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STUDIES ON THE TREMATODE PARASITE OF REPTILES FOUND IN
INDIA CONTRIBUTION TO THE KNOWLEDGE OF BLOOD FLUKES
FROM THE MARINE TURTLES, FROM THE GULF OF MANAR,
SOUTH INDIA

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Spirorchiidae Stunkard, 1921.

Amphiorchiinae Yamaguti, 1958.

Amphiorchis indicum n. sp.

In January, 1967, three specimens of this parasite were recovered for study, from the mesentric capillaries of the intestine of the marine turtle, *Eretmochelys squamosa*. The fluke has an elongated body, rounded at both the ends, measuring 1.9-2.2 mm in length and 0.18-0.20 mm in maximum width attained at the level of the cirrus sac. The cuticle is aspinose. The oral sucker is rounded and terminal in position, measuring 0.5-0.6 mm in diameter. The acetabulum is pedunculated, situated in the middle of the second quarter of the body and measures 0.092-0.096 by 0.044-0.092 mm. The mouth, surrounded by the oral sucker, leads directly into a long oesophagus 0.36-0.43 mm in length, which bifurcates into two intestinal caeca anterior to acetabulum, 0.49-0.52 mm from the anterior end of the body. The caeca terminate blindly at a short distance from the posterior extremity.

The excretory bladder is "Y"-shaped, the pore being situated at the caudal extremity.

The testes, two in number, are lobed, the anterior being smaller than the posterior one. The anterior testis which is placed in front of the external seminal vesicle measures 0.094-0.114 by 0.060-0.061 mm. The posterior testis is elongated, situated behind the ovarian complex, measuring 0.193-0.270 by 0.067-0.109 mm. The cirrus sac is well-developed, elongate, measuring 1.98-2.13 mm and is situated in the post-equatorial zone. It encloses within it, a vesicula seminalis interna, a ductus ejaculatorius covered over by prostatic glands and a small cirrus. The external seminal vesicle is placed in between the ovary and the anterior testis and is connected to the seminal vesicle interna by a small duct.

The slightly lobed ovary 0.11-0.14 by 0.06-0.08 mm is placed beside the anterior margin of the cirrus sac. The oviduct emerges out from the ovary and meets with the duct of the receptaculum seminis. The vitellaria are follicular and extend along the lateral margin along the caeca from the intestinal bifurcation to the caudal end. Uterus is short.

DISCUSSION

It is interesting to note that the genus *Amphiorchis* is for the first time being reported from India. Of the known species of *Amphiorchis*, *Amphiorchis amphiorchis* Price, 1934 and *Amphiorchis lateralis* Oguro, 1938 in the form of the body and disposition of the gonads, but it can be readily differentiated from it on the following grounds:

1. In *Amphiorchis lateralis* Oguro, 1938 the ovary is posterior to the genital pore, whereas, in the new species it is lateral to the genital pore.
2. The receptaculum seminis is immediately posterior to the ovary in the new species, while it is posterior to the right of the ovary in *Amphiorchis lateralis*.
3. There is a simple external seminal vesicle, placed immediately posterior to the anterior testis in the new species but in *Amphiorchis lateralis*, the external seminal vesicle is divided into two parts.

In view of the above differences, the writers feel justified in creating a new species for the worm under discussion and designate it as *Amphiorchis indicum* n. sp.

Host: *Eretmochelys squamosa*.

Habitat: Intestine.

Locality: Pamban, Gulf of Manar, South India.

***Shobanatrema shobanae* n. g., n. sp.**

This fluke was collected on numerous occasions from the mesenteric capillaries of the large intestine of two marine turtles, *Caretta caretta*.

The body of the distome is thin, narrow and elongate, measuring 2.33-2.91 mm in length, and 0.23-0.25 mm in maximum width attained at the equatorial region of the body. The cuticle is armed with minute spines. The sub-terminal oral sucker is oval, measuring 0.05-0.08 by 0.03-0.06 mm. The acetabulum, placed 0.71-0.84 mm from the anterior end of the body, is oval, membranous, measuring 0.05-0.07 by 0.04-0.08 mm. The oesophagus 0.34-0.38 mm long, is narrow and surrounded by the salivary gland cells. The oesophagus divides into two simple, thin intestinal caeca, 0.36-0.48 mm from the anterior end. The caeca pass downwards, laterally and unite in the caudal region of the body, 0.35-0.43 mm from the posterior end to form a single caecum.

