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Art. V.—*Preliminary Notes on Tasmanian Earthworms.*

(With Plates I., II., III., IV. and V.)

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[Read 8th March, 1894.]

In two previous communications to this Society I have described as preliminary to a joint work by Mr. Fletcher of Sydney and myself on the Earthworm fauna of Australia the species of Megascolides, Cryptodrilus and Perichæta which had up to the date of publication been found in Victoria. This evening I describe a series of Earthworms from Tasmania, and I have to thank Mr. A. Simson, of Launceston, Mr. A. Morton, of the Tasmanian Museum, and Mr. C. G. Officer, B.Sc., of the Melbourne University, for valuable assistance in collecting. To Mr. Morton I am indebted for several forms, and especially for specimens of the large *Megascolides tasmanianus*, described by Mr. J. J. Fletcher. My own collecting has been done on Mount Wellington, around Dee Bridge, amongst the mountains in the Lake St. Clair district, around Parattah, and to a small extent along the north coast in the neighbourhood of Table Cape and Emu Bay. A visit of the Field Naturalists' Club of Victoria to King Island, enabled me to collect one or two forms in this spot half-way between the continent and Tasmania. The search has not yielded so many forms as I had hoped and expected to find, a result which may possibly be due to the fact that it has been carried on during the summer, but Mr. Officer informs me that earthworms were much more numerous along the King River Valley amongst the western mountain ranges, than in the region of Lake St. Clair, where we were camped out for some four weeks in the early part of 1893.

The same three genera to which our Australian species are provisionally referred are all represented in Tasmania, and to

these genera the Tasmanian forms are likewise provisionally referred, though, as previously stated, it will be necessary to revise the classification when the collections of Mr. Fletcher and myself are sufficiently complete and described.

Up to the present time only a single earthworm is described from Tasmania, viz., *M. tasmanianus*, *Fl.*

The collection here described consists of 10 species of Cryptodrilus, 2 species of Megascolides, 6 species of Perichæta, all new to science, so that together with Mr. Fletcher's *M. tasmanianus* we now know of the existence of 19 species of earthworms in Tasmania. There must be very many yet undiscovered, especially in the well-watered valleys on the west coast of the island, but so far as yet known the earthworm fauna is not so extensive as that of Victoria or New South Wales.

The following account does not include the description of species which have clearly been introduced from foreign countries.

(a) Cryptodrilus, Fletcher.

(1). *C. irregularis*, sp. n. (Figs. 1, 2, 3). Spirit specimen, 6 inches long, more than $\frac{1}{8}$ inch broad.

Prostomium about half dovetailed into the peristomium.

Clitellum not at all prominent, indicated by darker colour in spirit specimen, and including segments 14-17 and the posterior part of segment 13.

Setæ regularly arranged only so far back as the fourteenth segment, after which they become very irregular and give a decidedly perichæte appearance to the body, though more than four do not appear to be present on each side.

Male pores difficult to determine. There is a ventral median patch on segment 18 of a white tumid nature, and on this the two openings lie either very close together or fused so as to form a single one.

Oviduct pores on segment 14. Ventral of and anterior to the innermost seta of each side.

Spermathecal pores, two in number, at the level of the innermost seta of each side. One between segments 7 and 8, the other between segments 8 and 9.

Dorsal pores present, the first between segments 4 and 5.

Nephridiopores not discernible.

Alimentary Canal. Gizzard in segment 5. There are vascular swellings on the oesophagus in segments 9-13, that in segment 13 being especially strongly developed, but it is not nipped off like a true calciferous gland. Large intestine commencing in segment 18.

Blood vascular system. Single dorsal blood vessel with hearts, the last of which is in segment 12. Supra-intestinal vessel in segments 8-12.

Excretory system. Plectonephric with no large nephridia.

Reproductive system. Testes, two pairs in segments 10 and 11, ciliated rosettes in the same segments.

Prostates flattened, racemose in segment 18.

Sperm sacs, saccular and attached to the anterior wall of segment 12.

Ovaries attached to the anterior wall of segment 13, oviducts open into the same segment.

Spermathecæ, two pairs, in segments 8 and 9. Diverticulum not quite half as long as the sac, both being simple in outline.

Habitat. Table Cape, Tasmania, under logs.

(2). *C. polynephricus* (Figs. 4, 5, 6). Length in spirit 5-6 inches. One quarter inch broad.

Prostomium about one half dovetailed into the peristomium. Clitellum distinct, and when fully formed complete, occupying segments 13-17. When not fully formed is incomplete ventrally, and somewhat saddle-shaped. Tumid.

Setæ, four couples regularly arranged. The two inner ones on each side near together, the two outer ones widely apart, the interval between them being twice as great as that which separates the two most dorsal ones. The dorsal and ventral intervals, and that between the second and third setæ of each side are about equal.

Male pores on segment 18 between the level of the two inner setæ on each side.

Oviduct pores on segment 14 ventral of, and anterior to, the level of the innermost setæ.

Spermathecal pores, two in number, on the anterior faces of segments 8 and 9, just dorsal to the level of the innermost setæ. On white elliptical patches.

Accessory copulatory structures. Three pairs of elliptical tumid patches on segments 9, 10 and 11, each placed at the posterior end of the segment at the level of the second setæ. Dorsal pores not visible.

Nephridiopores 10 in each segment. One just in front of each seta, and one between setæ 3 and 4 on each side.

Alimentary canal. Gizzard in segment 5. No true calciferous glands. Large intestine commencing in segment 17.

Excretory system. Five nephridia on each side in each segment, corresponding in position to the setæ, with an extra one between the third and fourth setæ. No ciliated funnels discernible.

Reproductive organs. Testes, two pairs, one in segment 10, another in segment 11. Rosettes in the same segments.

Prostates, large, tubular, somewhat coiled. Extending through segments 18-21.

Sperm sacs, racemose on the anterior septum of segment 12, and the posterior of segment 9.

Ovaries in segment 13. Oviducts opening into the same segment.

Spermathecæ, two pairs, each with a simple diverticulum about one-quarter the length of the sac.

Circulatory system. Single dorsal vessel. Hearts in segments 4-13. In segments 4-9 are small and arise from the dorsal vessel, in segments 9-13 large, and arise from the supra-intestinal vessel which extends through segments 9-13.

Habitat. Mount Wellington, Hobart, and Parattah, Tasmania.

(3). *C. mortoni.* Length in spirits, $2\frac{1}{2}$-3 inches, one-quarter inch broad. In spirit the worm is a flesh colour, and broad in comparison to its length. (Figs. 7, 8, 9).

Prostomium completely dovetailed into the peristomium. Clitellum well marked, extending over segments 14-17, somewhat darker than the rest of the body in spirit specimens. Tumid.

Setæ regularly arranged in four couples, the intervals between the two couples nearly equal and slightly greater than that between setæ 2 and 3.

Male pores on papillæ on segment 18 just dorsal to the level of the innermost setæ.

Oviduct pores on segment 14.

Spermathecal pores, five in number at the intervals between segments 5 and 6, 6 and 7, 7 and 8, 8 and 9, 9 and 10. Indicated by white glandular spots just dorsal to the level of the innermost setæ.

Accessory copulatory structures. An elliptical tumid patch in the median ventral space between segments 17 and 18; other patches at the level of the second setæ of each side on segment 17 and between segments 18 and 19 and 19 and 20 at the level of the first setæ. The two latter extend inwards near to the mid-ventral line.

Dorsal pores present, the first between segments 4 and 5.

Nephridiopores at the level of the third seta on each side.

Alimentary canal. Gizzard in segment 5. True calciferous glands present in segments 13-16. Large intestine commencing in segment 18.

Excretory system. Meganephric.

Reproductive system. Testes in segments 10 and 11. Ciliated rosettes in segments 10 and 11.

Sperm sacs, racemose, attached to the anterior wall of segment 12.

Ovary in segment 13. Oviducts opening into the same segment.

Spermathecæ, 5 pairs, one each in segments 5-9, with a small simple diverticulum less than one-half the length of the sac.

Habitat. Dee Bridge and Mount Wellington, Tasmania. Under logs and stones. I have pleasure in associating with this the name of Mr. A. Morton, Curator of the Hobart Museum, and Secretary of the Royal Society of Tasmania, to whom I am indebted for help in various ways.

(4). *C. hobartensis* (Figs. 10, 11, 12). Length in spirits 3 inches, slightly more than $\frac{1}{8}$ inch broad. The dorsal surface is purple, the ventral is flesh coloured, and the clitellum lighter than the surrounding parts. The setæ are distinct. There is a median dorsal dark line extending on to the prostomium.

Prostomium dovetailed about one half into the peristomium.

Clitellum distinct, tumid, complete occupying segments 14-16 together with the posterior part of 13, and the anterior part of 17.

Setæ in four couples, the two of the ventral couple being nearer to each other than the two of the outer. The fourth seta on each side is near to the dorsal surface.

Males pores on papillæ at the level of the interval between the two inner setæ on segment 18.

Oviduct pores on segment 14.

Spermathecal pores, five pairs at the level of the first setæ between segments 4 and 5, 5 and 6, 6 and 7, 7 and 8, 8 and 9.

Dorsal pores, present, the first between segments 4 and 5.

Accessory copulatory structures. Four pairs of elliptical patches at the level of the interval between the first and second setæ between segments 16 and 17, 17 and 18, 18 and 19, 19 and 20.

Alimentary canal. Gizzard in segment 5. The calciferous glands in segments 12, 13, 14 and 15. Large intestine commencing in segment 17.

Circulatory system. Single dorsal vessel. The last pair of hearts in segment 12.

Excretory system. Meganephric.

Reproductive system. Testes, two pairs, in segments 10 pan 11 into which also open the rosettes.

Prostates. Long, widely tubular and coiled, extending through segments 18-24.

Ovaries in segment 13, into which the oviducts also open.

Spermathecæ, five pairs, in segments 5, 6, 7, 8 and 9. The diverticulum simple and not more than half the length of the sac.

Sperm sacs, racemose in segments 9 and 12.

Habitat. Parattah and Mount Wellington.

In internal anatomy this worm is almost identical with *C. mortoni*, but the two are perfectly distinct in external appearance. The worm in question is a whitish stout form, whilst *C. mortoni* is darkly coloured with conspicuous setæ, and is long and narrow.

(5). *C. campestris* (Figs. 13, 14, 15). Length in spirits 2-3 inches, $\frac{1}{8}$ inch broad. Colour when alive whitish with pink clitellum, the same colour retained, only duller, in spirits.

Prostomium dovetailed about $\frac{1}{3}$ into the peristomium.

Clitellum distinct, tumid, occupying segments 13-17, but not the whole of 17 ventrally, so that at its posterior end it is slightly saddle-shaped.

Setæ in four couples, regularly arranged, the dorsal couple of each side being so close to the mid-dorsal line, that only a slight interval is left between the dorsalmost setæ of each side.

Male pores on large papillæ on segment 18, the pore being just within the level of the second seta.

Oviduct opening on segment 14.

Spermathecal pores, two, indicated by small white tumid patches just dorsal to the level of the innermost setæ between segments 7 and 8, 8 and 9.

Accessory copulatory structures. Two large circular patches on segment 17, two elliptical patches on segments 18 and 19, 19 and 20.

Dorsal pores present, the first between segments 3 and 4.

Nephridiopores not visible.

Alimentary canal. Gizzard in segment 5. No true calciferous glands. Large intestine commencing in segment 16. Glandular tufts (pepto-nephridia?) connected with the alimentary canal in segment 4.

Circulatory system. Single dorsal blood-vessel with the last pair of hearts in segment 12. Sub-intestinal vessel from which in segments 10, 11 and 12 arise the hearts.

Excretory system. Plectonephric with no large nephridia.

Reproductive system. Testes, two pairs in segments 10 and 11 with ciliated rosettes in the same segments.

Prostates small and flattened in segment 18.

Sperm sacs, racemose, attached to the anterior wall of segment 12 and the posterior of segment 9.

Ovaries in segment 13 with oviducts opening into the same segment.

Spermathecæ, two pairs, one each in segments 8 and 9. The diverticulum is rosette-shaped, the sac simple.

Habitat. Parattah, Tasmania, in damp earth under logs.

(6). *C. tesselatus* (Figs. 16, 17, 18). Length in spirit 1 inch. Colouration of the body strongly marked both when alive and in spirits. The body is purplish with the setæ on small white elevations which give it a distinct chequered appearance. A mid-dorsal line runs right forward on to the prostomium. About 65 segments. The peristomium has a mid-ventral cleft.

