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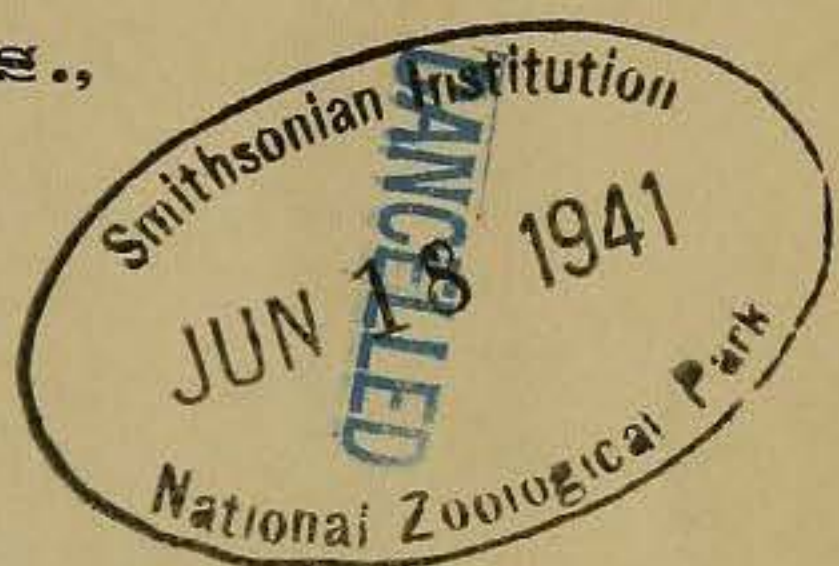


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EDITED BY  
H. M. PHIPSON, C.M.Z.S.,  
*Honorary Secretary.*



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Forty-four Plates and Twelve Woodcuts.*

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*Dates of Publication.*

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## ON SOME EARTHWORMS FROM INDIA.

BY SOPHIE M. FEDARB.

*(With two Plates.)**(Read before the Bombay Natural History Society on 16th April, 1896.)*

These worms have been collected by Messrs. H. Ferguson, A. Gleadow and R. C. Wroughton in Travancore, Poona, and North Konkan, and sent through the kindness of Mr. E. H. Aitken. By the generosity of Mr. F. E. Beddard, M.A., F.R.S., I have been allowed to examine them in his laboratory at the Zoological Society's Gardens. The collection contains *Eudrilus eugeniæ*, a *Perichæta*, a *Megascolex* and some species of *Benhamia*. These last coming from India are extremely interesting. Hitherto the genus *Benhamia* has been restricted to Africa, though introduced forms have occurred in India, and also some small species have been discovered in the Malay Archipelago. But Dr. Michaelsen is of opinion, that for several reasons—their size among other things—they are artificially located. The specimens under consideration may, of course, be in the same position; but the existence of modified organs, not similar to those found in any from African renders it possible that they may be indigenous, and some even belong to a new genus.

1. *Benhamia aitkeni*, n. sp. (Plate I, Figs. 1, 2, 3, 4, 5, 7).

This worm is 119 mm. long and 3 mm. broad, and has 180 segments.

The clitellum extends from XIII to XVII. The setæ appear through to some extent.

There are eight setæ in each segment. The dorsal space is of considerable size, while the ventral is very small. The setæ are paired, but not at all closely. The ventral pair are closer together than the dorsal, which latter are as far from the ventral pair as their two setæ are apart. Between the four ventral setæ, a pilose line is developed. There are no ventral pairs on segments XVII, XVIII, and XIX, though XVIII has the dorsal pairs.

The oviducal pore is single and appears on a marked area in the clitellum.

The male pores are very small and close together on XVIII.

The spermiducal pores on XVII and XIX are furnished with setæ. They are smooth and much resemble the others in shape, except that



they are about three times as long, and have the greatest circumference at the third instead of the half of their length.

The dorsal pores commence at XIX.

The nephridia are diffuse.

The pharynx is large.

There is a pair of flocculent mucous glands with three lobes each in segment III.

The gizzard is single, of considerable size, and lies in VII, while in VIII, there is a soft crop-like portion joined by a distinct line.

In segment XV are well marked calciferous glands, which, viewed from the head, radiate from the œsophagus in a fan-like manner. Each is divided into two distinct lobes, the dorsal cut up again into two smaller lobes, and the ventral lobe in three parts.

