

## REFERENCES.

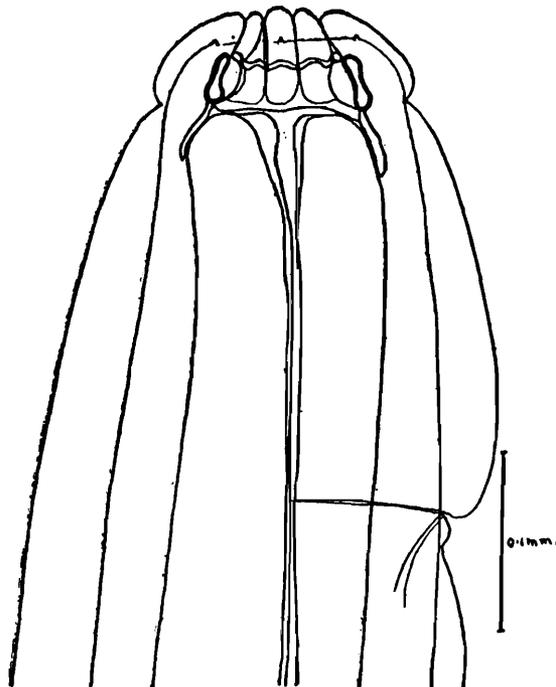
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## Part 8. OESOPHAGOSTOMINAE AND NECATORINAE.

***Oesophagostomum indicum*, n. sp.**

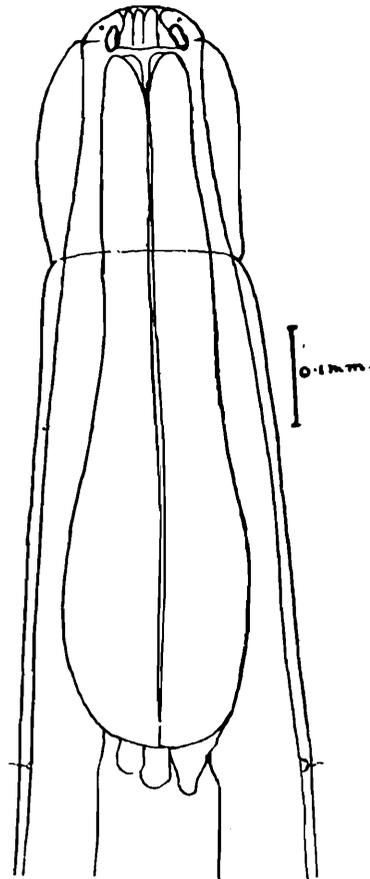
These worms were found in the large intestine of a Hog deer (*Cervus axis*).

They are similar to *O. dentatum* in general appearance, as the cephalic vesicle is the same shape. There is a distinct mouth collar with three papillae on each side, the lateral pair being larger than the subdorsal and subventral papillae. The cervical papillae are just posterior to the oesophagus (figs. 111 & 112). The buccal capsule is circular and there is

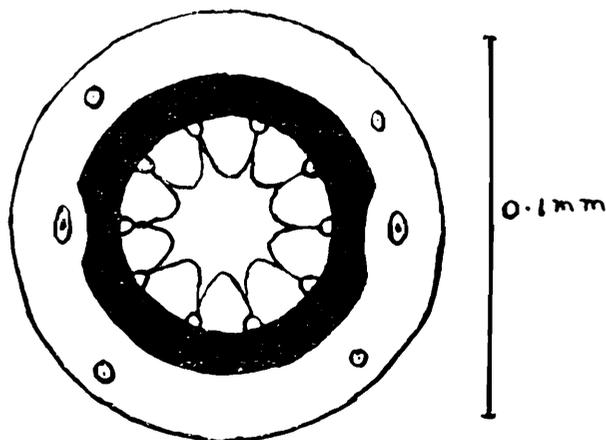


TEXT-FIG. 111.—*Oesophagostomum indicum*, n. sp. Anterior end, lateral view.

a broad shallow longitudinal groove on each side of it, which is only visible in and end-on view (fig. 113). There are two leaf crowns each of which



TEXT-FIG. 112.—*Oesophagostomum indicum*, n. sp. Anterior end, ventral view.

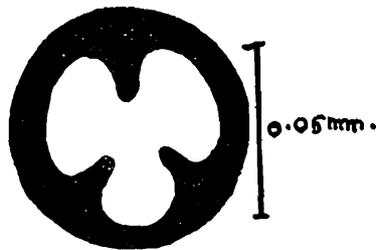


TEXT-FIG. 113.—*Oesophagostomum indicum*, n. sp. Buccal capsule, end-on view.

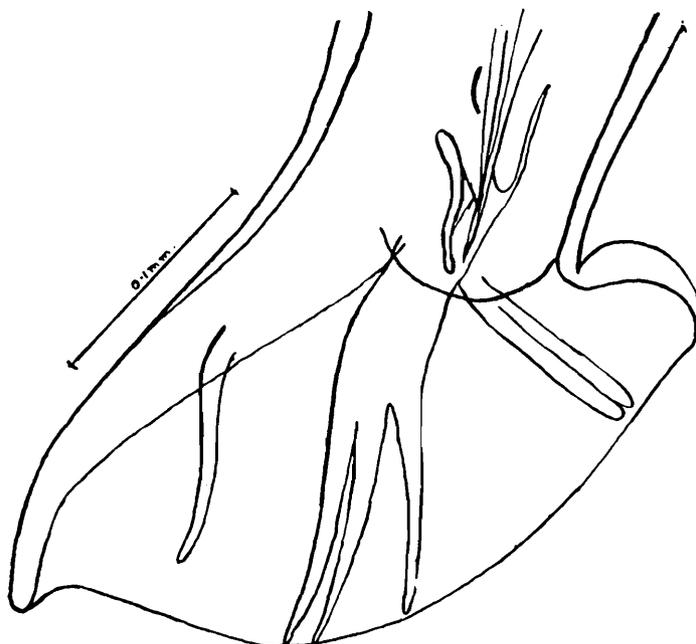
consists of ten broad elements. The external leaf crown arises from the base of the capsule, from which it sweeps inwards and forwards. The internal leaf crown consists of very short coarse elements, which in optical section appear as a double-contoured wavy line running across the capsule at its anterior end (fig. 111.) The anterior end of the oesophagus is lined with a thick chitinous layer, from which three longitudinal ridges project into the slightly-dilated oesophageal funnel (fig. 114).

*Male*.—The male bursa is composed of two broad lateral lobes. The ventral rays are cleft almost to their bases, the lateral rays arise from a common trunk, the externo-lateral being slightly separated from the other laterals. The externo-dorsal ray arises from a common trunk

with the dorsal, and it does not reach the border of the bursa (fig. 115). The dorsal ray is bifurcate for slightly more than half the distance from

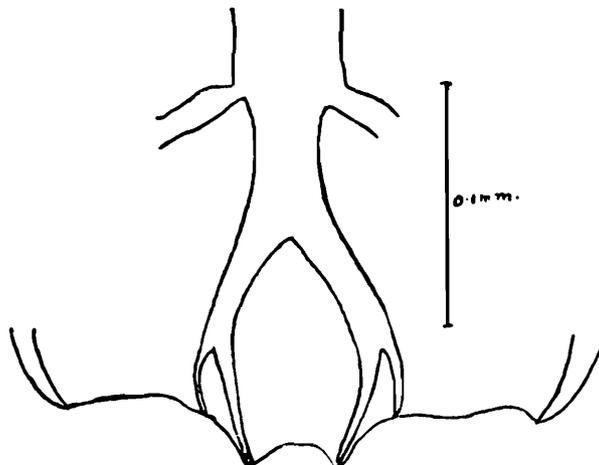


TEXT-FIG. 114.—*Oesophagostomum indicum*, n. sp. Oesophageal funnel, optical section end-on view.



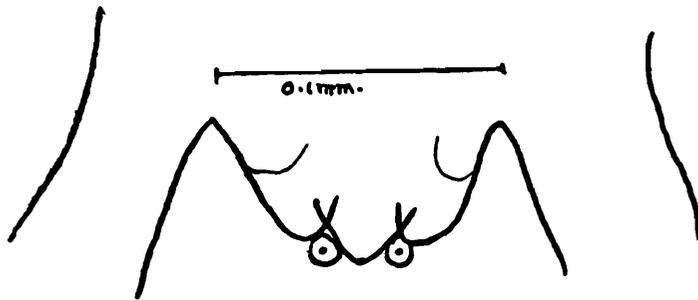
TEXT-FIG. 115.—*Oesophagostomum indicum*, n. sp. Posterior end, male, lateral view.

its tips to the origin of the externo-dorsal rays. Each tip is divided into a longer internal and a shorter external branch, which both curve inwards towards those of the opposite side (fig. 116). The genital cone



TEXT-FIG. 116.—*Oesophagostomum indicum*, n. sp. Male bursa, dorsal ray.

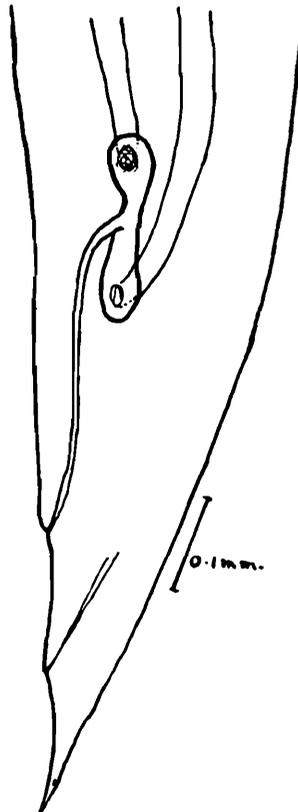
consists of a central conical body with broad papillae on each side of its base, and two smaller papillae more centrally placed (fig. 117). The



TEXT-FIG. 117.—*Oesophagostomum indicum*, n. sp. Genital cone, male.

spicules are equal and alate, and the gubernaculum is of the usual shape seen in the genus (fig. 116).

