

Studies on the Parasite Fauna of Insectivora

IV. Four nematodes from the Japanese *Sorex* spp.

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Introduction

In the preceding three papers,^{1,2,5)} we described various nematode parasites of the Japanese shrews (genera *Sorex* and *Crocidula*). Furthermore, we added four nematode species newly found from the Japanese *Sorex* and redescribed them.

Materials and Methods

From 1974 to 1983, Japanese shrews, *Sorex shinto saevus* THOMAS, and 229 big-clawed shrews, *S. unguiculatus* DOBSON, were collected in several areas of Hokkaido, Japan, and the authors obtained four nematodes from the Japanese *Sorex* (Tab. 1).

The nematodes were fixed in 5% formalin, and for microscopic examination were cleared in lacto-phenol solution. The submucosal tissues of the intestine in which *Porrocaecum* sp. were found were fixed in 10% formalin and embedded in paraffin. The sections made were stained with hematoxylin-eosin for pathological investigations.

Results and Discussion

1) *Parastrongyloides winchessi* MORGAN, 1928⁷⁾

This species was obtained from the intestine of 66 big-clawed shrews, *S. unguiculatus* DOBSON, and 10 Japanese shrews, *S. shinto saevus* THOMAS.

Description (measurements in mm)

Male (three specimens): Buccal capsule obvious, $0.004\sim 0.005\times 0.005\sim 0.006$ in size. Body, filiform, 1.12~1.30 in length and 0.03 in width. Esopha-

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Table 1. Occurrence of four nematodes found newly from Japanese *Sorex* spp., Japan

GEN. SP.	HABITAT	HOSTS	
		<i>S.u.</i> (N=129)	<i>S.s.</i> (N=99)
<i>Parastrongyloides</i>			
<i>winchesi</i>	intestine	66†(30.1)*	10 (10.1)
<i>Syphacia</i> sp.	intestine	2 (0.9)	1 (1.0)
<i>Porrocaecum</i> sp.			
(encysted larva)	submucosal tissue of gut	50 (21.8)	14 (14.1)
Rhabditidae gen. sp.			
(larva)	nasal cavity	9 (3.9)	0 (0.0)

†: Number of shrews infected.

*: Percentage of shrews infected (%).

S.u.: *Sorex unguiculatus*; *S.s.*: *S. shinto saevus*.

gus, 0.39~0.46 in length, without esophageal bulb. Nerve ring at 0.10~0.17 from head end. Excretory pore unknown. Tail curved ventrally. Cloaca opening at 0.03~0.06 from tail end with a swollen cuticular projection and a pair of papillae. Spicules equal, 0.037~0.047 in length, and spicule sheath boat-shaped. Gubernaculum fusiform, 0.09 in length. Female (four specimens): Body, slender, slightly larger than males, 1.11~1.49 in length and 0.03~0.05 in width. Esophagus, 0.29~0.45 in length. Nerve ring at 0.10~0.13 from head end. Excretory pore unknown. Vulva at 0.83~0.97 from head end without a special structure. Egg, segmented or contained a larva, 0.03~0.05×0.03 in size, number of eggs per one female, 6~8. Anus at 0.04~0.05 from tail end.

This species has been reported from *Sorex araneus* and *S. minutus* in Europe,^{8,12)} but, from this is the first recording in Japan.

2) *Syphacia* sp.

Three female specimens of *Syphacia* sp. were obtained from the intestine of 2 big-clawed shrews, *Sorex unguiculatus* DOBSON, and a Japanese shrew, *S. shinto saevus* THOMAS.

