

A New Species of the Genus *Strongylus* Müller, 1780 from the Black Rhinoceros, *Diceros bicornis* L. and a Note on the Other Species Occurring in Kenya

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In a small collection of nematode parasites made by Mr. J. G. Tremlett of the Veterinary Research Laboratory, Kabete, Kenya from the black rhinoceros from the Royal Tsavo National Park, Kenya were seven specimens of a species of *Strongylus* Müller, 1780. Four were males and three females. These specimens constitute a new species and the name *Strongylus* (*Dicerocola* subgen.nov.) *tremletti* sp.nov. is proposed. This is believed to be the first record of a species of *Strongylus* from *Diceros bicornis* L.

***Strongylus* Müller, 1780**

Dicerocola subgen.nov.

Strongylus (*Dicerocola*) *tremletti* sp.nov.

Holotype :

This is a male specimen measuring 16.4 mm. in length and 1.17 mm. in maximum width. The head is not marked off from the body. The buccal capsule is 0.56 mm. in length and 0.57 mm. in width. It is slightly more convex dorsally. The mouth opening is subterminal and directed slightly dorsally; it measures 0.41 mm. in greatest width. The dorsal gutter is well developed. There are no teeth in the buccal capsule. The elements of the external leaf crown are numerous; they occur in bunches and have a ragged appearance. An internal leaf crown is absent. The oesophagus measures 1.67 mm. in length and 0.43 mm. in width. The cervical papillae are inconspicuous and do not project beyond the cuticle of the body wall. They are located 1.39 mm. from the anterior extremity. The nerve ring and the excretory pore are situated 1.33 mm. and 1.55 mm. respectively from the anterior end of the body.

The bursa is shallow being 1.11 mm. in lateral width, 1.13 mm. in dorsal width and 0.31 mm. in length. The dorsal ray is undivided

until near its tip where it is trifurcated. The externodorsal rays are undivided and do not reach the margin of the bursa. The postero- and mediolateral rays arise from the same stem and reach the margin of the bursa. The anterolateral ray is separate and does not reach the margin of the bursa. The ventral rays are stout. The dorsal lobe of the bursa is small and is represented by a small projection in which is found the median terminal branch of the dorsal ray. The genital cone is well developed but not large and is triangular in shape. The genital appendages consist of two lateral stout subdivided structures with a small projection between. Caudal papillae could not be located with any degree of certainty. They are probably present but small, like the cervical papillae. The spicules are slender with narrow alae and pointed at their ends. There is a conspicuous terminal curve to the spicules which are 1.07 mm. in length. An accessory piece is absent.

Allotype :

A female specimen 29.1 mm. in length and 1.28 mm. in maximum width. The head is not marked off from the body. The buccal capsule is oval in shape and is 0.73 mm. in length. It is wider laterally than dorsally being 0.63 mm. in lateral width and 0.60 mm. in dorsal width. The buccal capsule is slightly more convex dorsally. The mouth is oval in shape, subterminal and directed slightly dorsally. The dorsal gutter is well developed. There are no teeth in the buccal capsule. The elements of the external leaf crown are numerous and as in the holotype, ragged in appearance. An internal leaf crown is absent. The oesophagus measures 2.2 mm. in length and 0.62 mm. in width. The cervical papillae are small and inconspicuous and do not project beyond the cuticle of the body. They are located 1.83 mm. from the anterior extremity. The nerve ring and excretory pore are slightly anterior to the cervical papillae being respectively 1.67 mm. and 1.78 mm. from the anterior end of the body. The vulva is 15.8 mm. from the tip of the tail. The tail measures 0.76 mm. in length and is bluntly tapering. The eggs are 0.072-0.090 by 0.043-0.050 mm. and are segmented when laid.

Paratypes :

These consist of three male and two female specimens. Two male and two female specimens are deposited in the Helminthological Collection of the London School of Hygiene and Tropical Medicine.

Male Paratypes :

These are the same as the holotype. In all three specimens the nerve ring and excretory pore are slightly anterior to the cervical papillae. The terminations of the dorsal ray may be simple trifurcate or the lateral branches may have accessory branches. Detailed measurements of the holotype and the male paratypes are given in Table I.

