

Wild Antelopes as carriers of Nematode Parasites of Domestic Ruminants—Part III.

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I. IMPALA (*AEPYCEROS MELAMPUS*.)

THE material studied was collected by Dr. A. D. Thomas and Mr. W. O. Neitz of this Institute in and near the Kruger National Park in the Northern Transvaal, on the 23rd-25th June, 1932. It contained the following:

From the abomasum one *Haemonchus* female, *Cooperia hungi*, *Trichostrongylus thomasi** and *Bigalkea sabie*.*

From the jejunum *Cooperia hamiltoni**, *Impalazia tuberculata* and *I. nudicollis*.

From the colon *Oesophagostomum columbianum*.

Material of the lungs contained very slender nematodes, which could not be dissected out satisfactorily from the fixed tissues. Apparently similar nematodes were present in the lungs of the blue wildebeest (*Gorgon taurinus*). At a later date fresh lungs of an impala were obtained from the same locality, forwarded in chloroform vapour, and sufficient worm material was obtained to allow a definite identification to be made. The worms proved to belong to a new genus and were described as *Pneumstrongylus calcaratus*.

TRICHOSTRONGYLUS THOMASI, MÖNNIG, 1932.*

Rather small, delicate worms, more or less straight. The cuticle shows fine transverse striations and, in the female, it forms irregular thickenings in the region of the vulva. The excretory pore lies, as is commonly the case in *Trichostrongylus*, in a depression 0.13 to 0.18 mm. from the anterior extremity. The head is about 0.011 mm. wide and the mouth opening is followed directly by the oesophagus, which measures 0.82 to 0.92 mm. in length and is slightly club-shaped. The nerve-ring surrounds the oesophagus 0.68 to 0.71 mm. from the anterior extremity of the body.

The Males are 4.19 to 5.3 mm. long and 0.094 to 0.108 mm. wide across the prebursal papillae. The bursa is well developed with large lateral and a small dorsal lobe (Fig. 1). The latero-ventral is the thickest ray, it is widely divergent from the small ventro-ventral and ends in a slender prolongation which curves forwards. The antero-lateral also narrows down suddenly to form a finger-like extremity. The postero-lateral is long, practically reaching the bursal margin. The externo-dorsals are thick at their bases and each has a knob-like swelling near the end with a thin tip. The dorsal bifurcates distally but the branches are not digitate. The spicules are equal and similar, 0.229 to 0.236 mm. long and brown in colour. They are slightly curved and bear a number of ridges (Fig. 2), but have no hook near the end. Around the middle

* Short descriptions of the new species have been published in the *Jl. S.A. Vet. Med. Assn.*, Vol. 3, No. 4, pp. 171-175, 1932.

third each spicule bears two small triangular alae, which are not shown in the figure and can only be seen when the spicules have been dissected out. The gubernaculum is 0·13 mm. long, pointed anteriorly, split in the middle and alate posteriorly (Fig. 3).

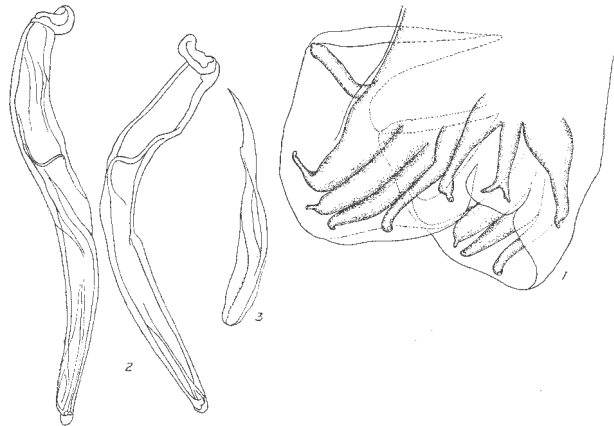


Fig. 1. *Trichostrongylus thomasi*..... Male bursa.
 Fig. 2. " " Spicules.
 Fig. 3. " " Gubernaculum.

The *females* are 4·2 to 5·6 mm. long and 0·082 mm. wide across the vulva. The tail is 0·07 to 0·11 mm. long and pointed. The vulva is a longitudinal crescent-shaped slit, surrounded by irregular cuticular thickenings and situated 0·92 to 1·19 mm. from the posterior extremity. The ovejectors are well developed, measuring each 0·21 to 0·26 mm. in length, the posterior being usually longer than the anterior. The eggs in the ovejectors measure 0·071 to 0·078 by 0·037 mm.

Host—Impala (*Aepyceros melampus*).

Location: abomasum.

Locality: Kruger National Park.

Types in Onderstepoort Helminthological Collection, No. 2466.

I have much pleasure in dedicating this species to my colleague, Dr. A. D. Thomas.

BIGALKEA SABIE, MÖNNIC, 1932.