Description (measurements in mm)

Male: unknown. Female (two specimens): Body, 4.0 in length and 0.29 in width. Esophagus 0.46 in length. Nerve ring at 0.14 and excretory

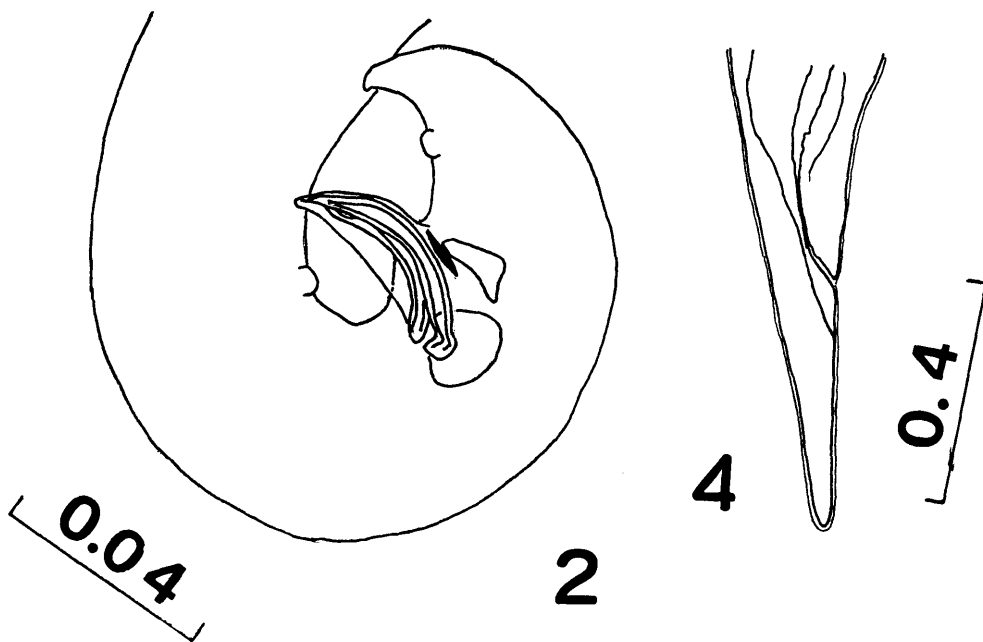
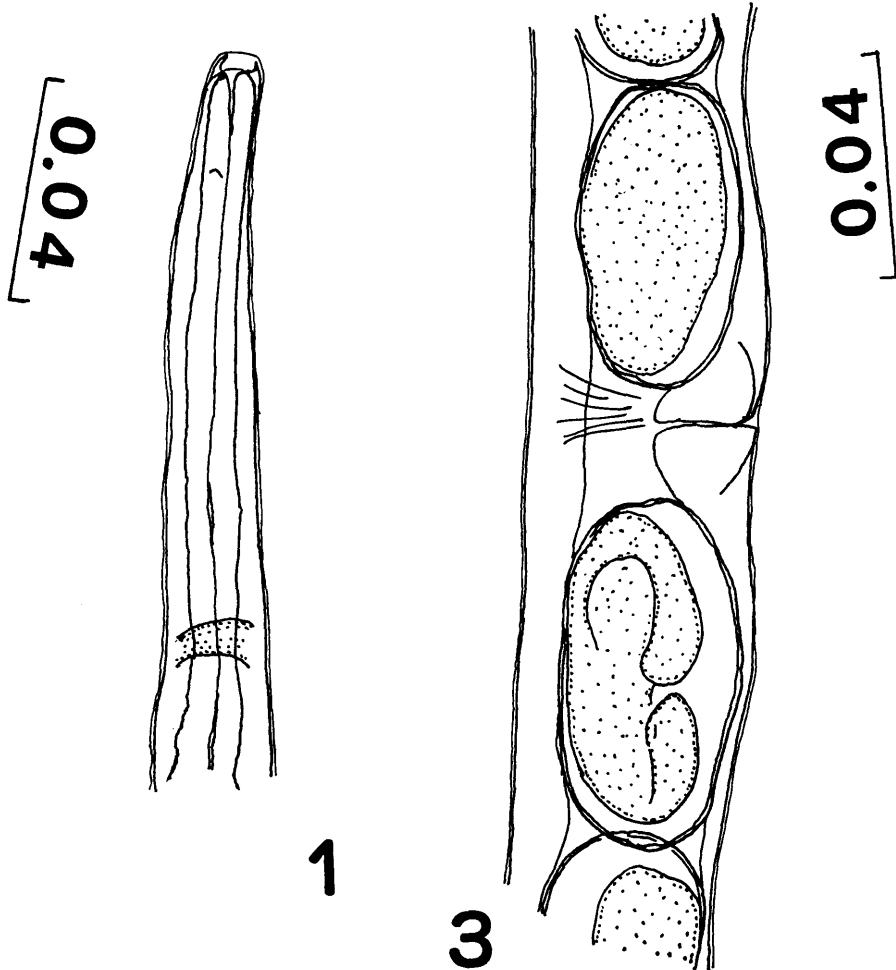
Figures 1-4. *Parastrongyloides winchesi* MORGAN, 1928 (scale in mm).