*Female*.—The tail ends in a sharp straight point, and the vulva opens a little distance anterior to the anus. There is a long vagina, which curves forwards to end in a typical hour-glass shaped ovejector which receives the uteri (fig. 118).



TEXT-FIG. 118.—*Oesophagostomum indicum*, n. sp. Posterior end, female, lateral view.

Comparison of the characters of this worm together with the dimensions given in the table below (p. 153), with those of the known species of the genus *Oesophagostomum*, indicate that it is different in several particulars, therefore it must be considered a new species for which the name *Oesophagostomum indicum*, n. sp. is proposed.

*Type-host.* *Cervus axis*.

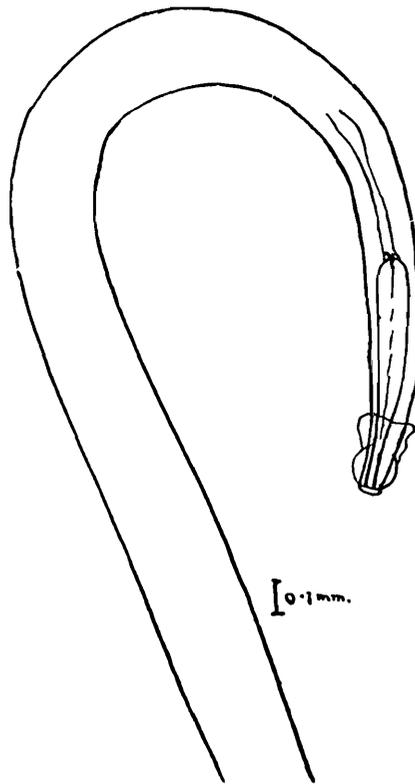
Since the discovery of the original material, worms which agree in all anatomical details with *O. indicum* have been found in the large intestine of a Red deer (*Cervus elaphus*), but these worms are slightly larger, the males being 10.5 mm. and the females 12.2 mm. in length.

Type-specimens are in the Indian Museum, Calcutta.

***Oesophagostomum curvatum*, n. sp.**

This species was found in the large intestine of a Hog deer in company with *O. indicum*.

The most striking character of this worm is the shape of the anterior end, which is bent in the shape of a shepherd's crook, similar to *O. radiatum*. (fig. 119.) There is a well-marked mouth collar in the form of a ring with rounded edges, which curves forwards laterally (fig. 120). The cephalic inflation is in two portions marked off from each other by a constriction similar to that of *O. radiatum*; behind the constrictor

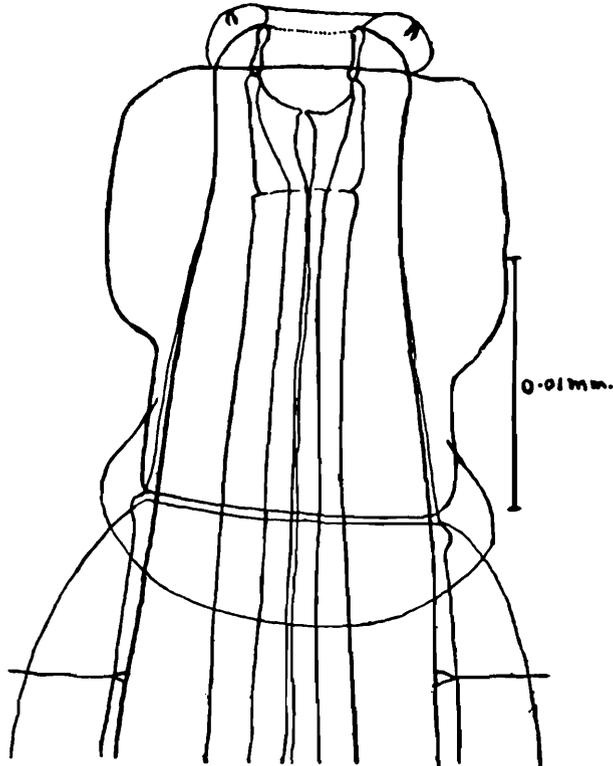


TEXT-FIG. 119.—*Oesophagostomum curvatum*, n. sp. Anterior end, lateral view.



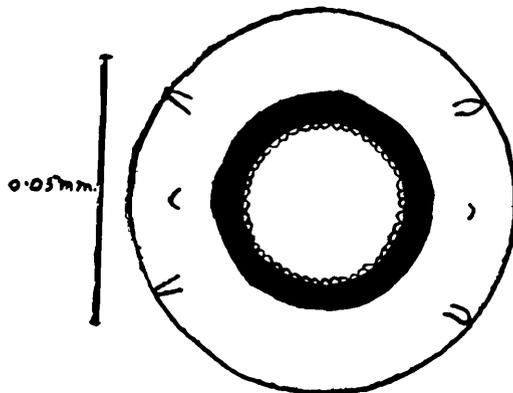
TEXT-FIG. 120.—*Oesophagostomum curvatum*, n. sp. Anterior and, lateral view.

the inflation is composed of two rounded cuticular flaps, which unite on the dorsal and ventral surfaces (figs. 120 & 121). Well-developed lateral flanges arise at the level of the cervical groove, and the long cervical papillae arise a short distance behind this (fig. 121). The buccal

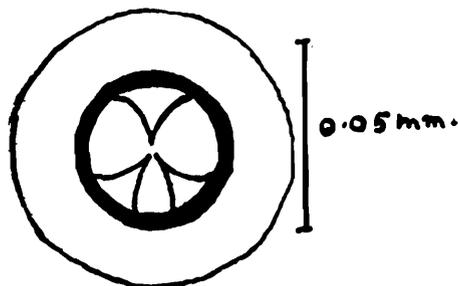


TEXT-FIG. 121.—*Oesophagostomum curvatum*, n. sp. Anterior end, dorsal view.

capsule is circular and cylindrical, and there is no external leaf crown, but the anterior border of the capsule bears at least fifty small points representing the internal leaf crown (fig. 122). The anterior portion of the oesophagus is thinner than the rest of the organ with the result that there is a oesophageal funnel without any external enlargement of



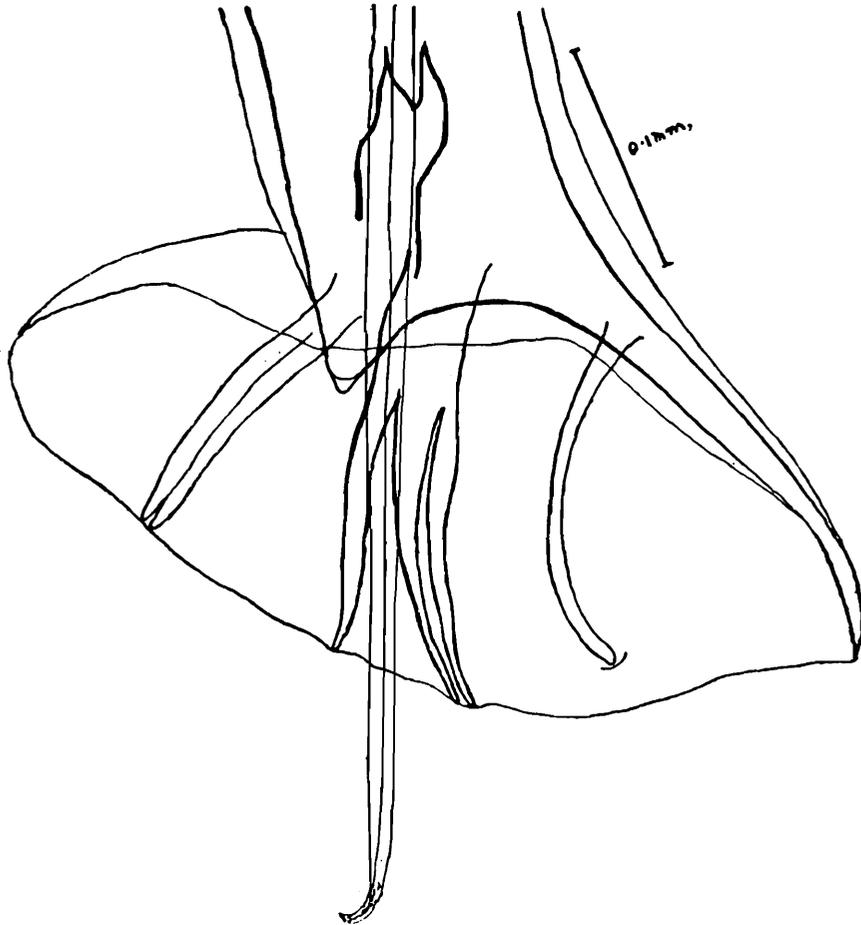
TEXT-FIG. 122.—*Oesophagostomum curvatum*, n. sp. Buccal capsule, end-on view.



