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THREE TRICHOSTRONGYLID NEMATODES  
FROM THE RED ROCK RABBITS,  
*PRONOLAGUS* SP., IN KENYA\*<sup>1</sup>

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Three species of trichostrongylid nematodes; *Trichostrongylus colubri-formis* (GILES, 1892), *Impalaia tuberculata* MÖNNIG, 1923 and *Paraheligmonelloides kenyensis* gen. et sp. n. are described. All worms were found in the small intestines of the *Pronolagus* sp. from Kenya. This is the first record of parasitic nematodes from the genus *Pronolagus*. *I. tuberculata* is the first record of the genus *Impalaia* from a non-ruminant animal. *P. kenyensis* gen. et sp. n. belongs to the family Heligmonellidae and is characterized by synlophes with 15 aretes and the dorsal rays which divide at their base.

INTRODUCTION

In the subfamily Paleolaginae, only three genera of rabbits are known in the world, viz, *Pentalagus furnessi* (Amami black rabbit: Japan), *Romerolagus diazi* (Volcano rabbit: Mexico) and *Pronolagus* spp. (Red rock rabbit: South and East Africa).

The authors have been doing research on Paleolaginae rabbits with the aim of studying the hosts and their parasites from the zoographic and phylogenetic point of view.

In this paper, three nematodes belonging to Trichostrongyloidea from *Pronolagus* sp. captured in Kenya are described.

MATERIALS AND METHODS

During the period from October to November 1979, 6 red rock rabbits were collected at Kedong Valley, Rift Valley district, about 50 km south-west of Nairobi, Kenya.

Nematodes collected from small intestines using a dissection microscope were fixed in 10% formalin and then treated with lacto-phenol solution for microscopic observation.

The specimens are deposited in the helminthological collection of the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University, Japan.

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## RESULTS AND DISCUSSIONS

Collected nematodes are shown as table 1. Only 3 species of trichostrongylid nematodes were found.

1) *Trichostrongylus colubrifomis* (GILES, 1892)

Ten males and 10 females were examined.

Small and slender. Not spirally coiled and white in color while alive.

TABLE 1 *Trichostrongylid nematodes from Pronolagus sp. in Kenya*

| HOST NUMBER | <i>Trichostrongylus colubrifomis</i> |    |       | <i>Impalaia tuberculata</i> |   |       | <i>Paraheligmone loides kenyensis</i> gen. et sp. n. |   |       |
|-------------|--------------------------------------|----|-------|-----------------------------|---|-------|--|---|-------|
|             | ♂                                    | ♀  | total | ♂                           | ♀ | total | ♂  | ♀ | total |
| 1           | 4*                                   | 6  | 10    | 0                           | 1 | 1     | 0  | 0 | 0     |
| 2           | 3                                    | 6  | 9     | 1                           | 4 | 5     | 1  | 1 | 1     |
| 3           | 0                                    | 3  | 3     | 0                           | 3 | 3     | 0  | 0 | 0     |
| 4           | 0                                    | 5  | 5     | 1                           | 2 | 3     | 0  | 0 | 0     |
| 5           | 0                                    | 2  | 2     | 1                           | 3 | 4     | 0  | 0 | 0     |
| 6           | 16                                   | 15 | 31    | 1                           | 4 | 5     | 1  | 0 | 1     |

