

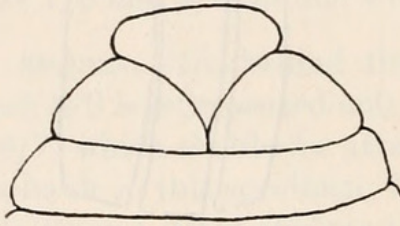


Fig. 4. *Dichogaster kigogoana*; prostomium.

Dorsal pores begin in furrow $5/6$.

The setae are paired; $aa = bc$ mostly, but in front of the clitellum bc is greater; dd is equal to $\frac{2}{3}$ of the circumference.

The clitellum, saddle-shaped, extends over segms. XIII–XIX ($= 7$). The prostatic pores, on XVII and XIX, are in line with the ventral setae; the seminal grooves are straight, bordered by faint lips. The female and spermathecal apertures could not be distinguished.

Internal Anatomy. Septa 10/11–12/13 are somewhat thickened, 13/14 slightly so, the rest thin; 6/7 is present, but excessively tenuous, perhaps incomplete.

The gizzards, of some size, are in VI and VII. The calciferous glands, in XV–XVII, present no obvious differences in size. The last hearts are in XII.

Testes and funnels are free in X and XI. The seminal vesicles, in XI and XII, are large,—much larger than is usual in these Central African species of the genus; they are cauliflower-like, cut up into a large number of small lobules.

The prostates are tubular, rather small, apparently confined to one segment, not coiled. The duct is very thin, short, and of the same diameter throughout.

Ovaries and funnels are present in XIII, and ovisacs in XIV.

The spermathecae (fig. 5) consist each of three parts: (I) a sac-like thin-walled ampulla, separated by a constriction from (II) a middle portion, bulkier and more opaque than the ampulla and apparently with thicker walls, rounded, broader than long; (III) the duct, shining and muscular, as long as the middle portion, broadest above, narrowing gently towards its exit. The diverticulum is single, ovoid or almost spherical, shortly stalked, attached to the base of the middle portion and dependent by the side of the duct.

The penial setae (fig. 6) are one per bundle, 1.34 mm. long, and 15μ in diameter at the middle of the shaft. The shaft is very slightly bowed, the proximal end bent through the quadrant of a circle, somewhat like a hockey club; the tip is bluntly pointed and slightly hooked; there may be a few very faint undulations on the distal third or half of the shaft, which however may be almost indistinguishable. The ornamentation consists of a few in-

cisures — they can hardly be called teeth — on the terminal 0.25 mm. of the shaft, which cause a faint indentation of the margin of the shaft (the convex margin) as seen in profile.

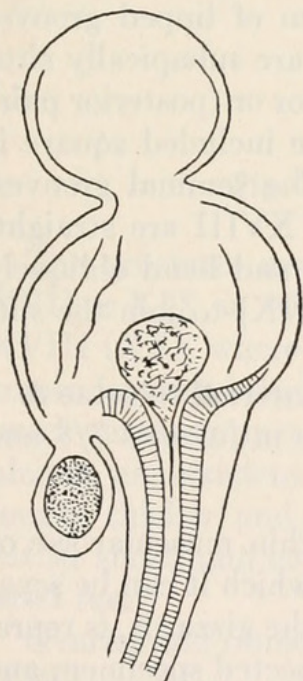


Fig. 5. *Dichogaster kigogoana*; spermatheca.

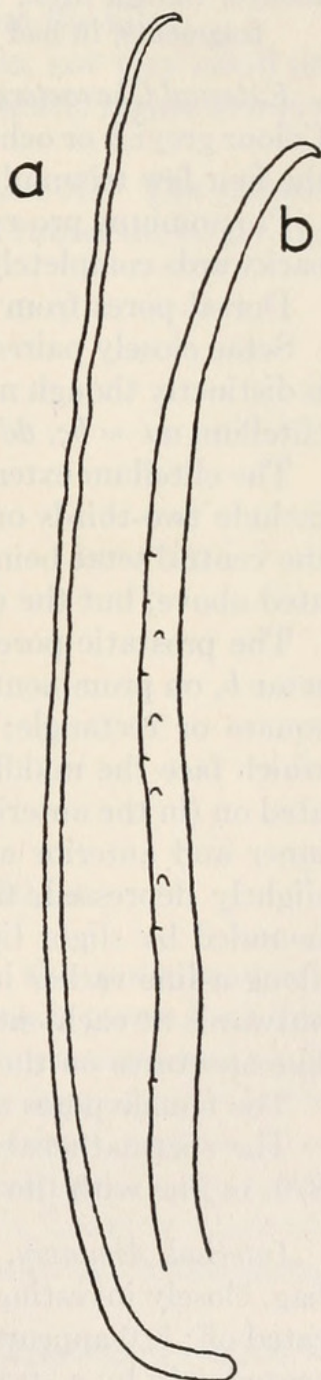


Fig. 6. *Dichogaster kigogoana*; penial seta. a, whole seta, $\times 95$; b, distal end, $\times 400$.