The intestine begins in XVI.

There are no cæca, and apparently no typhlosole.

The dorsal vessel is single, and the hearts are in XI, XII and XIII.

There are two pairs of spermathecæ in VIII and IX.

They are very small, possibly a young specimen.

They open very close together, and consist of an oval pouch with a short duct bearing a small tubular diverticulum.

The sperm-sacs are not well developed, but seem to occur in IX and XII.

The spermiducal glands in XVII and XIX are tubular. They are twisted regularly and present a sort of sausage-like appearance.

The exact position of this worm is uncertain. It can hardly belong to *Acanthodrilus*, as its nephridia are entirely diffuse. Though having some affinities with Mr. Beddard's genus *Octochætus*, it probably does not belong to it, as the dorsal vessel is not double, the male pores are not borne on papillæ, and the calciferous glands are very distinct indeed.

For the present it had better remain in *Benhamia*, from the general type of which it differs in several respects.

The setæ are not closely paired, but *B. mexicana* has the dorsal pair further apart.

The clitellum only extends to XVII; in *B. curta* it goes no further than a part of XVIII.



There is only one gizzard, but *B. schlegelii* is stated to only have one.

The oviducal pore is single, which is also the case with *B. bolavi* and *B. gracilis*.

The calciferous glands of this species are peculiar, occurring only in segment XV, and not being simple pouches on the side of the œsophagus but more elaborate lobed structures. No other *Benhamia* has glands like this.

HABITAT : Travancore.

2. *Benhamia travancorensis*, n. sp. (Pl. I., Figs. 6, 8, 9, 11, 12.)

It is 75 mm. in length and 2 mm. in breadth. It has 131 segments.

The clitellum extends from XIV to XXI. It is saddle-shaped, having a ventral line not thickened.

The setæ are in pairs very close together.

The dorsal pores commence posteriorly.

The pharynx is very large.

There are two gizzards in VIII and IX. They are more or less cylindrical, the posterior one is somewhat flattened ventrally.

There are calciferous glands in XIV, XV and XVI.

They are pouch-shaped, somewhat corrugated, the anterior being the smallest.

The intestine commences in XVII and has no cæca.

The last hearts occur in XIII.

The nephridia are diffuse.

There are two pairs of spermathecæ in VIII and IX. Each has a constriction dividing the pouch from the pouch-like duct which bear the diverticulum.

The sperm-sacs in XI and XII are very minute.

The spermiducal glands in XVIII and XIX are within the clitellum ; they are tubular and fusiform.

They have a bunch of penial setæ at the mouth.

These are about four times as long as the ordinary ones, and terminate in a fine whip-like end frequently bent into a hook.

No ventral pairs of setæ occur on XVII, XVIII, or XIX.

In many respects this worm resembles *Benhamia kafuruensis*.

Septa IX to XIV are thickened.

HABITAT : Travancore.



3. *Benhamia poonensis*, n. sp. (Pl. I, Fig. 10; Pl. II, Figs. 3, 4, and 9).

It is 134 mm. long and 3 broad. It has 157 segments, the last of which are very small.

The clitellum is very ill-marked. It appears to end at segment XVI dorsally, but to be continued to XX ventrally.

The setæ are closely paired, the four pairs occupying rather less than the ventral half of the body.

The apertures of the spermiducal glands on segments XVII and XIX are in a line with the ventral setæ. There are no penial setæ, but small papillæ in a line with pores, at the edges bordering segment XVIII, occur on XVII and XIX. There are no ventral setæ on these three segments, but those on XX are placed on a pagilla.

The pharynx is very large and pouch-like.

There are two gizzards in V and VI. They are connected by a narrow junction. They are more or less globular, the anterior being the larger.

There are globular calciferous glands in XI and XII.

The intestine begins in segment XIV.

In segments IX, X, XI and XII are four pairs of hearts. They are very large indeed, the walls being transparent and altogether much more delicate than those of the dorsal vessel.

There are two pairs of spermathecæ in segments VIII and IX.

The pouch is oval with a duct of about the same length which becomes sinuous near the mouth. At the junction with the pouch is the diverticulum, which is very characteristic in form. It is a much-complicated structure, almost having the appearance of a complicated gland.