Delicate, slender worms not coiled. The cuticle bears about 32 longitudinal striations beginning 0·8 to 0·9 mm. behind the anterior extremity which bears transverse striations. The head is simple, 0·034 to 0·04 mm. wide, and not swollen. Cervical papillae are present, triangular in shape and situated 0·35 to 0·42 mm. from the anterior extremity. The excretory pore opens 0·31 to 0·38 mm. from the anterior extremity. The oesophagus is slightly club-shaped, 0·69 to 0·8 mm. long in the males and 0·75 to 0·86 mm. in the females and is surrounded by the nerve-ring 0·29 to 0·35 mm. from the anterior end of the body.

The *males* are 8·19 to 8·82 mm. long and 0·1 to 0·12 mm. broad in front of the bursa. The latter has large lateral lobes, but is devoid of a dorsal lobe (Fig. 4). The latero-ventral ray is larger than the ventro-ventral and slightly divergent, but curves forward again distally. The antero-lateral diverges forwards from the medio-lateral which is straight, while the postero-lateral diverges towards the dorsal side. The externo-dorsal arises from the base of

the dorsal stem and are bent sharply inwards at the middle. The dorsal bifurcates distally to form two short, parallel branches, but it is difficult to see clearly where the bifurcation begins. There are two equal, alate spicules 0.16 to 0.176 mm. long. They are partly membranous in the distal half and each ends in a slightly hooked point (Fig. 4). In this respect the spicules of *B. albifrontis* have not been quite correctly described, as they also are partly membranous in the distal half, while they end in three points each. The gubernaculum is broad and measures about 0.07 mm. in length.

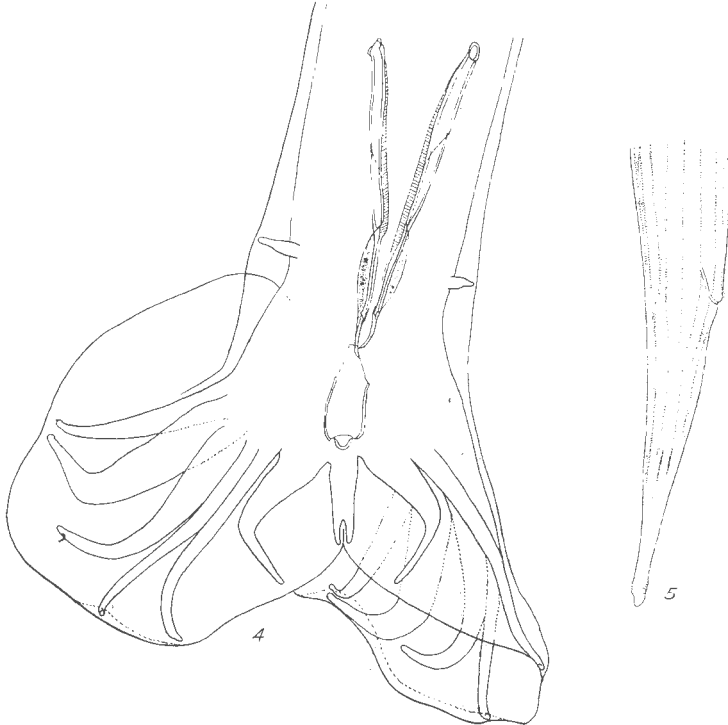


Fig. 4. *Bigalkea sabie*..... Bursa and spicules.
 Fig. 5. " Tail of female.

The females are 11.07 to 15.7 mm. long and 0.124 mm. wide across the vulva. The latter is usually surrounded by lateral cuticular thickenings which bear transverse striations, but there is no flap. The tail is 0.165 to 0.2 mm. long, acute, with a blunt tip bearing a small number of transverse striations frequently on a slight swelling as shown in Fig. 5. The vulva is situated 1.97 to 2.3 mm. from the posterior extremity. The ovejectors are each 0.15 to 0.17 mm. long and the eggs contained in them measure 0.067 by 0.041 mm.

Host -Impala (*Aepyceros melampus*).

Location : abomasum.

Locality : Kruger National Park.

Types in Onderstepoort Helminthological Collection, No. 2465.

This worm is very closely related to the other species of this genus, *B. albifrontis*. It can be distinguished especially by the shape of the spicules, absence of a dorsal lobe in the male bursa, the divergence of the postero-lateral from the medio-lateral rays, the sharp bend of the externo-dorsal, the long stem of the dorsal ray and the appearance of the tail in the female.

surrounded by the nerve-ring at a distance of about 0.28 mm. from the anterior end of the body.

The *males* are 5.67 to 6.4 mm. long and 0.12 to 0.14 mm. wide in front of the bursa. Small prebursal papillae are present. The bursa is well developed, with lateral and dorsal lobes (Fig. 7). The ventral rays are not far apart and run more or less parallel. The antero-lateral is thick, straight and tapers out to a point, the medio- and postero-laterals are also long and pointed and only slightly divergent. The externo-dorsal arises near to the base of the dorsal ray and is long and slender, lying close to the postero-lateral and ending near the bursal margin. The dorsal ray is long and bifurcates at its middle, each branch being slender and digitate at its extremity near the margin of the bursa.