DICHOGASTER LOVERIDGEI sp. nov.

Kogogo, Uzungwe Mts., Tanganyika Territory. 18.i.30. Seven specimens, with two fragments, in bad condition.

Ihenye, Ukinga Mts., Tanganyika Territory. 8.ii.30. Several specimens and fragments, in bad condition.

External Characters. Length 71–87 mm.; maximum diameter 4 mm. Colour greyish or ochreous. Segms. 146, 148; preclitellar segments after the first few triannular.

Prostomium pro-epilobous, with a deep median groove prolonged backwards completely through segm. I.

Dorsal pores from furrow 5/6.

Setae closely paired, all ventral; in the middle and hinder regions *aa* is distinctly though not very much greater than *bc*, while in front of the clitellum $aa = bc$; $dd = \frac{2}{3}$ of the circumference.

The clitellum extends over the posterior third of XIII backwards to include two-thirds or the whole of XX ($= 7-7\frac{1}{3}$) it is thinner below, the ventral setae being visible, and the furrows; the furrows are obliterated above, but the dorsal pores are visible.

The prostatic pores are two pairs, on XVII and XIX, in line with setae *b*, on prominent spout-like porophores situated at the angles of a square or rectangle; the apertures have the form of lipped grooves which face the middle point of the square,— i.e. are subapically situated on (in the anterior pair) the inner and posterior or (posterior pair) inner and anterior aspect of the porophore. The included square is slightly depressed, flattened, and corrugated. The seminal grooves, bounded by slight lips, in their course on segm. XVIII are straight, along a line rather internal to that of the pores, and bend obliquely outwards at each end (i.e. on segms. XVII and XIX) to join the slit-like apertures on the porophores.

The female pores are in the setal zone of XIV internal to setae *a*.

The spermathecal apertures, inconspicuous, are in furrows 7/8 and 8/9, in line with the ventral setae.

Internal Anatomy. Septum 4/5 appears as a thin muscular sac or bag, closely investing the pharyngeal mass, from which it can be separated off; 5/6 appears to be absent; 6/7, between the gizzards, is represented only by a strand on the left side of the dissected specimen, and could not be distinguished at all on the right; 7/8 and 8/9, lying close together, are very thin; 9/10 is slightly thickened, 10/11–13/14 somewhat or moderately thickened, shining; the rest are thin.

The gizzards, in VI and VII, are of moderate size, rather rectangular, broader than long. The calciferous glands, in XV-XVII, show no great difference in size and none in colour or general appearance; those in XV are perhaps a little smaller, especially the one on the left side; in XVII a small separate lobe is seen depending from the hilus.

The last hearts are in XII. The micronephridia, not very small organs, are arranged in the segments behind the prostatic region as a row of about half a dozen on each side.

The testes and funnels are free in segms. X and XI. The seminal vesicles are two pairs, in XI and XII, those in XII rather the larger and lobed, those in XI smooth.

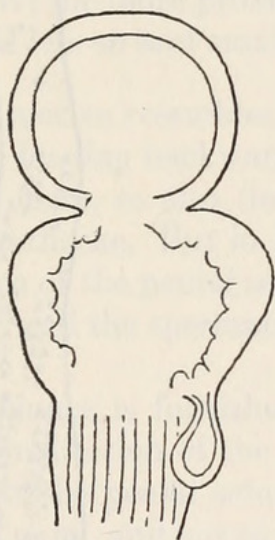


Fig. 7. *Dichogaster loveridgei*; spermatheca.

The prostates are tubular, each beginning in the same segment, XVII or XIX, in which it ends; after a short course it passes back into XVIII (XX), where it forms an irregularly convoluted mass, and again comes forward into XVII (XIX), ending abruptly by passing into the much narrower duct. The duct forms a loop with a short, very short, or almost non-existent narrow ental limb, the ectal limb being much longer, thicker, and more shining; the whole duct is however relatively rather short, and ends in close proximity to the stout muscular penial setal sac.

Ovaries and funnels are present in XIII, and rudimentary ovisacs in XIV.

The spermathecae (fig. 7) are of moderate size; the ampulla is smooth, subspherical, and constricted off from the middle portion, a soft sac of somewhat subspherical or irregular form, of approximately the same size as or rather broader than the ampulla; the middle portion

passes at its base into the short thick shining muscular duct. The diverticulum is single, pear-shaped (or ovoid and stalked), dependent, attached to the base of the middle portion, and bound down by connective tissue to the upper part of the duct.

A single stout penial seta (fig. 8) is contained in each setal sac; in length it is 2.24 mm., in diameter 53μ in the middle, 20μ near the tip.

