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STUDIES ON THE PARASITE FAUNA OF INSECTIVORA I

PARACRENOSOMA TAKIKAWAI N. SP. FROM *SOREX UNGUICULATUS* DOBSON IN HOKKAIDO, JAPAN

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A new metastrongylid nematode of Japanese insectivore was described. *Paracrenosoma takikawai* n. sp. was found in the lungs of 17 out of 63 big-clawed shrews, *Sorex unguiculatus* DOBSON, captured in Hokkaido, Japan. This species is the largest among the known species of genus *Paracrenosoma* and is easily differentiated by the size and morphology of its spicules, gubernaculum and bursal rays. This is the first recording of genus *Paracrenosoma* YUN & KONTRIMAVICUS, 1963, in Japan.

INTRODUCTION

The insectivores, which are primitive mammals, exist throughout the world, with the exception of Australia, most of South America, Greenland and Antarctica.[6,16] They are known to be terrestrial, fossorial, or semi-aquatic, and their food habitats are generally insectivorous, although some have been found to be carnivorous. Up to now, there has been little information on the ecology of the insectivores of Japan, with the exception of some studies by ABE (1967, 1968). Recently, however, some insectivores, especially the musk shrew, *Suncus murinus murinus* (LINNAEUS), is going to be developed as laboratory animals.[8]

Since a few studies about the parasite of insectivores were carried out in Japan,[9~12,14,17,18] the author has initiated investigations to clarify the phylogenic nature and geographical background of the parasite fauna of Japanese insectivores.

Herein a new metastrongylid nematoda of genus *Paracrenosoma* which is parasitic in the lungs of big-clawed shrews, *Sorex unguiculatus*, is described.

MATERIALS AND METHODS

From 1971 to 1975, 3 kinds of *Sorex* spp., 63 *Sorex unguiculatus*, 15 *S. minutus gracillimus* THOMAS and 4 *S. caecutiens saevus* THOMAS, were trapped in Teshio District (northern Hokkaido), Nemuro District (eastern Hokkaido), and the suburbs of

Sapporo, and routine measurements of the shrews were taken. The skulls were preserved for taxonomical identification and age estimation. The nematodes in the lungs were collected using the dissection microscope, and then preserved in 5% formalin solution. The specimens were treated with lacto-phenol solution for microscopy. The paraffin sections of the lesional lung tissues were stained with hematoxylin-eosin.

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

RESULTS

Paracrenosoma takikawai n. sp. (Nematoda : Crenosomatidae)

Among the three species of *Sorex*, nematodes were found in only 17 out of 63 *S. unguiculatus*. All of the infected shrews were old, according to age criteria by ABE (1958). The conglomeration of nematodes was observed under the pleura of the lungs (fig. 12).

Host : *Sorex unguiculatus* DOBSON

Habitat : Bronchiole and alveolus

Locality : Teshio District and the Sapporo suburbs

Description : Filiform, fragile, slightly yellowish nematode, attenuated toward the extremities. Cuticula inflated with fine, longitudinal striations. Cuticular transverse striations distinct at extremities. Mouth surrounded by 6 small papillae. Buccal cavity indistinct. Esophagus cylindrical, slightly dilated posteriorly. Excretory pore at nerve ring. Excretory vesicle well-developed.

Male : Body length 7.30–9.85 mm. Maximum width 0.208–0.288 mm. Caudal end bent ventrally. Esophagus 0.275–0.310 mm in length. Nerve ring, 0.102–0.160 mm from anterior extremity. Bursa almost round, 0.11–0.12 mm in diameter. Ventral surface of bursa rough. Bursal rays, except externo-dorsal ray and antero-lateral ray, touching the bursal edge. Ventro-ventral and latero-ventral rays differentiable by shallow incision near bursal edge, ending with a small protuberance. Lateral rays with a common trunk. Antero-lateral ray rising separately from lateral rays at approximately middle of trunk, not touching the bursal edge. Other lateral rays the same as ventral rays. Dorsal ray 0.038–0.045 mm in length, split into four at proximal end. Externo-dorsal ray long, rising proximally at one fourth of trunk. Spicules equal, filiform, proximally chitinized, yellowish, hollowed in appearance, 0.128–0.150 mm in length with rounded distal end. Small outgrowth on dorsal side of each spicule. Gubernaculum chitinous, bowed in shape, 0.026–0.032 mm in length. Excretory pore near nerve ring, 0.099–0.121 mm from anterior extremity.