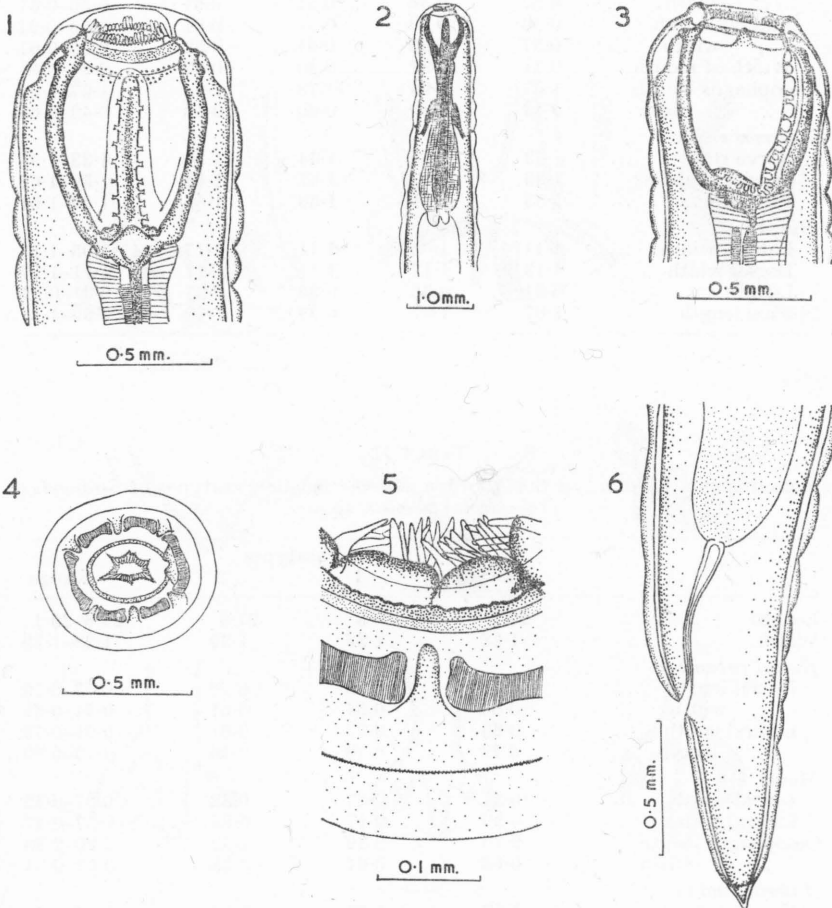
*Strongylus (Dicerocola) tremletti* sp. nov.

Fig. 1.—Head of female, dorsal view. Fig. 2.—Anterior end of female, dorsal view. Fig. 3.—Head of male, lateral view. Fig. 4.—*En face* view of head of male. Fig. 5.—Enlargement of part of fig. 4. Fig. 6.—Tail of female, lateral view.

TABLE I

Measurements (in mm.) of the Holotype and male Paratypes of *Strongylus* (*Dicerocola*) *tremletti* sp. nov.

			Holotype	1	Paratypes		Range
					2	3	
Length	...	...	16.4	18.9	20.7	19.0	16.4-20.7
Width	...	...	1.17	1.22	1.17	1.20	1.17-1.22
<i>Buccal capsule</i>							
Dorsal length	...	...	0.56	0.60	0.57	0.61	0.56-0.61
"	width	...	0.57	0.56	0.61	0.61	0.56-0.61
Lateral length	...	...	0.56	0.60	0.57	0.61	0.56-0.61
"	width	...	0.57	0.56	0.61	0.56	0.56-0.61
Width of mouth	...	...	0.41	0.37	0.40	0.37	0.37-0.41
Oesophagus length	...	...	1.67	1.94	1.78	1.94	1.67-1.94
"	width	...	0.43	0.60	0.60	0.50	0.43-0.60
<i>Anterior end to :</i>							
Nerve ring	...	...	1.33	1.55	1.44	1.50	1.33-1.55
Cervical papillae	...	...	1.39	1.67	1.67	1.61	1.39-1.67
Ex. pore	...	...	1.55	1.61	1.58	1.55	1.55-1.61
<i>Bursa :</i>							
Lateral width	...	...	1.11	1.05	1.11	1.17	1.05-1.17
Dorsal width	...	...	1.13	1.17	1.11	1.17	1.11-1.17
Length	...	...	0.31	0.36	0.36	0.37	0.31-0.37
Spicule length	...	...	1.07	1.07	0.89	1.10	0.89-1.1