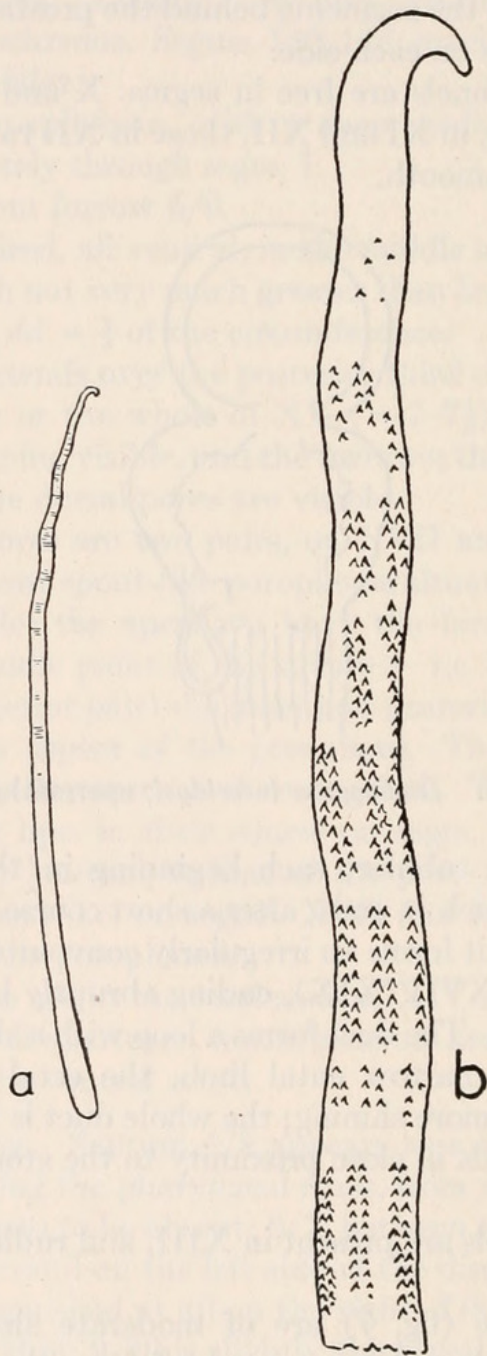


Fig. 8. *Dichogaster loveridgei*; penial seta. a, whole seta, $\times 46$; b, distal end, $\times 300$ (the ornamentation is not, as shown here, all in focus at once, since the groups of denticles are alternately on opposite sides of the shaft).

The shaft is slightly bowed, the distal two-fifths or so gently undulating,—about five faint undulations; the tip narrows to form a small hook. A few faint transverse striations, irregularly distributed, are seen in the substance of the shaft. In the concavities, apparently, of the undulations are four to six longitudinal rows, limited in extent and arranged more or less in pairs, of tiny sculpturings, resembling small teeth; sometimes the grouping is less regular. What appears as a convexity on one side of the shaft is a concavity on the other, and hence there are two series of such sculpturings, on opposite sides of the shaft, brought into view not all at once, but separately, by focussing at different levels. The ornamentation extends over the whole of the undulating part of the shaft; the more proximal groups of sculpturings are very distinct, the distal less so and smaller.

Remarks. The present species resembles *D. sellae* in some respects (Cognetti, '09); the groove leading backwards from the prostomium is rather reminiscent of that form, as also (in very general outline) are the penial setae and spermathecae. But in *D. sellae* *dd* = half the circumference, the undulations of the penial setae are closer together and the ornamentation sparser, and the spermathecal diverticulum may be many-chambered.

Perhaps a closer resemblance is furnished by *D. monticellii* (Cognetti, '14), where the ornamentation of the penial setae alternates, as here, on opposite sides; but the penial setae are not hooked, and the rows of denticles are not in pairs, and not so close together as here; and the middle portion of the spermatheca is not swollen (if indeed a middle portion can be distinguished in *D. monticellii*), but is of the same diameter as the duct.

DICHOGASTER RUNGWEENSIS sp. nov.

Nkuka Forest, Rungwe Mtn., Tanganyika Territory (to the N. E. of the N. end of Lake Nyasa). 17.iv.30. Two specimens, in bad condition.

Madehani, Ukinga Mts., Tanganyika Territory (at the N. end of Lake Nyasa): ii.30. Two specimens, in bad preservation.

External Characters. I regret that the condition of the specimens renders impossible anything more than a very cursory description of the external features. The longest specimen (which broke immediately into three pieces) measured 105 mm., but on account of the softening and consequent extension this is quite unreliable; another measured

90 mm. Diameter 3–4 mm. Colour purplish brown, cuticle iridescent. Segments?

The prostomium forms a considerable rounded lobe with a narrow triangular tongue, pointed backwards, the point just reaching furrow $1/2$; a transverse furrow in front of the tongue (combined pro-epilobous and tanylobous).