The spicules are equal and similar, 0.2 to 0.23 mm. long and brown in colour. The body, which is simple, bears a large prominent dorsal spur, which supports a large cuticular expansion, while the distal half of the body itself bears a similar expansion (Fig. 8).

The *females* are 7.2 to 8.2 mm. long and 0.14 to 0.15 mm. wide across the vulva. The tail has a mucronate tip (Fig. 9) and is 0.16 to 0.2 mm. long, the tip measuring 0.19 to 0.034 mm. The vulva is situated 1.32 to 1.6 mm. from the hind end and is surrounded by corrugated thickenings of the longitudinal lines; sometimes a small flap is present. The ovejectors are 0.32 to 0.37 mm. long, well developed and contain a few eggs which measure about 0.067 by 0.037 mm.

Host—Impala (*Aepyceros melampus*).

Location: Small intestines.

Locality: Kruger National Park.

Types in Onderstepoort Helminthological Collection, No. 2467.

PNEUMOSTRONGYLUS CALCARATUS, MÖNNIG, 1932.

The worms are filiform and the females are thicker than the males. The head is about 0.03 mm. in diameter. Head papillae are very small and difficult to see. The mouth is surrounded by apparently three small lips and leads directly into the oesophagus. The latter is cylindrical in shape and 0.33 mm. long. The nerve ring lies obliquely around the oesophagus, about 0.176 mm. from the anterior end of the body.

The longest portion of a male recovered from the lung measured 29.7 mm. The males are 0.082 to 0.109 mm. wide in front of the bursa. The latter has large lateral lobes, extending forward along the body some distance anterior to the rays (Fig. 10). There is no dorsal lobe. The ventral rays have a common stem about twice as long as the rays themselves. The antero-lateral diverges from the medio-lateral ray, which is fused with the postero-lateral except at their distal extremities. The externo-dorsals arise separately and the dorsal ray is small, flexed in underneath the body towards the ventral side and ends in three papillae (Fig. 11). The margin of the cloacal opening bears a papillae on either side. The spicules are equal and similar (Fig. 10), expanded, and pigmented brown in their posterior halves, only the distal extremities again are unpigmented. They are 0.384 to 0.421 mm. long. There is no gubernaculum but a strongly-developed telamon, consisting of a central unpigmented body which gives rise to a pair of hooklike arms. The latter are each 0.056–0.06 mm. long, conspicuous on account of the fact that they contain brown pigment and project from the cloacal opening. Altogether five male tails were found and the telamon was in this position in all of them. Between the bases of the two arms there is a refractive piece of chitin (Fig. 11) which moves with the telamon as the worm is rolled and is apparently fixed to it.

No characteristic parts of female worms were found. The eggs in the uteri are segmenting and such eggs are also found in the lungs together with others in more advanced stages of development as well as numerous free larvae.