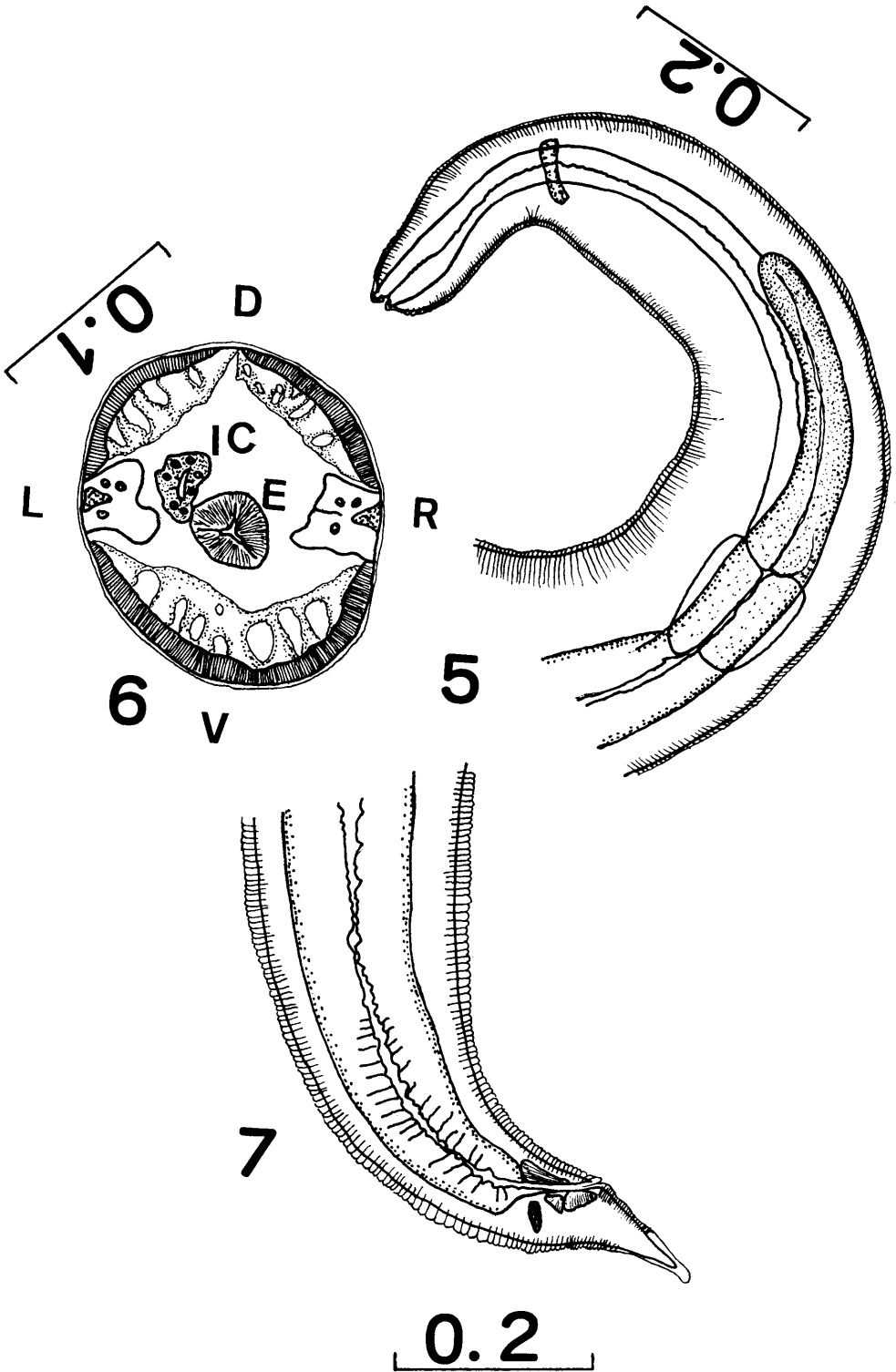
Fig. 1. Anterior extremity of female.

