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HAEMONCHUS KRUGERI SP. NOV. (NEMATODA: TRICHOSTRONGYLIDAE) FROM AN IMPALA (*AEPYCEROS MELAMPUS*)

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The *Haemonchus* parasites forming the basis of this study were recovered from two impalas from the Sabie-Sand Private Nature Reserve adjoining the western boundary of the Kruger National Park. They were collected and presented to this Institute by Dr. S. M. Hirst, Veterinary Officer to the Department of Nature Conservation, Transvaal, to whom the writer wishes to express his cordial appreciation. The specimens consist of more than 40 males and 90 females. They differ from the known *Haemonchus* species reported from domestic and wild ruminants from Southern Africa, and are described under the name *Haemonchus krugeri** sp. nov.

Macroscopically the creamy white worms give the impression of being smaller than *H. contortus* of sheep, which has also been found in the impala. The female appears plumper than that of the common wire worm, but the uteri give her the same barberpole-like appearance.

The male varies in length from 10·0 to 12·0 mm with a maximum thickness of 0·2 mm. The body is attenuated anteriorly, the head end being only about 0·02 mm in diameter. The two prominent, backwardly directed spike-like lateral papillae are situated from 0·35 to 0·38 mm from the anterior end. The cuticle is thin and transparent. Transverse striations are very indistinctly indicated. There are about 20 longitudinal striations down the body. The mouth is surrounded by the usual four small, submedian papillae and two lateral amphids. The mouth cavity is small and is not lined by a thickened cuticle. From the end of the dorsal sector of the oesophagus there arises a small recurved tooth, about 0·007 mm long, projecting just beyond the mouth opening; its tip is thickened and pointed. The oesophagus is straight, club-shaped, and measures from 0·9 to 0·95 mm long. At its anterior end it is 0·02 to 0·022 mm thick; posteriorly its thickness increases and attains 0·08 to 0·09 mm at this end. The nerve ring encircles the oesophagus at 0·23 to 0·25 mm from the anterior end. The excretory pore is about 0·05 mm behind the level of the nerve ring. The bursa consists of two separate, elongate, oval, lateral lobes from 0·4 to 0·45 mm long with a small asymmetrically placed dorsal lobe between them. The ventral and lateral bursal rays are arranged as described for the genus (Fig. 1 A). But the dorsal ray differs from that of the other wire worms; it originates from the base of the externo-dorsal ray of the left side, divides into two at about half its length, and each branch again divides to form a short outer branch and a much longer, outwardly curved inner branch (Fig. 1 B). This shape is very distinctive and serves to differentiate this

* Named in memory of President S. J. P. Kruger who was responsible for the establishment of the Sabie Game Reserve, now enlarged and known as the Kruger National Park

† Deceased on 12 April, 1964

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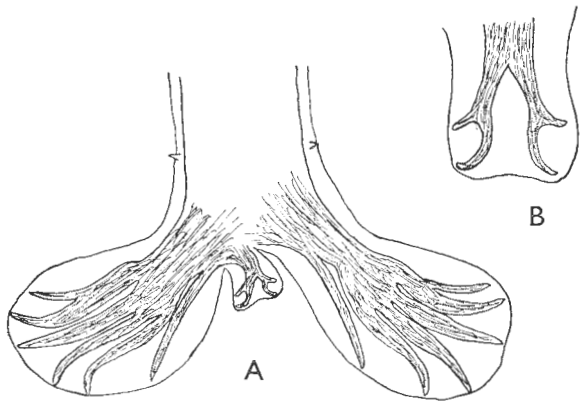

FIG. 1.—*Haemonchus krugeri* sp. n.
A. Dorsal view of male bursa showing rays
B. Dorsal lobe showing dorsal ray

species easily from its relatives. The spicules (Fig. 2) are darkly pigmented, as in some Trichostrongyles, subequal, from 0·26 to 0·3 mm long. Their outer surfaces carry a few longitudinal ridges. Proximally the spicules are from 0·045 to 0·05 mm thick, distally each is terminated by a ploughshare-like thickening somewhat similar to that of *Trichostrongylus colubriformis*. This thickening is about 0·05 mm long and viewed from the ventral surface it presents an outline similar to the sole of a cow's hoof. Each spicule terminates in a bluntly rounded point. The presence of these " hooves " and the absence of barbs make the spicules very distinctive for this species. The gubernaculum is gourd-shaped, consisting of an anterior oval body and a posterior neck bent sharply towards the ventral surface. Its total length viewed from the dorsal aspect is 0·15 to 0·17 mm; its anterior body has a transverse thickness of about 0·048 mm, and its neck a thickness of 0·015 to 0·018 mm. Two small prebursal lateral papillae are situated just in front of the bursa.

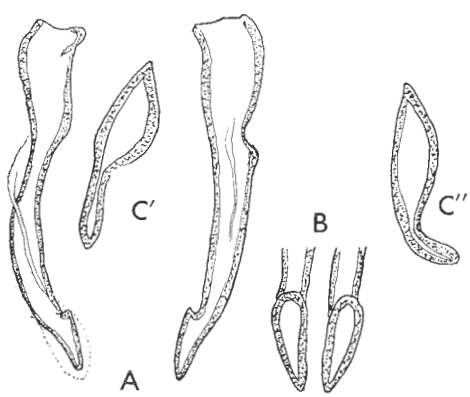

FIG. 2.—*Haemonchus krugeri* sp. n.
A. Lateral view of spicules
B. Ventral view of tips of spicules
C′ Dorsal view of gubernaculum
C″ Lateral view of gubernaculum

The female is from 12·5 to 17·0 mm long with a maximum thickness of 0·35 to 0·4 mm at the middle. The body is attenuated towards both ends, the posterior end terminating in a long, slender tail 0·52 to 0·6 mm long (Fig. 3 A). The anterior end is similar to that of the male but is slightly larger, being 0·022 to 0·025 mm broad. The cervical papillae are located 0·3 to 0·33 from the front. The oesophagus is 0·85 to 1·05 mm long with a maximum posterior thickness of 0·105 to 0·15 mm. The nerve ring is located 0·2 to 0·25 mm from its anterior end.