\* Number of collected worms

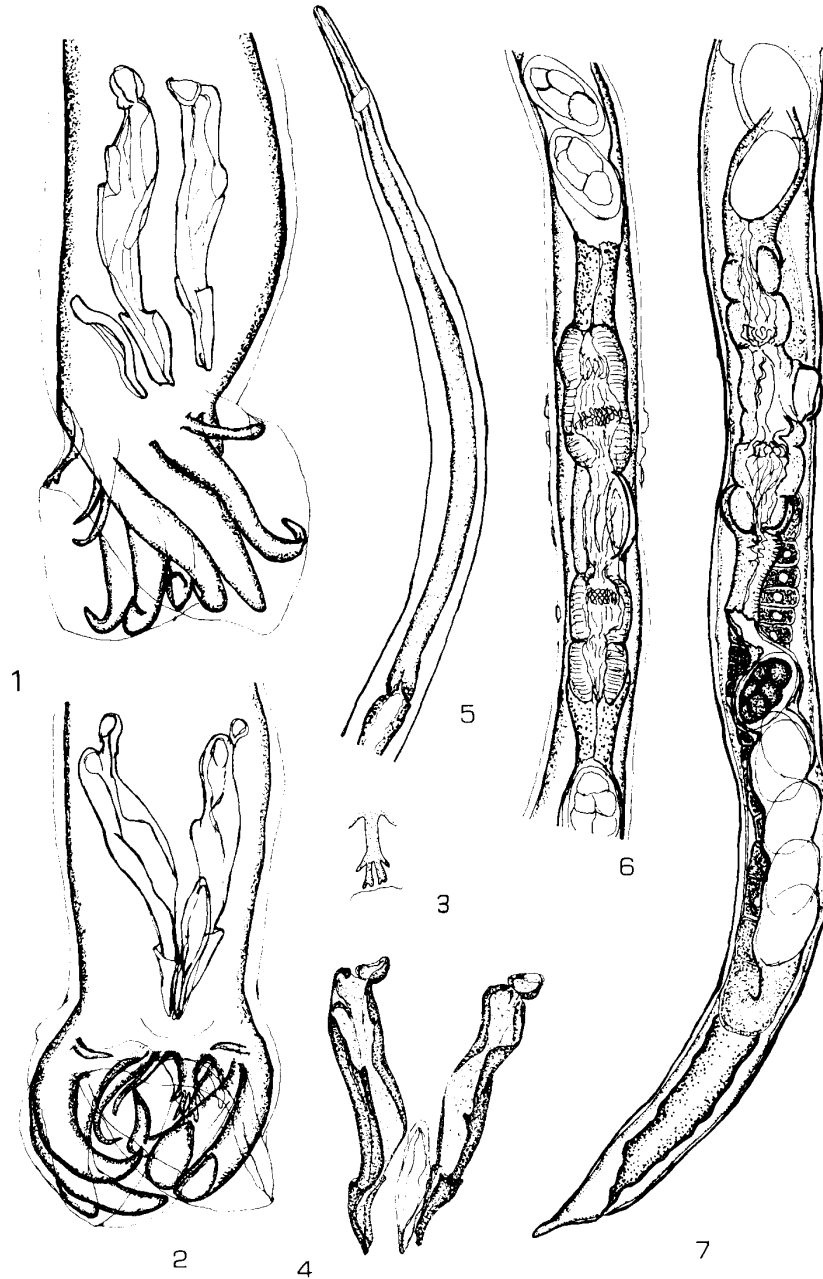
Male: Body 3.7-4.6 mm long, 0.078-0.104 mm wide at level just anterior to bursa. Esophagus 0.517-0.773 mm long. Nerve ring and excretory pore 0.085-0.104 mm and 0.098-0.135 mm, respectively, from anterior end. Spicules slightly unequal in shape and length, 0.115-0.146 mm long and bent ventrally. Gubernaculum boat-shaped and 0.067-0.100 mm long. Bursa with developed lateral lobes and a small dorsal lobe, symmetric. Ventral rays reaching to the bursal margin. Anteroventral rays small and arising from the base of posteroventral rays. Lateral rays large and reaching to the bursal margin. Anterolateral rays largest. Posterolateral rays smaller and arising from the base of externodorsal rays. Dorsal ray small and bifurcates into two branchlets and inner branchlets reaching to the bursal margin.

Female: Amphidelphic. Body 3.7-5.2 mm long, 0.078-0.112 mm wide at vulval region. Esophagus 0.603-0.776 mm long. Nerve ring and excretory pore 0.059-0.098 mm and 0.083-0.126 mm, respectively, from anterior end. Ovejectors well developed 0.348-0.543 mm long including sphincters. Eggs in uterus 0.050-0.068 mm by 0.026-0.039 mm.

This specimen is identified as *T. colubrifomis* (GILES, 1892) RAMSOM, 1911, because of the morphology of bursal rays and spicules.

This is the first record of *T. colubrifomis* from *Pronolagus* sp.

