

CLINOSTOMID TREMATODES AS ABERRANT PARASITES IN THE MOUTH OF THE DOMESTIC CAT (*FELIS CATUS* *DOMESTICUS*)

R. J. ORTLEPP, Veterinary Research Institute, Onderstepoort

The parasites forming the subject of this study were recovered from domestic cats on two separate occasions: (a) Worms collected by Mr. D. R. Smith, Durban, Natal, from the gums of a cat; several transverse sections of four trematodes were available for examination, and (b) eleven entire specimens collected from the mouth of a cat by Dr. C. J. Coetzee,* Senior State Veterinarian at Lydenburg, Transvaal. The following information accompanied the specimens:—

“An Indian resident at Badfontein brought in a male domestic cat in fairly good condition with the information that it had worms in its mouth. Examination revealed a granulomatous growth in the soft tissues under the tongue along the frenulum linguae. Parasites resembling maggots were present in the growth; they were firmly attached and were consequently forcibly removed with forceps. Close examination showed that they were not maggots.”

The following description is based on the Lydenburg specimens.

Clinostomum falsatum sp. nov.

The parasites were killed and fixed in 10 per cent formalin after removal. Upon examination they proved to be a species of trematode. As they were too thick and opaque for immediate identification, frontal, sagittal and horizontal serial sections were cut. From these it was possible to classify them as belonging to the family Clinostomidae.

In the preserved worms the unspined body has a pinkish colour and varies in length from 4.1 to 4.6 mm; in profile they are somewhat club-shaped, with a narrower neck portion and a thicker abdominal portion (Fig. 1). In some worms the neck portion is more or less straight whereas in others it is bent ventralwards, its length varies according to the stage of contraction, but in general it forms about one-third of the total length of the body. The abdominal portion is flattened to slightly concave ventrally and is traversed by a number of transverse ridges which are probably due to contraction. Dorsally it is dome shaped and smooth.

* The writer wishes to express his thanks to Dr. Coetzee for placing this material at his disposal.

CLINOSTOMID TREMATODES IN MOUTH OF DOMESTIC CAT

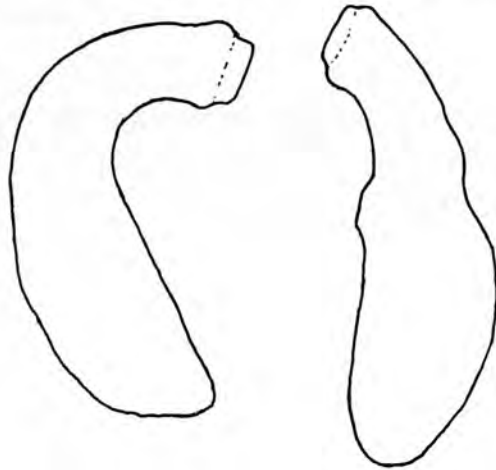


FIG. 1.—*Clinostomum falsatum* sp. nov.
Lateral profiles showing ventral curva-
ture of anterior end.

The ventral sucker is situated at the junction of the neck and abdominal portions. In some specimens its external opening is partially closed, measuring only 0.16 mm across while in others it is wide open, measuring up to 0.48 mm across and occupying a considerable portion of the body width. The distance from the anterior body end to the front edge of the sucker varies from 1.2 to 1.6 mm. At the head end the body is from 0.62 to 0.83 mm across; from here the neck increases gradually in width so that at the level of the middle of the ventral sucker its width is from 0.8 to 1.1 mm.

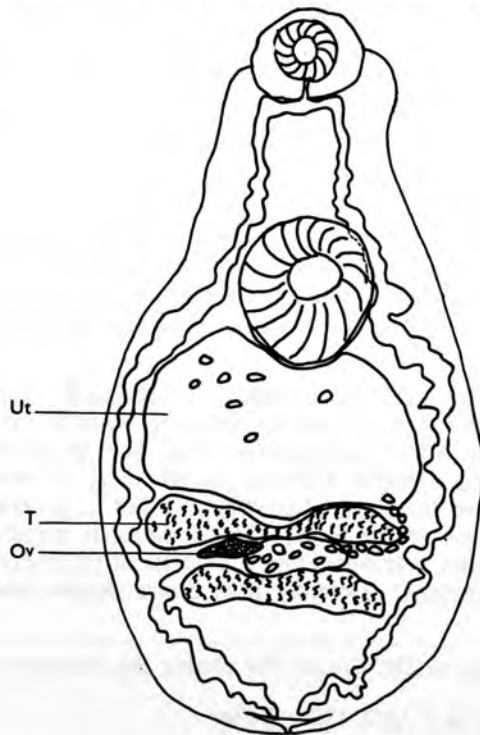


FIG. 2.—*Clinostomum falsatum* sp. nov.
Horizontal section. Ov=ovary. T=
testes. Ut=uterine sac.