Prostomium scarcely at all dovetailed into the peristomium.

Clitellum distinct, tumid and occupying segments 13-17 with a mid-ventral continuation including parts of segments 18 and 19 so far dorsal as the level of the second setæ on each side.

Setæ, 4 on each side, the dorsal row very irregular and may be wanting in a few segments, so that occasionally there are only 3 on each side. The third row is regular to within some 6 segments of the posterior end.

Male pores on small papillæ on segment 18 at the level of the interval between the two inner setæ on each side.

Oviduct pores on segment 14.

Spermathecal pores, two in number, at the level of the interval between the two inner setæ of each side, between segments 7 and 8, 8 and 9.

Accessory copulatory structures. Two pairs of small elliptical patches, at the level of the interval between the two inner setæ of each side, between segments 12 and 13, 13 and 14.

Dorsal pores present, the first between segments 5 and 6.

Nephridiopores not discernible.

Alimentary canal. Gizzard in segment 5. No true calciferous glands present. Large intestine commencing in segment 17.

Circulatory system. Single dorsal vessel. Last pair of hearts in segment 12. Supra-intestinal vessel present (?).

Excretory system. Meganephric.

Reproductive system. Testes, two pairs, in segments 10 and 11, into which the ciliated rosettes open.

Prostates, flattened, small, in segment 18.

Sperm sacs, attached to the anterior wall of segment 12, sacular in form.

Ovaries in segment 13, the oviducts opening into the same segment.

Spermathecæ, two pairs, one each in segments 8 and 9. The diverticulum is simple and less than one-half the length of the sac.

Habitat. Mount Olympus, Lake St. Clair, Tasmania, in damp soil under logs, and amongst decaying leaves in Beech Forest (*Fagus cunninghami*).

(7). *C. insularis* (Figs. 19, 20, 21). Length in spirit 1-2 inches, about $\frac{1}{8}$ inch broad. In spirit is dull purple colour dorsally, pinkish-purple laterally, and flesh colour ventrally.

Prostomium dovetailed about one half into the peristomium.

Clitellum distinct, including segments 14-16 and the anterior portion of segment 17, and the posterior of segment 13. Lighter in colour than surrounding segments.

Setæ regularly arranged save an odd one or two at the posterior end. The two innermost setæ of each side are drawn in towards the middle line in segments 17, 18 and 19, so that the inner couple lie close together on each side.

Male pores on white elliptical patches on segment 18 at the level of the interval between the inner couple of setæ on each side.

Oviduct pores on segment 14.

Spermathecal pores, five in number, placed at the level of the innermost setæ between segments 4 and 5, 5 and 6, 6 and 7, 7 and 8, 8 and 9.

Accessory copulatory structures. A pair of small elliptical patches at the level of the interval between the two inner setæ of each side, between segments 16 and 17.

Dorsal pores present, the first between segments 5 and 6.

Nephridiopores at the level of the third setæ, the openings indicated by a small white patch on the anterior margin of the segment.

Alimentary canal. Gizzard in segment 5. No true calciferous glands present. Large intestine commencing in segment 16.

Circulatory system. Single dorsal vessel. Hearts in segments 10, 11 and 12, larger than those in front and arising from the supra-intestinal vessel.

Excretory system. Meganephric.

Reproductive system. Testes in segments 10 and 11, ciliated rosettes in the same segments.

Prostates very long, extending through segments 18-27, tubular, coiled.

Sperm sacs, racemose, on the posterior face of segment 9 and the anterior of segment 12.

Ovaries in segment 13, into which also the oviducts open.

Spermathecæ, five pairs, in segments 5, 6, 7, 8 and 9. The diverticulum simple and about one-half the length of the sac.

Habitat. Parattah, Tasmania, under logs.

(8). *C. ellisii* (Figs. 22, 23, 24). Length in spirits 1-1½ inches about ⅛ inch broad. The dorsal surface (in spirits) is dark purple in front of the clitellar region, brown behind this, and dull flesh colour at the posterior end, the ventral surface throughout being lighter in colour than the dorsal. The clitellum is dull flesh colour.

Prostomium dovetailed one-half into the peristomium and marked by a median dorsal line which is continued down the body.

Clitellum distinct, tumid, lighter coloured than the surrounding parts and extending completely over segments 14-16. It may include the posterior part of segment 13.

Setæ in 4 couples regularly arranged. The two inner ones on either side nearer together than the two outer ones. The spaces between setæ 2 and 3, 3 and 4, and dorsally between seta 4 of each side being about equal.

Male pores on papillæ on segment 18, the pore being at the level of the second seta of each side or perhaps slightly ventral of this.

Oviduct pores on segment 14.

Spermathecal pores, three in number, on white elliptical patches at the level of the second setæ between segments 6 and 7, 7 and 8, 8 and 9.

Accessory copulatory structures. Two elliptical patches at the level between the two inner setæ of each side on the anterior faces of segments 10 and 11. Two pairs at the same level between segments 17 and 18, 18 and 19. Two pairs at the same level on the anterior margins of segments 20 and 21.

Dorsal pores present, the first between segments 5 and 6.

Alimentary canal. Gizzard in segment 5. Two pairs of calciferous glands present one each in segment 14 and segment 15. Large intestine commencing in segment 17.

Circulatory system. Single dorsal blood vessel. The last pair of hearts in segment 12.

Excretory system. Meganephric.

Reproductive system. Testes, two pairs, in segments 10 and 11 into which also open the ciliated rosettes.

Prostates tulular, coiled, occupying segments 17-20.

Sperm sacs, racemose, attached to the anterior face of segment 12 and the posterior of segment 9.

Ovaries in segment 13 into which the oviducts also open. Ovisacs (or additional ovary ?) in segment 14.

Spermathecæ, three pairs, in segments 7, 8 and 9. The diverticulum simple and small compared with the sac.

Habitat. Dee Bridge, Tasmania, under logs and stones.

(9). *C. wellingtonensis* (Figs. 25, 26, 27). Length in spirits a little less than 4 inches, $\frac{1}{4}$ inch broad.

Prostomium scarcely dovetailed at all into the peristomium.

Clitellum, tumid, well marked, occupying segments 14-17, and extending slightly into the dorsal surface of segment 18, and incomplete ventrally in the median part of segment 17.

Setæ, the inner couple close together, the dorsal couple not visible.

Male pores on a papilla on segment 18 at the level of the interval between the inner couple of setæ on each side.

Spermathecal pores, two pairs, on white elliptical patches on the anterior margins of segments 7 and 8, at the level of the interval between the two inner setæ of each side.

Accessory copulatory structures. Swollen, tumid ridges on segments 18, 19 and 20.

Dorsal pores present, the first between segments 3 and 4.

Nephridiopores not discernible.

Alimentary canal. Gizzard in segment 5. No true calciferous glands, but vascular swellings in segments 9-14. In segment 9 the canal is especially swollen and whitish in appearance. Large intestine commencing in segment 16.

Circulatory system. Single dorsal vessel. Hearts in segments 6-12, those in segments 9-12 larger than the rest, and connected with the supra-intestinal vessel.

Excretory system. Plectonephric, with no large nephridia.

Reproductive system. Testes, two pairs, in segments 10 and 11, the ciliated rosettes opening into the same segments.

Prostates, flattened, racemose surface, in segment 18.

Sperm sacs in segments 9 and 12 ; racemose.

Ovaries in segment 13 into which also the oviducts open.

Spermathecæ, two pairs, in segments 8 and 9. The diverticulum distinct and rosette shaped.

Habitat. Mount Wellington. Tasmania.

(10). *C. officeri* (Figs. 28, 29, 30). Length in spirit $1\frac{3}{4}$ inch, less than one-quarter inch broad. In spirit the body is a light violet colour dorsally, and flesh colour ventrally, the clitellum being darker than the rest.

Prostomium about three-quarters dovetailed into the peristomium.

Clitellum distinct, tumid, complete, extending over segments 14-17. Purple colour, except the mid-ventral surfaces of segments 15, 16 and 17 where it is light coloured.

Setæ in four couples. Irregular at the posterior end. About one-third of the way down the body the fourth row becomes irregular, then the third and at the very posterior end all four rows may be irregular, but the first and second are quite regular except during the last few segments.

Male pores on papillæ on segment 18, at the level of the second seta on each side.

Oviduct pores on segment 14.

Spermathecal pores, three pairs placed slightly dorsal to the level of the second row of setæ between segments 6 and 7, 7 and 8, 8 and 9.

Accessory copulatory structures. Elliptical patches at the level of the second row of setæ between segments 15 and 16, 16 and 17. A pair at the level of the interval between the two inner setæ between segments 19 and 20.

Dorsal pores present, the first between segments 4 and 5.

Nephridiopores not visible.

Alimentary canal. Gizzard well marked, but there are no distinct septa in front of that bounding segment 8 anteriorly. No true calciferous glands, but vascular swellings are present in segments 13-15. Large intestine commencing on segment 17.

Circulatory system. Single dorsal vessel. No continuous supra-intestinal. Hearts in segments 7-12.

Excretory system. Three nephridial tufts on each side of the body—resembling in this respect *C. fastigatus*, and *C. dubius*.

Reproductive system. Testes, two pairs, in segment 10 and 11, the ciliated rosettes opening into the same segment.

Prostates small, flattened, racemose, in segment 18.

Sperm sacs, racemose, in segments 9 and 12.

Ovaries in segment 13 into which the oviducts also open.

Spermathecæ, three pairs in segments 7, 8 and 9. The diverticulum in the form of a group of little finger-like processes, the sac long and irregular in outlines.

Habitat. King River Valley, Tasmania.

(b) Megascolides, McCoy.

(1). *Megascolides simsoni* (Figs. 31, 32, 33). Length in spirits $1\frac{3}{4}$ inches, $\frac{1}{8}$ inch broad.

Prostomium very slightly dovetailed into the peristomium.

Clitellum complete including when fully grown segments 13-18.

Setæ in four couples. Those of the two inner couples considerably nearer together than those of the outer. The former are regularly arranged all the whole length, the latter become irregular about half-way down the body, though here and there an odd one may be irregular immediately behind the clitellum.

Male pores not very clearly marked on slight papillæ on segment 18 at the level of the innermost seta of each side.

Oviduct pores on segment 14.

Spermathecal pores, two pairs at the level of the innermost setæ between segments 7 and 8, 8 and 9.

Accessory copulatory structures. Two pairs of white elliptical patches at the level of the interval between the two inner setæ between segments 19 and 20, 20 and 21.

Dorsal pores present, the first between segments 4 and 5 (?).

Nephridiopores. A pore is present immediately in front of each seta, so that from the second segment backwards there are eight nephridiopores in each segment, though occasionally one or more on each side may not be visible. In the clitellar region apparently there may be more than eight in each segment.

Alimentary canal. Gizzard in segment 5. No true calciferous glands, but vascular swellings are present in segments 9-16. Large intestine commencing in segment 19.

Circulatory system. Single dorsal vessel. Hearts in segments 8-13, through which also runs a supra-intestinal vessel.

Excretory system. Some four meganephridia (?) in each segment but no funnels visible. Behind the clitellar region sac-like structures lie dorsally and tufts of coiled tubes in two or three rows lie ventral of them and correspond apparently in position to the nephridiopores externally.

Reproductive system. Testes in segments 10 and 11 into which also the rosettes open.

Prostates, small, flattened, and slightly racemose, in segment 18.

Sperm sacs, racemose in segments 11 and 12 attached to the anterior walls.

Ovaries in segment 13 into which the oviducts open.

Spermathecæ, two pairs, in segments 8 and 9. Diverticulum simple and small compared with the sac.

Habitat. Emu Bay and Launceston, Tasmania. This form is associated specifically with the name of Mr. A. Simson, of Launceston, to whose kindness I am indebted for specimens of Tasmanian forms.

(2). *M. bassanus* (Figs. 34, 35, 36). Length in spirit $3\frac{1}{2}$ inches, slightly more than $\frac{1}{8}$ inch broad.

Prostomium not at all dovetailed into the peristomium.

Clitellum distinct and saddle-shaped, extending over segments 14-19. The whole of the anterior part of segment 14 is included, but except here the tumid portion extends as far ventrally on each side as half-way between the two inner setæ.

Setæ in four couples, the outer couple on each side twice as far apart as the inner.