In the neighbourhood of the opening are long setæ with notched ends. They are about three or four times as long as an ordinary seta.

There is a pair of bent tongue-shaped sperm-sacs in XII.

The spermiducal glands are tubular. There is a long straight duct; the glandular end is very twisted, almost forming a knot, and is pigmented.

HABITAT: Poona.

4. *Megascolex konkanensis*, n. sp. (Pl. II, Figs. 1, 6, 7, 8, and 10.)

It is 200 mm. long and 2 broad, having 222 segments.

Externally this worm much resembles a *Perichaeta*, having a short clitellum, a well-marked area round the median oviducal pore, tumid male pores, and the lines of setæ quite distinct.



The setæ are not continuous. There is a ventral gap of about the space of three setæ, while the dorsal space is much less. But quite at the tail end of the animal—segment 170th—this arrangement is obliterated, where there are 24 setæ equidistant.

The clitellum obviously extends from XIV—XVI, and the setæ show through. There is a large area on XIV, in a line with the setæ, bearing the oviducal pore. The modified tissue of the clitellum, which can only be distinguished with the microscope, extends as far forward as to just in front of segment X and backwards to XX.

The male pores are borne on two large papillæ, the width of the segment, with no setæ between.

The dorsal pores commence IV—V.

The pharynx is large. There are a pair of mucous glands in V.

There is a large gizzard in VI.

There are no calciferous glands.

The œsophagus is small till segment XVI.

The intestine commences in XVI in two large pouches.

There are hearts in XII and XIII.

In segments VIII and XI are two pairs of spermathecæ.

The pouch is pear-shaped with a very delicate duct about the same length. A club-shaped diverticulum, the length of the duct, joins near the aperture.

Segments XI and XII each possess a very well developed pair of sperm-sacs. They are very racemose indeed, the divisions being almost globular.

The spermiducal glands are very peculiar and have a mop-like appearance. The duct is straight and has no muscular sac. The distal end seems dilated into a sac from which arise numerous simple filiform processes. In a younger specimen the gland appeared like a tube with many transverse branches at the end.

HABITAT : North Konkan and Travancore.

5. *Perichæta travancorensis*, n. sp. (Pl. II, Figs. 2, 5.)

This worm has 94 segments. It is 70 mm. long and 4 broad.

Its anterior dorsal surface is purplish, which colour behind the clitellum narrows to a strip.

The clitellum extends from XIV—XVI. The area round the female pore is much marked.



The male pores are rather tumid, but have no papillæ. They are separated by 10 setæ.

The gizzard lies in VII and IX.

The intestine commences in XV. It has cacæ which arise in XXVI and continue forward into XXV, where the end is slightly curled round.

There are hearts in XI, XII, XIII.

In segments VII, VIII, and IX are three pairs of spermathecæ. As there is no intervening septum between the last two, they lie very close together. They are long pear-shaped bodies, gradually narrowing to the duct which bears near the opening a small diverticulum on a long duct which in some cases is arranged in a zigzag.

Small sperm-sacs are found in XI, XII, and XIII.

The spermiducal glands have a sac and a coiled duct; the lobes of the glands extend through three segments, viz., XVII—XIX; they are loose and comparatively thin.

The dorsal pores are not very obvious, but do not commence till XVI—XVII.

HABITAT: Travancore.