The dorsal pores begin in furrow $5/6$; in one of the examples from Madehani there was a rudimentary pore in $4/5$.

The setae are paired; in front of the clitellum (where alone they can be distinguished) aa is usually equal to bc , occasionally slightly greater than bc ; dd = about two-thirds of the circumference.

The clitellum, embracing XIII–XX (= 8), is ring-shaped on XIII–XVI, though thinner mid-ventrally, where it is paler and the ventral setae are visible; it is absent mid-ventrally and hence saddle-shaped, on XVII–XX.

The prostatic apertures, on XVII and XIX, are in line with the ventral setae, more exactly, perhaps, with b ; the seminal grooves are very slightly bowed inwards, and are bordered by faint whitish lips; the male area, including the prostatic apertures and seminal grooves, has the form of a square.

The female pores were not visible.

The spermathecal apertures are small, in furrows $7/8$ and $8/9$, in line with setae b .

Internal Anatomy. Septum $4/5$, behind the pharyngeal mass, is thin but quite obvious; $5/6$ is very thin, perhaps incomplete, situated in front of the anterior gizzard; $6/7$, between the two gizzards, is thin and probably incomplete, or even considerably reduced; $7/8$ is more or less, $8/9$ – $11/12$ somewhat or moderately thickened, $12/13$ slightly so.

The gizzards, in VI and VII, are well developed, cylindrical, the anterior being the larger,—both broader and longer. The calciferous glands, kidney-shaped, attached by the hilus, in XV–XVII, increase in size backwards, those in XV being the smallest, those in XVII the largest.

The last hearts are in XII. The micronephridia in the clitellar region are 9–10 on each side per segment (6 in a specimen from Madehani); behind the clitellum they are indistinguishable in these specimens.

The testes and funnels are free in X and XI. Seminal vesicles are present in XI and XII, those in XII of moderate size, with a granular surface but not divided into large lobes, those in XI rather smaller but similar in appearance.

The prostates are tubular, not very long, irregularly bent; the duct is relatively short, very narrow, irregularly bent, quite sharply limited from the glandular part.

The ovaries and funnels are in XIII, and ovisacs are present in XIV.

The spermathecae (fig. 9) are composed, as before, of three parts: (I) the ampulla, elongated, spindle-shaped, joined by a rather narrow neck to the next, or (II) middle portion, opaquely white like the ampulla, widening gradually towards its base; (III) the duct, shining,

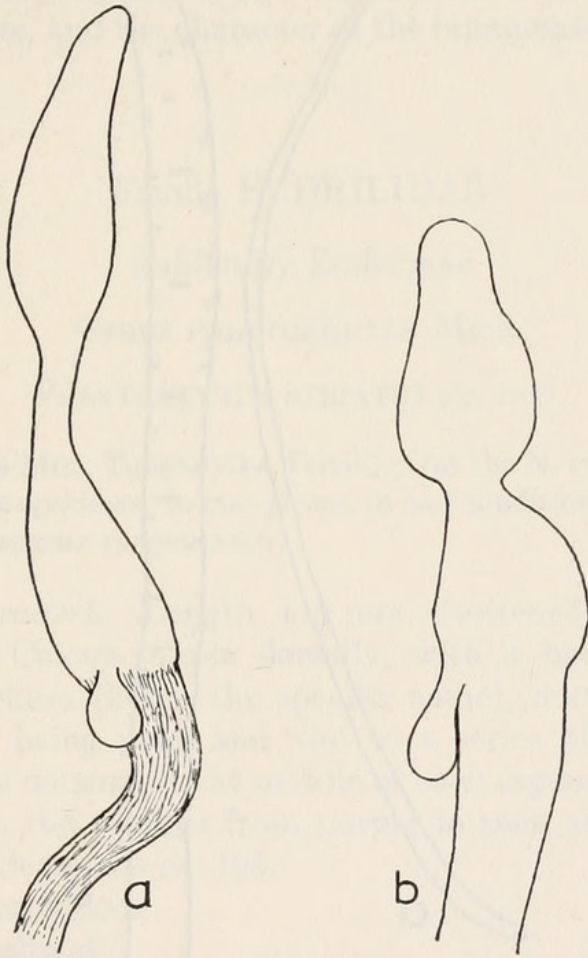


Fig. 9. *Dichogaster rungweensis*; a and b, spermathecae of two different specimens.

muscular, as broad as the middle portion at its upper end, but narrowing somewhat as it passes towards the body-wall. The diverticulum is small, ovoid, shortly stalked, glistening, and dependent, and is attached to the middle portion at its lower end, where this merges into the duct. In a specimen from Madehani the spermathecae were shorter and relatively thicker, as if contracted (fig. 9 b).