Male pores on papillæ on segment 18 at the the level of the innermost setæ. Oviduct pores on segment 14 within the tumid part of the clitellum.

Spermathecal pores, two pairs, at the level of the interval between the two inner setæ of each side between segments 7 and 8, 8 and 9.

Accessory copulatory structures. A median ventral patch on segments 17 and 18. Two papillæ at the level of the innermost setæ joined together by a median ridge in segment 19.

Dorsal pores present, the first between segments 4 and 5 (?).

Nephridiopores at the level of the third setæ (!)

Alimentary canal. Gizzard in segment 5. No true calciferous glands but vascular swellings in segments 13 and 14. Large intestine commencing in segment 19, but there is no clearly marked differentiation between it and the oesophagus in front which is swollen out in each segment.

Circulatory system. Single dorsal blood-vessel. No continuous supra-intestinal. Hearts in segments 8-13.

Excretory system. Meganephric. A single large one in each segment with ciliated funnel as usual.

Reproductive system. Testes not visible, but a pair of well-marked rosettes in segments 10 and 11.

Prostates small and coiled in segment 18.

Sperm sacs, racemose, on the anterior walls of segments 10, 11 and 12.

Ovaries in segment 13 into which the oviducts open.

Spermathecæ, two pairs, in segments 8 and 9. The diverticulum simple and less than half the length of the sac.

Habitat. King Island, in Bass Straits.

(c) Perichæta.

(1). *Perichæta tasmanica* (Figs. 37, 38, 39). Length in spirit $2\frac{1}{2}$ - $3\frac{1}{2}$ inches, one eighth inch broad. There is a dark median dorsal line.

Prostomium dovetailed about one half or one third into the peristomium, which is marked by a median ventral cleft.

Clitellum distinct and complete, occupying segments 13-17.

Setæ. The first setigerous segment has 8 on each side. Back to the clitellum there are 10 or 11, behind the clitellum vary from 12-14.

Male pores on well-marked small papillæ placed (in spirit specimens) in a depression at or very slightly within the level of the innermost setæ of each side.

Oviduct pores on segment 14.

Spermathecal pores. Five pairs between segments 4 and 5, 5 and 6, 6 and 7, 7 and 8, 8 and 9, at the level of

Accessory copulatory structures. Median ventral elliptical patches on segments 9, 10, 11, 19, 20, 21 and 22.

Dorsal pores present, the first between segments 4 and 5.

Alimentary canal. Gizzard in segment 5. Three pairs of calciferous glands present in 10, 11 and 12. Large intestine commencing in segment 18.

Circulatory system. Dorsal vessel single. Hearts in segments 6-12. In segments 10-12 they arise from the supra-intestinal vessel.

Excretory system. Plectonephric : no large nephridia present. Attached to the walls of the alimentary canal in the first four segments are peptonephridial (?) glands.

Reproductive system. Testes, two pairs, in segments 10 and 11 with rosettes in the same segments.

Prostates flattened and bilobed, but with a single duct in segment 18.

Sperm sacs, racemose in segments 9 and 12.

Ovaries in segment 13 with oviducts opening into the same segment.

Spermathecæ, five pairs, in segments 5, 6, 7, 8 and 9. Each consisting of a sac with a diverticulum slightly longer than the sac and with a swollen extremity.

Habitat. Emu Bay, Tasmania, and King Island in Bass Straits.

This form is a member of the group to which belong also *P. rubra*, *P. frenchii*, *P. hoggii*, *P. sylvatica*, *P. steeli* and *P. halli*, all of which are closely allied to one another and agree in the possession of a median ventral cleft on the peristomium, in having five pairs of spermathecæ, in having three pairs of true calciferous glands in segments 10, 11 and 12, in having a plectonephric excretory system, and in having the prostate bilobed.

(2). *P. moræa* (Figs. 40, 41, 42). Length in spirits 4 inches.

Prostomium very slightly dovetailed into the peristomium.

Clitellum not marked externally.

Setæ, in front of the clitellum, vary from 11-18 on each side. Within the clitellum there are twenty-one on each side, and the same number is present behind the clitellum. The setæ form a very definite raised ridge round each segment, and the dorsal and ventral break is very small.

Male pores on papillæ at the level of the interval between the third and fourth setæ.

Oviduct pores on segment 14.

Spermathecal pores, two pairs, at the level of the interval between the first and second setæ between segments 7 and 8, 8 and 9.

Accessory copulatory structures. Median ventral ridge on segment 18 between the two papillæ; a pair of elliptical patches at the level of the interval between the first and second setæ between segments 19 and 20.

Dorsal pores present, the first between segments 3 and 4. Nephridiopores at the level of the ninth or tenth seta in the middle of the body.

Alimentary canal. Gizzard in segment 5. No true calciferous glands present. Large intestine commencing in segment 17.

Circulatory system. Single dorsal vessel. Hearts in segments 6 to 12. Supra-intestinal vessel present.

Excretory system. Meganephric.

Reproductive system. Testes in segments 10 and 11, into which also open the rosettes.

Prostates, extending through segments 17-20.

Sperm sacs, racemose in segments 9 and 12.

Ovaries in segment 13 into which open the oviducts.

Spermathecæ, two pairs in segments 8 and 9. The diverticulum simple.

Habitat. Lake St. Clair district, Tasmania.

(3). *P. richea* (Figs. 43, 44, 45). Length in spirit 3 inches, about $\frac{1}{8}$ inch broad. Dorsal surface (in spirit) purplish colour, ventral flesh coloured. A dark median dorsal line.

Prostomium about one-half dovetailed into the peristomium.

Clitellum complete, distinct, lighter than the surrounding parts, and occupying segments 14-17.

Setæ, 12 on each side in front of the clitellum, behind this the number is greater being 24 half-way along the body.

Male pores on papillæ at level of interval between the first and second setæ.

Oviduct pores on segment 14.

Spermathecal pores, five pairs, on small tumid, elliptical patches on the posterior margins of segments 4, 5, 6, 7, 8 and 9 at the level of first setæ.

Accessory copulatory structures. None developed.

Dorsal pores present, the first between segments 3 and 4.

Alimentary canal. Gizzard in segments 3 and 4. No true calciferous glands, but in segments 11 and 12 the oesophagus is white and swollen. Large intestine commencing in segment 17.

Circulatory system. Dorsal vessel single. Supra-intestinal vessel in segments 9-12. Hearts in segments 5-12, those in segments 9-12 large.

Excretory system. Meganephric.

Reproductive system. Testes, two pairs, in segments 10 and 11. Rosettes in the same segments.

Prostates, wide, tubular, in segments 17-19.

Sperm sacs, racemose, in segments 9 and 12.

Ovaries in segment 13 into which also the oviducts open, an extra pair of ovaries (or ovisacs ?) in segment 14.

Spermathecæ, five pairs, in segments 5, 6, 7, 8 and 9. The diverticulum is very small at the base of the large simple sac.

Habitat. Under logs in the Beech Forest on Mount Olympus, Tasmania.

(4). *P. dilwynnia* (Figs. 46, 47, 48). Length in spirit 2 inches, $\frac{1}{8}$ inch broad.

Prostomium about one-half dovetailed into the peristomium. Clitellum distinct, complete, occupying segments 14-17, segments 14-16 tumid, purplish colour, segment 17 not so tumid, but darker than the segments behind.

Setæ. First setigerous segment has 6 behind this back to the clitellum are 7 on each side. For 40 segments behind the clitellum, and up to half-way down the body the rows of setæ are

quite regular, behind this a few more become intercalated but the number on each side never exceed 13.

Male pores on papillæ at the level of the interval between the two innermost setæ.

Oviduct pores on segment 14, very close to, and just ventral of and anterior to, the innermost setæ.

Spermathecal pores, five pairs, at the level of the interval between the first and second setæ, between segments 4 and 5, 5 and 6, 6 and 7, 7 and 8, 8 and 9.

Accessory copulatory structures. A mid-ventral tumid patch on the anterior margin of segment 18, two pairs of patches at the level of the innermost setæ between segments 18 and 19, 19 and 20.

Dorsal pores present, the first between segments 4 and 5.

Alimentary canal. Gizzard in segment 5. In segments 6 and 7 the oesophagus is swollen, white, but not vascular, in segments 8 to 12 it is white, swollen and very vascular, in segments 13-15 it is again white and swollen but not vascular. There are no true calciferous glands. The large intestine commences in segment 17.

Circulatory system. Dorsal vessel single. Supra-intestinal vessel in segments 11 and 12. Last heart is in segment 12.

Excretory system. Meganephric.

Reproductive system. Testes, two pairs, in segments 10 and 11. Rosettes in the same segments.

Prostates wide, tubular with racemose surfaces extending through segments 17-20.

Sperm sacs in segment 12, saccular in form.

Ovaries in segment 13 into which open the oviducts.

Spermathecæ, five pairs, in segments 5, 6, 7, 8 and 9. The diverticulum is simple and very small.

Habitat. Dee Bridge, Tasmania.

(5). *P. scolecoidea* (Figs. 49, 50, 51). Length in spirits $1\frac{1}{8}$ inch, slightly more than one quarter inch broad. The body consists of some 77 segments, the first 12 of which are a fair width, the rest very narrow indeed. The body has the general appearance of a minute annulated sausage.

Prostomium less than one half dovetailed into the peristomium.

Clitellum, not visible.

Setæ very numerous; there are at least 40 on each side, but they are very minute, and difficult to count. There is no continuous or any distinct dorsal break except at the very posterior end; the ventral break is slightly better marked, but is very small.

Male pores on minute papillæ at the level of the fourth setæ in segment 18.

Oviduct pores on segment 14 just in front of the second setæ.

Spermathecal pores, two pairs, at the level of the fourth seta between segments 7 and 8, 8 and 9.

Accessory copulatory structures, none developed.

Dorsal pores present, the first between segments 3 and 4.

Alimentary canal. The whole canal is thrown into coils. Gizzard in segment 5 and very large in comparision to the length of the body. No true calciferous glands. Large intestine commencing in segment 18.

Circulatory system. Single dorsal vessel. Supra-intestinal in segments 8-12. Lateral vessel on either side in segments 10 and 11. The last heart is in segment 12, the first round the gizzard in segment 5.

Excretory system. Meganephric. In segments 2-5 the nephridia appear to consist of a large number of coiled tubules than elsewhere. Peptonephric salivary glands present (?).

Reproductive organs. Testes, two pairs, in segments 10 and 11, rosettes in the same segments

Prostates, small, flattened, racemose in segment 18.

Sperm sacs, racemose in segment 12.

Ovaries in segment 13, into which the oviducts open.

Spermathecæ, two pairs, in segments 8 and 9. Two very small diverticula at the base of a fair sized sac.

Habitat. Under logs in the King River Valley, Tasmania.

This worm is remarkable for its short stumpy nature. It is evidently mature, though in external appearance it does not look so. Mr. Officer who found it tells me that it is very abundant, and never seems to attain to a larger size. It has not the slightest resemblance externally to a perichæte worm, and in spirit at all events the minute setæ project only a very short way from the surface.

(6). *P. irregularis* (Figs. 52, 53, 54). Length in spirit $3\frac{1}{2}$ inches, $\frac{3}{16}$ inch broad. The dorsal surface (in spirit) is purplish brown, the ventral is flesh coloured, and the setæ form a very distinct ring.

Prostomium dovetailed about one-half into the peristomium.

Clitellum distinct, complete, occupying segments 13-17 and the anterior portion of segment 18 dorsally. Tumid, and purple colour dorsally, ventrally lighter coloured. Does not hide either the setæ or the dorsal pores.

Setæ, about 13 on each side in front of the clitellum, 16 on segment 14, 15 on segment 17, 15 in the segments in the middle of the body increasing to 20 on the posterior segments.

Male pores on papillæ at the level of the interval between the second and third setæ on segment 18.

Oviduct pores on segment 14.

Spermathecal pores, three pairs. The first between segments 6 and 7 at the level of the third setæ, the second between segments 7 and 8 at the level of the fourth setæ, the third between segments 8 and 9 at the level of the fifth setæ.

Accessory copulatory structures, two pairs of elliptical patches at the level of the third setæ between segments 18 and 19, 19 and 20.

Dorsal pores present, the first between segments 4 and 5.

Nephridiopores at the level of the interval between the eighth and ninth setæ.