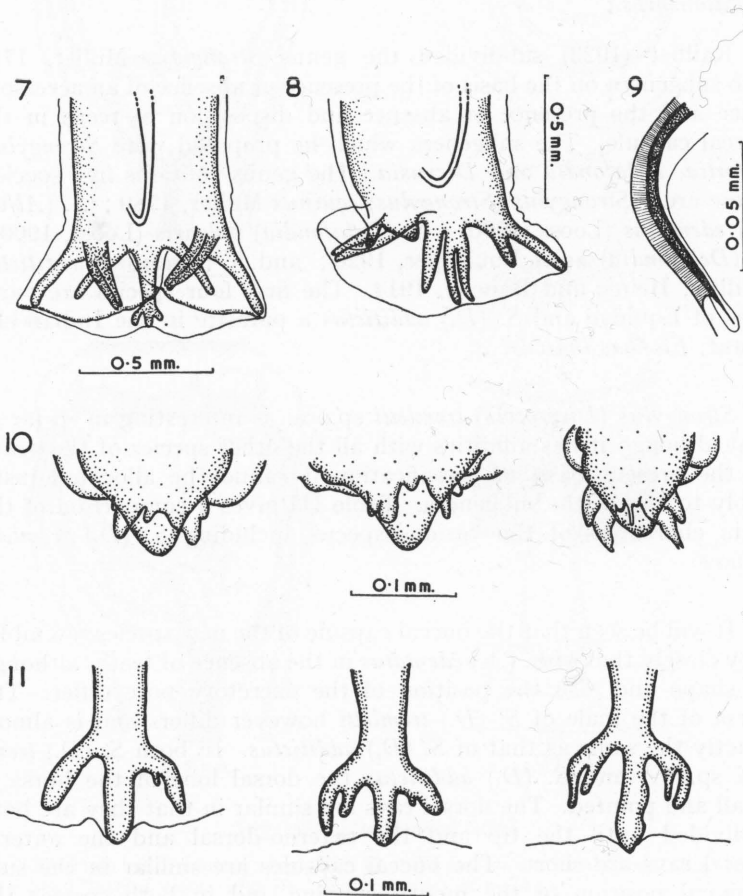
TABLE II

Measurements (in mm.) of the Allotype and the female Paratypes of *Strongylus* (*Dicerocola*) *tremletti* sp. nov.

			Allotype	Paratypes		Range	
				1	2		
Length	...	...	29.1	28.3	27.8	27.8-29.1
Width	...	...	1.28	1.33	1.39	1.28-1.39
<i>Buccal capsule</i>							
Dorsal length	...	...	0.73	0.79	0.76	0.73-0.79
"	width	...	0.60	0.54	0.61	0.54-0.61	
Lateral width	...	...	0.63	0.73	0.61	0.61-0.73
"	length	...	0.73	0.79	0.76	0.73-0.79	
<i>Mouth</i>							
Dorsal width	...	...	0.31	0.27	0.32	0.27-0.32
Lateral width	...	...	0.39	0.47	0.37	0.37-0.47
Oesophagus length	...	...	2.20	2.39	2.32	2.20-2.39
"	width	...	0.62	0.64	0.63	0.62-0.64	
<i>Anterior end to :</i>							
Nerve ring	...	...	1.67	1.67	1.78	1.67-1.78
Cervical papillae	...	...	1.83	1.67	1.83	1.67-1.83
Ex. pore	...	...	1.78	1.67	1.83	1.67-1.83
Vulva to tail	...	...	15.8	15.5	15.5	15.5-15.8
Anus to tail	...	...	0.76	0.93	0.89	0.76-0.93

Female paratypes :

These are the same as the allotype. The nerve ring, cervical papillae and excretory pore are all at the same level in one specimen, while in the other specimen the nerve ring is slightly anterior to the excretory pore and cervical papillae. In both specimens, as in the allotype, the vulva is slightly anterior to the middle of the body. Detailed measurements of the allotype and the female paratypes are given in Table II.



Strongylus (Dicerocola) tremletti sp. nov.

Fig. 7.—Male bursa, ventral view. Fig. 8.—Male bursa, lateral view. Fig. 9.—Distal end of spicule. Fig. 10.—Genital cone, variations. Fig. 11.—Dorsal ray, variations.

Host : *Diceros bicornis* L.