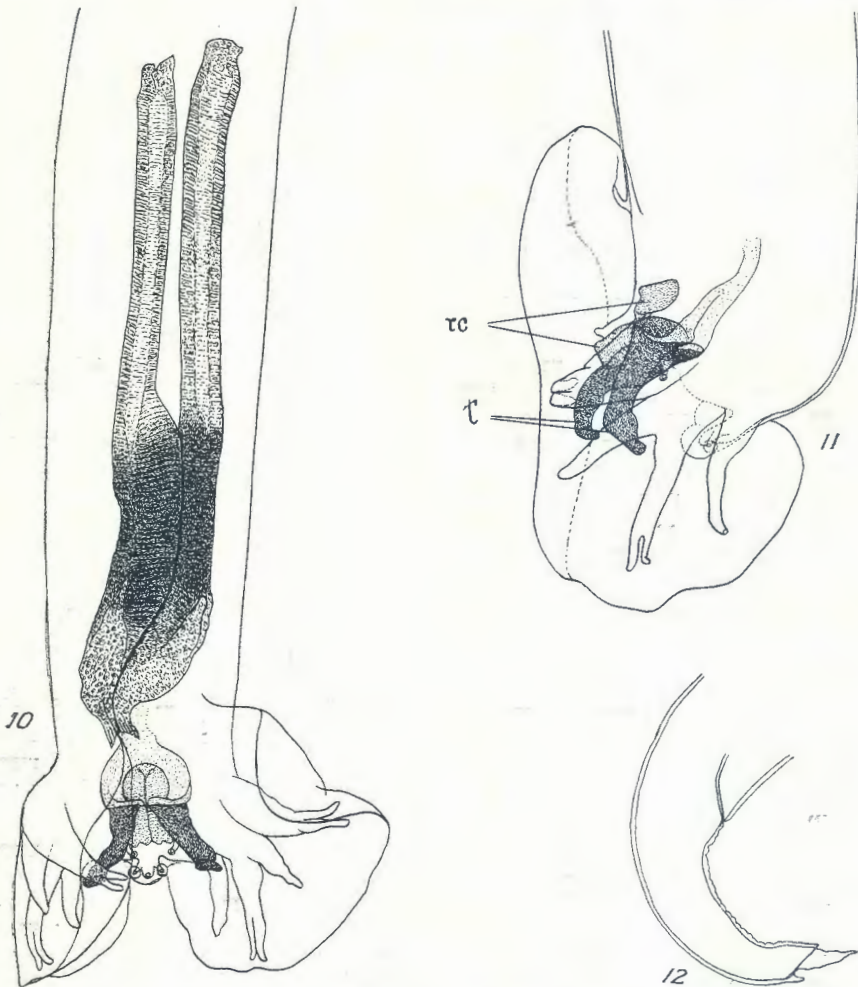


Fig. 10. *Pneumostrongylus calcaratus*.... Hind end of male, ventral view.

Fig. 11. Male bursa and telamon, lateral view.

rc—refractive chitin.

t—telamon.

Fig. 12. *Pneumostrongylus calcaratus*.... Hind end of larva from lungs.

The eggs measure 0.09–0.109 by 0.045–0.052 mm. The larvae are 0.28–0.33 mm. long; the head is simple and has a small mouth. The tail of the larva is characteristic (Fig. 12), it is usually curved ventrad and has a small dorsal spur near the distal extremity which ends in an acute point.

Host—Impala (*Aepyceros melampus*).

Location: Lungs—alveoli and small bronchi.

Locality: Sabie, Transvaal.

Types in Onderstepoort Helminthological Collection No. 2496.

The worm differs so markedly from other known *Metastrongylidae*, especially in the strong development of the telamon, that a new genus had to be created for it.

Generic diagnosis. Genus *Pneumostrongylus-Metastrongylidae*: body filiform; mouth with apparently three minute lips; buccal cavity absent. Male bursa with large lateral lobes, dorsal lobe absent; ventral rays close together; antero-lateral divergent from the fused medio- and postero-laterals; the latter separate only at the tips; externo-dorsals arise separately; dorsal ray very short, bent in under the body and ending in a few papillae. Spicules equal, stout expanded and pigmented. Gubernaculum absent. Strongly developed telamon present. Oviparous, eggs segmenting when laid.

Transmission Tests.

Faeces cultures of the impala contained only a small number of larvae of *Trichostrongylus*, *Cooperia* and *Strongyloides*. Two lambs which harboured only a few *Trichostrongylus* and *Strongyloides* were infected with these larvae. The first lamb, killed after three weeks, harboured only a few females of *Trichostrongylus*. The second lamb, killed six weeks after infection, had *T. falculatus*,

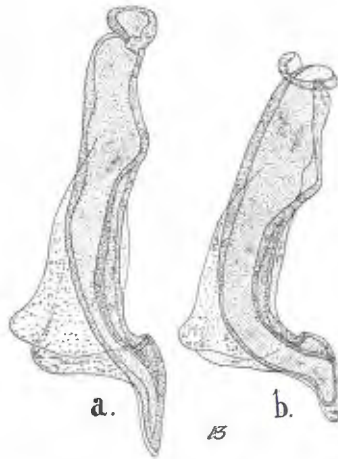


Fig. 13. *Trichostrongylus instabilis*..... Lateral view of right spicules—(a) normal, (b) extreme variation.

T. instabilis and *Cooperia hungi*. The specimens of *T. instabilis* showed the same variations as had been found previously in lambs infected from the water-buck and described in Part I of this series. A normal type and an extreme variant of these spicules are shown in Fig. 13.

2. KOODOO (*STREPSICEROS STREPSICEROS*),

This material was from the same source as that from the impala. It contained the following worms:—

From the right ventricle and pulmonary arteries: *Cordophilus sagitta*,

From the abomasum: *Haemonchus vegliai*.

From the small intestine—*Cooperia neitzi*, and from the Colon: *Agriostomum cursoni*.

COOPERIA NEITZI, MÖNNIG, 1932.

Moderately small worms, anteriorly coiled. The cuticle bears 20 to 30 longitudinal striations beginning 0.138 to 0.15 mm. behind the anterior end, which bears transverse striations. The head is 0.043 to 0.048 mm. wide, without any prominent cuticular swelling. The excretory pore is situated 0.44 to 0.53 mm. from the anterior end, near the end of the oesophagus and frequently behind it in the females. A pair of minute cervical papillae are present directly behind the level of the excretory pore. The oesophagus is 0.457 to 0.49 mm. long in the males and 0.49 to 0.57 mm. in the females, surrounded by the nerve ring 0.33 to 0.37 mm. from the anterior end of the body.