FIGURE 1 *Trichostrongylus colubriformis* (GILES, 1892)



1 Male, caudal end (lateral view) 2 Male, caudal end (ventral view) 3 Dorsal ray  
4 Spicules and gubernaculum 5 Female, anterior end 6 Female, vulval region  
7 Female, caudal end  
scale 1-4: 0.2 mm 5-7: 0.1 mm

The authors also found *T. colubriiformis* from *Lepus* sp. and small rodents captured in the same area. In Kenya, DAUBENY (1933) reported *T. colubriiformis* from sheep (*Ovis aries*), cattle (*Bos taurus*) and Grants' gazelle (*Gazella granti*).

2) *Impalaia tuberculata* MÖNNIG, 1923

Four males and 6 females were examined.

Small nematode. Not spirally coiled and reddish brown in color while alive. Possessing a cephalic vesicle with fine cross striations. Sixteen synlophes on the body wall.

Male: Body 5.7–6.4 mm long and 0.090–0.100 mm wide at level just anterior to bursa. Cephalic vesicle 0.080–0.100 mm by 0.040–0.05 mm. Esophagus 0.33–0.41 mm long. Nerve ring and excretory pore 0.22–0.26 mm and 0.34–0.42 mm, respectively, from anterior end. Spicules equal in length, slender and with fine pointed end, 0.95–1.09 mm long. Gubernaculum boat-shaped and poorly sclerotized, 0.073–0.079 mm long. Bursa almost symmetric with well developed lateral lobes. Dorsal lobe in distinct. All of the distal ends of lateral rays reaching to the margin of the bursa. Posterolateral rays longest. Externodorsal rays arise at different levels of the dorsal ray, from nearly the anterior end. Their distal ends not reaching to the margin of the bursa. Right branch of externodorsal ray longer than left one. Dorsal ray long, well developed and bent. Distal end divided into two branches and each branch redivided into two branchlets.

Female: Monodelphic. Body 8.9–12.9 mm long and 0.08–0.11 mm wide. Cephalic vesicle 0.07–0.11 mm long and 0.04–0.05 mm wide. Esophagus 0.35–0.48 mm long. Nerve ring and excretory pore 0.18–0.22 mm and 0.28–0.50 mm, respectively, from anterior end. Vulva and anus 0.11–0.22 mm and 0.05–0.07 mm, respectively, from posterior end. Three papillae on the tail end. Eggs in uterus 0.050–0.068 mm by 0.032–0.041 mm.