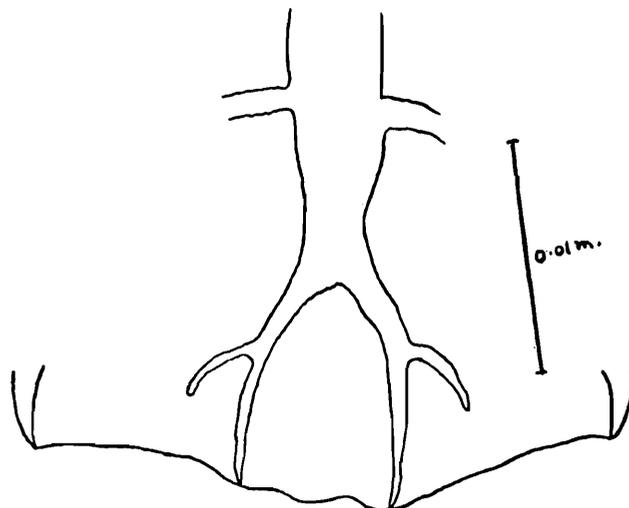
TEXT-FIG. 123.—*Oesophagostomum curvatum*, n. sp. Oesophageal funnel, optical section, end-on view.

the anterior end. The funnel is marked off from the rest of the oesophagus by a transverse line, and its chitinous lining is furnished with three sharp longitudinal ridges which might almost be regarded as teeth (figs. 121 & 123).

*Male.*—The bursa consists of two broad lateral lobes. The ventral rays are cleft almost to their bases, the lateral rays arise from a common trunk, the externo-lateral being separated from the other two lateral rays, which lie close together. The externo-dorsal rays arise from a common trunk with the dorsal ray, they are long and thin and do not reach the edge of the bursa (fig. 124). The dorsal ray is bifid for



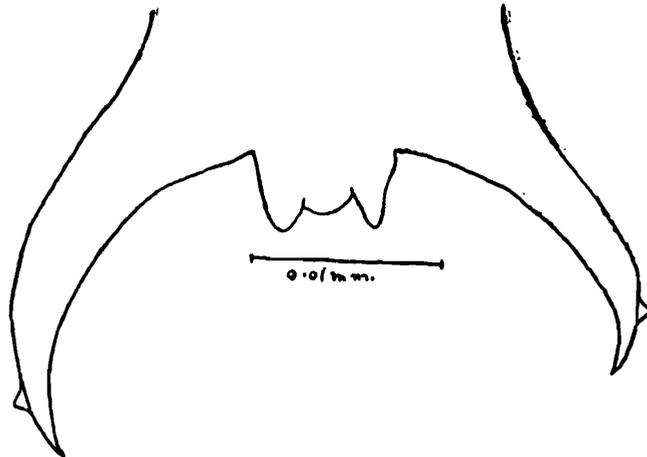
TEXT-FIG. 124.—*Oesophagostomum curvatum*, n. sp. Posterior end, male, lateral view



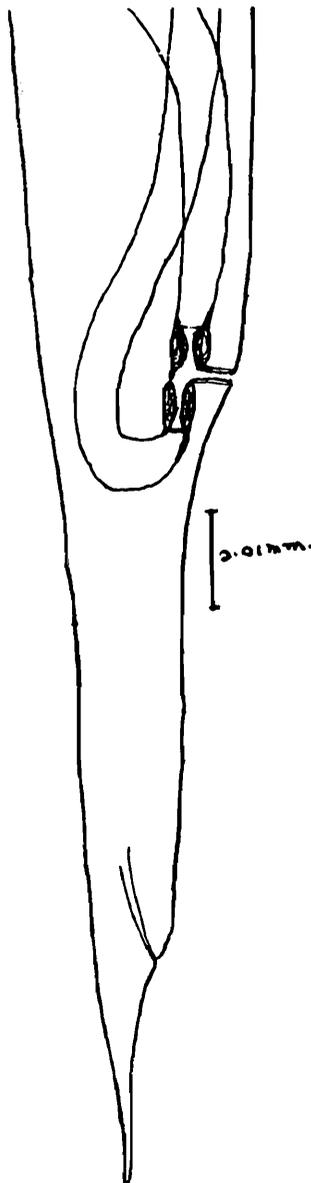
TEXT-FIG. 125.—*Oesophagostomum curvatum*, n. sp. Male bursa, dorsal ray.

about half its length from the origin of the externo-dorsal rays, and each branch is divided into two, the external branch being the shorter (fig. 125). The genital cone is composed of a central rounded papilla with a single coarse papilla on each side of it (fig. 126). The spicules are long and straight with the tips curving ventrally. The gubernaculum is in the form of a deep trough in which the spicules lie (fig. 124).

*Female*.—The tail of the female ends in a straight tip. The vagina is short and it runs directly inwards, and from its inner end two short



TEXT-FIG. 126.—*Oesophagostomum curvatum*, n. sp. Genital cone, male.



TEXT-FIG. 127.—*Oesophagostomum curvatum*, n. sp. Posterior end, female, lateral view.

muscular ovejectors arise, which diverge at right angles (fig. 127). This portion of the female genital apparatus is very similar to that of *O. radiatum*.

In its general characters this worm is very similar to *O. radiatum*, according to the description by Goodey (1924), but it is smaller in all its dimensions. Other more reliable differences are that the mouth collar is not so inflated, and the number of elements in the internal leaf crown is greater in my species than it is in *O. radiatum*. In the male the genital cone and gubernaculum differ in the two species, and in the female the tail is straight in my species and curved ventrally in *O. radiatum*. It is therefore proposed to name my species *Oesophagostomum curvatum*, n. sp.

*Host*.—*Cervus axis*.

Type-specimens are in the Indian Museum, Calcutta.

### *Oesophagostomum radiatum* (Rud. 1803).

The typical host of this species is domestic cattle, and its distribution is world-wide. I have recovered specimens of this worm from a hybrid bison (*Bos frontalis* and *Bos taurus*).

TABLE OF MEASUREMENTS.

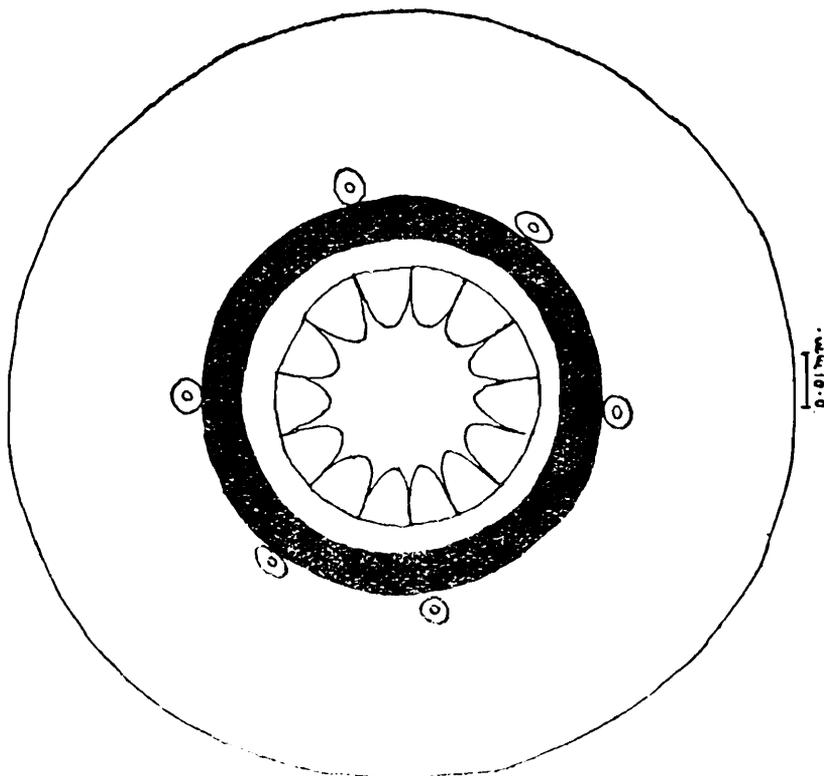
	<i>O. indicum</i> .		<i>O. curvatum</i> .	
	Male.	Female.	Male.	Female.
Length	7.6—9.1	9.9—10.4	8.4—9.6	12.5—14.8
Diameter, maximum	0.034—0.036	0.038	0.29—0.32	0.36—0.42
Mouth collar, diameter	0.13	0.14	0.075	—
Buccal capsule, diameter—				
Anterior	0.05	0.052—0.06	0.028—0.032	0.032
Posterior	0.066	0.072		
Cervical papillae from ant. end.	..	..	0.28	..
Cervical groove from ant. end.	0.26	0.28	0.21	0.22
Oesophagus, length	0.713	0.713	0.57—0.61	0.65—0.79
Oesophageal funnel, depth.	..	..	0.044	..
Spioules, length	1.3—1.36	..	0.49—0.59	..
Gubernaculum, length	0.084	..	..	..
Vulva to anus	..	0.18	..	0.57—0.75
Anus to tip of tail	..	0.13—0.14	..	0.22—0.26
Eggs	..	0.068—0.076 × 0.036—0.042	..	0.072—0.076 × 0.04

**Oesophagostomum apiostomum** (Willach, 1891).

Worms which I have tentatively referred to this species have been found on three occasions in the stomach of the Hoolock (*Hylobates hoolock*). There were never more than three or four specimens on any occasion and they were always free in the lumen of the stomach.

Ihle (1922) gave a redescription of this species, but he omitted to mention several important structures, which are present in all Oesophagostomes. The size given by Ihle is 10—12·8 mm. for males and 11·5—16 mm. for females, whereas my specimens measured 16·8 mm. for males and 19—20·8 mm. for females. This difference is not considered sufficiently great to indicate a difference of species, for it is a general rule to find considerable variation in length in a species of this genus if a large number of specimens are measured. For example, forty females of *O. dentatum* measured by Maplestone (1930) varied between 9·69 and 14·48 mm. in length.