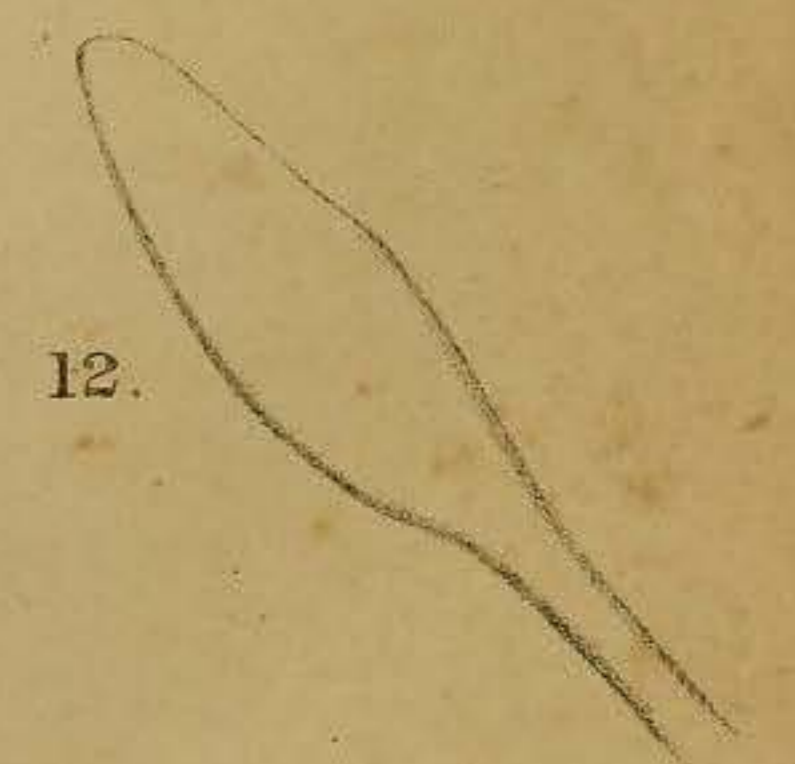
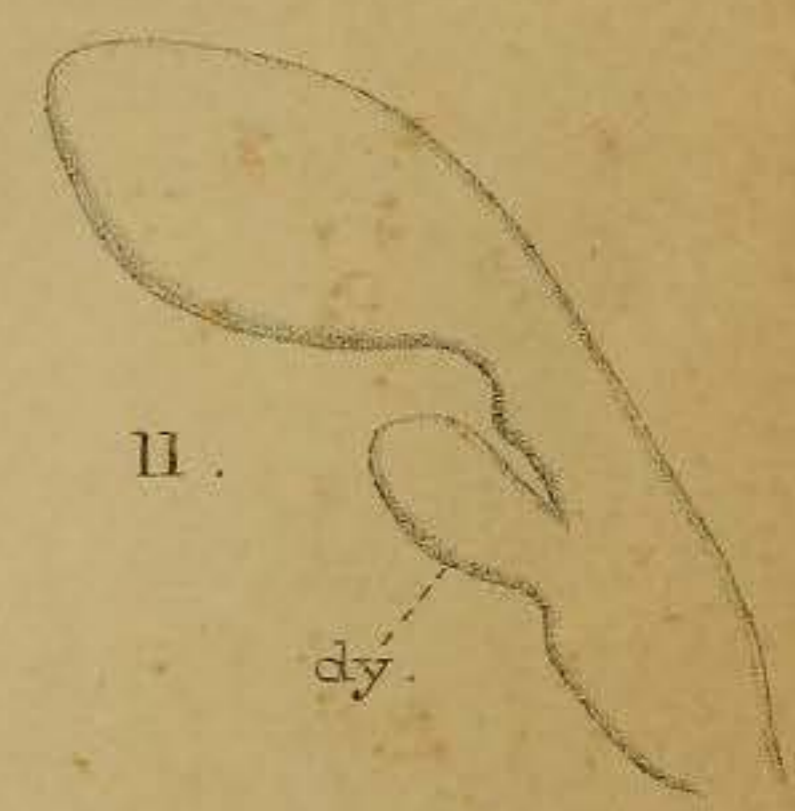