Female : Viviparous. Body length 9.79–14.78 mm. Width 0.325–0.390 mm at vulval region. Nerve ring and excretory pore, 0.090–0.125 mm and 0.093–0.138 mm from cephalic end, respectively. Vulva, 5.94–8.67 mm from cephalic end. Orifice of vulva

split trasversely. Vagina muscular and short. Muscular "trichostrongylid" ovijector well-developed, with prominent sphincter. Two-layer ovijector wall consisting of muscular inner and outer layers with hexagonal pattern, resembling the basal membrane. Uterus reversed at the end of excretory vesicle. Short tail, 0.112–0.173 mm in length. Larvae with pointed tail, 0.230–0.240 mm in length. Eliptical eggs with larvae, 0.070–0.074 × 0.042–0.045 mm in size.

Pathological observations: The conglomeration of nematodes was observed under the pleura of the lungs (fig. 12); the lung tissues were occupied by the nematodes (fig. 13). Neither the larvae or eggs, however, were scattered in the terminal bronchioles or alveoli; and there were rarely found in the lymphatic vessel (fig. 14). Although the terminal bronchioles or alveoli parasitized by the nematodes were extremely dilated, the adjacent alveoli were atrophied. There was no observable inflammatory reaction, however, and the involved tissues were not surrounded by a fibrous wall or capsule. The only noteworthy changes were the compensatory dilation of the tributary alveolar sac and the alveoli and pulmonary emphysama.

Discussion

The present species represents the first recording of genus *Paracrenosoma* in Japan, which includes 6 previously described species:

1 *Paracrenosoma skrjabini* (Pologentsev, 1935) Yun & Kontrimavichus, 1963: Host: *Sorex araneus* Linnaeus; Locality: Middle-Volga region, U. S. S. R.

2 *P. yuni* Chabaud, 1973 (*P. skrjabini* sensu Yun & Kontrimavichus, 1963); *S. araneus, S. caecutiens* Linnaeus, *Sorex* sp.; Altai, U. S. S. R.

3 *P. abei* Chabaud, 1973: *Soriculus leucops* Horsfield, *S. nigrescens* Gray, *Chimarrogale platycephala himalayaica* Gary; Nepal

4 *P. ohbayashii* Chabaud, 1973: *S. nigrescens*; Nepal

5 *P. combesi* Mas-Coma, 1977: *Crocidura russula* Hermann; Spain

6 *P. kontrimavichusi* Guenov, 1978: *Crocidura leucodon* Hermann, *C. suaveolens* Pallas; Bulgaria

P. takikawai differs considerably from the six, above-mentioned species of *Paracrenosoma*. In *P. skrjabini, P. abei, P. ohbayashii, P. combesi* and *P. kontrimavichusi*, the body, spicule, and gubernaculum are much shorter, and the morphology of the spicule and bursal rays differ. Morphologically, *P. takikawai* resembles *P. yuni*; however, in *P. yuni* the antero-lateral ray does not rise from the common trunk of the medio-lateral and postero-lateral ray, and the gubernaculum is much shorter. *P. takikawai* n. sp. is the largest species in the genus *Paracrenosoma*.

Although Soltys (1953) reported on *P. skrjabini* in the *S. minutus* of Poland, the lungworm was not recognized in the *S. minutus gracillimus* and *S. caecutiens saevus* of Hokkaido; therefore, further investigations must be carried out to determine

whether or not *P. takikawai* is the specific species of *S. unguiculatus*.