Alimentary canal. Gizzard in segment 6. No true calciferous glands, but in segments 14, 15 and 16 the oesophagus is swollen and vascular. Large intestine commencing in segment 17.

Circulatory system. Dorsal vessel single. The last pair of hearts in segment 12. Supra-intestinal vessel in segments 8-12.

Excretory system. Meganephric.

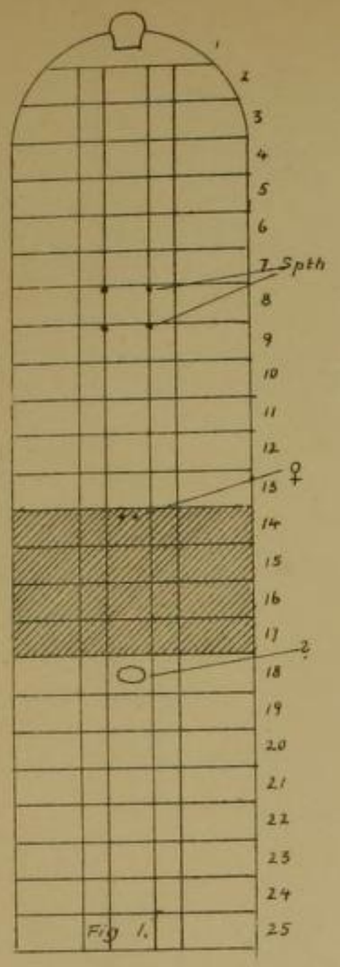
Reproductive system. Testes, two pairs, in segments 10 and 11, the rosettes opening into the same segments.

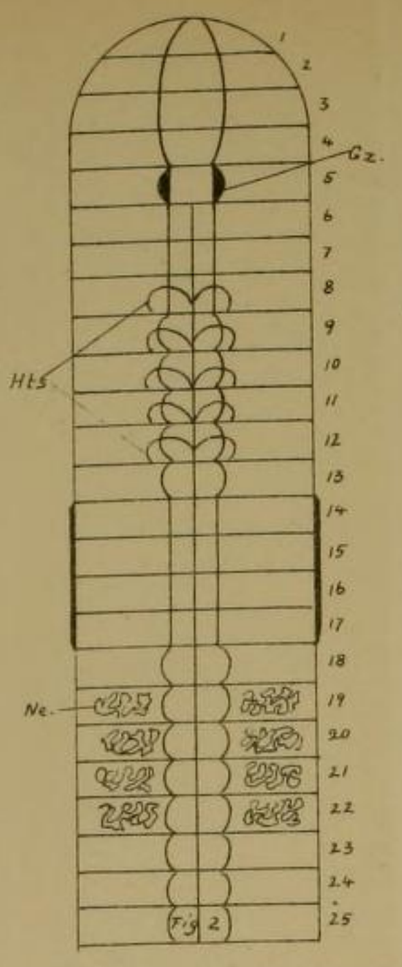
Prostates widely tubular, coiled, extending through segments 17-21.

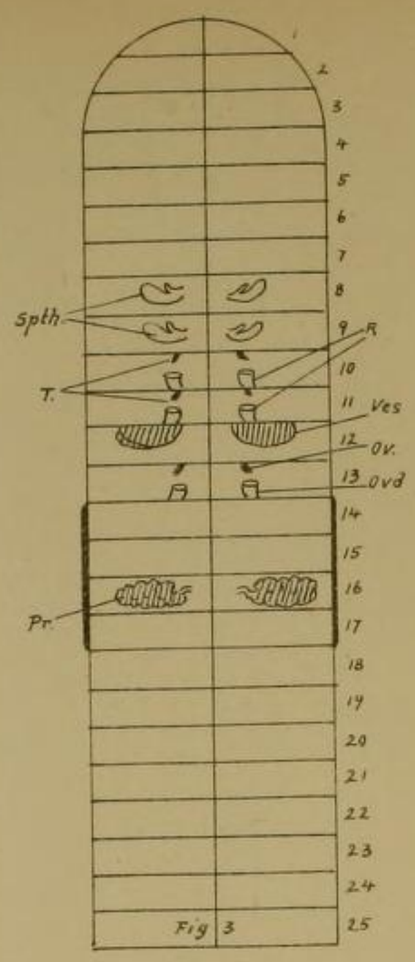
Ovaries in segment 13, the oviducts opening into the same segment.

Spermathecæ, three pairs, in segments 7, 8 and 9, each consisting of a large sac with a small simple diverticulum attached to its stalk. Special blood-vessels pass on to the surface of the sac.

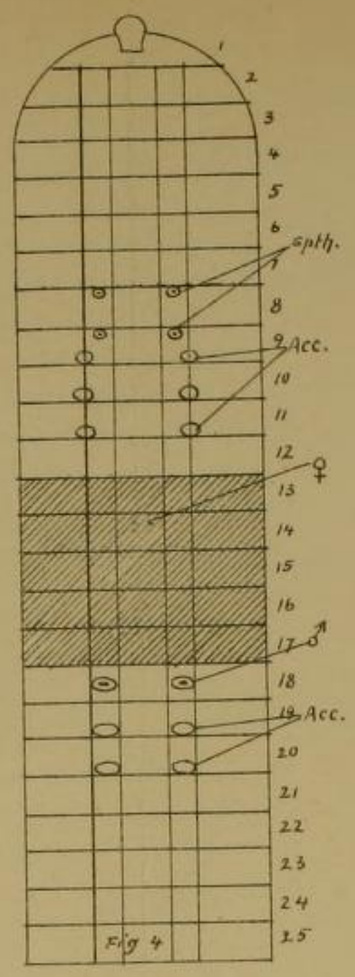
Habitat. King River Valley, Tasmania.