In horizontal and sagittal sections the retracted oral sucker has a globular shape and is only slightly wider than deep; its width varies from 0.297 to 0.312 mm and its depth is about 0.24 mm. In some specimens it is fully extruded and then has the shape of an open saucer. From the base of the sucker a very short oesophagus (? non-muscular pharynx) with slightly thickened walls leads to the junction of two intestinal limbs. It is only about 0.125 mm long and 0.09 mm in diameter and its slightly muscular wall is 0.025 mm thick. The proximal portions of the intestinal limbs have a transverse position and are slightly shouldered in the anterior direction (Fig. 2). From the shoulders they extend backwards, being more or less parallel to each other in the neck region. After the neck region they swing outwards and backwards passing laterally of the ventral sucker and genital organs and reach almost to the posterior end of the body. They are wavy and sacculated with irregularly placed trabeculae in the lumen. The lumen is lined by cilia up to 0.02 mm long. No connections are seen between the terminal portions of the intestinal limbs and the small and terminally placed V-shaped excretory bladder.

The ventral sucker is large with a transverse diameter of 0.7 to 0.9 mm which is nearly three times as large as the oral sucker; it is deeply sunken into the body surface so that the body thickness along its dorsal surface is only about

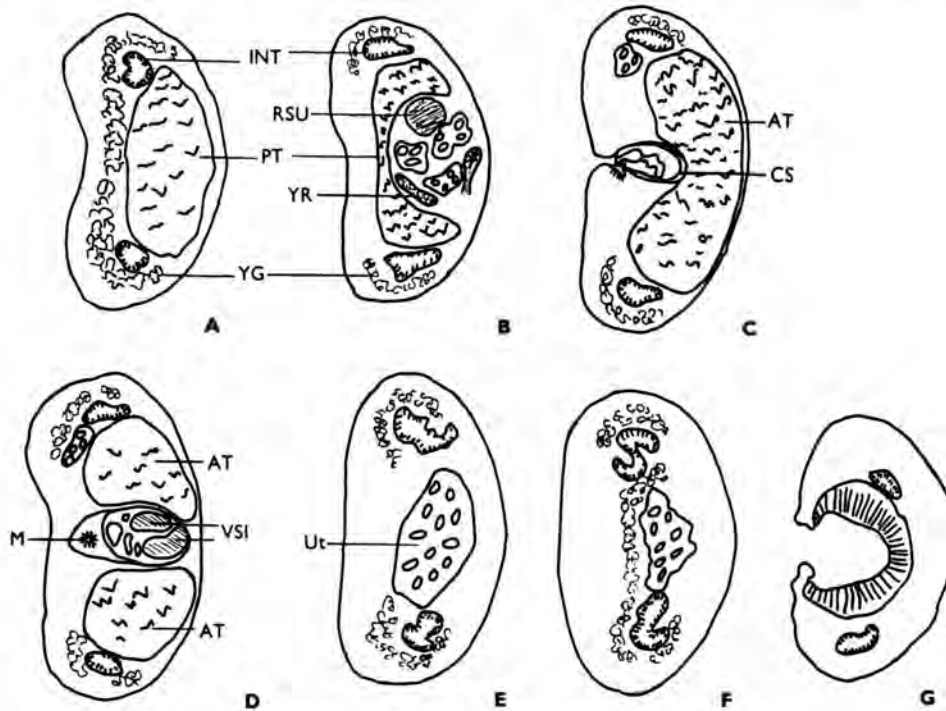


FIG. 3.—*Clinostomum falsatum* sp. nov. Transverse sections: A=through posterior portion of posterior testis; B=through anterior portion of posterior testis; C=through posterior portion of anterior testis; D=through anterior portion of anterior testis; E=anterior portion of anterior testis; F=just behind ventral sucker; G=through ventral sucker; AT=anterior testis; Cs=Cirrus sac; INT=intestine; M=metraterm; PT=posterior testis; RSU=receptaculum seminis uterinum; VSI=vesicula seminalis interna; YG=vitelline glands; YR=yolk reservoir.