Fig. 2. Posterior extremity of male, right-lateral view.

Fig. 3. Vulva of female, right-lateral view.

Fig. 4. Posterior extremity of female, right-lateral view.





pore at 0.39 from head end, respectively. Vulva at 0.16 and anus at 0.56~0.64 from tail end, respectively. Egg, 0.08×0.04 in size.

These specimens were similar to *Syphacia emileromani* CHABAUD *et al.*, 1963,⁹⁾ which commonly occurs in field mice (*Apodemus* spp.), although complete identification was not possible because of the absence of the male. The present *Syphacia* is considered to be a pseudoparasite because shrews sometimes feeds on the body of field mice,¹⁴⁾ which are true hosts.

3) *Porrocaecum* sp. (encysted larva)

Encysted larvae of the genus *Porrocaecum* were obtained from the submucosal tissue of the stomach and intestine of 50 big-clawed shrews, *Sorex unguiculatus* DOBSON, and 14 Japanese shrews, *S. shinto saevus* THOMAS. The sexes of the nematodes were not known because of immaturity.

Description (measurements in mm)

Sex unknown (five specimens): Body covered with cystic membrane, coiled two times, 5.3~8.4 in length and 0.16~0.20 in width. Many transverse striations present on the whole body surface. Esophagus 0.48~0.81 in length, ventriculus apple-shaped, 0.08~0.12 in length and 0.06~0.08 in width. Nerve ring at 0.19~0.23 from head end. Intestinal caecum arising from left base of intestine, 0.28~0.52 in length. Anus at 0.11~0.13 from tail end.

These specimens belong to the genus *Porrocaecum* RAILLIET & HENRY, 1912,¹⁰⁾ because of the morphological characteristics of ventriculus and intestinal caecum, and the habitat, although positive identification was not possible because of immaturity. The encysted larva of the genus *Porrocaecum* has also been reported from *Sorex araneus* and *S. minutus* in Europe,^{4, 6, 11, 12)} *Blarina brevicauda* in USA¹³⁾ and *Urotrichus talpoides* in Japan.⁸⁾ However, this is the first record of this genus obtained from the Japanese *Sorex*.

4) Rhabditidae gen. sp. (larva)

Larvae of the rhabditid nematodes were obtained from the nasal cavity of 9 big-clawed shrews, *Sorex unguiculatus* DOBSON. From 1 to 4 worms were collected from each host. Sexes of the worms were unknown because of immaturity.

Description (measurements in mm)

Sex unknown (four specimens): Body, minute, 0.84~1.00 in length

Figs. 5-9. *Porrocaecum* sp. (encysted larva) (scale in mm).

Fig. 5. Anterior extremity, left-lateral view.

Fig. 6. Cross-section of body at middle site of esophagus: D, dorsal; V, ventral; R, right; L, left; IC, intestinal caecum; E, esophagus.

Fig. 7. Posterior extremity of female, right-lateral view.