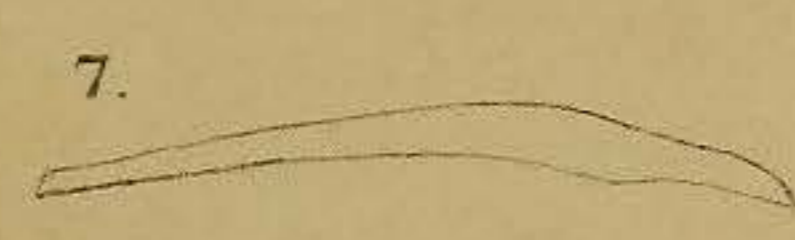
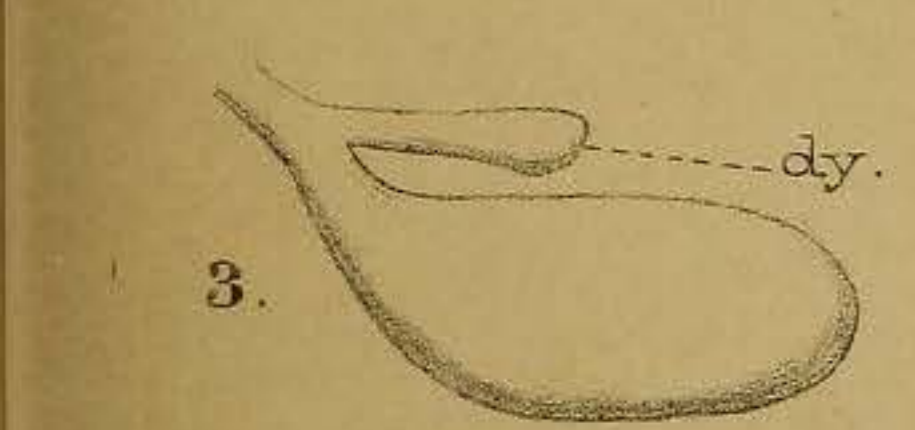