CLINOSTOMID TREMATODES IN MOUTH OF DOMESTIC CAT

one-third, or less, of that immediately in front of it. The anterior half of the abdominal body portion is filled by the relatively enormous distal end of the uterus which is greatly distended and forms a kind of uterine sac filled with numerous eggs. This uterine sac extends forwards to the posterior border of the ventral sucker while in some specimens it passes further forwards along the lateral borders or even dorsally of this sucker. This distension is responsible for the convex dorsal surface in this part of the body. The male and female glands placed almost midway between the ventral sucker and the posterior end, occupy about half the intercaecal area behind the uterine sac and the end of the body. The two testes lie one behind the other; they are flattened and transversely elongated with their outer surfaces somewhat irregular due to pressure exerted by the uterus and the genital organs. The anterior testis is about 1.3 mm broad, 0.52 mm thick and 0.3 mm long, the posterior testis is smaller, about 1.1 mm broad, 0.48 mm thick and 0.2 mm long. The dimensions and the shape of the testes are, however, subject to marked variation. In the sections of one worm the anterior testis is in the form of an irregular L, the long limb extending forwards laterad of the uterine sac, while the short limb is compressed to a thin sheet across the body, terminating laterally in a thickened knob. Generally the dorsal face of the anterior portion of the posterior testis is indented by pressure from the proximal portions of the uterus and the female genital ducts (Fig. 3B); the ventral surface of the anterior portion of the anterior testis is indented and split by the cirrus sac and the uteroduct, which occupy the area between the two horns so formed (Fig. 3C and D). In transverse sections through the posterior regions of these indentations the testes have a dumb-bell shape (Fig. 3B and C). The somewhat oval ovary, about 0.37 mm broad and 0.2 mm long, is situated

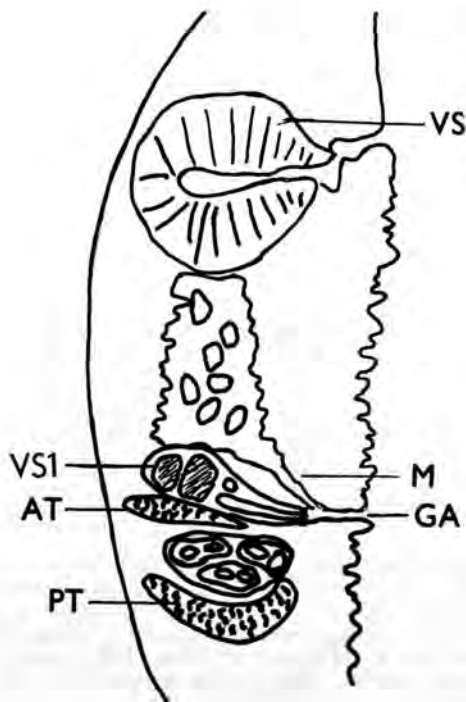


FIG. 4.—*Clinostomum falsatum* sp. nov. Sagittal section. Lettering as for Fig. 3. GA = genital opening. Vs = ventral sucker.

in the intertesticular space to the right of the midline. A striking feature is the great development of a receptaculum seminis uterinum; in some sections it fills most of the area between the testes. The inconspicuous median opening of the genital atrium is situated either in the same zone, as, or just anterior to, the anterior testis; into it opens a short, large metraterm arising from the distal end of the uterine sac and the centrally placed cirrus sac just behind the opening of the metraterm (Fig. 4). The large muscular cirrus sac passes inwards to near the dorsal surface. As it is generally partially folded on itself its length cannot be determined accurately. It is somewhat pear-shaped, from 0.5 to 0.6 mm long, with a maximum diameter of 0.14 to 0.16 mm near its inner end; its distal

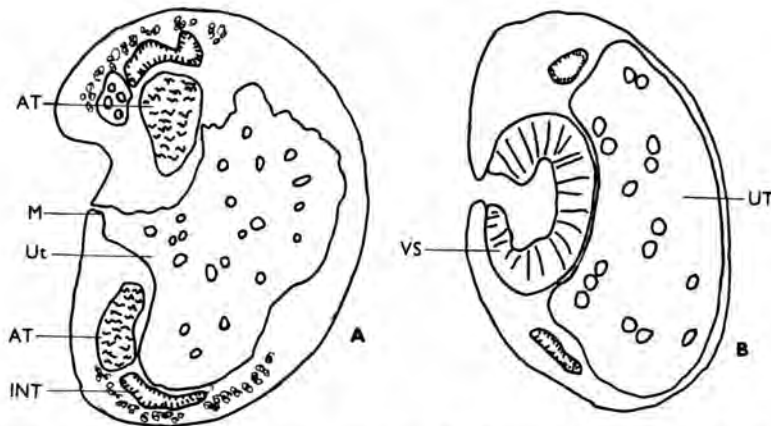


FIG. 5.—*Clinostomum* sp. Transverse sections: A=through level of metraterm opening; B=through ventral sucker; Vs=ventral sucker. Other lettering as for Fig. 3.

portion contains a convoluted and well developed internal vesicular seminalis; the retracted cirrus carries no cuticular bosses on its inner surface.