Habitat : Colon

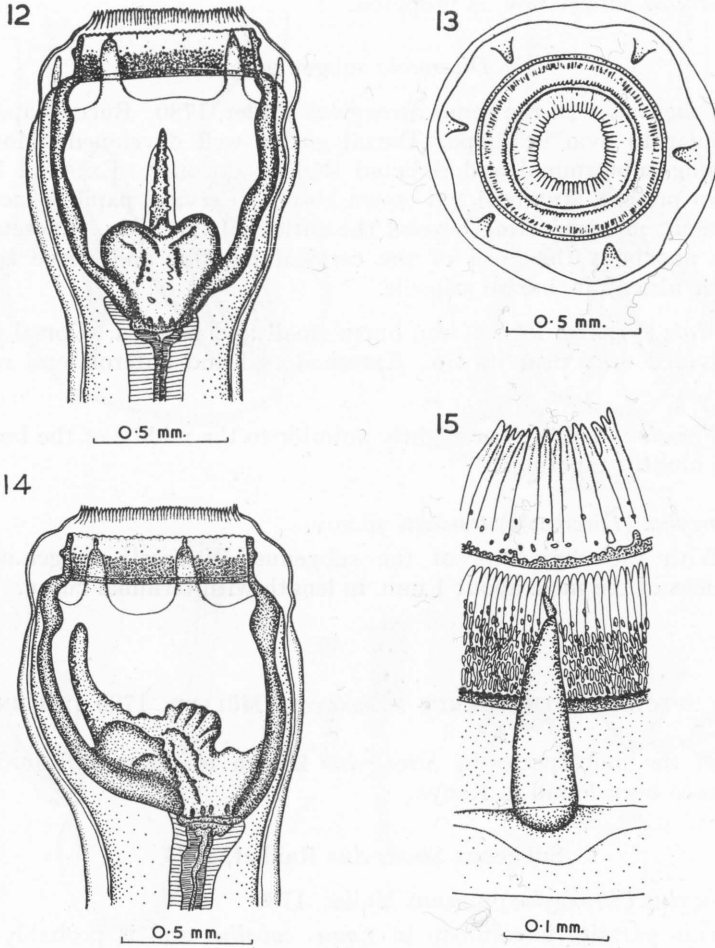
Locality : The Royal Tsavo National Park, map reference,
38° 25' E., 2° 43' S.

Relationships :

Railliet (1923) subdivided the genus *Strongylus* Müller, 1780 into subgenera on the basis of the presence or absence of an accessory piece and the presence or absence and disposition of teeth in the buccal capsule. The subgenera which he proposed were *Strongylus*, *Alfortia*, *Delafondia* and *Decrusia*. The genus contains five species. These are : *Strongylus* (*Strongylus*) *equinus* Müller, 1780 ; *S. (Alfortia) edentatus* (Looss, 1900) ; *S. (Delafondia) vulgaris* (Looss, 1900) ; *S. (Delafondia) asini* Boulenger, 1920 ; and *S. (Decrusia) additictus* Railliet, Henry and Bauche, 1914. The first four species are parasites of Equidae and *S. (D.) additictus* a parasite in the Indian elephant, *Elephas indicus*.

Strongylus (Dicerocola) tremletti sp.nov. is interesting in so far as that although it has affinities with all the other species of the genus on the present basis of classification it cannot be allocated justifiably to any of the subgenera. Table III gives a comparison of the main characters of the various species including *S. (D.) tremletti* sp.nov.

It will be seen that the buccal capsule of the new species resembles very closely that of *S. (A.) edentatus* in the absence of teeth, although its shape and also the position of the excretory pore differ. The bursa of the male of *S. (D.) tremletti* however differs and is almost exactly the same as that of *S. (D.) additictus*. In both *S. (D.) tremletti* sp.nov. and *S. (D.) additictus* the dorsal lobe of the bursa is small and pointed. The dorsal rays are similar in that they are both undivided until the tip and the externo-dorsal and the antero-lateral rays are short. The buccal capsules are similar in the sub-terminal position of the mouth opening and in both species the excretory pore is located at about the level of the nerve ring. The main differences between the two species are the lack of teeth in the buccal capsule and the absence of the internal leaf crown in *S. (D.) tremletti* sp.nov.



Strongylus (Delafondia) asini

Fig. 12.—Male head, ventral view. Fig. 13.—*En face* view of male head. Fig. 14.—Male head, lateral view. Fig. 15.—Enlargement of fig. 14.