The excretory opening is terminal and the bladder is "V" shaped. The anus could not be traced due to the large vitelline follicles.

The testes, two number, are oval with entire margins, with ovary in the middle and occupy the intercaecal space. The anterior testis is placed, just below the acetabulum, in the anterior half of the body and the posterior one is situated in the posterior half of the body. The former is smaller than the latter and the two measure 0.11-0.19 by 0.09-0.15 mm and 0.13-0.25 by 0.11-0.16 mm respectively. The cirrus sac situated between ovary and the anterior testis, is retort-shaped and measures 0.10-0.22 mm in length and 0.08-0.09 mm in width at the base. The seminal vesicle fills the basal part and is followed by the tubular pars prostatica covered over by prostatic cells. The ductus ejaculatorius occupies the narrow terminal part of the cirrus sac. The genital pore is on the inner margin of the left caecum below the anterior testis.

The ovary is oval, with entire margin, inter-testicular, just above the equatorial plane. It measures 0.13-0.19 by 0.08-0.16 mm. The Mehlis' gland mass is situated below the ovary in the middle of the yolk reservoir and the longitudinal yolk duct (Fig 2). The vitellaria are distributed mostly in the post-equatorial region of the body. A few acini are also found anterior to the testis and acetabulum. The longitudinal yolk ducts, from the posterior as well as anterior groups, unite to form the yolk reservoir, just below the ovary. The ovum was not observed.

DISCUSSION

Of all the known genera of the Sub-family spirorchinae Yamaguti, 1958 the newly found distome is closely related to the genus *Amphiorchis* Price, 1934, due to the general disposition of the gonads and the vitellaria but the new form is sharply marked off from *Amphiorchis* by the following characters:

1. The caeca unite to form a small median caecum, in the posterior end of the body in the new species but in *Amphiorchis* they end blindly, without uniting.
2. The genital pore is immediately pre-ovarian in *Amphiorchis* while it is pre-testicular i.e. front of the anterior testis in the new genus.
3. The receptaculum seminis is lacking in *Shobanatrema* n. g., whereas, in *Amphiorchis* it is present.

In view of these marked differences, the authors are justified in establishing a new genus for the reception of the new-found fluke. It is proposed to name it *Shobanatrema* n. g., and designate the type species as *Shobanatrema shobanae* n. sp. in honour of the junior author's mother, Shobana.

Generic Diagnosis: Body narrow, elongate; oral sucker oval; acetabulum oval, membranous; oesophagus long; caeca unite in the caudal region; excretory bladder "V"—shaped; testes oval; no external seminal

vesicle; cirrus sac between ovary and anterior testis; genital pore below anterior testis; ovary inter-testicular; receptaculum seminis lacking; vitellaria mostly in post-equatorial region, a few acini in acetabular zone.

Type species: *Shobanatrema shobanae* n.g., n.sp.

Specific Diagnosis:

Specific Diagnosis:

Characters as defined above.

Host: *Caretta caretta*.

Habitat: Large intestine.

Locality: Pamban, Gulf of Manar, South India.

Haplotrematinae Poche, 1926.

The material on which the account of this genus is based, was collected in January, 1967 from the blood vessel of a marine turtle, *Chelone mydas*. In all only two specimens were available for study. The trematode which appeared like *Haplotrema* Looss, 1899 and *Coeuritrema* Mehra, 1933, could not be assigned to them, on detailed examination. A new genus and species is erected for the reception of this blood fluke.

The body of the distome is elongate, flat, attenuated at the anterior end and rounded at the posterior end. The cuticle is aspinose and the parasite measures 1.62-1.97 mm in length and 0.11-0.31 mm in maximum width, attained at the equatorial region of the body. The oral sucker is terminal measuring 0.05-0.07 by 0.04-0.05 mm. The acetabulum, which is placed in the anterior region of the second quarter of the body, is smaller than the oral sucker and measures 0.036-0.040 by 0.040-0.070 mm. The mouth, which is surrounded by an oral sucker, leads directly into a long and narrow oesophagus 0.19-0.30 mm in length which bifurcates anterior to the acetabulum 0.31-0.34 mm from the anterior end of the body into two saccular intestinal caeca which run along the lateral margins of the body and reach the caudal end.

The excretory bladder is "Y"-shaped and opens to the exterior at the hind end of the body, through the medianly placed excretory pore.