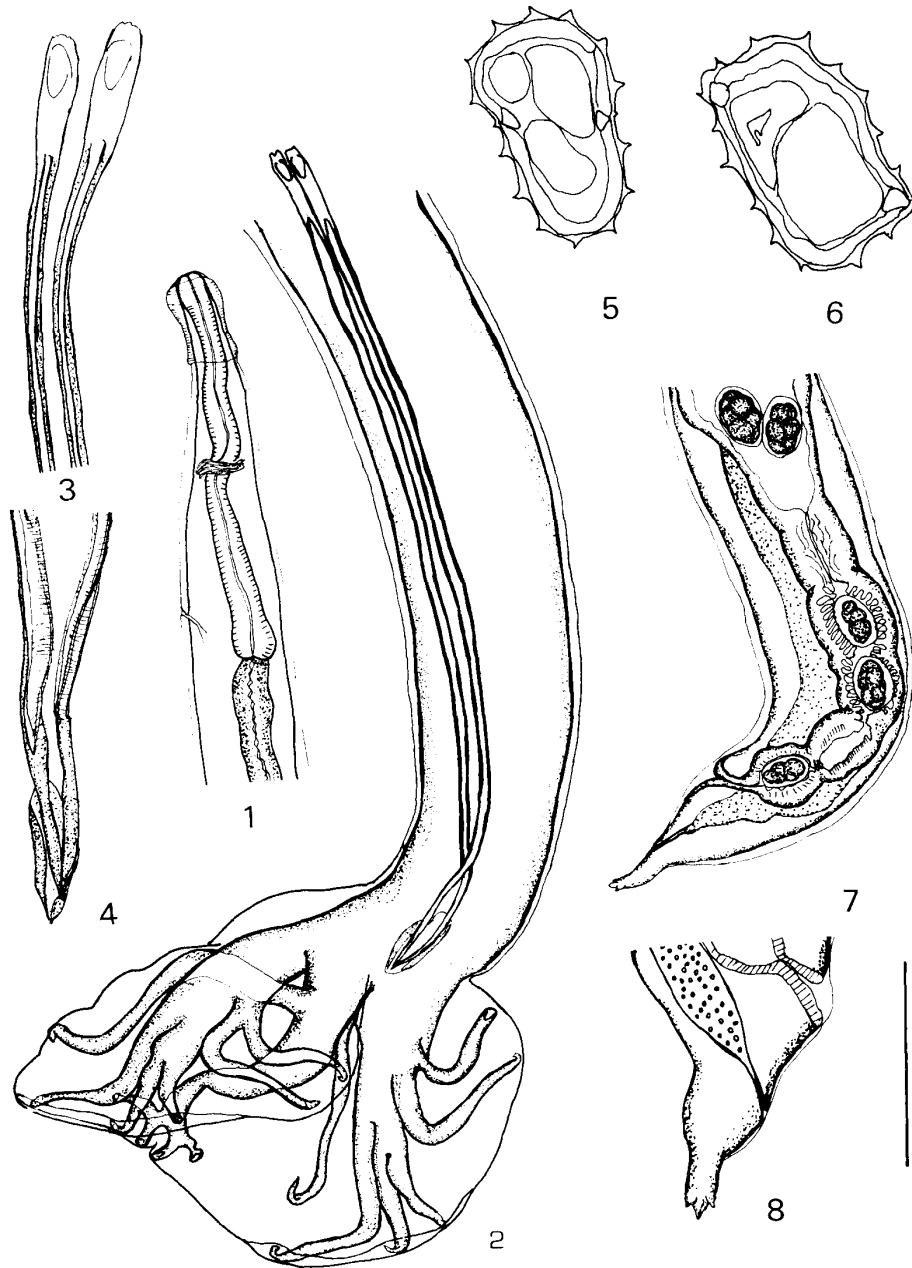
Recently, two reviews of the genus *Impalaia* have been made by GIBBONS et al. (1977) and BOOMKER (1977), respectively. In their reviews, both authors classified the genus *Impalaia* into 4 species: *I. tuberculata* MÖNNIG, 1923, *I. nudicollis* MÖNNIG, 1931, *I. taurotragi* (LE REUX, 1936) and *I. okapiae* (VAN DEN VERGHE, 1937). All species of the genus *Impalaia* are recorded only from wild and domestic ruminant animals, mainly in Africa. DAUBENY (1931) reported *I. nudicollis* (synonym of *I. tuberculata*) from the sheep, *Ovis aries*, in Kenya. In male, the morphology of bursal rays, particularly in the well developed and bent dorsal ray, and the slender spicules are similar to *I. tuberculata*. Also in female, because of the presence of three pairs of caudal papillae. This is the first record of *I. tuberculata* from *Pronolagus* sp. and also the first record of the genus *Impalaia* from non-ruminant animal.

3) *Paraheligmoneiloides kenyensis* gen. et sp. n.

Two males were examined.

Host: Red rock rabbit, *Pronolagus* sp.

FIGURE 2 *Impalaia tuberculata* MÖNNIG, 1923



1 Male, anterior end 2 Male, caudal end 3 Spicules, anterior end 4 Spicules, posterior end 5 Cross section of male 6 Cross section of female 7 Caudal end of female 8 Tail end of female  
scale 1, 2, 7: 0.2 mm 3-6, 8: 0.1 mm