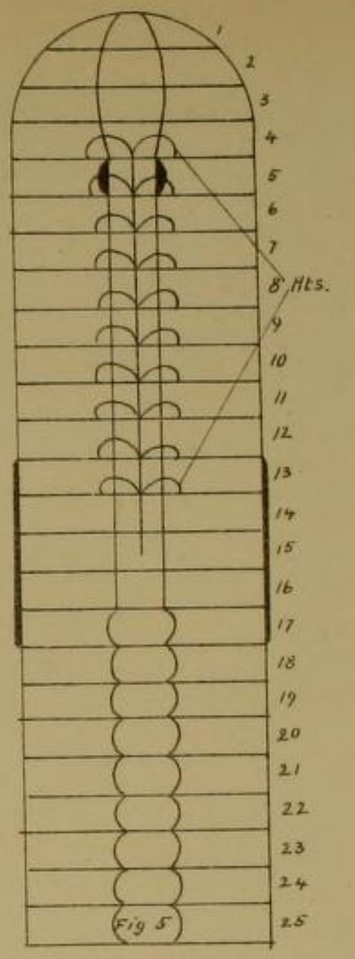


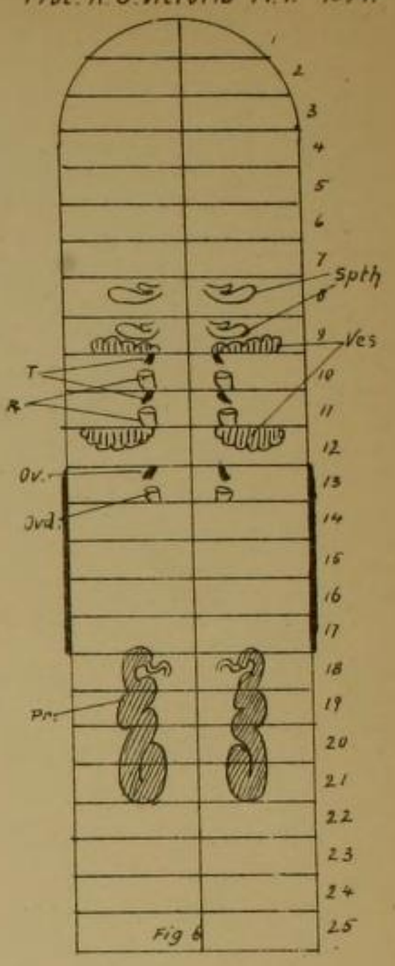




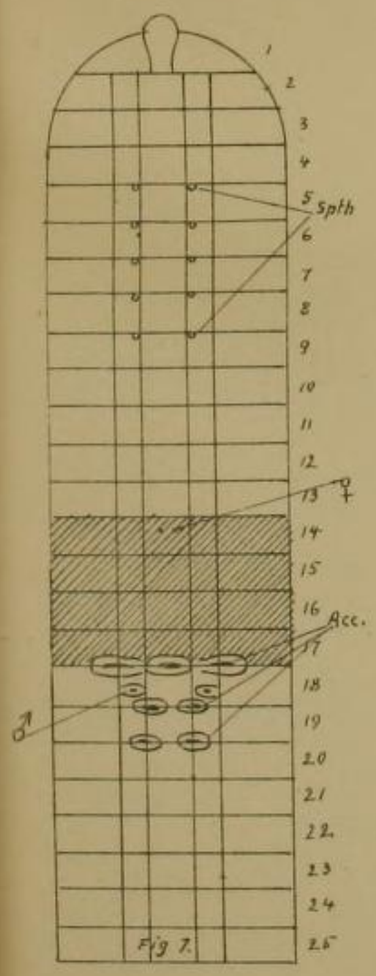
CRYPTODRILUS IRREGULARIS

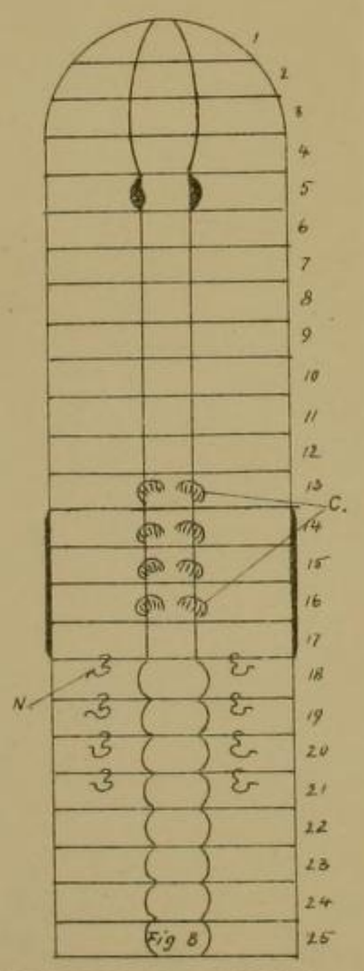


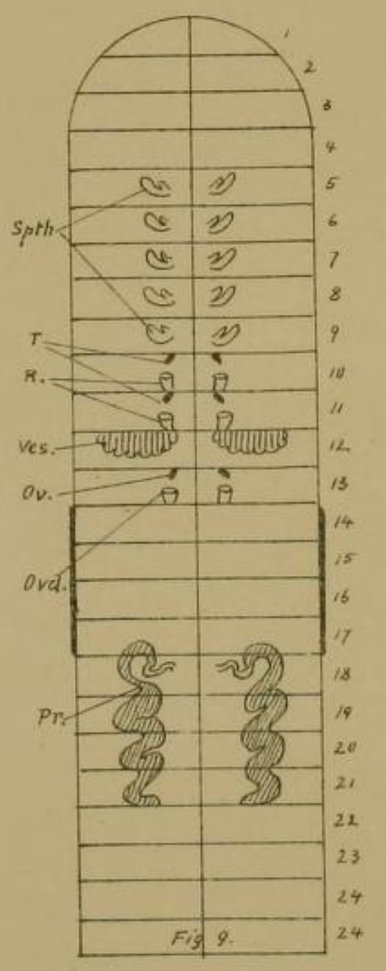


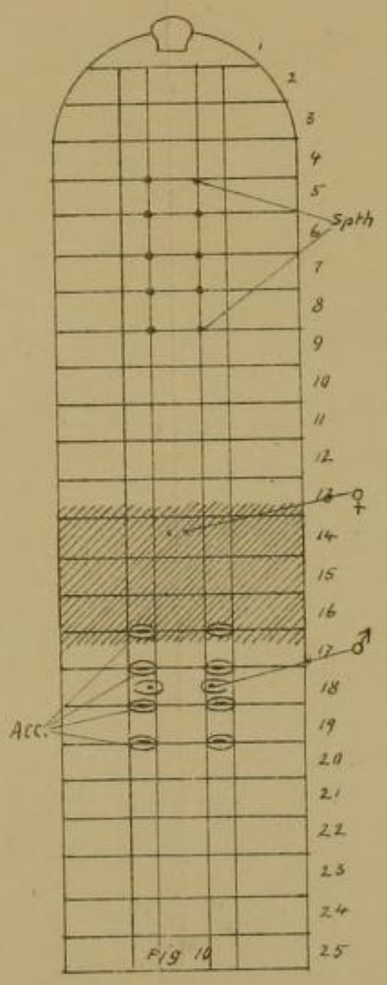


CRYPTODRILUS POLYNEPHRICUS

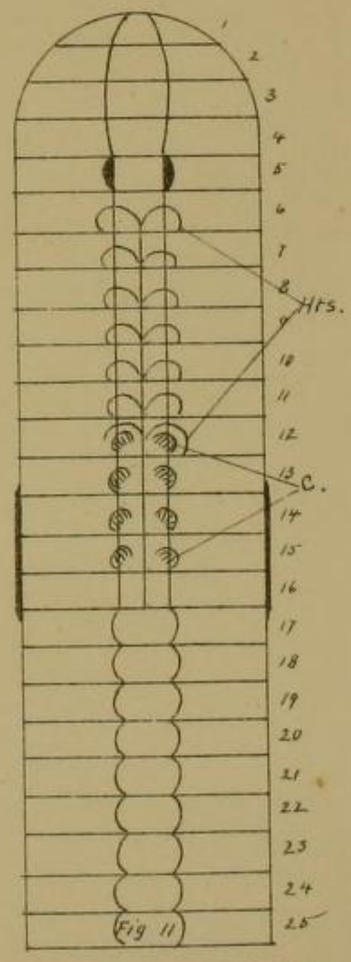


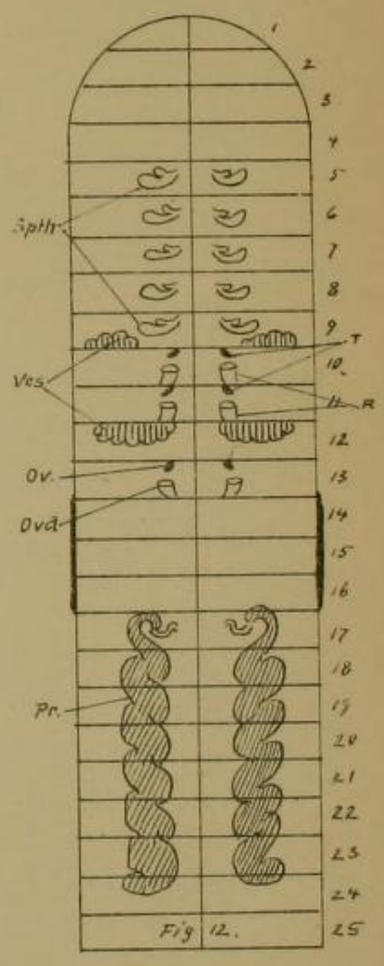






CRYPTODRILUS MORTONI.





CRYPTODRILUS HOBARTENSIS.

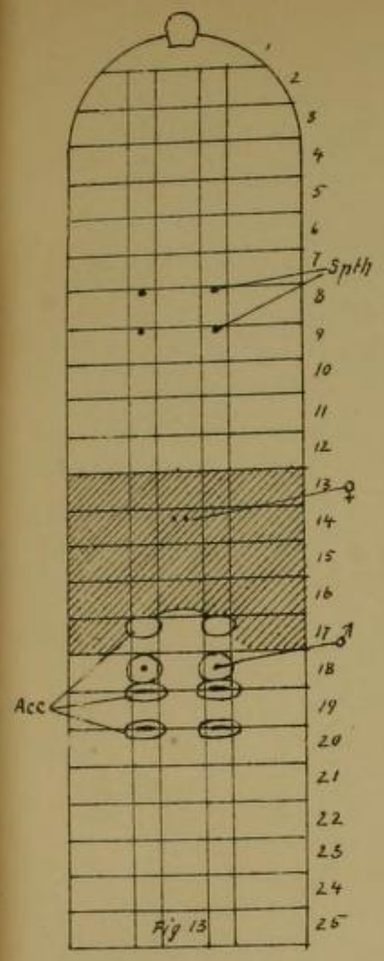


Fig 13

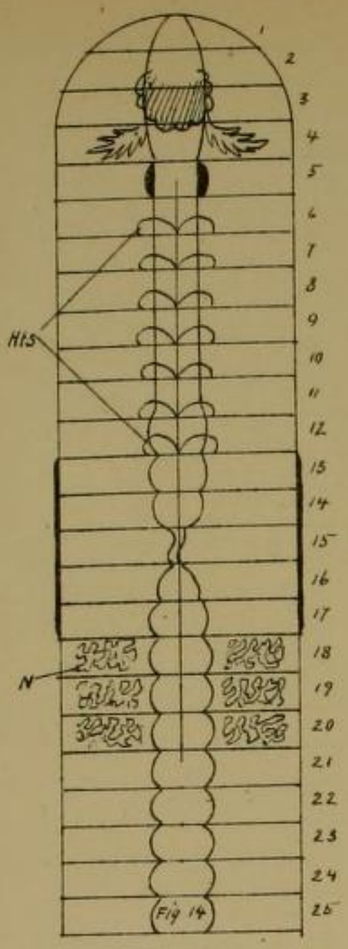


Fig 14

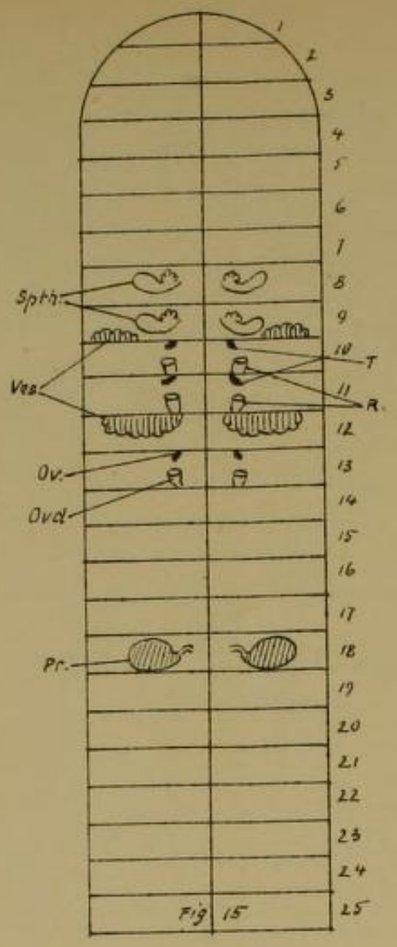


Fig 15

CRYPTODRILUS CAMPESTRIS.

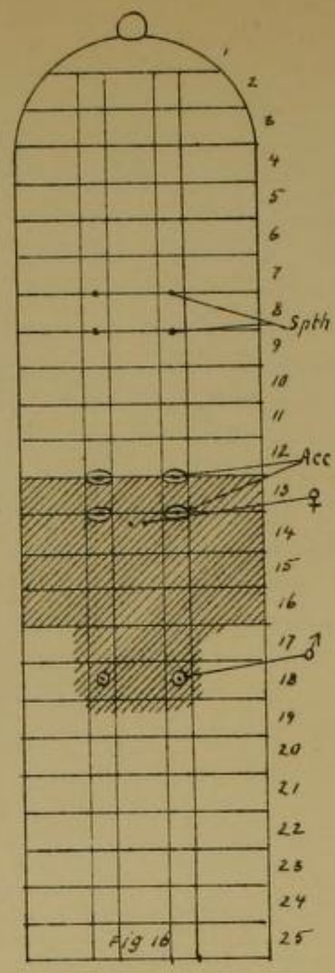


Fig 16

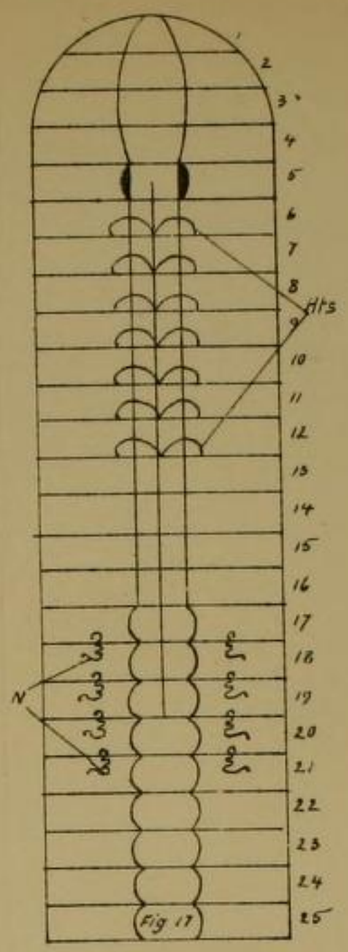


Fig 17

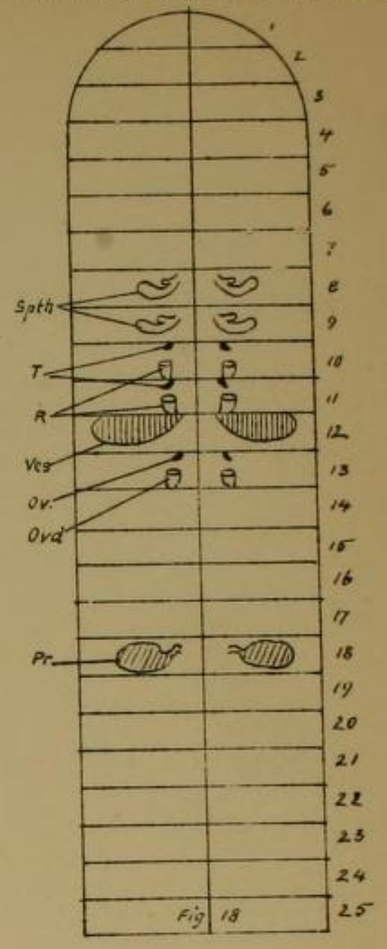


Fig 18

CRYPTODRILUS TESSELATUS.

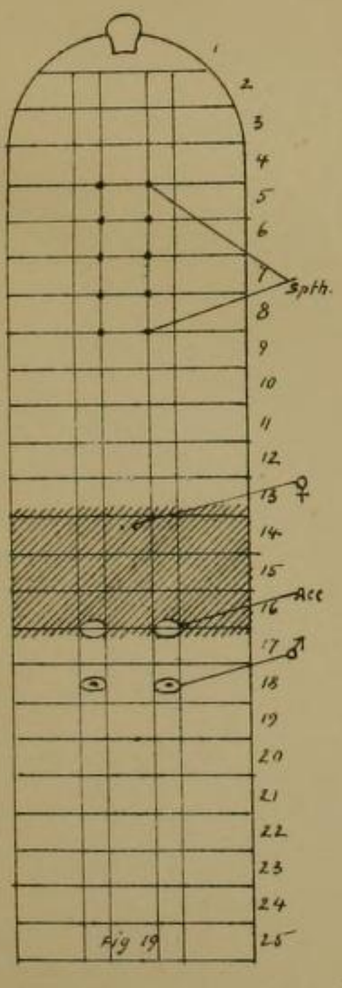


Fig 19

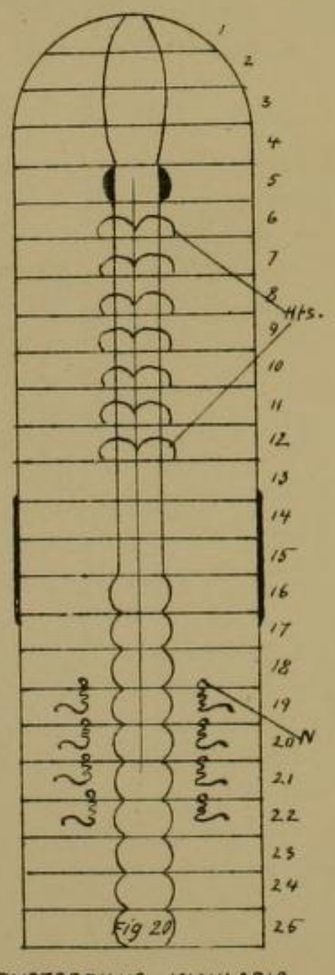


Fig 20

CRYPTODRILUS INSULARIS.