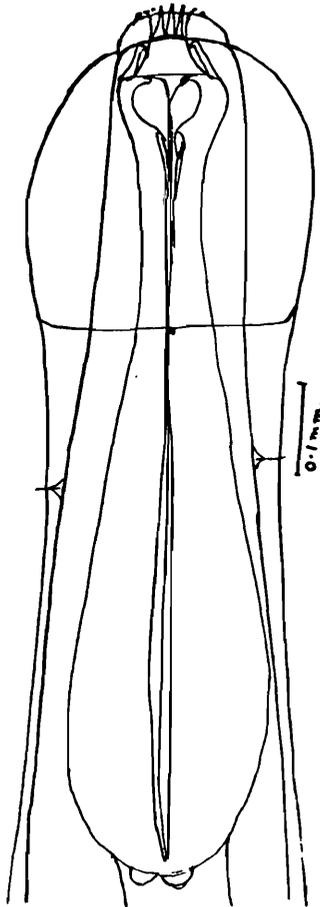
Ihle states that there are twelve elements in the leaf crown, and that he found one specimen with thirteen elements. When examined lying on a slide<sup>5</sup>I could only count twelve elements in all my specimens, but when I obtained an end-on view of the head of one of these specimens I found there were really fourteen. It therefore seems probable that one element is missed on each side when focussing up or down to follow the curve of the buccal capsule when the worms are lying on a slide, and that the true number of elements in the leaf crown is fourteen (fig. 128).



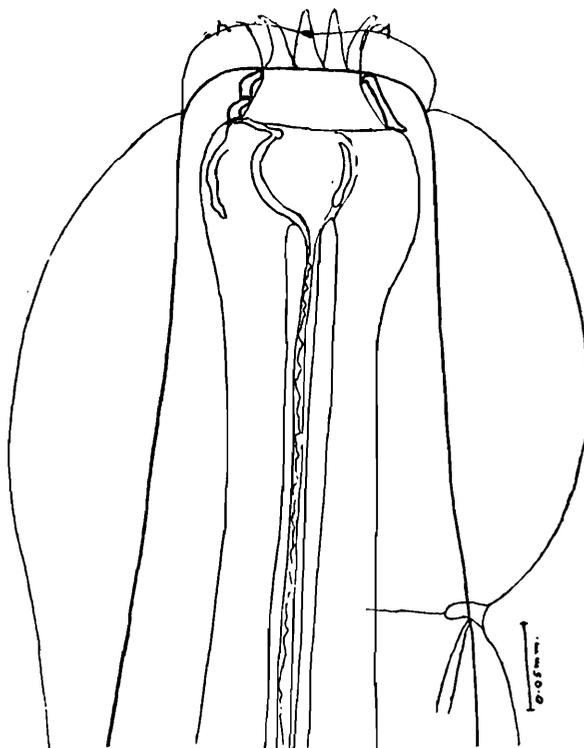
TEXT-FIG. 128.—*Oesophagostomum apiostomum*. Buccal capsule, end-on view.

The buccal capsule is slightly narrower anteriorly than it is posteriorly, and a small portion of the dorsal wall appears to be shorter than the rest of the capsule, as well as being divided into two parts in the mid-dorsal

line (fig. 130). When examined from the dorsal surface this appearance is seen to be due to notches on the anterior and posterior borders of the

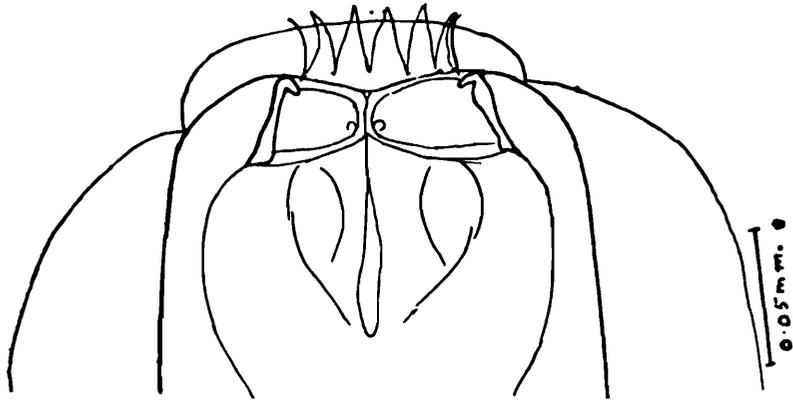


TEXT-FIG. 129.—*Oesophagostomum apistomum*. Anterior end, ventral view.



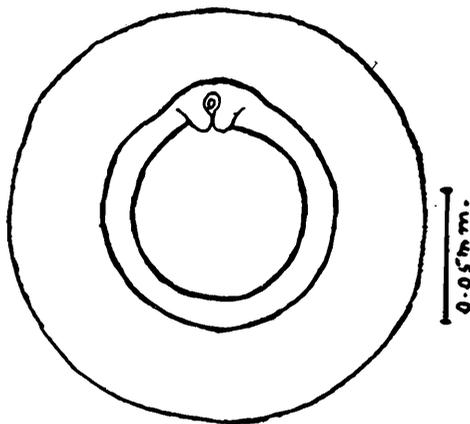
TEXT-FIG. 130.—*Oesophagostomum apistomum*. Anterior end, lateral view.

capsule through which the duct of the dorsal oesophageal gland runs antero-posteriorly (fig. 131). This organ is exceptionally clearly defined



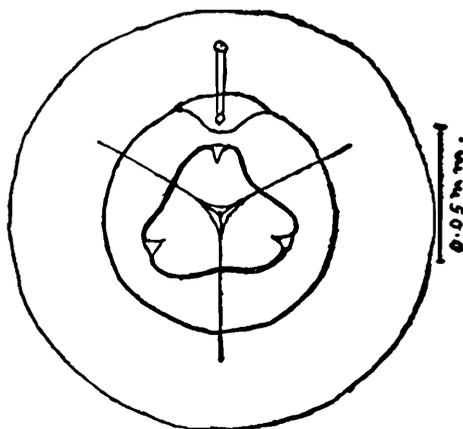
TEXT-FIG. 131.—*Oesophagostomum apiostomum*. Anterior end, dorsal view to show dorsal wall of buccal capsule.

in this species and in an end-on view of the capsule at a plane slightly below the opening of the duct it is seen to be surrounded by a special portion of the capsule, which projects slightly into its lumen (fig. 132).



TEXT-FIG. 132.—*Oesophagostomum apiostomum*. Optical section, through middle of buccal capsule.

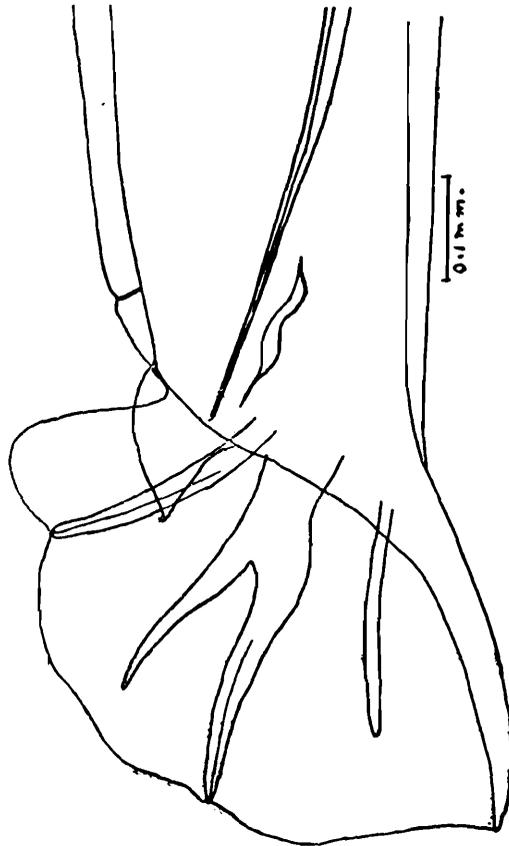
This projection is even more marked further posteriorly in an optical section of the oesophageal funnel at the level of the teeth (fig. 133).



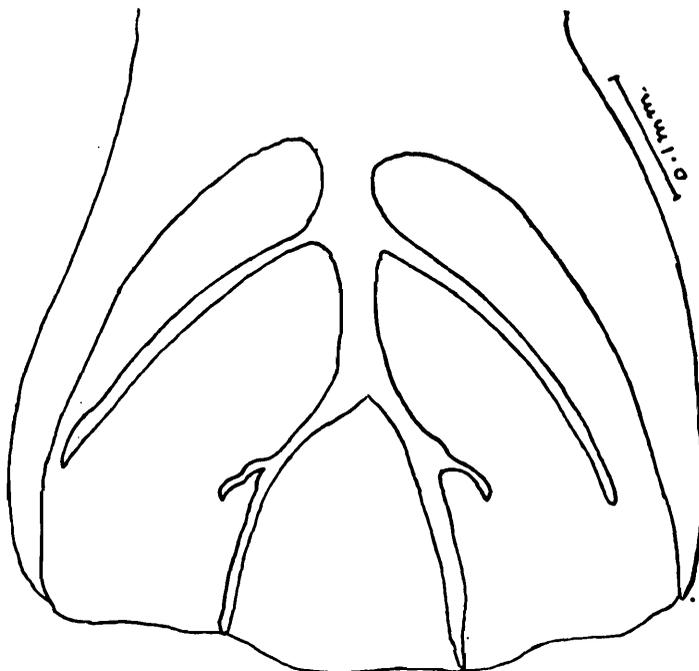
TEXT-FIG. 133.—*Oesophagostomum apiostomum*. Optical section through oesophageal funnel at level of teeth.