The *males* are 8.44 to 9.83 mm. long and 0.14 mm. wide just anterior to the bursa. The latter has large lateral lobes and a small dorsal lobe (Fig. 14). The ventral rays are divergent, the latero-ventral being much larger than the ventro-ventral and both curve forwards. The antero-lateral is straight, wide and pointed, the medio-lateral slender and distally divergent from the antero-lateral, while the postero-lateral is slender and divergent from its middle. The

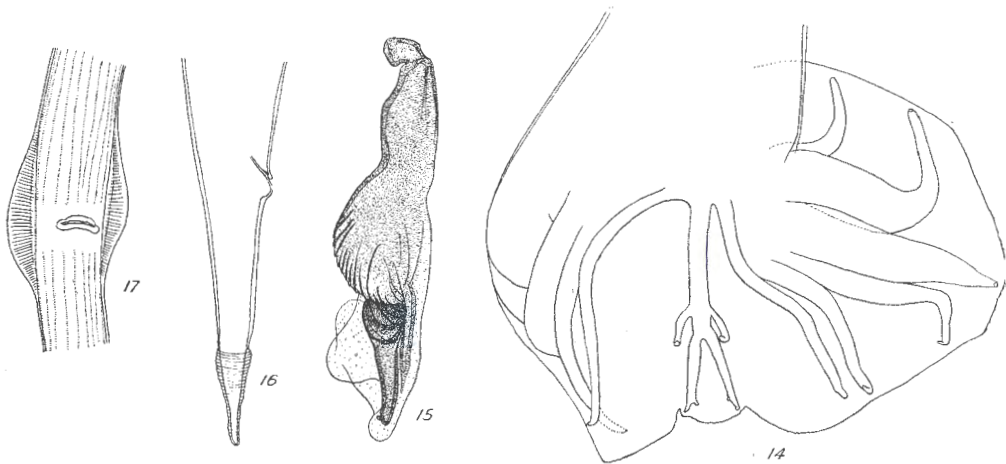


Fig. 14.	<i>Cooperia neitzi</i>	Male bursa.
Fig. 15.	„	Lateral view of left spicule.
Fig. 16.	„	Tail of Female.
Fig. 17.	„	Vulvar region.

externo-dorsal arises from the base of the dorsal and lies close to the postero-lateral, almost reaching the margin of the bursa. The dorsal gives off two short, lateral branches at its middle and then soon bifurcates into two terminally digitate branches.

There are two brown, equal and similar spicules (Fig. 15), measuring 0.195 to 0.217 mm. They have each a pectinate expansion at the middle, followed by a circular depression into which the corrugations extend. The posterior quarter is simple and bears large alae.

The *females* are 10.49 to 12.4 mm. long and 0.108 to 0.13 mm. wide across the vulva, not including the cuticular expansions. The tail is pointed, 0.187 to 0.23 mm. long and the distal quarter is transversely striated, frequently provided with small cuticular alae (Fig. 16). The vulva is situated 2.16 to 2.6 mm. from the posterior extremity and is a transverse slit (Fig. 17) usually

accompanied by a pair of lateral alae. The longitudinal striations are interrupted in the vulvar region on the ventral side of the body, but are continuous on the dorsal aspect. The ovejectors are well developed and each is 0.44 to 0.59 mm. long. The eggs measure 0.078 to 0.09 by 0.041 mm.

Host : Koodoo (*Strepiceros strepiceros*).

Location : small intestine.

Locality : Sabie, Northern Transvaal.

Types in Onderstepoort Helminthological Collection No. 2470.

This species is dedicated to my colleague Mr. W. O. Neitz.

Transmission Tests.

Larvae from faeces cultures of the Koodoo were given to two lambs, showing only a slight infection with *Trichostrongylus* and *Strongyloides*. The first lamb, killed after three weeks, harboured a large number of young *Haemonchus vegliai* and several specimens of each of the following: *Cooperia neitzi*, *C. nicolli*, *C. pectinata*, *C. punctata* and *Trichostrongylus instabilis* with variations in the spicules as described above. The origin of the three last named species of *Cooperia* is uncertain. The lambs had not been near cattle or other animals from which they could have become infected with these worms. *C. nicolli* has been found in cattle in South Africa but is very rare. The second lamb, killed after six weeks, harboured only *H. vegliai* and *C. neitzi*.

3. BLUE WILDEBEEST (*GORGON TAURINUS*).

This material, also from the same source as the above, contained only *Haemonchus bedfordi* and the worm was transmitted to one lamb.

4. ELAND (*TAUROTRAGUS ORYX*).

In the beginning of June, 1932, well preserved specimens of worms were received from Mr. J. Walker, Chief Veterinary Officer, Kenya, taken from five eland. It is with much pleasure that I wish to record my appreciation of this kind assistance. The worms were identified as follows:—

Abomasum : *Haemonchus contortus* (2 cases), *H. mitchelli* (1 case).