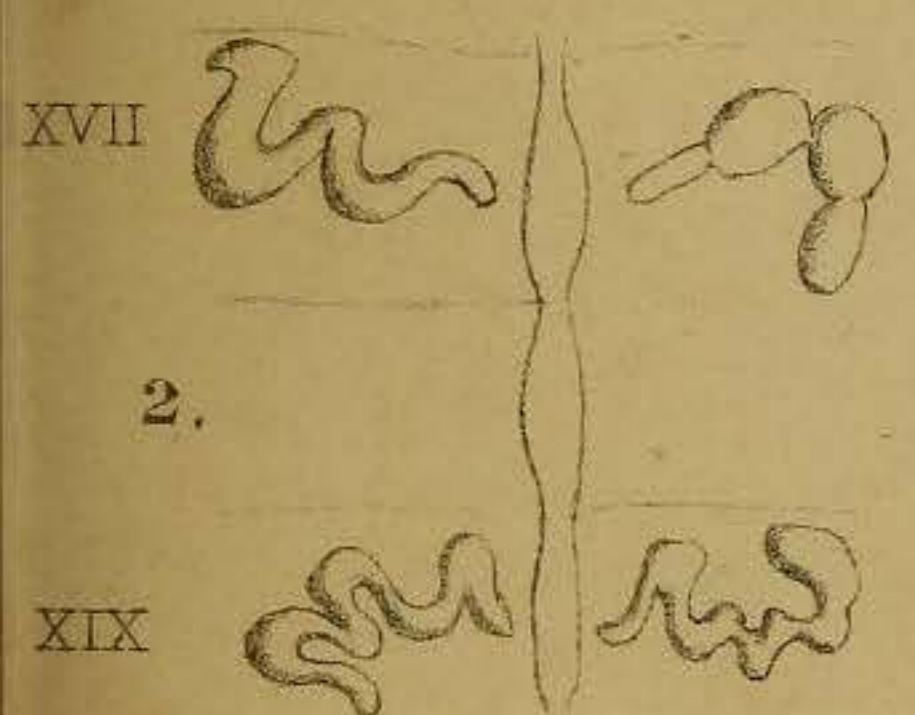
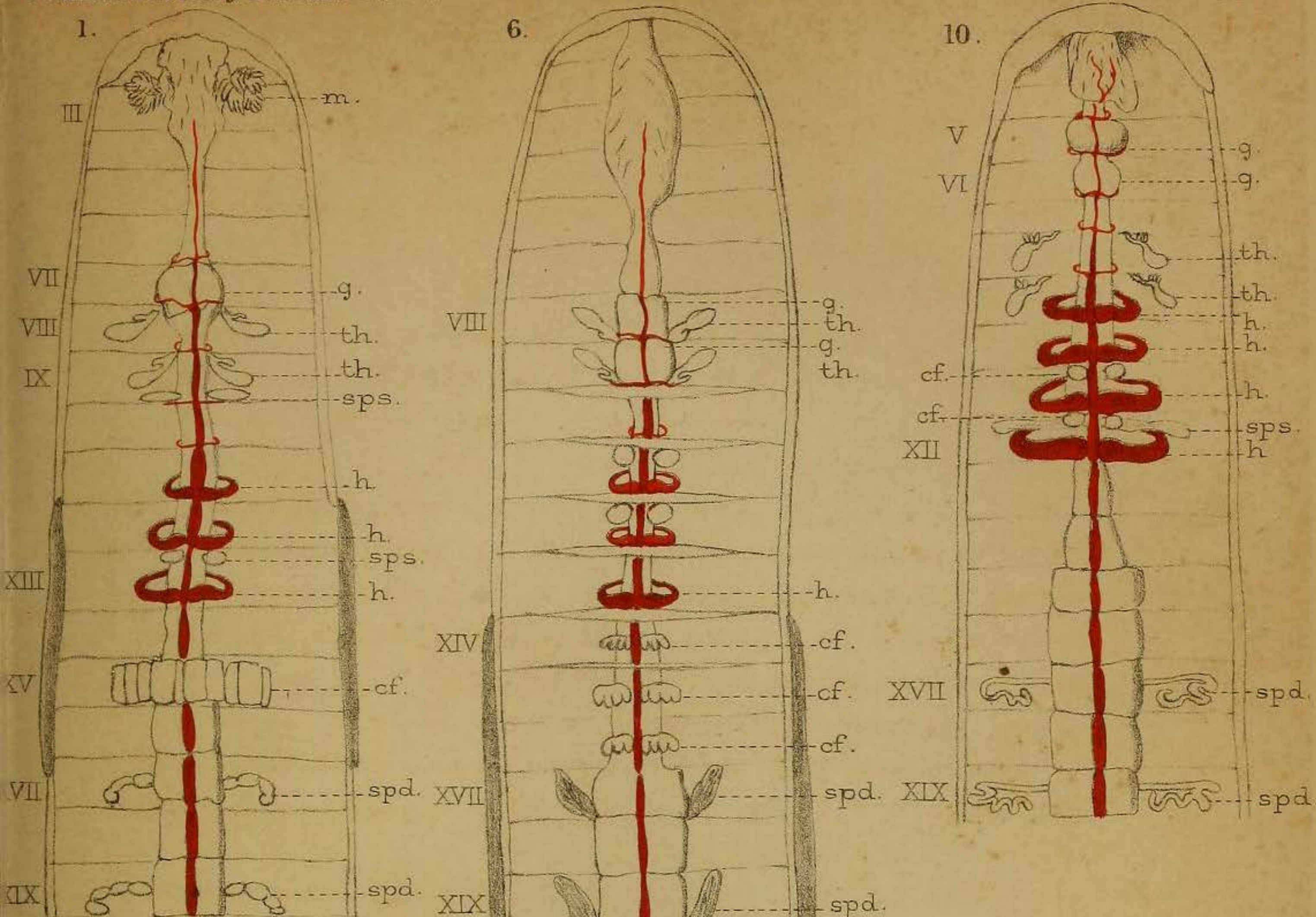
## EXPLANATION OF PLATES.