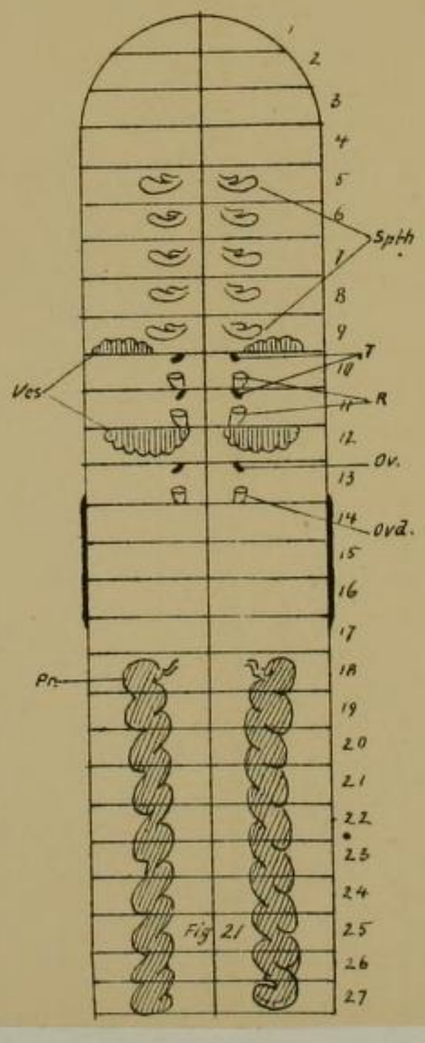


Fig 21

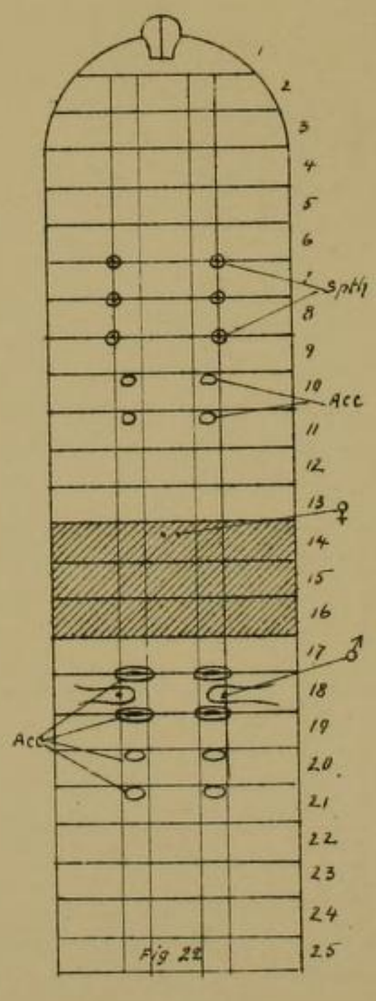


Fig 22

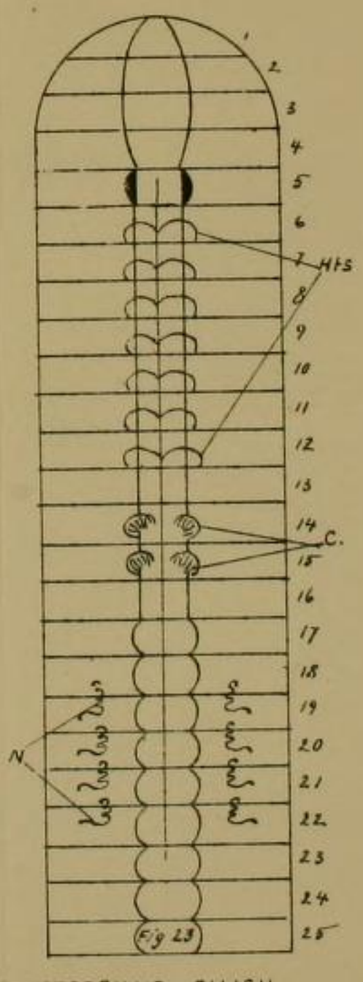


Fig 23

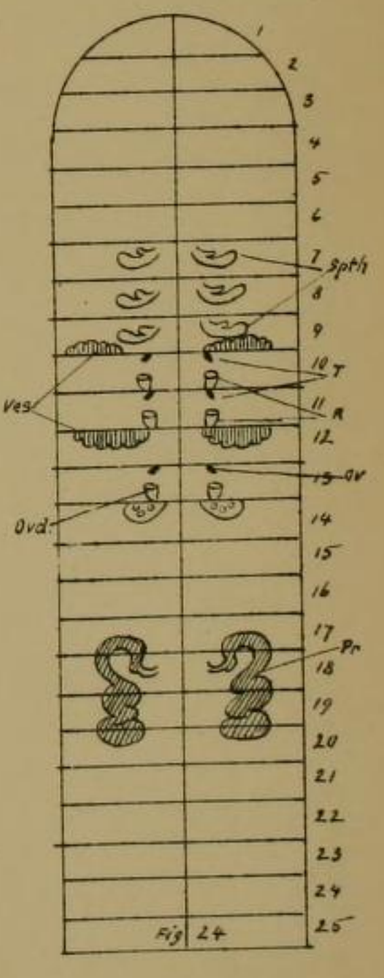
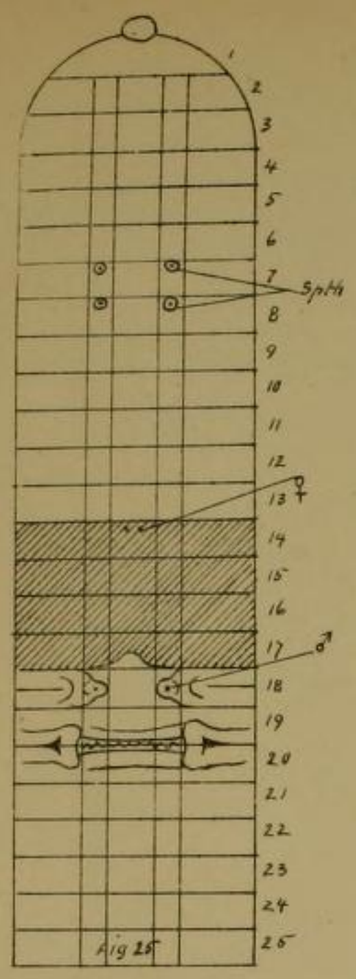
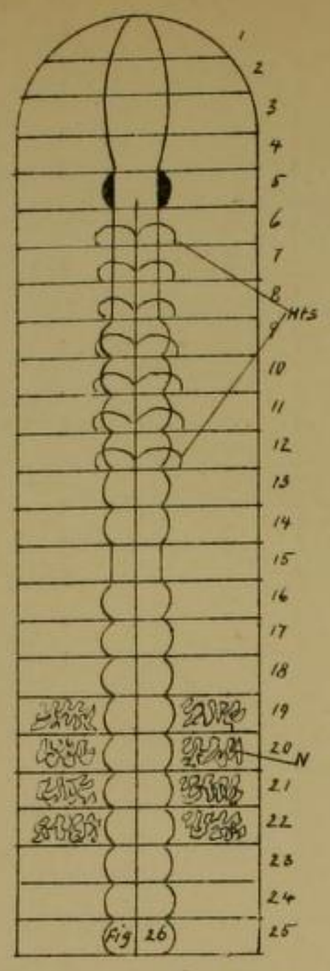
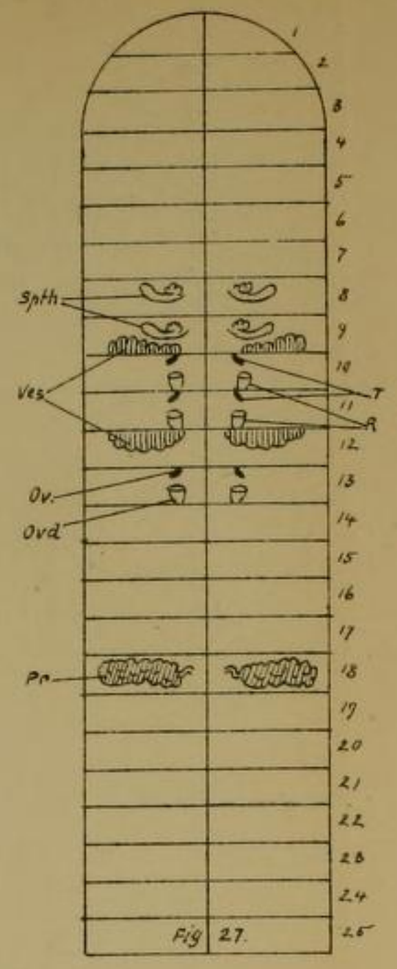


Fig 24

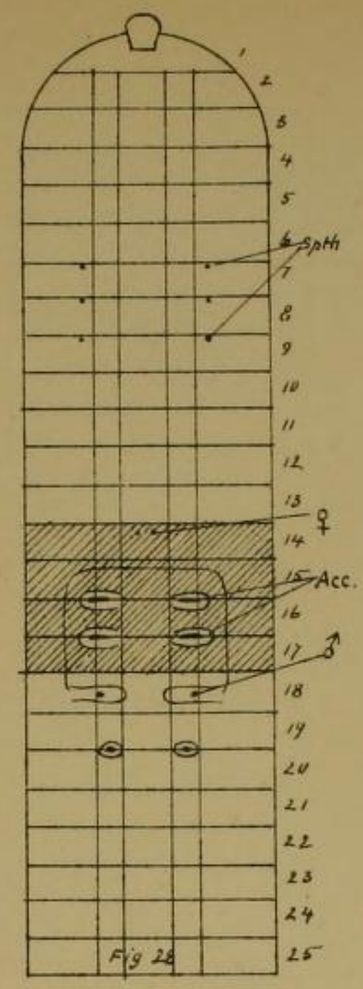
CRYPTODRILUS ELLISII.

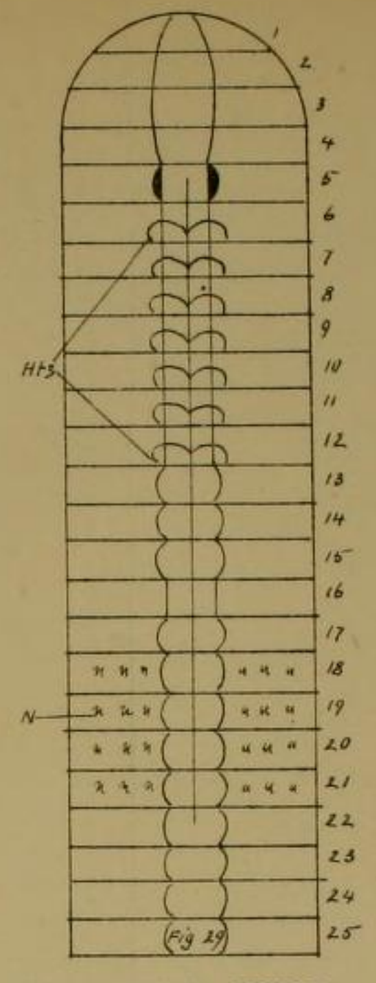


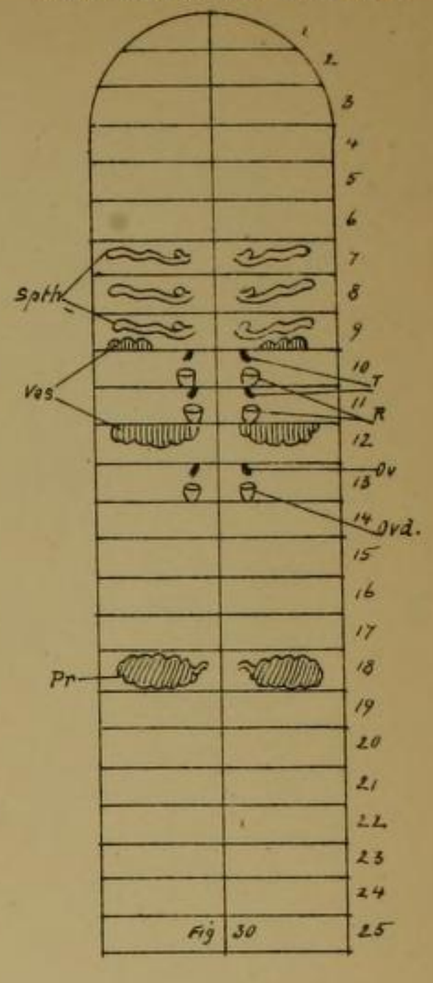




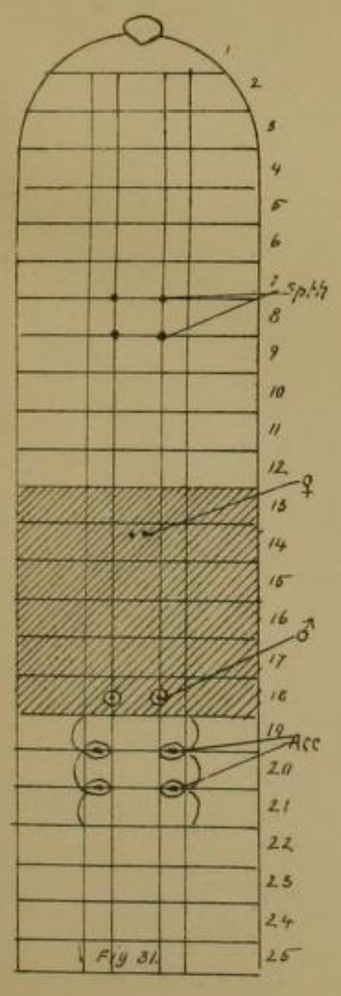
CRYPTODRILUS WELLINGTONENSIS.