Small intestine : *Impalalia tuberculata* (2 cases), *Cooperia verrucosa* (3 cases), *Cooperia africana* (1 case), *Moniezia expansa* (2 cases), *Avitellina centripunctata* (2 cases).

Large intestine : *Oesophagostomum walkeri* (3 cases).

COOPERIA VERRUCOSA, MÖNNIG, 1932.

Moderately small worms, coiled anteriorly. The head is 0.052 to 0.06 mm. wide and is followed by transversely striated cuticle for a length of 0.157 to 0.187 mm. from the anterior extremity. The rest of the cuticle has 18 to 24 longitudinal striations; of these one in the male and three in the female on either side of each lateral line are punctiform, while the rest have the usual comb-like appearance. Cervical and prebursal papillae are absent. The excretory pore opens just behind the end of the oesophagus, which is 0.457 to 0.53 mm. long. The nerve ring is situated 0.35 to 0.38 mm. from the anterior extremity.

The *mules* are 8·2 to 12·6 mm. long and 0·22 to 0·26 mm. wide in front of the bursa. Their bodies are more coiled than those of the females. The bursa is strongly developed and has a small dorsal lobe. The rays show the usual arrangement, the ventrals and laterals being all divergent. The antero-lateral is very stout and the latero-ventral is next in thickness. The externo-dorsals emerge near the base of the dorsal ray, which has a long stem dividing about halfway to the bursal margin; each branch soon gives off a short lateral branch and has a bidigitate distal extremity (Fig. 18). The spicules measure 0·384 to 0·42 mm. in length; they are darkbrown in colour and have a small expansion at the middle which bears corrugations, the latter extending on to the posterior half of the spicule where they are transverse and more numerous than on the expanded portion (Fig. 19). Small dorsal and ventral alae are present.

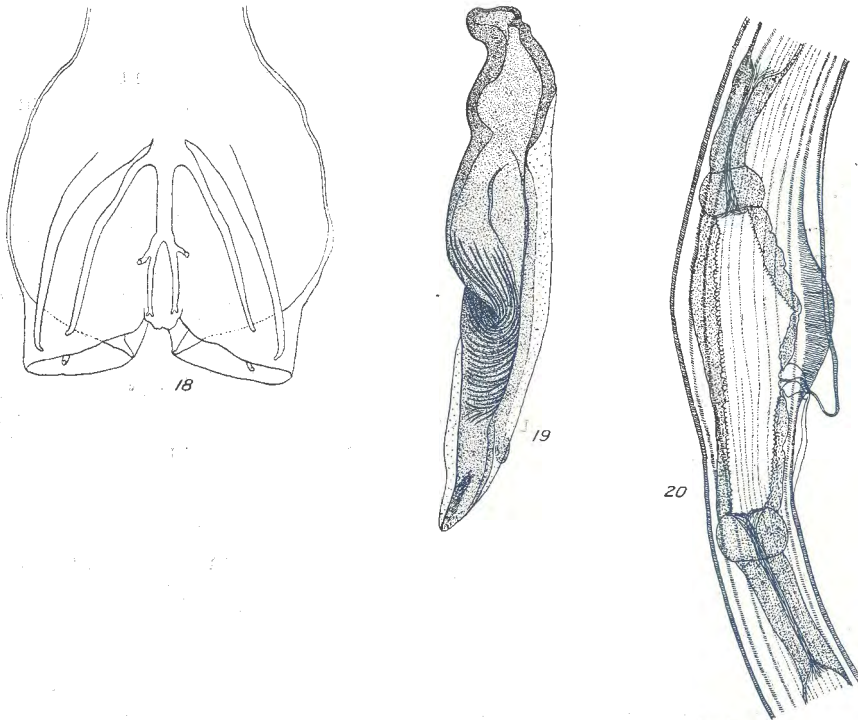


Fig. 18. *Cooperia verrucosa*..... Male bursa, dorsal view.
 Fig. 19. „..... Lateral view of left spicule.
 Fig. 20. „..... Vulvar region.

The *females* are 13·85 to 14·8 mm. long and 0·16 to 0·18 mm. wide. The tail is 0·195 to 0·225 mm. long, pointed and bears transverse striations on the last one third of its length. The vulva opens 4·1 to 4·48 mm. from the posterior end. It is covered by an anterior flap (Fig. 20), on either side of which one of the longitudinal striations is raised into an alar expansion. The body is conspicuously thickened in this region. The ovejectors are strongly developed and measure each 0·55 to 0·73 mm. in length. Eggs contained in the ovejectors measure about 0·095 by 0·049 mm.

Host—Eland (*Taurotragus oryx*).

Location: Small intestine.

Locality: Kenya.

Types in Onderstepoort Helminthological Collection No. 2478.