The teeth in the oesophageal funnel vary from rounded knobs to sharply pointed structures. The genital cone in the male is a simple conical body ending in a nipple-like point and without any accessory papillae.

The male bursa is typical, and there is a pair of prebursal papillae, and a curved gubernaculum (figs. 134 & 135).

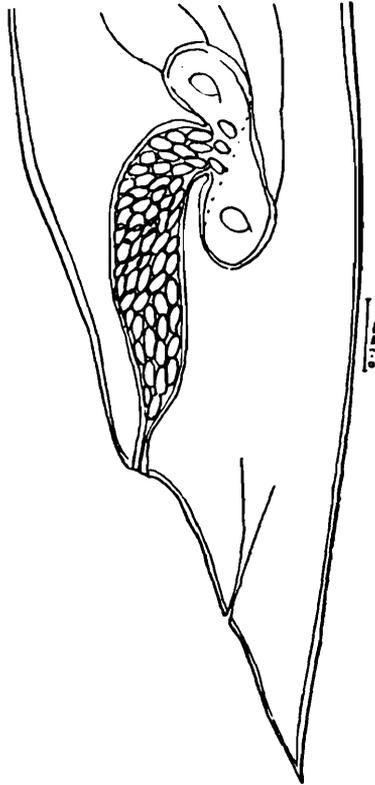


TEXT-FIG. 134.—*Oesophagostomum apiostomum*. Posterior end, male, lateral view.



TEXT-FIG. 135.—*Oesophagostomum apiostomum*. Male bursa, dorsal ray.

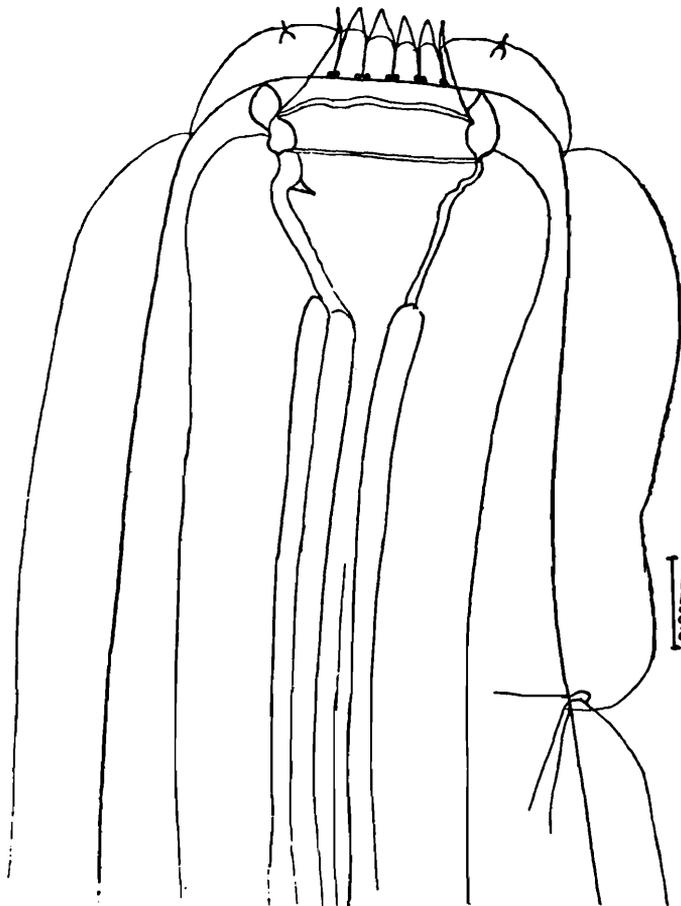
The vagina in the female is large, and it curves anteriorly from the vulva to end in a typical "hour-glass" ovejector, from each end of which the uteri arise. In the specimen from which fig. 136 is drawn the vagina is crowded with eggs.



TEXT-FIG. 136.—*Oesophagostomum apiostomum*. Posterior end, female, lateral view.

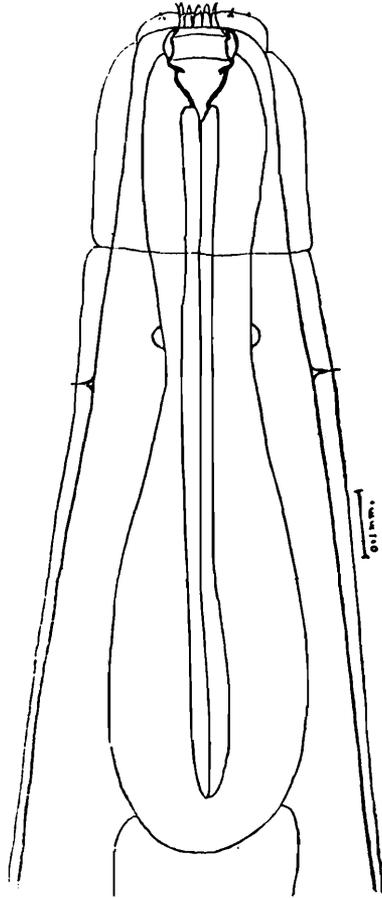
***Oesophagostomum blanchardi* Railliet & Henry, 1912.**

This worm was briefly described by Railliet and Henry (1912) from the Orang outan, and a single male and female apparently belonging to this species have been obtained by me from the stomach of a Hoolock monkey.



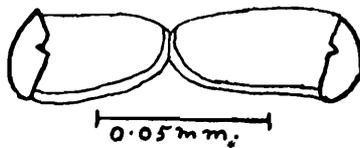
TEXT-FIG. 137.—*Oesophagostomum blanchardi*. Anterior end, lateral view.

The worm is closely allied to *O. apiostomum* but it exhibits several distinct differences. The cephalic inflation is not so globular as in *O. apiostomum* and the buccal capsule is of different shape (figs. 137 and 138), but it shows the same notches on the anterior and posterior bor-



TEXT-FIG. 138.—*Oesophagostomum blanchardi*. Anterior end, dorsal view.

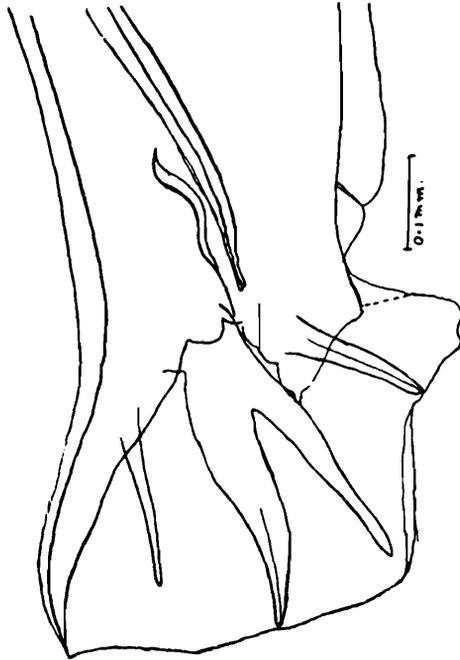
ders of the capsule in the mid-dorsal line (fig. 139). There are said to be sixteen elements in the external leaf crown in *O. blanchardi* but I



TEXT-FIG. 139.—*Oesophagostomum blanchardi*. Buccal capsule, dorsal wall.

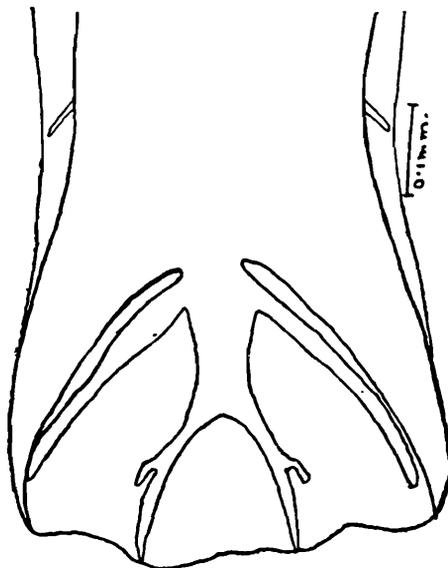
was only able to count fourteen. It seems probable that two are not visible in lateral view as in the case of *O. apiostomum*, but I was unable to confirm this as there was not enough material to warrant sacrificing

a specimen to obtain an end-on view. At the point where the leaf crown projects beyond the anterior end of the capsule a small thickening is visible on each side of the base of each element, which probably represents a rudimentary internal leaf crown (fig. 137).



TEXT-FIG. 140.—*Oesophagostomum blanchardi*. Posterior end, male, lateral view.

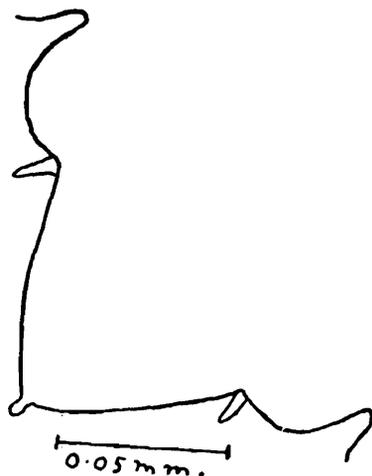
In the male the bursa is typical and prebursal papillae are present (figs. 140 and 141). The gubernaculum is similar to that of *O. apiosto-*



TEXT-FIG. 141.—*Oesophagostomum blanchardi*. Male bursa, dorsal ray.