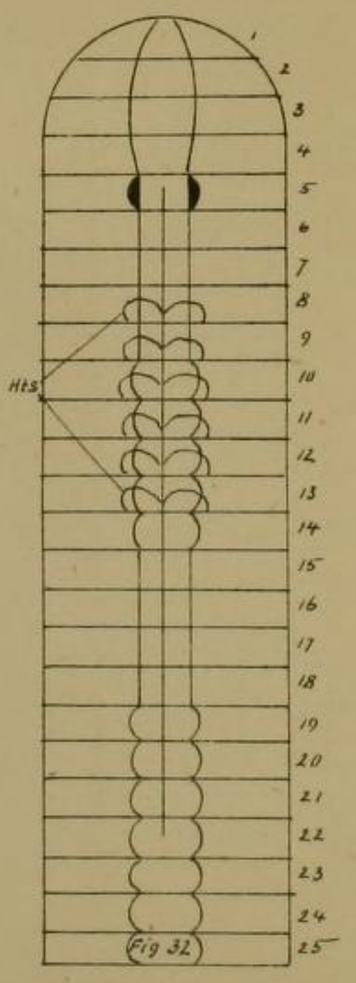


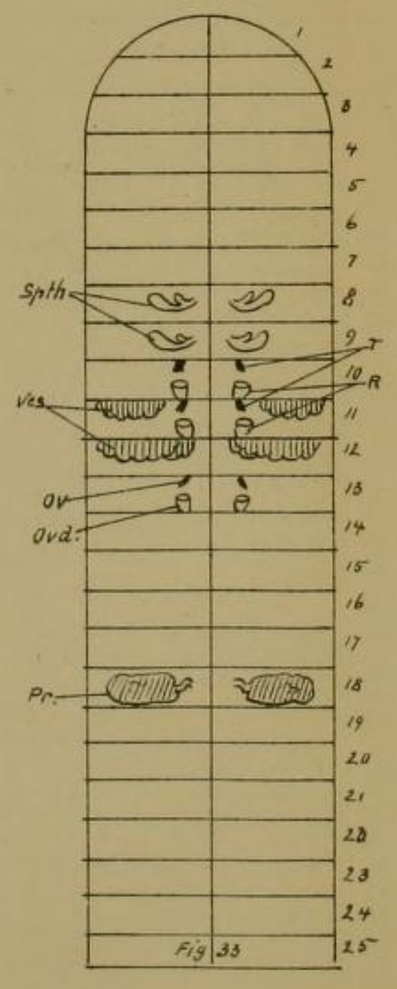




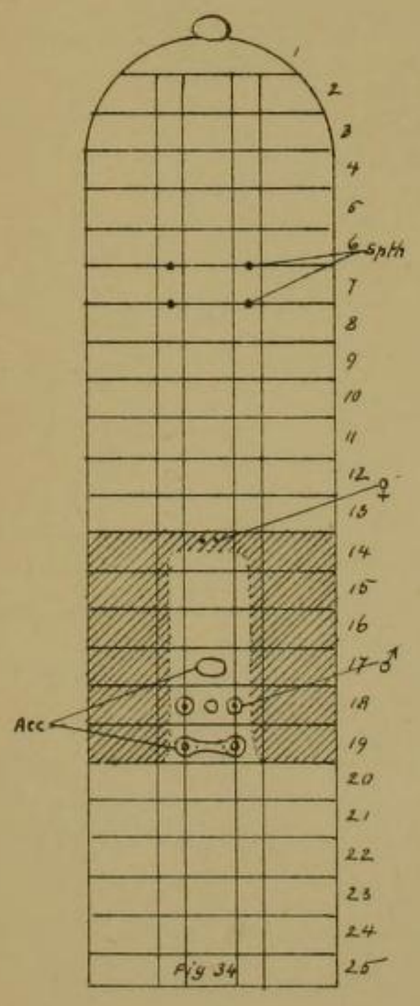
CRYPTODRILUS OFFICERI.

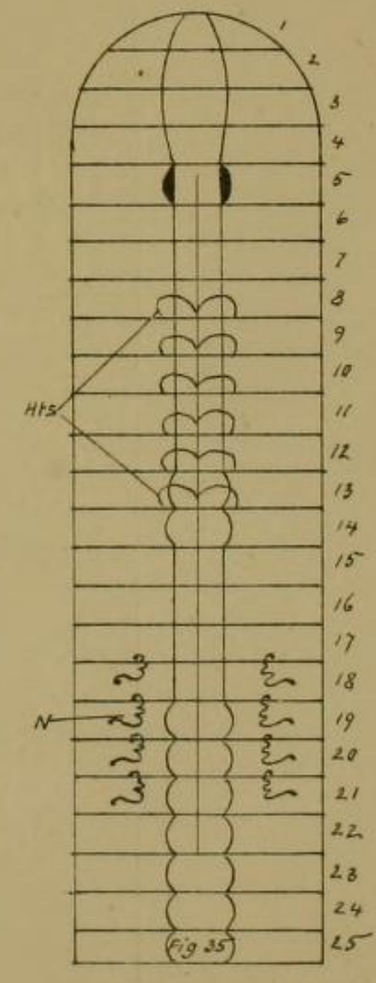


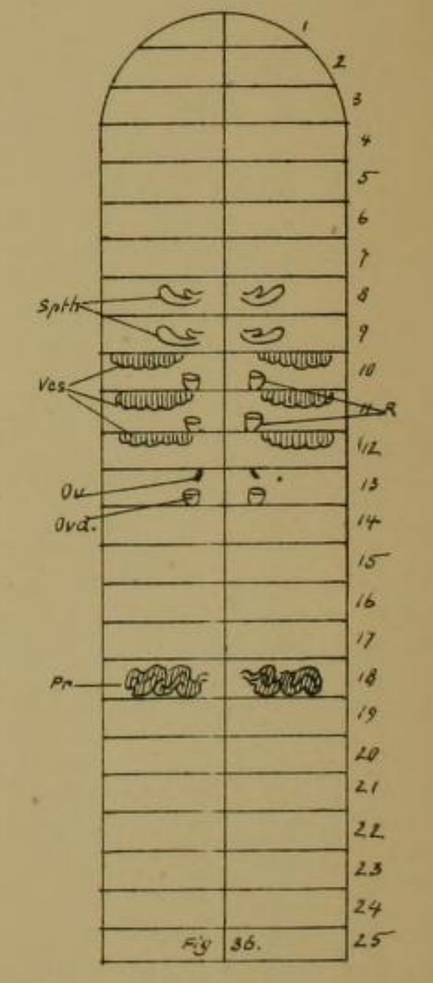




MEGASCOLIDES SIMSONI







MEGASCOLIDES BASSANUS.