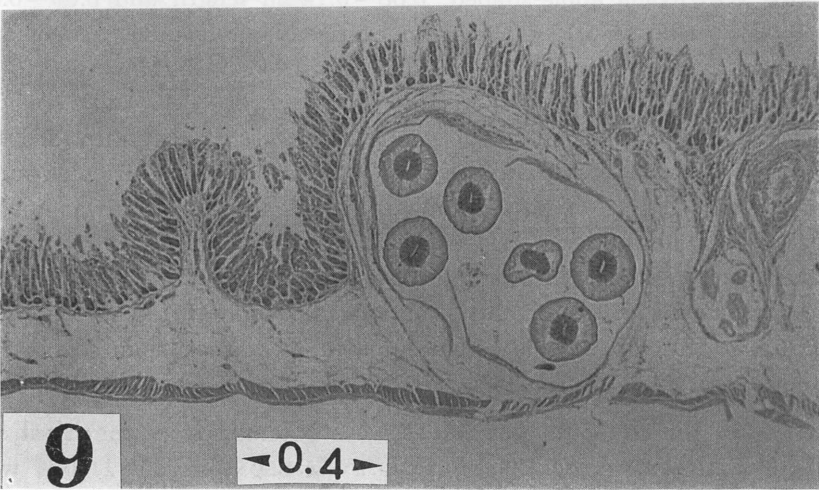
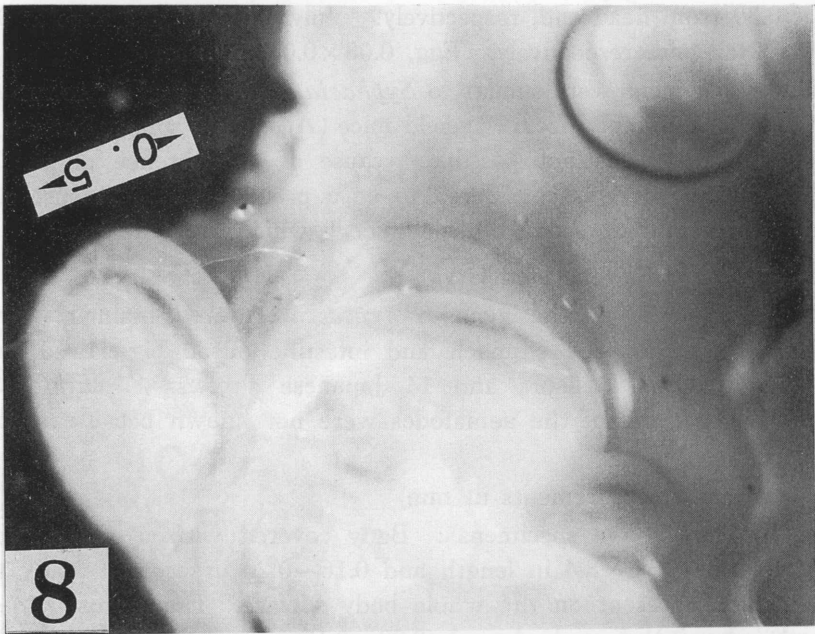


Figure 8. Stomach of *S. unguiculatus* parasitized by larva of *Porrocaecum* sp. (scale in mm).