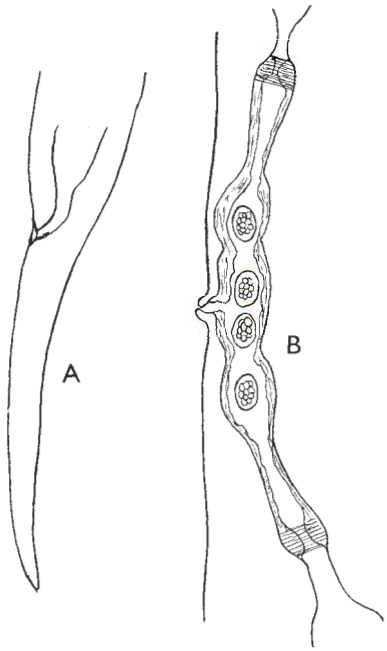

FIG. 3.— *Haemonchus krugeri* sp. n.
A. Lateral view of female tail
B. Lateral view of vulva and ovejector

The vulva is situated in the posterior body-half, at about the junction of the third and fourth body-quarters. Its position varies from 2·5 to 4·0 mm in front of the anus. Its transversely oval external opening is slightly protuberant but vulval flaps are entirely absent; at most there might be a slight thickening of the cuticle laterally to, or just behind the vulva. The vulva leads into the typical female genitalia (Fig. 3 B) arranged along the long body axis. The uteri are opposed at first but eventually they recurve and pass towards the vulva forming a number of loops over the intestine. The distal ends of the uteri are filled with oval, thin-shelled, morulated eggs having a length of 0·06 to 0·065 mm and a thickness of 0·04 to 0·045 mm.

SPECIFIC DIAGNOSIS

Trichostrongylidae, Haemonchinae: males up to 12 mm, females up to 17 mm long; dorsal ray with a long terminal outwardly curved inner branch; spicules subequal, 0·26 to 0·3 mm long, with hoof-shaped termination and no barbs; gubernaculum gourd-shaped with neck bent ventralwards; vulva naked with no linguiform processes, situated at junction of third and last quarters of body. Egg thin-shelled, oval and morulated, 0·06–0·065 by 0·04 to 0·045 mm. Parasitic in abomasum of *Aepyceros melampus.*

Host: Aepyceros melampus (Licht.) Impala

Location: Abomasum

Locality: Sabie-Sand Nature Reserve (Eastern Transvaal)

Types: In Onderstepoort collection

Affinities

The presence of a dorsal buccal tooth and the composition of the male bursa with its asymmetrically placed dorsal lobe, place this species in the genus *Haemonchus*. The nature of the spicules, structure of the dorsal ray and shape of the gubernaculum differentiate it from the known species of *Haemonchus*.

Key for the Determination of *Haemonchus* Species from South Africa

1. Tip of spicules barbed, tips not thickened.....2
   Barbs on spicules absent, ends thickened and hoof-shaped....*H. krugeri* sp. nov.
2. Single barb on each spicule.....3
   Two barbs on left spicule.....*H. vegliai*
3. Spicules over 0·5 mm long.....4
   Spicule less than 0·5 mm long.....5
4. Spicules up to 0·54 mm long.....*H. mitchelli*
   Spicules over 0·6 mm long.....*H. longistipes*
5. Spicules 0·4–0·46 mm long.....*H. bedfordi*
   Spicules shorter than 0·4 mm.....*H. contortus*, *H. placei*

Helminths recovered from the impala

Trematodes

Calicophoron calicophorum (Fisch., 1901)
Schistosoma mattheei Veg. & Le R., 1929

Cestodes

Cysticercus spp.
Stilesia hepatica Wolfh., 1903

Nematodes

Cooperia fulleborni Hung, 1926
Cooperia hungi Mönnig, 1931
Cooperiodes hamiltoni Mönnig, 1932
Cooperiodes hepaticae Ortlepp, 1938
Gaigeria pachyscelis (Raill. & Henry 1910)
Haemonchus contortus Rud., 1803
Haemonchus krugeri sp. nov.
Impalaia tuberculata Mönnig, 1923
Longistrongylus sabie Mönnig, 1932
Oesophagostomum columbianum (Curtice, 1890)
Onchocerca sp.
Ostertagia sp.
Pneumostrongylus calcaratus Mönnig, 1932
Trichostrongylus thomasi Mönnig, 1932
Setaria scalprum Linstow, 1908
Setaria yorkei Thwaite, 1927

SUMMARY

Haemonchus krugeri sp. nov. from the impala (*Aepyceros melampus*) may be distinguished from the other species of this genus by the absence of barbs on the distal end of the spicules as well as differences in the structure of the dorsal ray and of the gubernaculum. Vulval flaps are entirely absent. A key is given for the diagnosis of *Haemonchus* species from South Africa. Parasitic helminths recovered from the impala are listed.

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