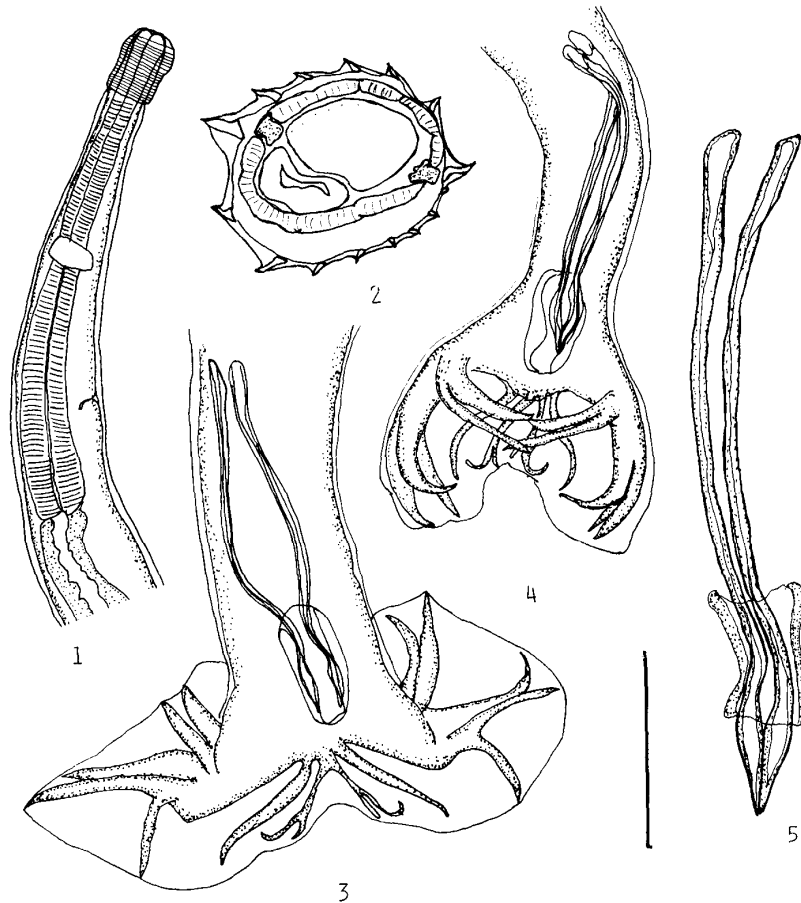
Habitat: Small intestine

Locality: Kedong Valley, Kenya

Date collected: October, 1979

Description: Small nematode. Spirally coiled and reddish brown in color while alive. Cephalic vesicle possessing fine cross striations, 0.061–0.078 mm long and 0.039–0.041 mm wide. In the cross section of the body at the middle region, 15 synlophes consist of aretes, 2 comparatively larger aretes laterally, 5 dorsally and 8 ventrally. Synlophes extend along the length of the body from posterior margin of cephalic vesicle to just anterior to bursa. Body 4.4–5.8 mm long and 0.087 mm wide at level just anterior to the bursa. Nerve ring and excretory pore 0.143–0.196 mm and 0.183–0.218 mm, respectively, from anterior end. Bursa well developed and almost symmetric. Ventral

FIGURE 3 *Paraheligmonelloides kenyensis* gen. et sp. n.



1 Anterior end of male 2 Cross section of male 3 Caudal end of male (dorsal view) 4 Caudal end of male (ventral view) 5 Spicules and gubernaculum  
scale 1, 3, 4: 0.2 mm 2, 5: 0.1 mm

rays divided at their base and reaching to the bursal margin. Lateral rays long, reaching to the margin of the bursa. Anterolateral and mediolateral rays run parallel. Medi-olateral and posterolateral rays have same trunks and divided divergently. Externodorsal rays arise from the base of the dorsal rays, and not reaching to the margin of the bursa. Dorsal rays divided at their base and bifurcated their distal end into two branchlets. Spicules equal in length, 0.217–0.304 mm long, thick and well chitinized. Gubernaculum well chitinized, 0.040–0.050 mm by 0.035–0.039 mm.

Female unknown.

Generic diagnosis: Trichostrongyloidea, Heligmonellidae.

Male: Synlophes consist of 15 aretes, 2 lateral ones comparatively larger, in the cross section at middle region of the body. Dorsal synlophes continuous. Externodorsal rays arise from the base of dorsal rays. Dorsal rays divided at their base. Spicules well sclerotized. Gubernaculum large,

Female unknown.

Type species: *Paraheligmonelloides kenyensis* sp. n.

Synlophes of the specimens are related to those of *Heligmonella* MÖNNIG, 1972, *Paraheligmonella* DURETTE-DESSET, 1971, *Neoheligmonella* DURETTE-DESSET, 1971 and *Boreostrongylus* DURETTE-DESSET, 1971. In *Heligmonella*, *Neoheligmonella* and *Boreostrongylus*, externodorsal rays arising from the stem of dorsal ray and the dorsal ray divide at its distal end. In *Paraheligmonella*, the morphology of externodorsal and dorsal rays are similar to those of *P. kenyensis*, but morphology of spicules and gubernaculum as well as the discontinuity of the dorsal synlophes.

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