The specific name is dedicated to Prof. S. TAKIKAWA, Teshio District Experimental Forests of Hokkaido University.

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Explanation of plates

Plate I

Figs. 1–11 *Paracrenosoma takikawai* n. sp.

Fig. 1 Posterior end of male, ventral view

Fig. 2 Posterior end of male, lateral view

Fig. 3 Spicule

Fig. 4 Distal end of spicules

Fig. 5 Gubernaculum

Fig. 6 Anterior extremity of female, end-on view

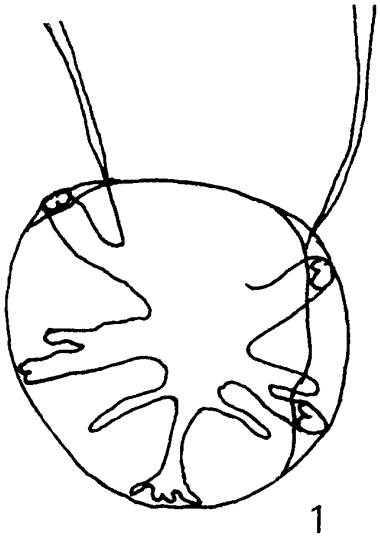
Fig. 7 Anterior end of female

Fig. 8 Ovijector

Fig. 9 Posterior end of female

Fig. 10 Egg

Fig. 11 Larva



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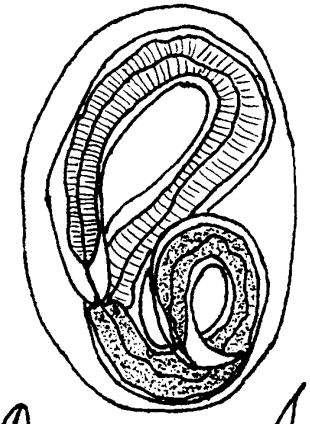

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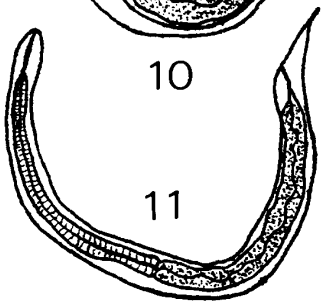

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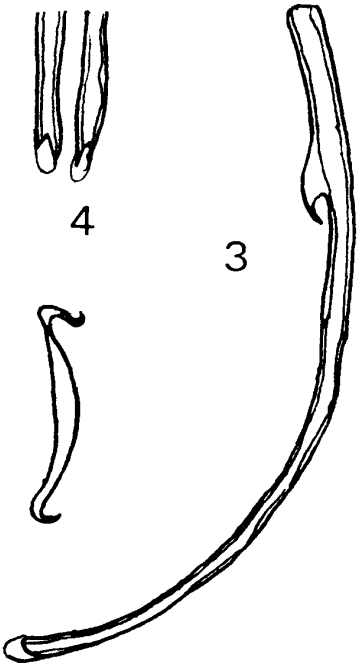

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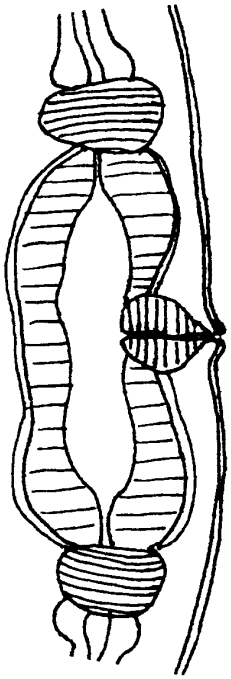

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4, 5, 6 :

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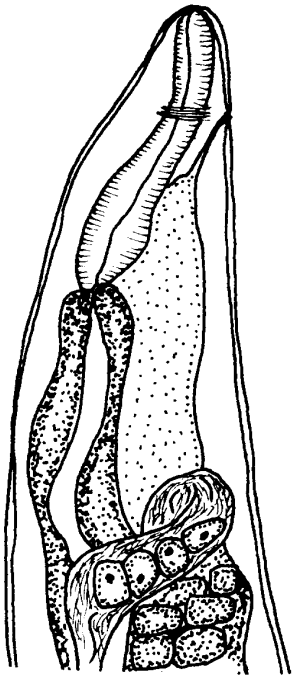