One fully grown and one incompletely developed penial seta are found in each bundle (fig. 10). In length a seta is about 1.8 mm., in diameter 20μ at the middle of the shaft, 28μ near the base, 16μ shortly before the tip. The shaft is slightly bowed, uneven in outline, in part

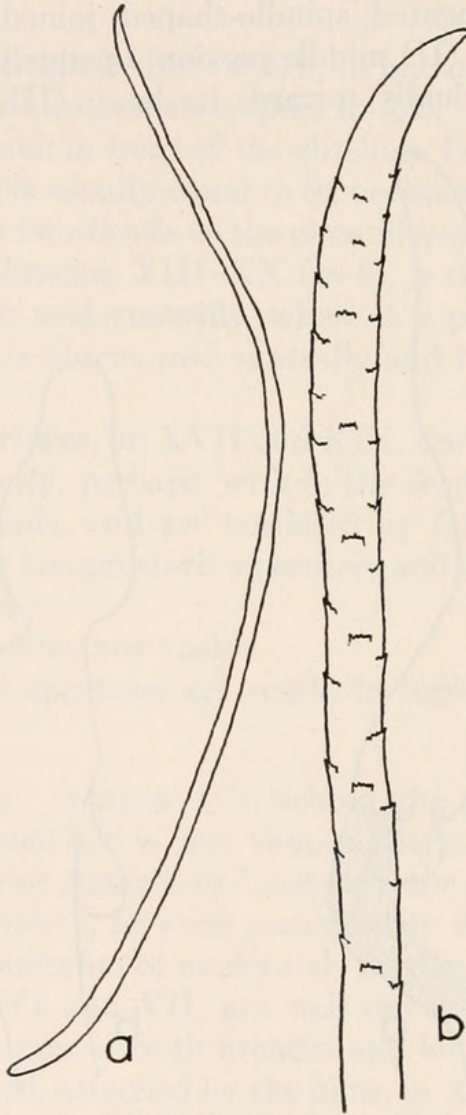


Fig. 10. *Dichogaster rungweensis*; penial seta. a, whole seta, $\times 58$; b, distal end, $\times 400$.

sinuous, in part gently swollen and contracted alternately, somewhat like the ventral nerve cord as seen in dissection, but less regular. The tip is slightly curved, and tapers to a blunt point; the distal fourth or so (0.4–0.5 mm.) is ornamented by a number of teeth, which may be described as broad jagged notches, irregularly situated, hardly standing

off at all from the surface. The seta may be slightly thicker near the tip than further up the shaft (as in fig. 10 b). In the specimens from Madehani these setae were slightly longer (1.9–2 mm.) and thicker (25μ at the middle, 33μ near the base, 17μ near the tip).

Remarks. The shape of the spermathecae is very strongly reminiscent of *D. mundamensis*, which however is a much smaller worm (length 40 mm., diameter 2 mm.), and differs in numerous other particulars,—e.g. the penial setae are hooked at the end, the distal portion tapers much more, and the character of the ornamentation is different.

Family EUDRILIDAE

Subfamily Eudrilinae

Genus POLYTOREUTUS Mich.

POLYTOREUTUS STRIATUS sp. nov.

Madehani, Ukinga Mts., Tanganyika Territory (at the N. end of Lake Nyasa).

ii.30. A single specimen, in two pieces, in bad condition (along with specimens of *Dichogaster rungweensis*).

External Characters. Length 115 mm. (softened); maximum diameter 4 mm. Colour purple dorsally, with a banded appearance behind the clitellum (hence the specific name), due to the intersegmental furrows being pale, and also to a series of transverse pale bands across the dorsum at the middle of each segment; ventrally the worms are pale, the passage from purple to pale at the sides being rather sudden. Segments ca. 195.

Prostomium prolobous.

Dorsal pores absent.

The setae are paired, the ventral widely, the lateral more closely (the setae can only be seen in front of the clitellum); aa is rather less than $2ab$, and is equal to bc ; $cd = ca. \frac{1}{2}ab = ca. \frac{1}{3}bc$, but the ratios vary somewhat; dd is scarcely as much as half the circumference.

The clitellum includes $\frac{2}{3}$ of segm. XIII in front and the whole of XVII behind; it is rather lighter in colour than the surrounding regions, not swollen, and the grooves are not completely obliterated. The huge genital field takes up much of the clitellar region on the ventral surface, so that it is difficult to say if it is saddle-shaped.