### PLATE I.

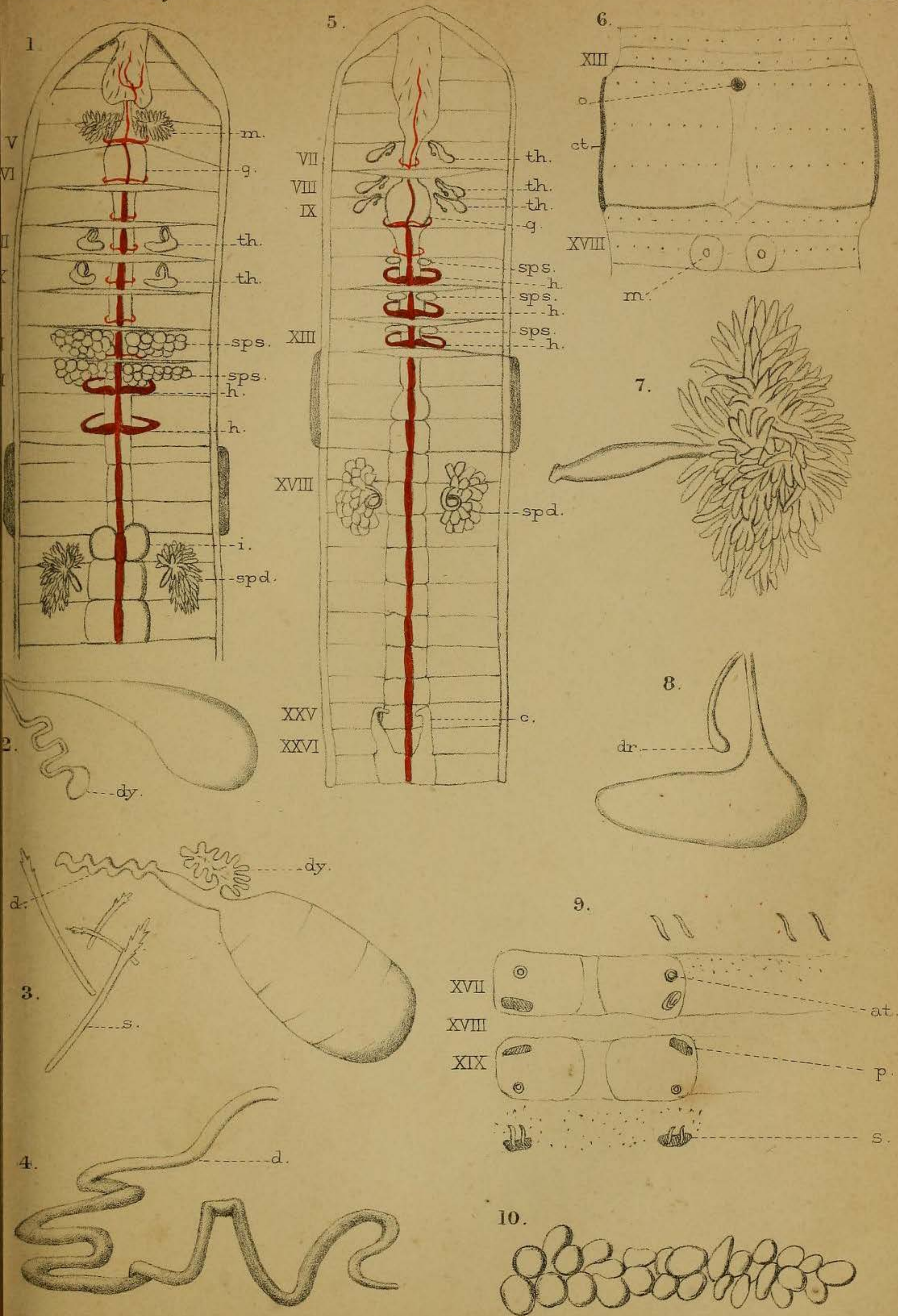
Fig.

1. *Benhamia aitkeni*. Dissection: *m*, mucous gland; *g*, gizzard, *th* spermatheca; *sps*, sperm-sac; *h*, heart; *cf*, calciferous gland; *spd*, spermiducal gland. The figures denote the number of the segment.
2. Spermiducal glands of *Benhamia aitkeni*.
3. Spermatheca of *Benhamia aitkeni*—*dv*, diverticulum.
4. Calciferous gland of *Benhamia aitkeni* belonging to the right side viewed from the head end.
5. Arrangement of setæ in *Benhamia aitkeni*—*s*, left dorsal pair.
6. Interior of *Benhamia travancorensis*.
7. Penial seta of *Benhamia aitkeni*.
8. Penial seta of *Benhamia travancorensis*.
9. Calciferous gland of *Benhamia travancorensis*.
10. Interior of *Benhamia poonensis*.











11. Spermatheca of *Benhamia travancorensis*.
12. Spermiducal gland of *Benhamia travancorensis*.

## PLATE II.

Fig.

1. Interior of *Megascolex konkanensis*—*i*, intestine.
2. Spermatheca of *Perichæta travancorensis*—*dv*, diverticulum.
3. Spermatheca of *Benhamia poonensis*—*d*, duct ; *dv*, diverticulum ;  
*s*, copulatory setæ.
4. Spermiducal gland of *Benhamia poonensis*.
5. Interior of *Perichæta travancorensis*—*c*, cæcum.
6. Ventral view of clitellum of *Megascolex konkanensis*—*o*, oviducal  
pore ; *ct*, clitellum ; *m*, male pore.
7. Spermiducal gland of *Megascolex konkanensis*.
8. Spermatheca of *Megascolex konkanensis*.
9. Portion of ventral surface of *Benhamia poonensis*—*p*, papilla ;  
*at*, atrial pore ; *s*, setæ.
10. A sperm-sac from *Megascolex konkanensis*.

*N.B.*—For *dy* on Plates read *dv*.