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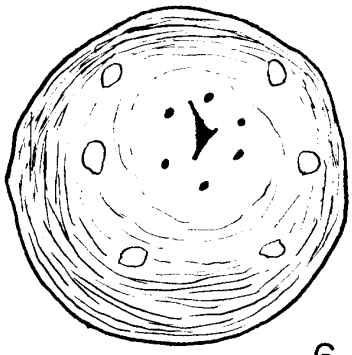

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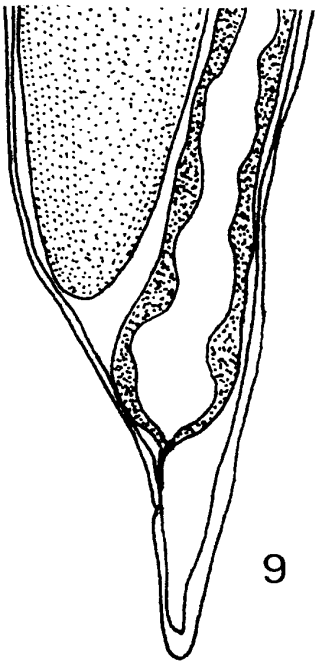

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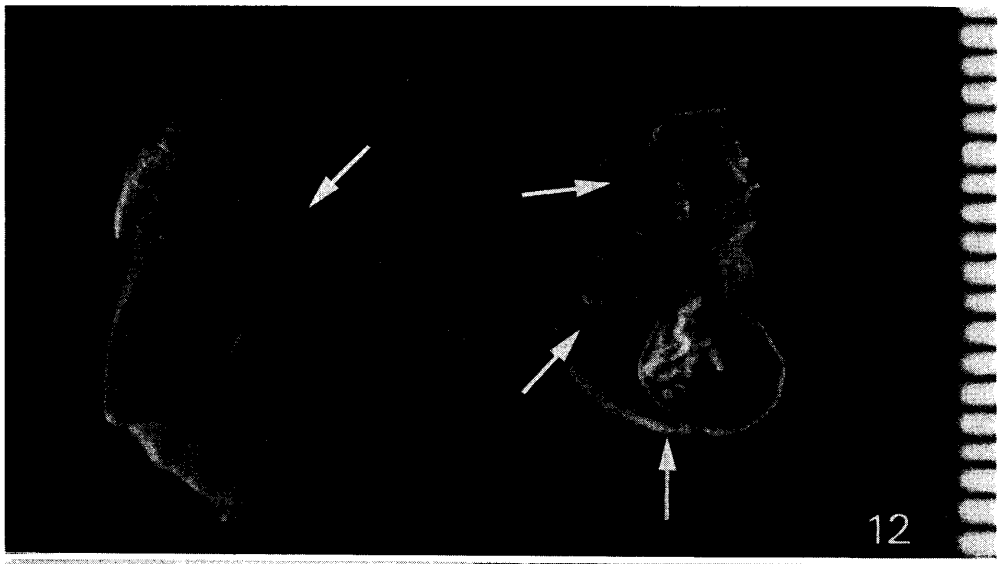
PLATE II

Fig. 12 The conglomeration of *P. takikawai* n. sp. in lungs (↗)