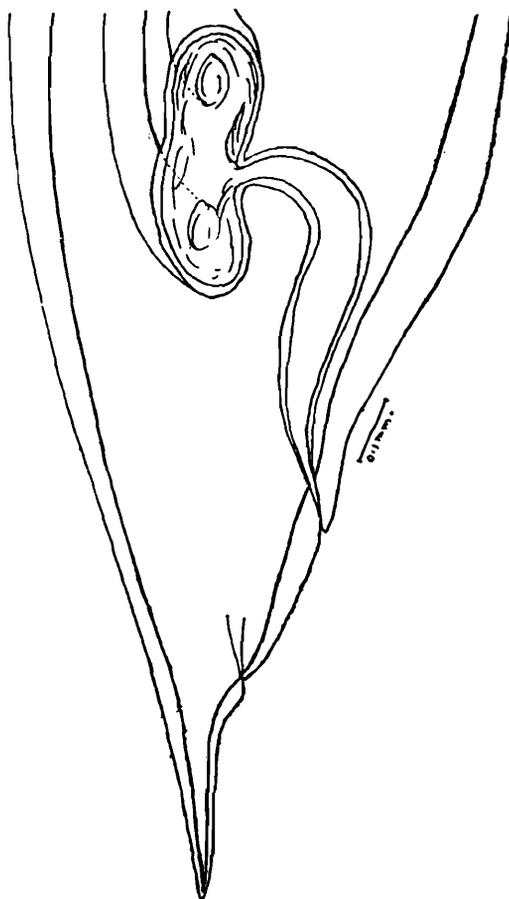
*mum*, but the genital cone consists of a central conical body ending in a nipple-like point; on each side of the base of this cone there is a broad

rounded mass, and a pair of fine papillae arise in the angles formed between these basal structures and the central cone (fig. 142).



TEXT-FIG. 142.—*Oesophagostomum blanchardi*. Genital cone, male.

The tail of the female and the terminal portions of the genital tubes are similar to those of *O. apiostomum* (fig. 143).



TEXT FIG. 143.—*Oesophagostomum blanchardi*. Posterior end, female, lateral view.

Both of these worms may be new species, but owing to the imperfect descriptions of *O. apiostomum* and *O. blanchardi* it is not possible to be definite on this point, so it appears preferable to place them in the above species rather than to make new species on doubtful grounds, especially as the data given here will enable anyone in possession of specimens of the above species to decide the matter.

MEASUREMENTS OF *O. apiostomum* AND *O. blanchardi* FROM MY MATERIAL.

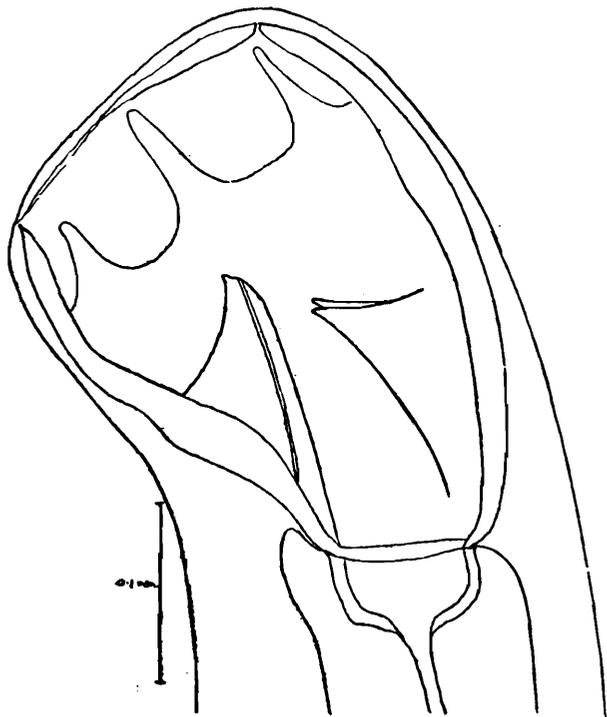
	<i>O. apiostomum.</i>		<i>O. blanchardi.</i>	
	Male.	Female.	Male.	Female.
Length	16.8	19—20.8	15.3	19.2
Diameter	0.614	0.673—0.672	0.654	0.83
Trans. groove . from ant. end.	0.297	0.336—0.376	0.356	0.396
Cervical pap. from ant. end.	0.416	0.455—0.515	0.536	..
No. of elements in leaf crown.	14	14	16?	16?
Mouth caps—				
Ant. diameter.	0.064—0.076	0.068—0.076	0.112	0.120
Post. diameter	0.088—0.096	0.088—0.096	..	..
Depth	0.022—0.024	0.028	0.039	0.041
Oesophagus, length	0.812	0.891—0.951	1.05	1.1
Min. diameter	0.088	0.088—0.096	0.152	0.164
Max. diameter	0.208	0.200—0.300	0.288	0.300
Spicules, length	1.56—1.58	..	1.98	..
Gubernaculum, length	0.158—0.160	..	0.200	..
Vulva to anus	..	0.218—0.297	..	0.297
Anus to tip of tail	..	0.196—0.237	..	0.277
Vagina, length	..	0.297—0.396	..	0.535
Ovejector, length	..	0.297—0.336	..	0.416
Caudal pap. from tip of tail.	..	0.052	..	0.092
Eggs	..	0.064 × 0.040 †	..	0.068 × 0.044

**Bunostomum bovis, n. sp.**

These worms have been found on three occasions in collections of nematodes taken from the abomasum of cattle which died at the Government Experimental Farm at Gauhati, Assam. They were never present in large numbers, on one occasion they were the only worms present, and on the two other occasions a few worms of this species were found among many hundreds of specimens of *Mecistocirrus digitatus*.

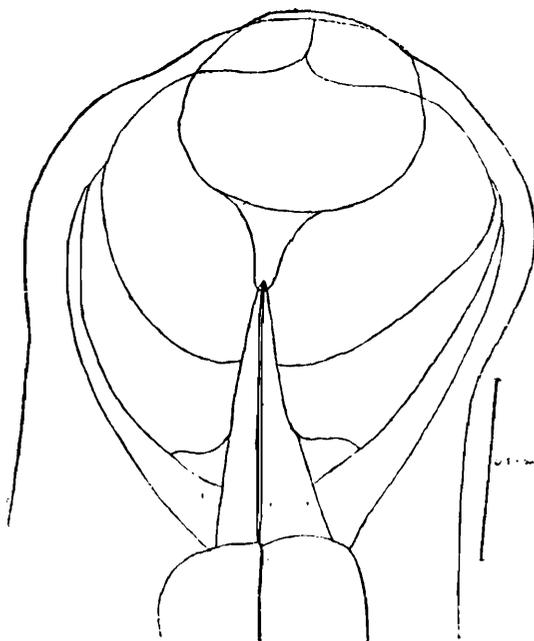
The males and females are approximately the same size, being 15—16 mm. in length, and about 0.5 mm. in maximum diameter. The anterior end is bent dorsally, and the cuticle is marked by coarse transverse

striations. The excretory pore is situated about 0.7 mm. from the anterior end, and immediately anterior to this point the worms become suddenly narrower to a diameter of 0.22 mm., which extends forwards almost to the mouth opening, which is slightly broader. The buccal capsule is elongate and funnel-shaped and it bears a pair of ventral teeth in its depth; the duct of the dorsal oesophageal gland is borne on a prominent cone, which projects into the mouth cavity for more than half-way up its depth (fig. 144). The ventral wall of the buccal capsule



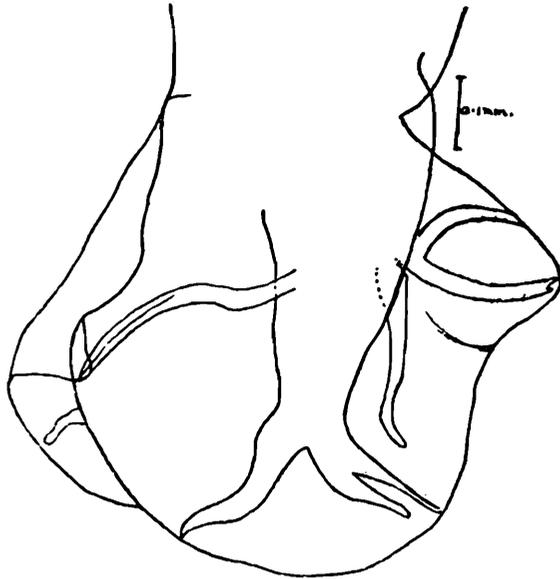
TEXT-FIG. 144.—*Bunostomum bovis*, n. sp. Anterior end, lateral view.

is slightly curved. When seen from the dorsal aspect the mouth opening is circular with a deep notch in its dorsal border, and its ventral side is guarded by a pair of narrow curved cutting plates (fig. 145):



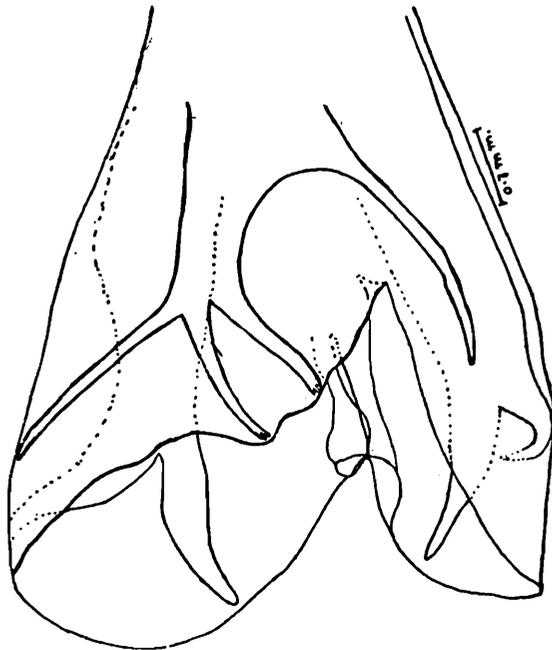
TEXT-FIG. 145.—*Bunostomum bovis*, n. sp. Anterior end, dorsal view

*Male*.—The male bursa is composed of two relatively long narrow lateral lobes, which are united ventrally, and the dorsal-lobe is only slightly developed. The ventral rays are long and thin and they arise from the ventral borders of the common trunks of the lateral rays, they are cleft for about half their length. The trunk of the lateral rays is long and stout, the externo-lateral is widely separated from the other laterals which lie closer together (fig. 146). The externo-dorsal rays



TEXT-FIG. 146.—*Bunostomum bovis*, n. sp. Posterior end, male, lateral view.

arise asymmetrically from a common trunk with the dorsal ray, they are long and thin and do not approach the edge of the bursa. The dorsal ray is bifurcate as far forward as the origin of the left externo-dorsal, and each branch ends in two or three small points (fig. 147).