The testes are deeply lobed, showing distinct lobes, intercaecally placed: the anterior testis is situated just posterior to the acetabulum and the posterior one is placed in the middle of the 3rd quarter of the body. The anterior testis is smaller than the posterior one measuring 0.062-0.098 by 0.110-0.150 and 0.13-0.21 by 0.13-0.17 mm respectively. A very small and elongate cirrus sac, lies transverse to the body, situated in between the ovary and the anterior testis measuring 0.109-0.120 mm in length. It encloses within it, a small seminal vesicle, a ductus ejaculatorius and the

cirrus. The genital pore is situated sinistrally at the inner margin of the left caecum.

The ovary placed between the testes, is deeply lobed and is nearer to the anterior testis. It measures 0.104-0.180 by 0.109-0.170 mm. A narrow oviduct, arising from the inner margin, descends down a little, to open at the ootype which also receives the vitelline duct. Laurer's canal was not discernible even in the live specimen. The vitellaria are well-developed, follicular, distributed between the intestinal bifurcation and the posterior end of the body. It completely fills all the available space, leaving only the testes, ovary, cirrus sac and the acetabulum. Eggs were not observed in the uterus.

DISCUSSION

The new genus, *Satyanarayanotrema satyanarayani* finds its closest ally with the genus *Hapalotrema* Looss, 1901 in the shape of the body and in the disposition of the gonads, but it can be readily differentiated from it in the following main characters:

1. In the genus the testes are lobed and two in number, whereas in *Hapalotrema* the testes are numerous and divided into two groups.
2. The vitellaria are present laterally and extend from the hind end of the body up to the caecal bifurcation, whereas, in the new genus described above they are well-developed, occupy whole of posterior region of the body, and extend up to the caecal bifurcation taking a lateral course.
3. The cirrus sac is very small, sandwiched between the ovary and anterior testis and is obliquely placed whereas, it is comparatively large in *Hapalotrema*.
4. The caecal bifurcation is much anterior to the acetabulum in the new genus, whereas it is immediately in front, in *Hapalotrema*.
5. Receptaculum seminis is present in the new genus but it is absent in *Hapalotrema*.

In view of the distinguishing characters, exhibited by the fluke, it is considered new to science and is designated as *Satyanarayanotrema satyanarayani* n.g., n.sp. in honour of Prof. Satyanarayan Singh, Professor Emeritus, Osmania University, Hyderabad

Generic Diagnosis:

Body elongate, flat, pointed anteriorly, blunt posteriorly; acetabulum smaller than the oral sucker; prepharynx and pharynx absent; intestinal caeca reach the caudal end; testes deeply lobed; cirrus sac small and elongate, encloses a small vesicula seminalis, ductus ejaculatorius and a cirrus; genital pore situated sinistrally on the inner margin of the left caeca;

ovary deeply lobed; receptaculum seminis present; vitellaria follicular; completely fill the available space leaving the gonads, cirrus, and the acetabulum; eggs not observed

Satyanarayanotrema satyanarayani n. g., n. sp.

Specific Diagnosis :

Characters as defined above.

Host : *Chelone mydas*.

Habitat : Blood vessel.

Locality : Pamban, Gulf of Manar, South India.

Enterohaemotrema Mehra, 1940.

Syn. *Hepatohaemotrema* Simha, 1958.

Enterohaemotrema hepaticum Simha, 1958.

The authors collected a large number of these distomes from the liver and kidney of the fresh water turtles, *Kachuga kachuga*. It is for the first time that this parasite is found to be parasitising the Kidney. The authors feel that *Hepatohaemotrema* Simha, 1958 is a synonym of *Enterohaemotrema* and Simha, 1958 for *Hepatohaemotrema*. The writers have nothing new to add to the description given for this worm by Simha (1958).

Host : *Kachuga kachuga*.

Habitat : Liver and Kidney.

Locality : Hyderabad (A. P.), India.

Cheloneotrematinae n. sub. fam.

Cheloneotrema testicaudata n. g., n. sp.