Fig. 13 Lung section showing bronchioles and alveoli occupied by nemrtodes

Fig. 14 Lung section showing atrophied alveoli adjacent to the female nematodes, and the larvae in the lymphatic vessel (↗)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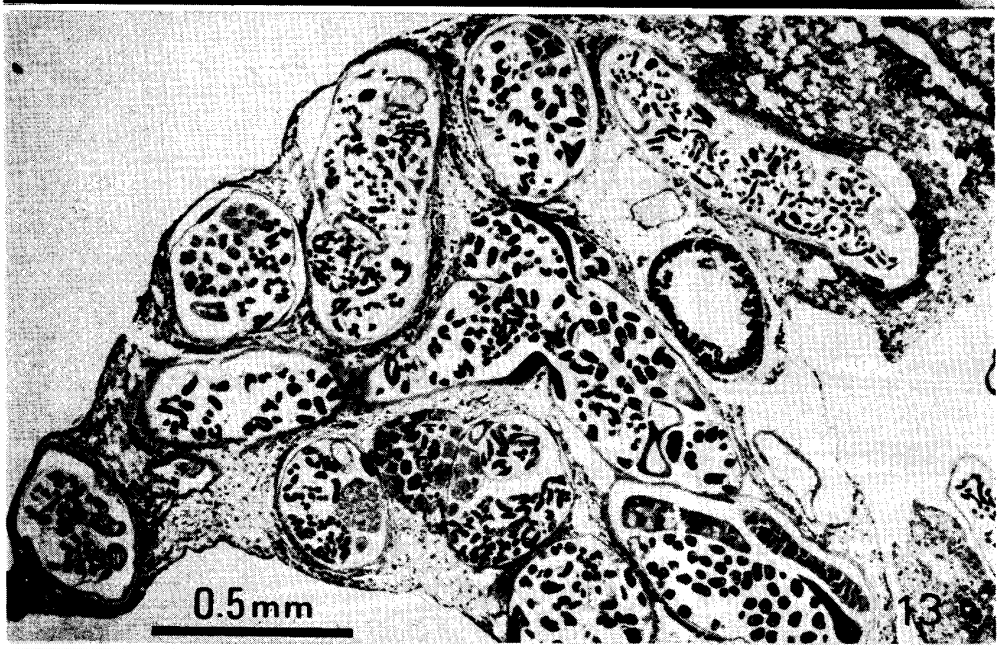
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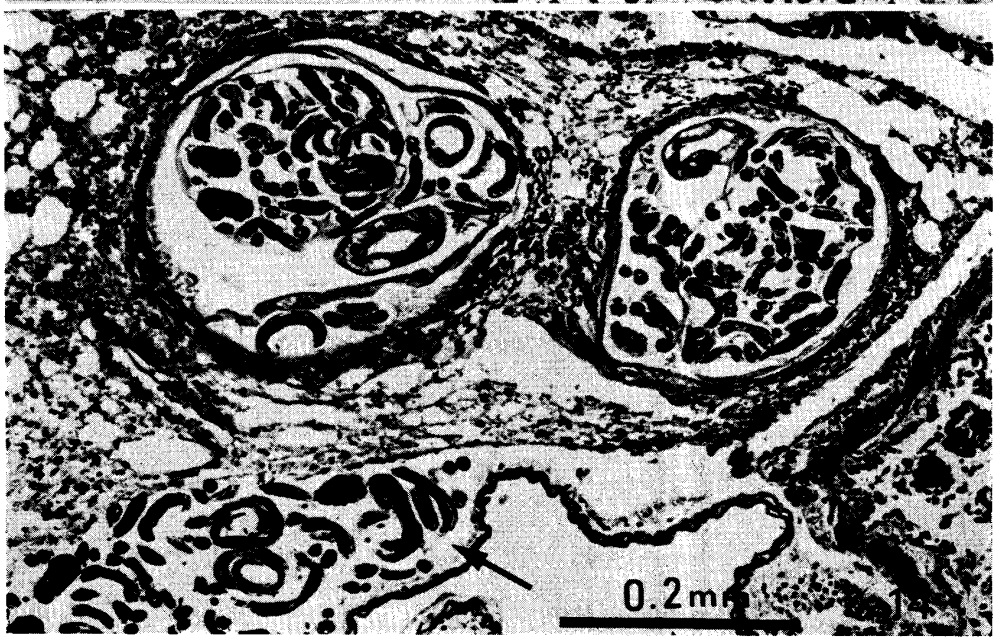
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