TEXT-FIG. 147.—*Bunostomum bovis*, n. sp. Posterior end, male, dorsal ray.

The spicules are thin and tapering, and about 4.5 mm. in length. They lie close together for their whole length and end in fine straight points, which are fused and surrounded by a membranous sheath. There is no gubernaculum.

*Female*.—The vulva is an inconspicuous slit a little in front of the middle of the body, being about 8.5 mm. from the posterior end. The short vagina divides into divergent uteri, which in turn pass into ovaries running towards the anterior and posterior ends of the body. The tail ends in a blunt straight point 0.34 mm. posterior to the anus. The eggs have thin shells and contain a morula, they are 0.072—0.076 × 0.044—0.046 mm.

The points whereby this species is distinguished from other members of the genus are given in a table at the end of the description of *B. cobi* below (p. 168). It is proposed to name this worm *Bunostomum bovis*, n. sp.

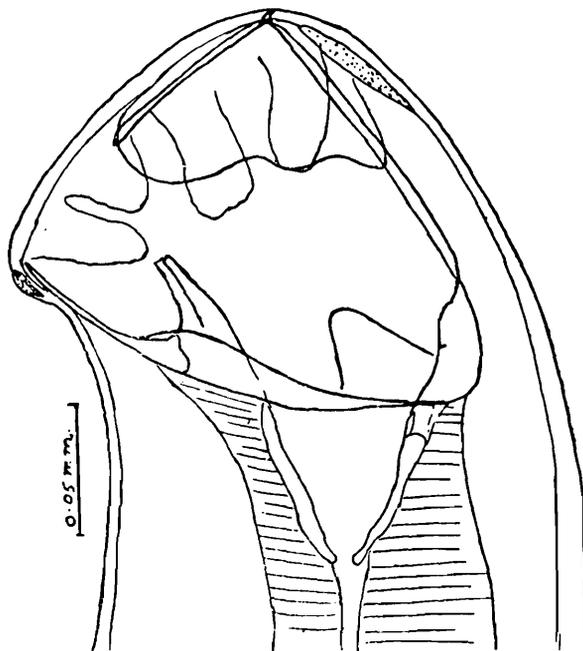
*Host*.—*Bos indicus*.

Type-specimens are in the Indian Museum, Calcutta.

### ***Bunostomum cobi*, n. sp.**

A large collection of these worms were recovered from a Water buck (*Cobus ellipsiprymnus*), from the Calcutta Zoological Gardens.

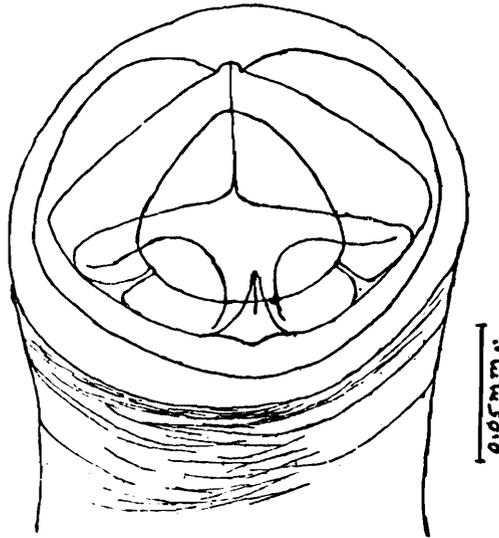
The anterior end is bent dorsally and the cuticle is transversely striated. In its lateral aspect the buccal capsule is distinctly funnel-shaped, being 0.164—0.176 mm. in depth and 0.124—0.128 mm. across its base, which coincides with the mouth opening. The ventral wall is remarkably straight and it forms almost a right-angle with the plate that runs dorsally along the ventral border of the mouth opening. When seen from the side the ventral cutting plates are triangular with a wavy free border and they lie across the angle formed by the two parts of the ventral wall of the capsule (fig. 148). The duct of the dorsal oesophageal



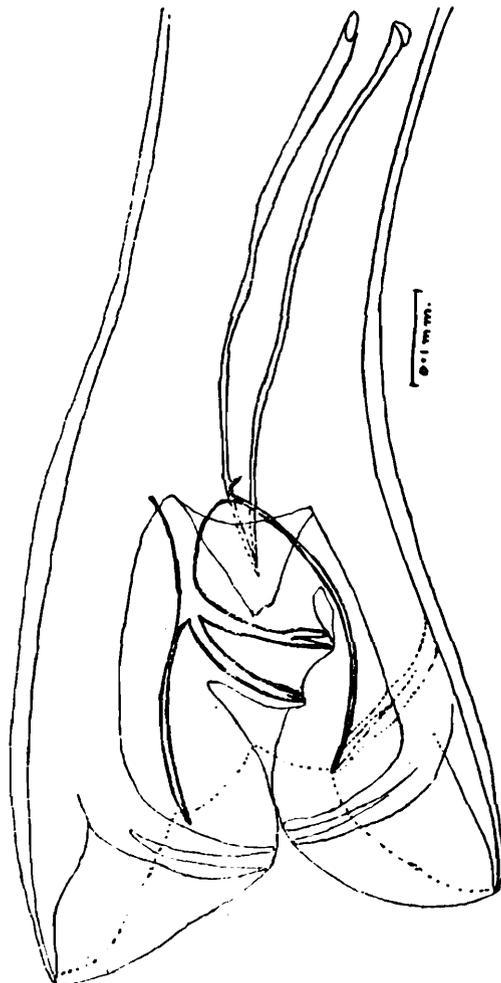
TEXT-FIG. 148.—*Bunostomum cobi*, n. sp. Anterior end, lateral view.

gland is borne on a well-developed cone, which ends in a square-cut blunt tip; the dorsal wall of the cone is only about half the length of the distance from the tip of the cone to the mouth opening. There is a single pair of broad rounded sub-ventral lancets, which may or may not have sharp points on their summits (fig. 148). When viewed from the

dorsal aspect the buccal capsule is slightly oval, being about 0.168 mm. in transverse diameter and about 0.148 mm. dorso-ventrally. The cutting plates are large and in the form of right-angled triangles with the angles rounded. The dorsal cone is pyramidal and it projects beyond the edge of the mouth opening. The mouth opening is pyriform with the apex directed ventrally, and it has a pair of very distinct papillae in its sub-dorsal border (fig. 149). The oesophagus is of the usual club-shaped type, and it is about 0.18—0.2 mm. in length.

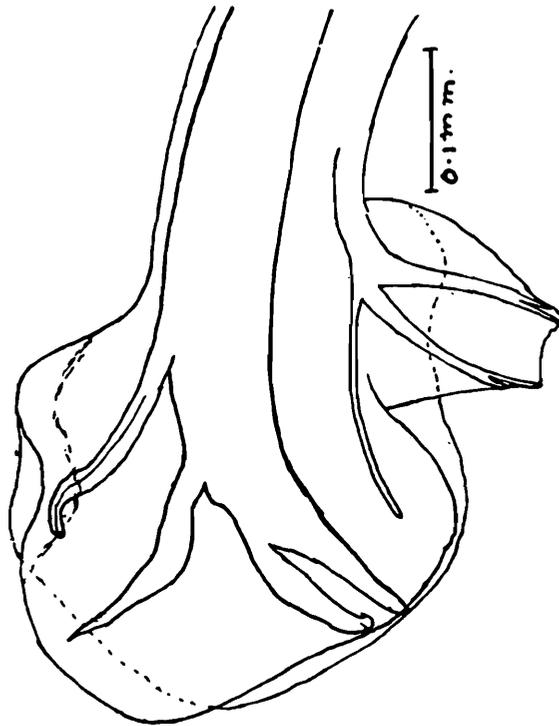


TEXT-FIG. 149.—*Bunostomum cobii*, n. sp. Anterior end, dorsal view.

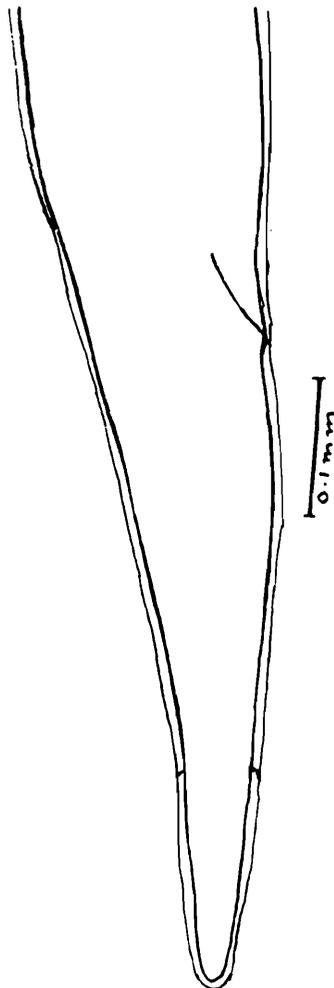


TEXT-FIG. 150.—*Bunostomum cobii*, n. sp. Posterior end, male, dorsal view.