In September, 1967, a solitary specimen of this distome was recovered from the intestine of one marine turtle, *Chelone mydas* caught from the Gulf of Manar, off the coast of Pamban, South India

The body of the fluke is transparent, dorsoventrally flattened, elongate, measuring 1.6 mm in length and 0.21 mm in width. The cuticle is armed with minute backwardly directed spines. The oral sucker is small, oval in outline, sub-terminal in position, measuring 0.06 by 0.05 mm. The acetabulum is strongly muscular, larger than the oral sucker, a little more than double the size of the latter, situated anteriorly in the middle third of the body. It measures 0.14 by 0.11 mm. The mouth, enclosed by the oral sucker, leads into a sinuous oesophagus, measuring 0.16 mm in length which bifurcates at 0.2 mm from the anterior end into two simple intestinal caeca. The intestinal caeca pass downwards laterally on either side of the body, to terminate in the caudal region of the body.

The excretory pore is sub-terminal in position and the bladder is "Y" shaped with a short median stem. The anterior limbs of the bladder were not discernible.

The testes, two in number, intercaecal in position, are lobed and are widely apart from each other. The anterior testis is situated at the equatorial level of the body and the posterior testis is situated at the caudal end. The latter is slightly smaller than the former and the two measure 0.20 by 0.13 mm and 0.27 by 0.15 mm respectively. The external seminal vesicle is oval in shape, placed immediately posterior to the anterior testis, measures 0.07 by 0.05 mm. The cirrus sac, measuring 0.54 mm in length, is much elongated, having a club-shaped basal portion and a long, somewhat sinuous tubular portion extending from the posterior level of the anterior testis to the posterior level of the posterior testis. It is situated lateral to the ovary and the posterior testis. The large internal seminal vesicle fills the basal part of the cirrus sac and is followed by a tubular pars prostatica, surrounded by prostatic cells. The ejaculatory duct occupies the terminal part of the cirrus sac. The genital pore is posterior to the posterior testis, anterior to the bifurcation of the excretory vesicle.

The ovary, slightly lobed, inter-testicular in position measures 0.12 by 0.10 mm. The receptaculum seminis, lies posteriorly to the ovary, measures 0.071 by 0.085 mm. The oviduct arises from the left margin of the ovary. The Mehlis' gland mass surrounding the cotype, lies behind the tubular duct of the cirrus sac. The metraterm runs ventral to the posterior testis to open at the genital pore. A single large ovum, pointed at the ends, is found in the anterior part of the uterus measuring 0.090 by 0.004 mm. The vitellaria are composed of large follicles, commencing a little posterior to the intestinal bifurcation. They fill the pre-acetabular space and extend posteriorly taking a lateral course, overstepping the caeca, some follicles even extending intercaecally. They unite just posterior to the posterior testis, forming a "U" round the posterior testis. The transverse vitelline duct arises at the posterior margin of the ovary and is clearly seen in the live specimen.

DISCUSSION

The blood fluke, recovered from the mesenteric capillaries of the intestine of the marine turtle *Chelone mydas*, could not be assigned to any of the known genera of blood flukes, due to the characters mentioned below:

1. There are two big testes, lobed with ovary placed in between them.
2. The posterior testis is caudal in position.
3. The vitellaria form a "U" round the posterior testis.
4. The genital opening is posterior to the posterior testis.

- 5 The cirrus sac is long and extends from the posterior level of the anterior testis to the posterior level of the posterior testis.

In view of these differences the writers are justified in erecting a new genus *Cheloneotrema* for its reception and designate that species as *Cheloneotrema testicaudata* n. g., n. sp. It is also proposed to establish a new subfamily Cheloneotrematinae for the reception of the genus *Cheloneotrema*.

Sub-family Diagnosis :

Body elongate, dorsoventrally flattened and transparent; cuticle spinose; oral sucker small, oval and sub-terminal; acetabulum large, strongly muscular; oesophagus sinuous; intestinal caeca extend to caudal region; excretory pore sub-terminal, excretory bladder "Y" — shaped; testes lobed, widely apart from each other; cirrus sac elongate with club-shaped basal portion and sinuous tubular portion; seminal vesicle large; ovary lobed, inter-testicular in position; vitellaria with large follicles; ovum single and large.

Generic Diagnosis : Characters as defined in Sub-family diagnosis

Type Genus : *Cheloneotrema* n. g.

Type Species : *Cheloneotrema testicaudata* n. g. n. sp.

Host : *Chelone mydas*

Habitat : Mesenteric capillaries

Locality : Pamban, Gulf of Manar, South India.