COOPERIA AFRICANA. MÖNNIG, 1932.

Only three males of this worm were collected. They are delicate, not much coiled and in a general way resemble specimens of *C. punctata*. They are 4.57 to 4.8 mm. long and 0.11 to 0.12 mm. broad. The head is 0.04 mm. wide, followed by transversely striated cuticle for a distance of 0.07 to 0.078 mm. from the anterior end of the body. The excretory pore opens at or just posterior to the hind end of the oesophagus, which is 0.26 to 0.28 mm. long. The nerve ring is situated at about the middle of the oesophagus. Cervical and prebursal papillae are absent. The cuticle bears 14 longitudinal striations of the usual type.

The bursa has lateral and dorsal lobes, with typical rays (Fig. 21). The ventrals and laterals are divergent, the antero-lateral is thick, but has a slender distal extremity: the externo-dorsal arises from the base of the dorsal and does not reach the margin of the bursa: the dorsal bifurcates at its middle, where it is somewhat thickened and gives off two lateral branches: the terminations of the main branches are bidigitate.



Fig. 21. *Cooperia africana*..... Male bursa.
 Fig. 22. .. Ventro-lateral view of left spicule.

The spicules are light brown in colour and measure 0.191 to 0.206 mm. They have a small expansion at the junction between the second and last thirds of their length, bearing a few corrugations (Fig. 22). The posterior third bears one large lateral cuticular expansion and there are also smaller dorsal and ventral alae: the distal extremity is blunt and curved towards the dorsal aspect.

Host—Eland (*Taurotragus oryx*).

Location: Small intestine.

Locality: Kenya.

Types in Onderstepoort Helminthological Collection, No. 2479.

OESOPHAGOSTOMUM WALKERI. MÖNNIG, 1932.

The material consisted of one adult male, two adult females and a fair number of immature males and females of about half the adult size, but already in the final stage of their development.

The anterior part of the body is curved towards the ventral side on account of the large lateral cervical alae. The cuticle bears fine transverse striations, about 0.005 mm. apart. The mouth-collar is well developed (Fig. 23), 0.142 mm. wide in the male and 0.169 mm. in the females, protruding well forward around the external leaf-crown. The cephalic vesicle is prominent ventrally and extends around to the dorsal side also. It extends on the ventral side to the cervical groove, which is situated in the male 0.2 mm. and in the females 0.26 to 0.27 mm. from the anterior extremity and ends on the lateral aspects

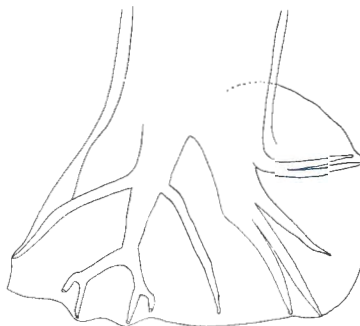
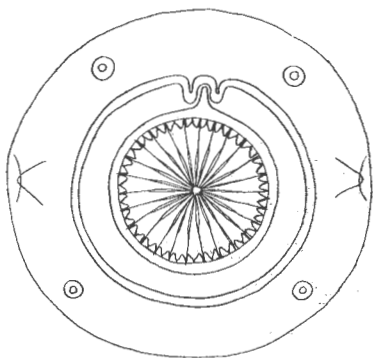
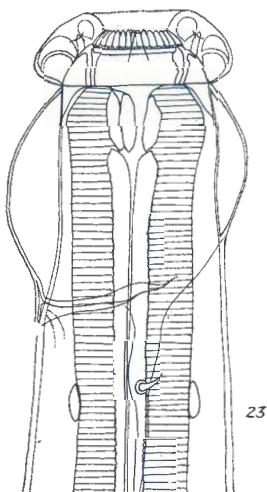


Fig. 23. *Oesophagostomum walkeri*..... Anterior end, lateral view.
 Fig. 24. " " Head, apical view.
 Fig. 25. " " Male bursa.

of the body. The cervical papillae are situated a short distance behind the cervical groove, 0.244 mm. from the anterior end in the male and 0.31 to 0.32 mm. in the female.

The buccal capsule is 0.026 mm. deep, cylindrical or slightly barrel-shaped. In an anterior view of the head (Fig. 24) the buccal capsule shows a very marked indentation of its wall on the dorsal aspect, probably due to the presence of the duct of the dorsal oesophageal gland. Four heads of the immature specimens

were cut off to obtain an anterior view and these had respectively 25, 26, 27 and 28 elements in the external leaf-crown and double the number of internal leaf-crown elements. The elements of the external set are long and narrow distally, equal in their length to the radius of the buccal capsule, so that their tips meet in the centre.

The oesophagus is lined with thick chitin forming three short bars anteriorly and then long bars down the whole length of the organ, which is 0.82 mm. long in the male and 0.91 to 0.97 mm. in the females. The nerve ring is situated around the oesophagus 0.3 to 0.34 mm. from the anterior extremity of the body.