Foldout

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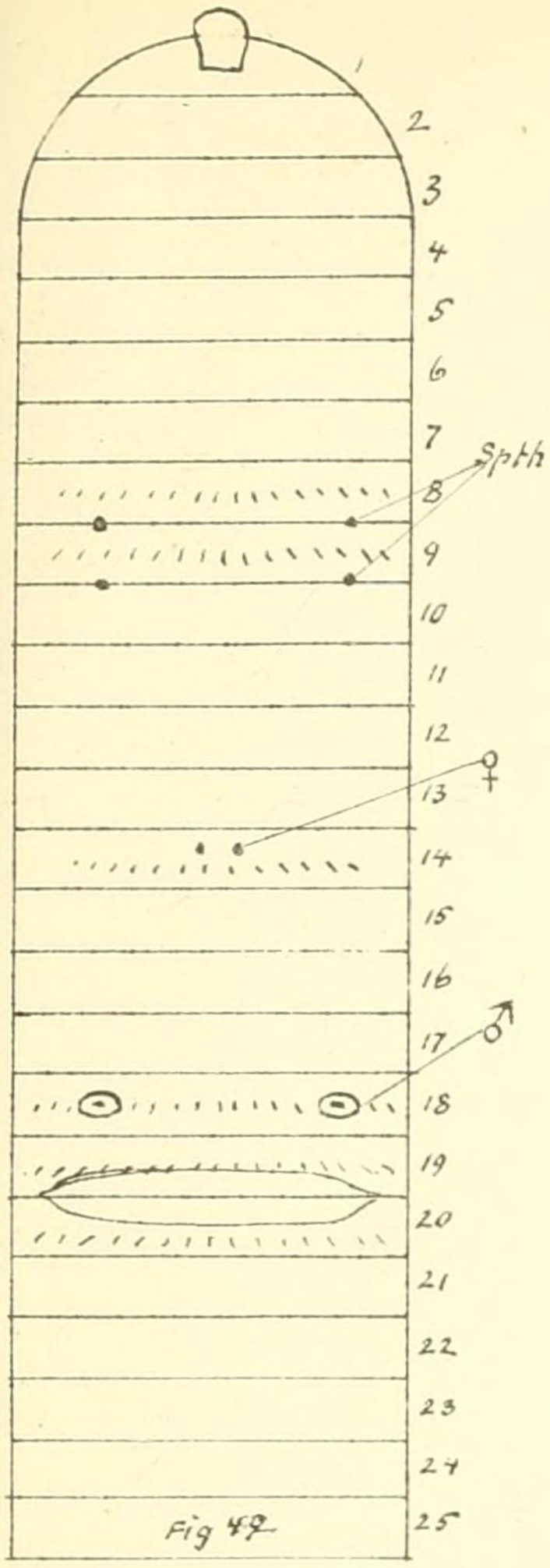
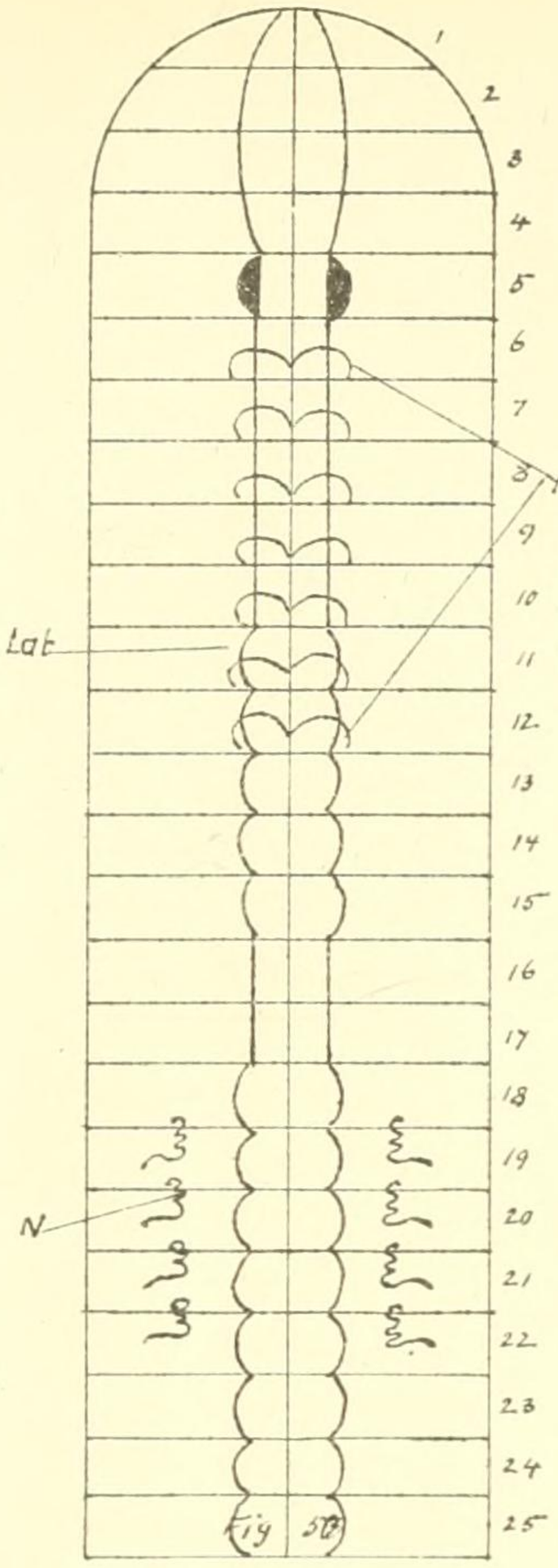
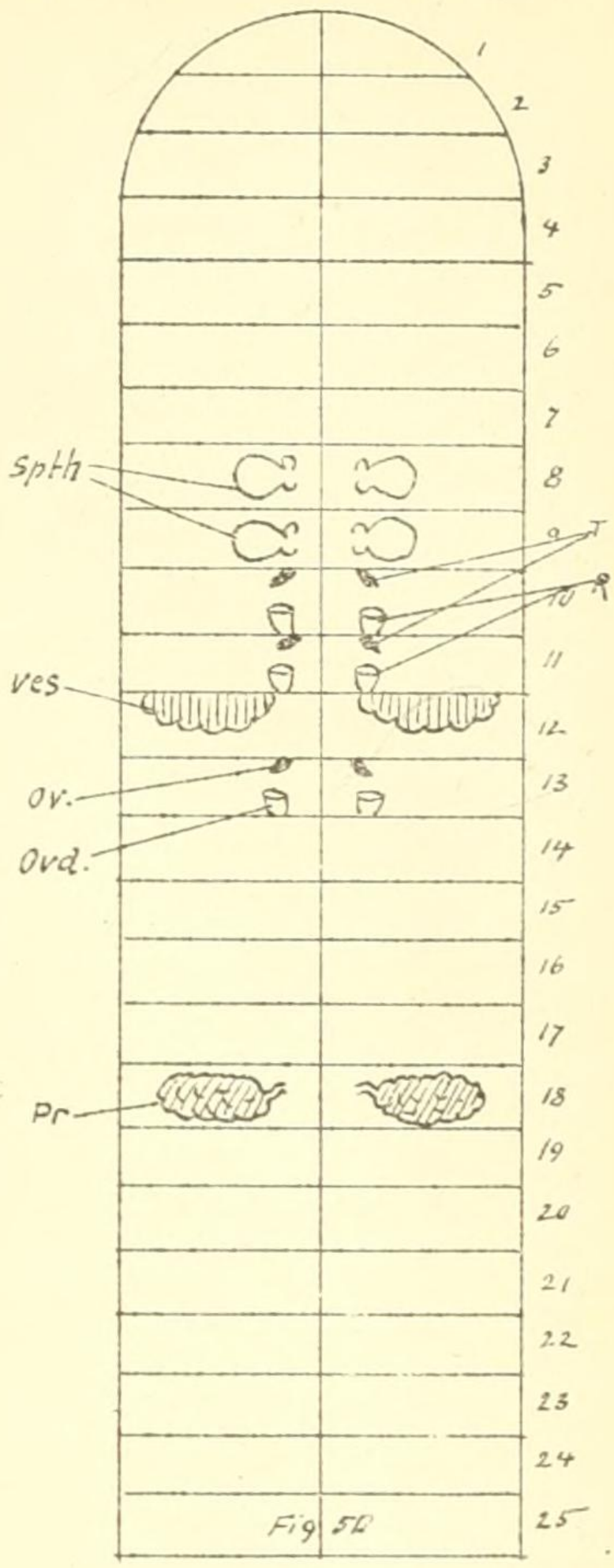
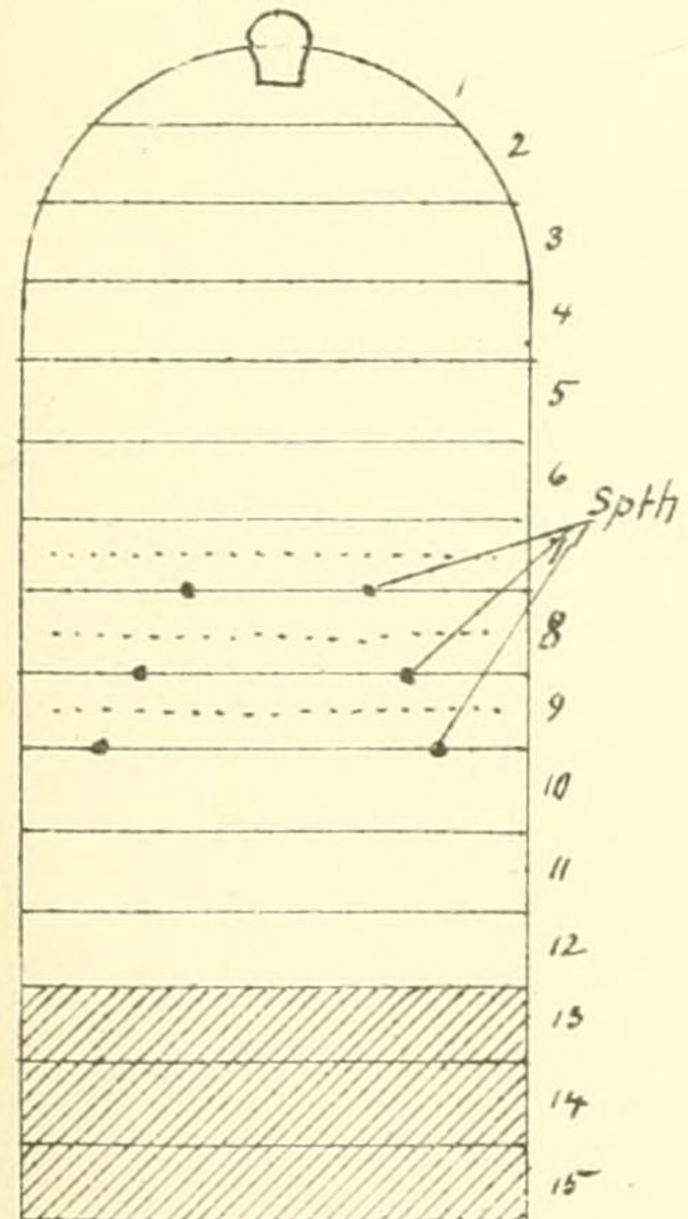
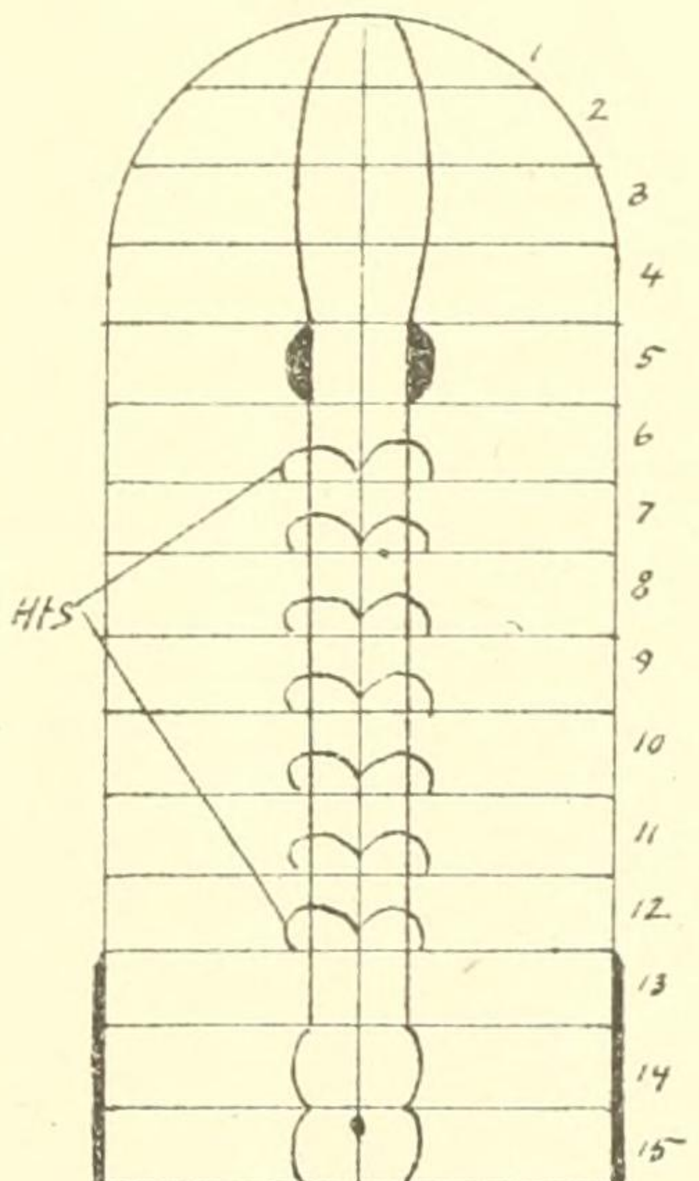


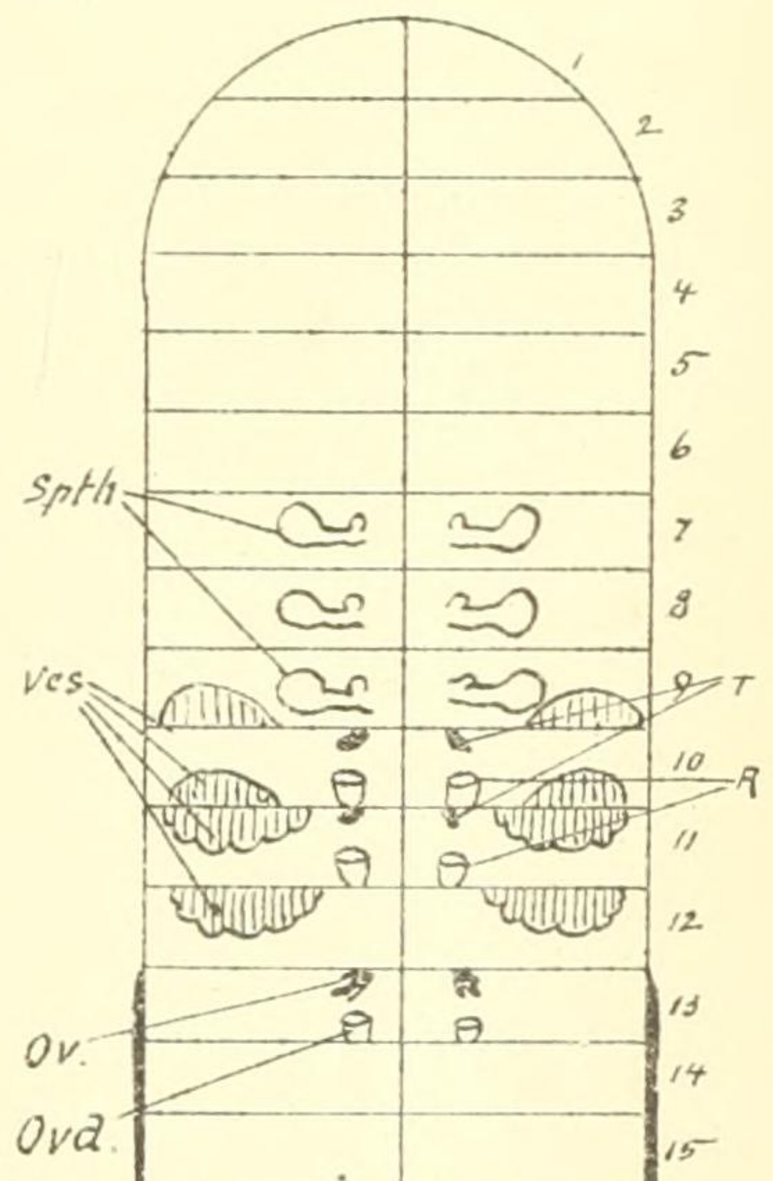




PERICHÆTA SCOLECOIDEA.







PERICHÆTA IRREGULARIS.