SUMMARY

1. A new species of *Amphiorchis* has been described from the mesenteric capillaries of the intestine of *Eretmochelys squamosa* and compared with its nearest ally *Amphiorchis lateralis* Oguro, 1938.
2. A new genus and species *Shobanatrema shobanae* is described and compared with its allied genus *Amphiorchis* Price, 1934.
3. A new genus and species, *Satyvanarayanotrema satyanarayani* has been described and compared with its allied genus *Hapalotrema* Looses, 1899.
4. *Cheloneotrema testicaudata* n. g., n. sp. is described in detail. A new sub-family Cheloneotrematinae is established for the reception of this genus.
5. *Hepatohacmotrema* Simha, 1958 is considered as a synonym of *Enterohacmotrema* Mehta, 1940 and has been reported from the kidney of the fresh water turtle, *Kachuga kachuga*.

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REFERENCES

- LEARED, A. 1862. "Description of a new parasite found in the heart of the edible turtle". *Quart. Jour. Micr. Soc. London* 2, 160-170.
- LOOSS, A. 1899. "Weitere Beiträge zur Kenntnis der Trematoden fauna Aegyptens zugleich Versuch einer natürlichen Gliederung des Genus *Distomum retzius*". *Zool. Jb. Syst.* 12, 521-784. (W.L. 23831).
- LUHMAN, M. 1935. "Two new trematodes from the loggerhead turtle (*Caretta caretta*)". *J. Parasit.* (4): 274-276. (W.L. 16035).
- MEHRA, H.R., 1933. "New blood flukes of the family Spirorchidae from Indian fresh water tortoises, with discussion on the systematic position of the genus *Coeuritrema* n.g. and the relationships of the families of blood flukes. Part I". *Bull. Acad. Sci. Unit. Prov.* 2: 203-222. (W.L. 3691c).
- MEHRA, H.R., 1939. "New blood flukes of the family Spirorchidae Stunkard (Trematoda) from the marine turtle *Chelone mydas* of the Arabian Sea with observations on the synonymy of certain genera and classification of the family". *Proc. Nat. Acad. Sci. India.* 9 (4): 155-167. (U.L. 16820a).
- ORURO, Y., 1938. "A new blood fluke *Amphiorchis lateralis* nov. sp. (Spirorchidae) found in a marine turtle in Japan". 6, 1-4. *J. Sci. Hiroshima Univ. Series B, Division I, Zoology.* (M.L. 11502 g).
- OZAKI, X., 1939. "A new blood fluke *Hapalorhynchus yoshidaei*". *Vol. Jubil. Pro. Prof. Yoshida* 1, 20-35.
- PRICE, E.W., 1934. "New genera and species of blood flukes from a marine turtle, with a key to the genera of the family Spirorchidae". *J. Wash. Acad. Sci.* 24 (3): 132-141. (W. L. 11600).
- SKRJABIN, K.I., 1951. "Trematodes of Animal and Man. Principles of Trematology". Vol. V., pp. 624. Publication Acad. U.S.S.R. Moscow. Leningrad.
- STUNKARD, H.W., 1921. "Notes on North American Blood flukes". *Am. Mus. Novit.* 12, 1-5.
- STUNKARD, H.W., 1923. "Studies on North American Blood flukes". *Bull. Amer. Mus. Nat. Hist.* Ser. 165-221 pls. ii-xiii (W.L. 3768).
- TAKEUTI, E., 1942. "New blood flukes of the family Spirorchidae from Japanese fresh water tortoise and marine turtles". *Jap. J. Med. Sci. VI. Bact. & Parasit.* 2 (3), 161-174. (W.L. 10831 r).
- THAPER, G.S. 1933. "New blood fluke from an India tortoise, *Trionyx gangeticus*". *J. Helminth.* 11 (3) 163-168, 3 figs (W.L. 11224 c).
- YAMAGUTI, S. 1958. "Systema Helminthum", 1 (1), (2), 1-979, 980-1575. Interscience Publishers Inc. New York.

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- Fig. 4. *Chelonectrema testicaudata* n.g., n.sp. (Dorsal view).