The *male* is 12.35 mm. long and 0.256 mm. broad. The bursa is of the usual type. All the rays run out to fine points (Fig. 25). The antero-lateral diverges from the medio-lateral and does not reach the margin of the bursa. The externo-dorsal is slightly curved and reaches near to the bursal margin. The spicules are alate, 0.787 mm. long; in the immature males they measure 0.8 to 0.84 mm.; the gubernaculum is small and triangular in shape.

The *females* are 18.3 and 20.3 mm. long and 0.42 mm. broad at the middle of the body. The tail is 0.27 to 0.31 mm. long, pointed with small papillae near the tip. The vulva is situated 0.897 to 1.04 mm. from the posterior extremity, the smaller measurement being that of the larger of the two worms. The vagina is short and the female organs all resemble those of *O. columbianum*. The eggs in the ovejectors measure 0.1 by 0.056 mm.

Host—Eland (*Taurotragus oryx*).

Location: Large intestine.

Locality: Kenya.

Types in Onderstepoort Helminthological Collection, No. 2477.

5. SPRINGBUCK (*ANTIDORCAS MARSUPIALIS*).

Several springbuck were obtained from the Orange Free State in June, 1932, and in some that died soon after their arrival the following worms were found:—

Abomasum—*Haemonchus contortus* and *Bigalkea albifrons*.

Duodenum—*Cooperia serrata*, *Trichostrongylus instabilis* and *T. minor*.

Caecum—*Trichuris globulosa*.

Colon—*Agriostomum equidentatum* and *Oesophagostomum africanum*.

OESOPHAGOSTOMUM AFRICANUM, MÖNNIG, 1932.

This worm is very closely related to *O. walkeri* and it is only by taking into account a number of small but constant differences, that they can be distinguished from each other. It can be easily distinguished from *O. multifoliatum* Daubney, 1932.

There are large cervical alae, causing a curvature of the anterior end of the worm. The cephalic vesicle is exactly similar to that of *O. walkeri*, extending to the dorsal aspect, while the cervical groove ends on the sides of the body (Fig. 26). The cervical papillae are situated 0.217 to 0.244 mm. from the anterior end. The excretory pore opens ventrally into the cervical groove 0.17 to 0.2 mm. from the anterior extremity. The usual lateral and four submedian head papillae are present.

Transmission Tests.

Several lambs were infected with larvae from these springbuck, repeated infections being given in some cases in the course of several weeks. *Bigalkea albifrontis* and *Cooperia serrata* were transmitted in several cases but neither *Agriostomum equidentatum* nor *Oesophagostomum africanum* was found in the lambs.

TRICHURIS GLOBULOSA (LINST., 1901) RANS., 1911.

As has already been pointed out by Sprehn (1927) *T. globulosa* and *T. ovis* have been badly mixed up in the literature. Perhaps the case is somewhat similar to that of *Ascaridia lineata* and *A. perspicillum*. The writer has examined all the available material at Onderstepoort and found that the *Trichuris* material from the sheep, goat, cattle and wild antelopes is all *T. globulosa*. Perhaps a similar state of affairs may be found to exist in some other parts of the world.

The following list gives the new records of parasites under the names of the hosts, including, besides those mentioned above, a few others that have been collected recently :—

SHEEP (OVIS ARIES).

Cooperia neitzi. *Cooperia nicolli*.

IMPALA (ÆPYCEROS MELAMPUS).

Trichostrongylus thomasi. *Cooperia hamiltoni*.
Bigalkea sabie. *Impalalia nudicollis*.
Cooperia hungi. *Oesophagostomum columbianum*.
Pneumostrongylus calcaratus.

KOOODOO (STREPSICEROS STREPSICEROS).

Cooperia neitzi. *Agriostomum carsoni*.

ELAND (TAUROTRAGUS ORYX).

Haemonchus contortus.
Impalalia tuberculata. *Cooperia verrucosa*.
Cooperia africana. *Oesophagostomum walkei*.

SPRINGBUCK (ANTIDORCAS MARSUPIALIS).

Bigalkea albifrontis. *Trichostrongylus minor*.
Trichuris globulosa. *Oesophagostomum africanum*.

DUTKER (SYLVICAPRA GRIMI TRANSVAALENSIS).

Impalalia nudicollis. *Oesophagostomum columbianum*.
 (Both through artificial infection.)

SABLE ANTELOPE (OZANNA NIGRA).

Haemonchus contortus.

ANTELOPES AS CARRIERS OF NEMATODE PARASITES.

HARTEBEEST (*ALCELAPHUS CAAMA SELBORNEI*)

Haemonchus contortus.

Agriostomum cursoni.

Haemonchus bedfordi.

STEENBUCK (*RAPHICEROS RUFESCENS*).

Impatiia tuberculata.



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