Numerous eggs are present. They are from 0.095 to 0.116 mm long and 0.065 to 0.074 mm in thickness, oval, operculated and not embryonated.

The yolk glands are well developed, their follicles occupying most of the lateral portions of the body from the level of the ventral sucker to the posterior end. At the posterior end the follicles are scattered throughout the whole thickness of the body, and are also present along the ventral surface of the last quarter of the posterior testis. Along the lateral borders the follicles extend inwards between the sacculations of the intestines. Immediately behind the ventral sucker a narrow ventral bridge of follicles connects the two lateral bands of yolk glands (Fig. 3F).

Host: *Felis catus domesticus*

Location: Mouth

Locality: Lydenburg, Transvaal

Types: In Onderstepoort helminthological collection.

DISCUSSION

To date very few cases of clinostomid trematodes as parasites in the oral cavity of domestic cats have been recorded. *C. abdoni* Tubangui and Garcia (1939) is described from the Philippines and *C. kalappahi* Bhalerao (1947) from India. The parasites described by Bhalerao were collected by veterinary surgeon Belliappa who forwarded them to Dr. Bhalerao. Belliappa (1944/45) stated that 21 worms were attached on both sides of the frenum linguae. The cat had shown symptoms of gnawing and salivation a year previously. He mentions another case where 40 parasites were attached to the frenum linguae and to the sides of the mouth. The body shape of the African *C. falsatum* shows some resemblance to that of *C. abdoni*, as figured by Tubangui and Garcia. In both species the body consists of a narrow anterior portion and a thicker abdominal portion, the thickening in both instances being due to the voluminous uterine sac. In *C. abdoni* the testes are very much smaller with a transverse breadth of only 0.4 mm. Their shape being kidney-shaped, is also quite different, and the genital aperture is anterior to the testes. In addition the uterine sac does not reach the ventral sucker. The original description of *C. kalappahi* is not available but according to the information given in Helminthological Abstracts (Bhalerao, 1947) it has a collar which is not continuous ventrally behind the oral sucker and the anterior testis is U-shaped. This information, however, is too incomplete to allow for further comparisons.

From the available literature it would appear that *C. falsatum* differs from all the known species of the genus in the following respects: The combined characters of small body size; smooth cuticle; large ventral sucker; flattened testes; enlarged uterine sac which reaches to and which may extend laterad and dorsad of the ventral sucker; the genital opening situated in the midline. These characteristics do not fit into any of the keys provided by Baer (1933), Price (1938), Jaiswal (1957) or Agarwal (1959). It is consequently described as a new species having specific diagnosis.

Specific Diagnosis

Clinostominae: Small worms not exceeding 5 mm in preserved specimens. Body divided into an anterior thinner and a posterior thicker portion. Cuticle not spined. Ventral sucker large, about three times diameter of oral sucker, occupies most of second quarter of body. Uterine sac well developed, extending from anterior testis to base of ventral sucker and even dorsal to this sucker. Testes transversely elongate, somewhat disk-shaped, much broader than long, occupying median area of body behind ventral sucker. Cirrus sac large, median with well developed vesicula seminalis interna. No bosses seen on cirrus. Ovary oval, somewhat flattened, situated to the right of the midline between testes. Well developed receptaculum seminis uterinum. Metaterm short. Opening of genital atrium median. Eggs numerous, oval, up to 0.116 mm long and 0.074 mm broad. Well developed yolk glands not radially arranged, extending beyond intestinal caeca at the end of the body. Caeca somewhat sacculated and not opening into the V-shaped excretory vesicle.

Clinostomum sp.

The transverse sections of the worms collected from a domestic cat in Durban are also referred to this genus. The sections show them to be closely related to, if not co-specific with, *C. falsatum*. From the sections (Fig. 5) it is seen that the

opening of the genital atrium is somewhat median in position and at the same transverse level as the anterior testis. The metraterm is short and leads into a voluminous uterine sac extending dorsal to the ventral sucker. The anterior portion of the anterior testis is split to form two short horns directed forwards.