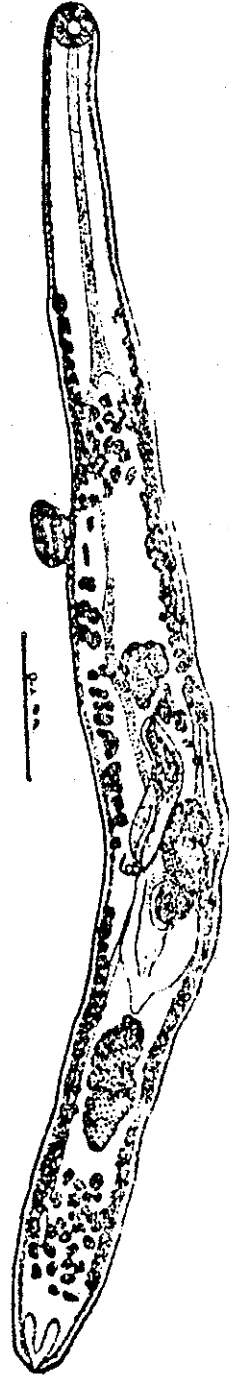


Fig. 1. *Amphiorchis indicum* n.sp. (Ventral view).



Fig. 2. *Shobanatrema shobanae* n.g., n.sp. (Ventral view).

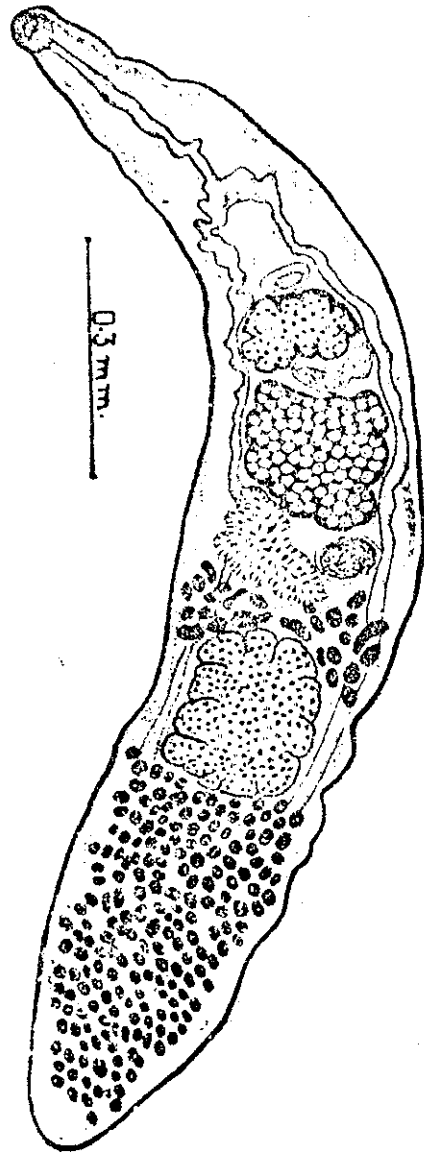


Fig. 3. *Satyanarayanotrema satyanarayoni* n.g. n.sp. (Dorsal view)

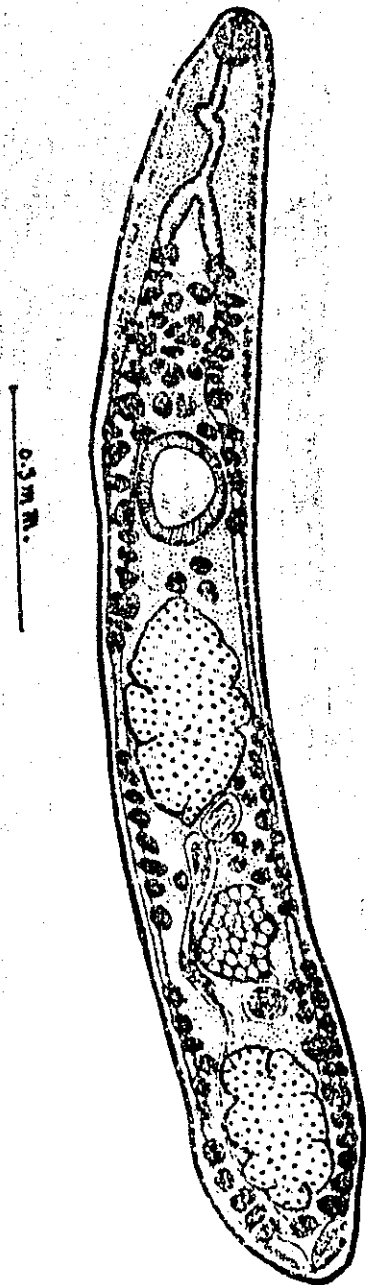


Fig. 4. *Chaloneotrema testiaudata* n.g., n.sp. (Dorsal view).