Since *S. (D.) tremletti* sp.nov. possesses some features in common with all the other species of the genus *Strongylus*, there is no alternative but to erect a new subgenus to contain it and for this the name *Dicerocola* subgen.nov. is proposed.

Dicerocola subgen.nov.

Diagnosis : Of the genus *Strongylus* Müller, 1780. Buccal capsule globular to oval in shape. Dorsal gutter well developed. Mouth opening subterminal and directed slightly dorsally. External leaf crown present. Internal leaf crown absent. Cervical papillae inconspicuous, not projecting beyond the cuticle of the body. Excretory pore at about the level of the cervical papillae and nerve ring. Teeth absent in buccal capsule.

Male : Dorsal lobe of the bursa small and pointed. Dorsal ray undivided until near its tip. Externodorsal and anterolateral rays short.

Female : Vulva at or slightly anterior to the middle of the body. Tail bluntly tapering.

Strongylus (Dicerocola) tremletti sp.nov.

With the characters of the subgenus *Dicerocola* subgen.nov. Spicules of the male about 1 mm. in length with terminal curve.

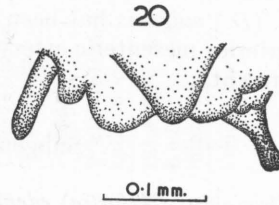
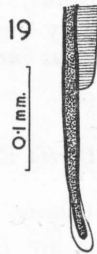
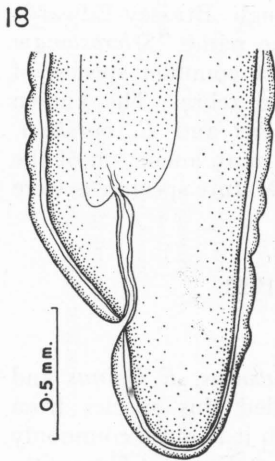
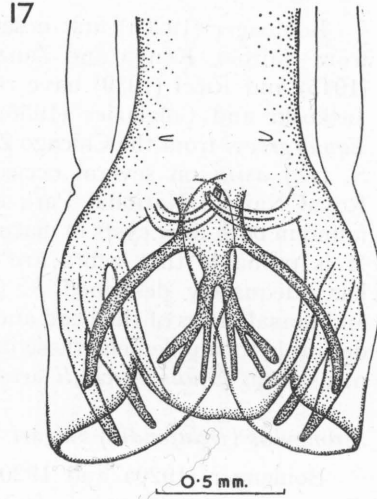
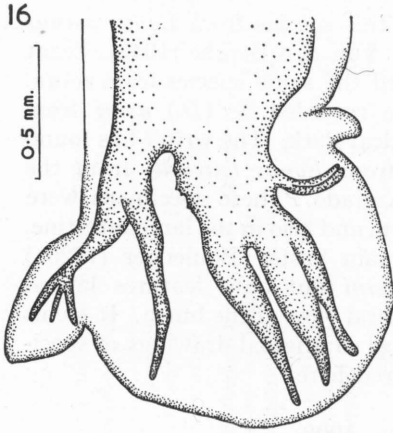
THE SPECIES OF THE GENUS *STRONGYLUS* MÜLLER, 1780 IN KENYA

Of the four species of *Strongylus* known to occur in Equidae, all have been found in Kenya.

Subgenus *Strongylus* Railliet, 1923

Strongylus (Strongylus) equinus Müller, 1780

This parasite is common in *Equus caballus* and is probably to be found anywhere that horses are kept. It is frequently seen in horses from the Highlands of Kenya. The species was first reported from Kenya by Solomon (1932). Brassey-Edwards (1911) records "*Sclerostonium Armatum*" and "*Sclerostonomam Armatum minor*" from horses from the Nairobi area. Since at that time the only known species of the genus *Strongylus* were *S. (S.) equinus*, *S. (A.) edentatus* and *S. (D.) vulgaris* he was probably referring to *S. (S.) equinus* and *S. (D.) vulgaris*.



Strongylus (Delafondia) asini

Fig. 16.—Male bursa, lateral view. Fig. 17.—Male bursa, dorsal view. Fig. 18.—Tail of female, lateral view. Fig. 19.—Distal end of spicule. Fig. 20.—Genital cone of male.