*Male*.—The males measures 8.8—11.4 mm. in length, and 0.29—0.32 mm. in maximum diameter. There is a distinct genital cone surmount-



TEXT-FIG. 151.—*Bunostomum cobbi*, n. sp. Posterior end, male, lateral view.



TEXT-FIG. 152.—*Bunostomum cobbi*, n. sp. Posterior end, female, lateral view.

ed by rounded papillae of varying appearance in different specimens. The bursal rays are typical (figs. 150 and 151), but the dorsal lobe is clearly defined (fig. 151). The spicules are similar to those of *B. trigonocephalum* described by Cameron (1923), and they measure 0.55—0.66 mm. in length (fig. 150).

*Female*.—The females are 15—16 mm. in length, and 0.45—0.5 mm. in maximum diameter. The vulva has slightly prominent lips and it opens 4.2—5.7 mm. from the anterior end. The vagina is short and the uteri are divergent. The tail ends in a straight blunt point 0.37—0.46 mm. posterior to the anus, and the sub-ventral papillae are about 0.15 mm. from its tip (fig. 152). The eggs measure 0.058—0.060 × 0.036 mm.

The characters whereby this species may be distinguished from the other members of the genus are given in the table below. On account of these differences it is proposed to name this worm *Bunostomum cobi*, n. sp.

*Host*.—*Cobus ellipsiprymnus*.

Type-specimens are in the Indian Museum, Calcutta.

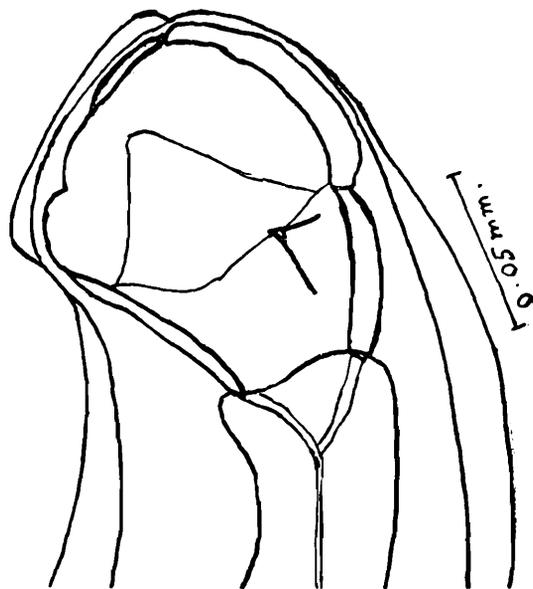
Cameron (1923) carefully revised the genus *Monodontus*, which is now regarded as a synonym of *Bunostomum* and he came to the conclusion that the only two recognizable members of the genus are *B. trigonocephalum* and *B. phlebotomum*. The table has been compiled from Cameron's descriptions and those of my two new species, as it seems the most convenient way of indicating the differences.

	<i>B. trigonocephalum</i> .	<i>B. phlebotomum</i> .	<i>B. bovis</i> .	<i>B. cobi</i> .
Dorsal cone	Pointed; duct opens sub-ventral to tip & dorsal wall longer than distance from tip of cone to mouth opening.	Shorter & blunter; duct opens at tip. Dorsal wall slightly shorter than dist. from tip to mouth opening.	Similar to <i>trigonocephalum</i> in shape, but dorsal wall shorter than dist. from tip to mouth opening.	Tip flat & blunt, and duct opens in centre of tip. Dorsal wall about half dist. from tip to mouth opening.
Teeth	Arise from ventral wall & sometimes a pair of smaller sub-ventral lancets present.	Ventral & sub-ventral lancets always present.	Only ventral lancets present, long & pointed.	A single pair of lancets only, sub-ventral in position.
Ventral cutting plates.	Obtuse angled	?	Narrow with curving free border.	Deep and right-angled.
Mouth opening	Oval; and dorsal cone projects beyond its border.	?	Nearly circular, with dorsal notch into which cone projects.	Pyriform; and dorsal cone projects beyond border.
Spicules, length	0.65 mm.	3.5—4 mm.	4.5 mm.	0.55—0.60 mm.
Bursa	Dorsal rays run towards right, no dorsal lobe.	Dorsal rays run towards left. Small dorsal lobe.	Dorsal rays run towards right, dorsal lobe indistinct.	Dorsal rays run towards right, distinct dorsal lobe.

***Uncinaria longespiculum*, n. sp.**

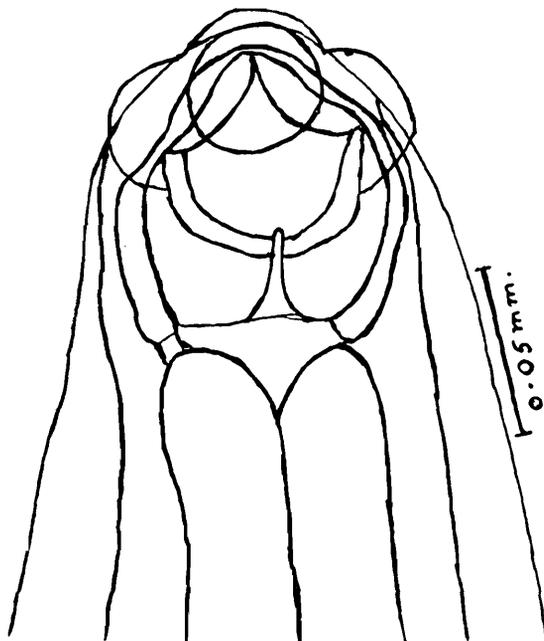
Two males and one female of this species were found in the small intestine of a Civet cat (*Viverricula malaccensis*).

The worms are short and relatively thick, and the head is bent dorsally (fig. 153). The buccal capsule is broad and somewhat funnel-



TEXT-FIG. 153.—*Uncinaria longespiculum*, n. sp. Anterior end, lateral view.

shaped. When viewed laterally the ventral wall of the capsule is seen to consist of three articulated plates, and articulations are also visible

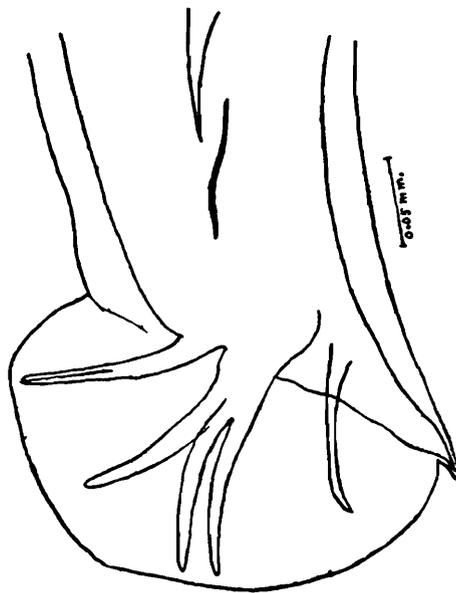


TEXT-FIG. 154.—*Uncinaria longespiculum*, n. sp. Anterior end, dorsal view.

in the lateral walls of the capsule. The mouth opening is circular and it is guarded by two ventral cutting plates. The duct of the dorsal

oesophageal gland opens in the dorsal wall of the capsule about half-way from its base (fig. 154). There are two well-developed triangular teeth arising subventrally from the base of the capsule (fig. 153). The oesophagus is relatively stout and muscular and it ends in a typical bulbar enlargement.

*Male*.—The bursa consists of two broad lateral lobes and a small dorsal lobe imperfectly differentiated. The rays are typical, the ventral rays are cleft for about half their length, the lateral rays arise by a common trunk, and the externo-lateral ray is somewhat widely separated from the two other laterals. The externo-dorsal rays are delicate and they arise by a common trunk with the dorsal. The dorsal ray is bifurcate at its tip and each branch shows three unequal digitations (figs. 155 and



TEXT-FIG. 155.—*Uncinaria longespiculum*, n. sp. Posterior end, male, lateral view.

156). The spicules are long, straight and equal, and there is a gubernaculum.



TEXT-FIG. 156.—*Uncinaria longespiculum*, n. sp. Male bursa, dorsal ray.

*Female*.—The vulva opens a little behind the middle of the body and the uteri are divergent. The tail ends in a blunt tip surmounted by a fine hair-like point. The eggs are oval with thin shells.

TABLE OF MEASUREMENTS.

	Male.	Female.
Length	3.3	4
Diameter, maximum	0.24	0.36
Head, diameter	0.08	0.09
Oesophagus, length	0.42	..
Spicules, length	1.19	..
Gubernaculum, length	0.088	..
Tail, length	..	0.25
Vulva, distance from tip of tail	..	1.7
Eggs	..	0.060 × 0.032

This worm is much smaller than the species *U. criniformis* and *U. stenocephala*. Size alone is not, however, a reliable guide but there are other differences by which it may be distinguished. For example the curve of the ventral wall of the buccal capsule is much more marked in the present species, the spicules are relatively much longer, and there is a well developed gubernaculum. Schwartz (1925) described a third species of *Uncinaria* viz. *U. lotoris*, which differs from my species in the same point as do the above two species. It is therefore proposed to name my species *Uncinaria longespiculum*, n. sp.

*Host.*—*Viverricula malaccensis*.

Type-specimens are in the Indian Museum, Calcutta.

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