The genital field (fig. 11) may be described as roughly triangular, with truncated apex (anterior end) and much rounded angles. The area includes (I) a lip, thick in front and behind, narrow at the sides; (II) three oval papillae, one smaller, median and anterior, within the curve of the lip, the flat surface of the papillae sloping backwards, and

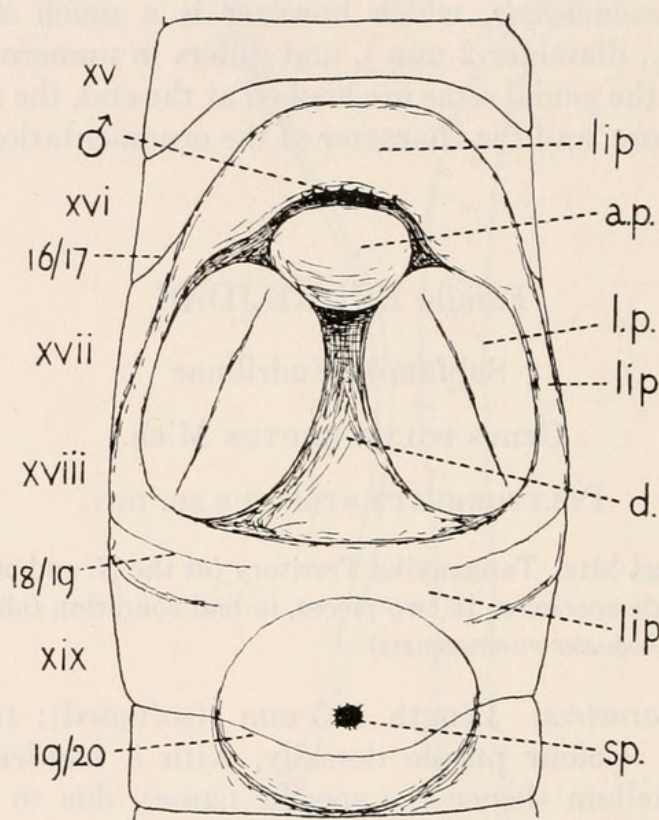


Fig. 11. *Polytoreutus striatus*; genital field. *a.p.*, anterior papilla; *d*, median depression; *lip*, lip surrounding papillae; *l.p.*, lateral papillae; *sp.*, spermathecal aperture with surrounding lip; ♂, position of male aperture.

two very large, lateral, their long axes directed forwards and slightly inwards, and their sharply cut margin bounded by a narrow groove on the outer side where the papilla is closely adjacent to the lip, and by a very deep groove on its inner side; their surfaces flat, and marked, rather external to their long axes, by a long, straight, narrow but quite shallow furrow; (III) a median depression, bounded by the two large papillae at the sides, the small anterior papilla in front, and the posterior lip behind; owing to the disposition of the large papillae this depression is broader behind than in front. Furrow 16/17 seems to bend forwards strongly and to pass in front of the lip, which overhangs it;

furrow 18/19 passes on the posterior lip, the hinder border of which is not well defined, and melts away in the mid-ventral region.

The male aperture is median, a slit between the anterior lip in front and the anterior of the three papillae behind; from the course of furrow 16/17 this would correspond to a position on segm. XVII.

The female apertures are not visible externally, but from dissection appear to be laterally situated on segm. XIV.

The spermathecal aperture is single, behind the genital field, moderately conspicuous, surrounded by a broad lip which is more prominent behind the aperture than in front of it; the whole transversely oval in shape, taking up more than half the width of the ventral surface, extending backwards over the whole of XX, while in front the lip of the spermathecal aperture melts into the lip bounding the genital area behind. On careful examination furrow 19/20 can be faintly seen, passing a little way behind the spermathecal aperture, across its posterior lip; the aperture is therefore on the hinder part of segm. XIX.

Internal Anatomy. Septum 4/5 is very thin, but apparently complete; 5/6 is thin; 6/7 shows a commencing thickening, 7/8 is somewhat and 8/9-10/11 moderately thickened, 11/12 slightly so, and the rest thin.

The gizzard, in segm. V, is firm and of some size, broad anteriorly, narrowing backwards. The calciferous glands are unpaired and ventrally situated in IX-XI, of moderate size, attached to the gut by a short narrow stalk, and paired in XIII, fairly bulky, attached by a broad base, not stalked.

The last hearts are in XI.

The worm is metandric; a pair of testis sacs are present in XI, rather small, sessile on septum 11/12. From each sac emerges in segm. XI a sperm reservoir, a looped or slightly convoluted tube, shining because of the contained spermatozoa, the second (or ectal) limb of the loop thicker than the first (or ental). Penetrating septum 11/12, the reservoir becomes the vas deferens, a straight tube which passes backwards by the side of the ventral nerve cord.

Leaving the testis sac, another tube, long, straight, narrow and semi-transparent, passes backwards from the hinder aspect of septum 11/12, side by side with its fellow, on the dorsal side of the gut; this is the seminal vesicle, which when it reaches segm. XXVII begins to swell out segmentally,—slightly in XXVII and XXVIII, more considerably in XXIX-XXXII, where it ends; these swollen portions of the vesicles are also on the dorsal side of the gut.