Subgenus *Delafondia* Railliet, 1923*Strongylus (Delafondia) asini* Boulenger, 1920

Boulenger (1920a) first described this species from *Equus asinus* from Nairobi, Kenya and Zanzibar. Van den Berghe (1943), Ezzat (1945) and Ricci (1939) have recorded the same species from zebra. Jaskoski and Colglazier (1956) have recorded *S. (D.) asini* from *Equus grevyi* from the Chicago Zoological Park. The writer has found *S. (D.) asini* on several occasions from *Equus burchelli* from the Royal Nairobi National Park and Kajiado. These specimens were found in both liver cysts in mature form and also in the large intestine. It is probable that zebra are the main hosts. Boulenger (1920a) has adequately described *S. (D.) asini* but only features lateral and dorsal views of the head and a lateral view of the bursa. It seems desirable to supplement these drawings so original drawings of specimens from *Equus burchelli* are featured here.

Strongylus (Delafondia) vulgaris (Looss, 1900)

Boulenger (1920a and 1920b) first recorded this species from *Equus asinus* and zebra from Kenya, though Brassey-Edwards (1911) was probably referring to it under the name "*Sclerostonam Armatum minor*". This is probably the most common species of *Strongylus* in Kenya especially in horses and zebra. The known hosts in Kenya are *Equus asinus*, *E. caballus* and *E. burchelli*. *S. (D.) vulgaris* has been found by the writer in an aneurysm of the anterior mesenteric artery of *Equus burchelli*. Mature specimens were present.

Subgenus *Alfortia* Railliet, 1923*Strongylus (Alfortia) edentatus* (Looss, 1900)

The known hosts in Kenya are *Equus caballus*, *E. asinus* and *E. burchelli*. Boulenger (1920a) first recorded this species from Kenya from a donkey from Nairobi. Although it is quite commonly seen in horses there is no previous record from Kenya. The writer has found it in horses from Elburgon.

Subgenus *Dicerocola* subgen.nov.*Strongylus (Dicerocola) tremletti* sp.nov.

Described by the present writer from *Diceros bicornis* L. from the Royal Tsavo National Park, Kenya.

TABLE III
 A comparison of the main characters of the species of *Strongylus* Müller, 1780
 including *Strongylus (Dicerocola) tremletti* sp.nov.

	<i>Strongylus (Strongylus) equinus</i>	<i>Strongylus (Alfortia) edentatus</i>	<i>Strongylus (Delafondia) vulgaris</i>	<i>Strongylus (Delafondia) asini</i>	<i>Strongylus (Decrusia) additictus</i>	<i>Strongylus (Dicerocola) tremletti</i>
Head	Not marked off from rest of body	Marked off from body by constriction	Not marked off from rest of body	Marked off from body by slight constriction	Not marked off from rest of body	Not marked off from rest of body
Buccal capsule shape	Oval	Cup shaped, narrowing behind	Cup shaped, more convex dorsally	Cup shaped, more convex dorsally	Oval	Oval in female, globular in male. More convex dorsally
Teeth	Simple, 2 dorsal, 2 subventral	Absent	Rounded, 2 dorsal	Rounded or irregular, 2 dorsal	Triangular, 2 subventral	Absent
Mouth opening	Terminal	Terminal	Terminal	Terminal	Subterminal	Subterminal
Internal leaf crown	Present	Present	Present	Present	Present	Absent
Excretory pore	Close behind mouth collar	Close behind mouth collar	At level of nerve ring	Close behind mouth collar	At level of nerve ring	At level of nerve ring
Accessory piece	Present	Present	Present	Present	Absent	Absent
Dorsal lobe of bursa	Well defined and rounded	Well defined and rounded	Well defined and rounded	Well defined and rounded	Small and pointed	Small and pointed
Dorsal ray	Bifurcates well before termination	Bifurcates well before termination	Bifurcates well before termination	Bifurcates well before termination	Undivided until near tip	Undivided until near tip
Vulva position	Caudal half	Caudal third	Caudal half	Caudal third	Caudal third	At middle or slightly anterior to middle of body

SUMMARY

1. *Strongylus (Dicerocola) tremletti* sp.nov. is described from the black rhinoceros, *Diceros bicornis* L. from Kenya.

2. The affinities of *S. (D.) tremletti* sp.nov. with the other species of the genus *Strongylus* Müller, 1780 are discussed and the subgenus *Dicerocola* subgen.nov. is erected to contain it.

3. The species of *Strongylus* in Kenya are noted and original drawings of *S. (D.) asini* Boulenger, 1920 are included.

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