The life history of clinostomid trematodes involves two intermediate hosts, firstly a snail in which the cercaria develop and secondly a fish or amphibian into which the cercaria penetrate and develop into large metacercaria. These metacercaria show most of the anatomical features of the adult. The final host is normally a fish-eating bird. In *C. vanderhorsti* Ortlepp, 1935, the metacercaria were found in the fresh water fish *Gnathonemus macrolopidotus*. They developed to maturity within eight days in a heron, *Ardea melanocephala*. In *C. complanatum* (Rud.), Yamaguti (1933) found mature adults in a heron 45 hours after feeding it with the metacercaria. *C. falsatum* is probably also normally a parasite of birds, the cat being purely an incidental host acquiring the infection from eating the second intermediate host.

SUMMARY

Two instances of clinostomid trematodes presumed to be aberrant parasites in the mouth of domestic cats are recorded from Lydenburg and Durban. These trematodes are considered to belong to a new species and are described under the name *Clinostomum falsatum* sp. n. The chief characteristics are the small size, being less than 5 mm long, the somewhat flattened disk-like testes, a well developed uterine sac which may extend over the ventral sucker and the median opening of the genital atrium. As only a limited number of transverse sections of the Durban worms are available, they are not specifically determined. They, however, show a close relationship to *C. falsatum*.

REFERENCES

- AGARWAL, S. M., 1959. Studies on the morphology, systematics and life-history of *Clinostomum giganticum* n. sp. (Trematoda: Clinostomatidae). *Ind. J. Helm.*, Vol. 11, pp. 75-115.
- BAER, J. G., 1933. Note sur un nouveau trématode, *Clinostomum lophophallum* sp. nov. avec quelques considérations générales sur la famille des Clinostomidae. *Rev. Suisse Zool.*, Vol. 40, pp. 317-342.
- BELLIAPPA, A. B., 1944/45. On a species of *Clinostomum* in a cat. *Ind. Vet. J.*, Vol. 21, pp. 101 and 102.
- BHALERAO, G. D., 1947. *Clinostomum kalappahi* n. sp. (Trematoda) from the mouth of cats in the Coorg. *Helm. Abst.*, Vol. 16, No. 576 C.
- BRAUN, M., 1900b. Die Fascioliden-Gattung *Clinostomum* Leidy. *Centlb. Bakt.*, Vol. 1, Vol. 14(1), pp. 1-48.
- BRAUN, M., 1900b. Die Fascioliden-Gattung *Clinostomum* Leidy. *Centlb. Bakt.*, Vol. 1, No. 27, pp. 24-32.
- DOLLFUS, R. PH., 1950. Trématodes récoltes au Congo Belge par Prof. Paul Brien (mai-août 1937). *Ann. Mus. Congo Belge. C. Zoologie. Ser.*, Vol. 1, pp. 1-136.
- JAISWAL, G. P., 1957. Studies on the trematode parasites of fishes and birds found in Hyderabad State. Pt. III. Clinostomidae. *Zool. Jahrb. Abt. Syst.*, Vol. 85, pp. 31-52.
- ORTLEPP, R. J., 1935. On the metacercaria and adult of *Clinostomum vanderhorsti* sp. n., a trematode parasite of fishes and herons. *O'Poort J. Vet. Sci. and Anim. Ind.*, Vol. 9, pp. 51-58.
- PRICE, E. W., 1938. A redescription of *Clinostomum intermedialis* Lamont (Trematoda: Clinostomidae), with a key to the species of the genus. *Proc. Helm. Soc. Wash.*, Vol. 5, pp. 11-13.
- RICHARD, JOSETTE, 1962. Trematodes d'oiseaux de Madagascar. *Bull. Mus. Nat. d'Hist. Nat.*, 2e Ser., Vol. 34 pp. 172-183.
- TUBANGUI, M. A. & GARCIA, E. J., 1939. *Clinostomum abdoni* sp. nov. a trematode parasite of the cat in the Philippines. *Philip. J. Sci.*, Vol. 70, pp. 397-401.
- YAMAGUTI, S., 1933. Studies on the helminth fauna of Japan. Pt. I. Trematodes of birds, reptiles and mammals. *Jap. J. Zool.*, Vol. 5, pp. 66-72.
- YAMAGUTI, S., 1958. *Systema Helminthum. The digenetic trematodes of vertebrates I.* 1-1575. New York and London: Intersci. Pub.