The prostates (fig. 12) are paired, the right (in this specimen at least) bent into a loop directed forwards and extending as far as segm. XIV, the left straight and stretching backwards to XXV; each is

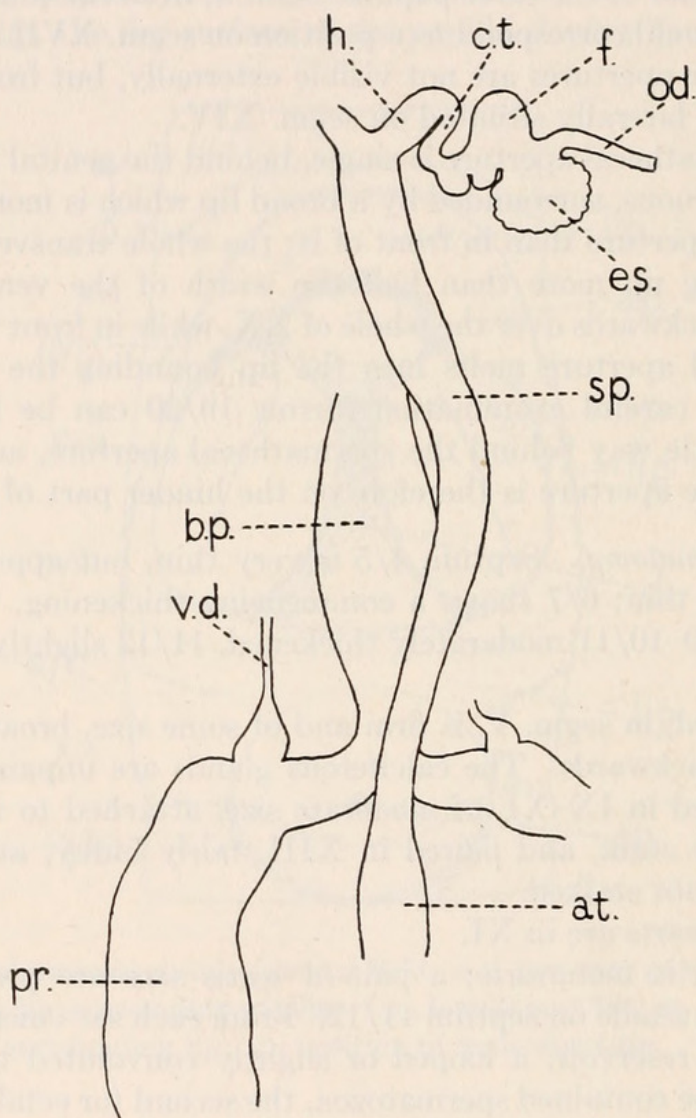


Fig. 12. *Polytreutis striatus*; female organs, median and of right side, with part of the prostates. *at.*, terminal slight dilatation of spermatheca (= atrium); *b.p.*, bursa propulsoria; *c.t.*, connecting tube; *es.*, egg-sac; *f.*, enclosed funnel; *h.*, anterior horn of spermatheca; *od.*, oviduct; *pr.*, prostate of left side; *sp.*, spermathecal tube; *v.d.*, vas deferens.

cylindrical, slightly shining, rather soft, and faintly constricted at the sites of the septa. The vas deferens joins a teat-like papilla situated near the ectal end of the gland, just before it narrows and turns inwards

to join its fellow in the middle line, beneath the nerve cord in XVIII. The single tube, narrow at its commencement, then passes forwards, swells out again to form a considerable ovoid longitudinally placed sac (bursa propulsoria) and finally again contracting somewhat, pierces the body-wall on a level with the nephridia of XVI (which corresponds to segm. XVII externally,— cf. fig. 11).

The spermatheca (fig. 12) is a median, shining, fairly regularly cylindrical tube, single throughout practically the whole of its extent (nearly as far as its anterior end), which passes forwards from its junction with the body-wall in XIX, over the place of junction of the two prostates, by the right side of the prostatic bursa to segm. XIV. It is faintly dilated at its posterior end, where it joins the body-wall, and its anterior half again is rather wider than the part behind this. There are no diverticula. At its anterior end the tube bifurcates to form two short horns, also shining; each horn is continued outwards by the connecting tube to the enclosed funnel, a swollen region, with which communicate a moderate-sized rounded mammillated egg-sac, and a multiple sperm-magazine which is hardly recognizable except in sections. The oviduct, a short straight tube directed outwards, places the enclosed funnel in communication with the exterior.

The horns of the spermatheca and all the organs subsequently described are situated in segm. XIV; none have any connection with the thin septum 13/14, and no genital organs are visible in XIII; ovaries and ovarian sacs have disappeared in the present specimen.

A few additional particulars can be gathered from the examination of sections (fig. 13): — The connecting tube, into which the horn of the spermatheca is continued, is narrow and bent, thick-walled, muscular, and lined with columnar epithelium. The enclosed funnel is an irregular cavity with a thick wall of (muscle and ?) connective tissue cells and fibres, lined by elongated columnar cells. The egg-sac is attached to the posterior aspect of the enclosed funnel by a broad base, and is thus shaped somewhat like a mushroom with a broad very short stalk; the mammillations of the surface correspond to egg-follicles; the ova are, if large, one or two in a follicle, but masses of smaller ova may occur, or one medium-sized ovum may occupy a follicle along with a number of small ova; the cavity in the base and stalk of the sac communicates widely with that of the enclosed funnel.

The sperm-magazine consists of about half a dozen small loculi, each somewhat pear-shaped, arranged side by side, their mouths (the narrow ends of the pears) converging somewhat to open into the base

of the enclosed funnel (or beginning of the oviduct) close against the stalk of the ovisac.

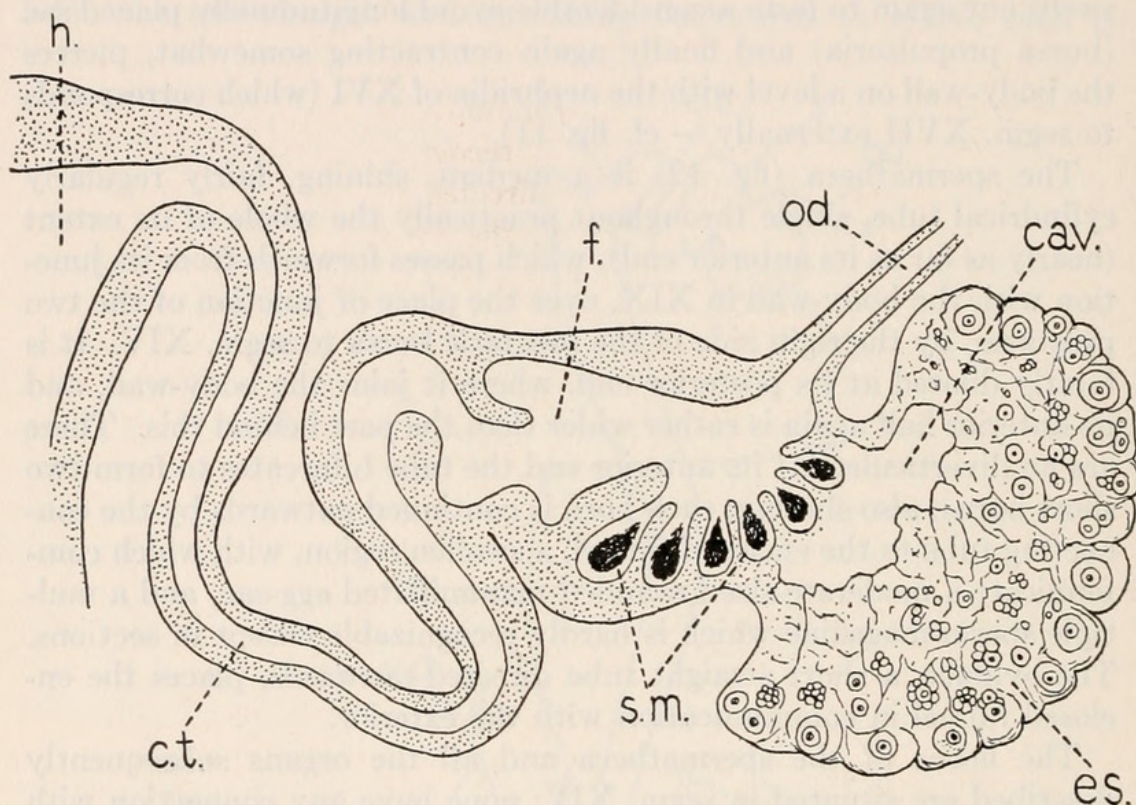


Fig. 13. *Polytoreutus striatus*; female organs of the right side, diagrammatic, constructed from a series of sections; the opening from the cavity of the egg-sac into the base of the enclosed funnel is at a different (lower) level from the openings of the chambers of the sperm-magazine. *cav.*, cavity of egg-sac; *c.t.*, connecting tube; *es.*, egg-sac; *f.*, enclosed funnel; *h.*, horn of spermatheca; *od.*, oviduct; *s.m.*, chambers of the sperm-magazine.

The oviduct is narrow and thin-walled, and leaves the anterior aspect of the sperm-magazine.

Family GLOSSOSCOLECIDAE

Subfamily Microchaetinae

Genus ALMA Grube

ALMA EMINI (Mich.) f. *typica*

Siphonogaster emini Michaelsen '92, Mitt. Mus. Hamburg, **9**, ii, p. 36, Taf. fig. 4, 5. Bukoba, Tanganyika Territory.

see also

Alma emini Michaelsen '15, Ergeb. 2. Deutsch. Zent.-Afr.-Exp. 1910-11. **1**, Teil i, p. 296.

Albertville, Belgian Congo. 21.v.30. A single specimen, not fully mature.

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