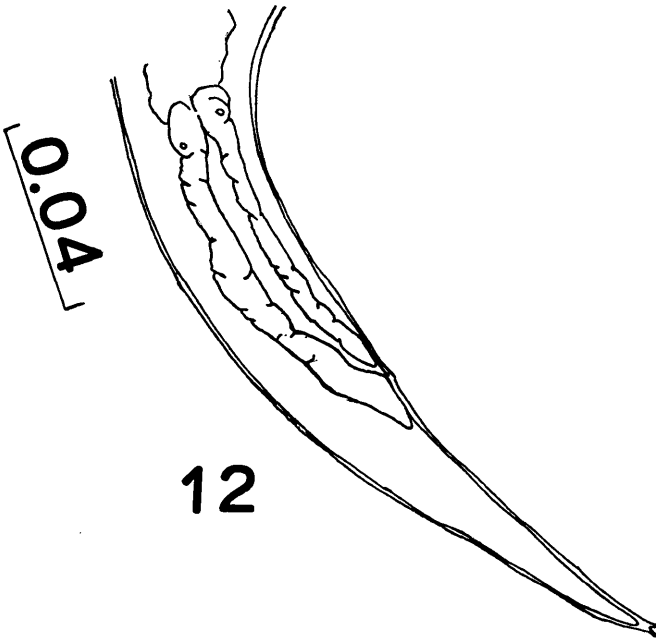
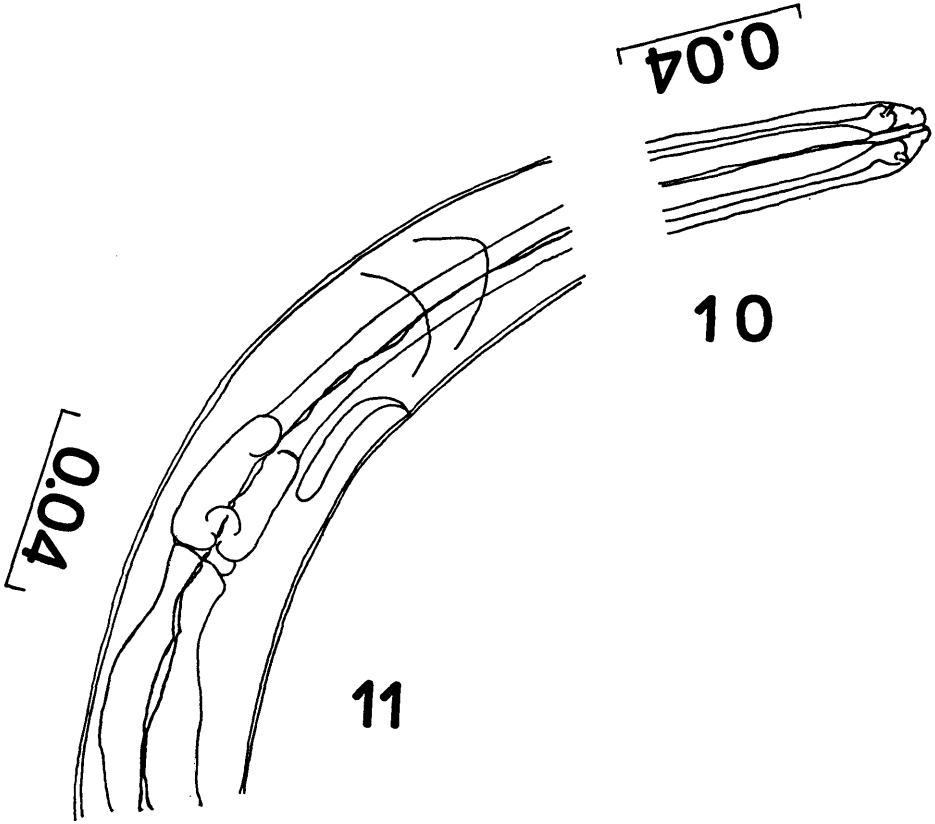
Figure 9. Stomach section of *S. unguiculatus* showing larva of *Porrocaecum* sp. (scale in mm).

Figures 10-12. Larva of Rhabditidae gen. sp. from *Sorex unguiculatus* (scale in mm).

Fig. 10. Anterior extremity.

Fig. 11. Junction of esophages and intestine.

Fig. 12. Posterior extremity.



and 0.03~0.04 in width. Buccal cavity cylindrical with clearly defined unjointed rhabdions, 0.008~0.013 in length. A pair of papillae in the peribuccal cavity. Nerve ring at 0.09~0.14 and excretory pore at 0.10 from head end, respectively. Esophagus with a bulb, 0.11~0.21 in length. Tail with two spines, 0.03~0.07 in length.

These specimens were considered to belong to the family Rhabditidae because of the morphological characteristics of buccal cavity and the larvae being in the dauerlarval stage. There is no record of the rhabditid from the nasal cavity of *Sorex*. Ohbayashi *et al.*,^{8,9} however, also obtained larval Rhabditidae gen. sp. from the lungs and basal cavity of the Japanese shrew mole, *Urotrichus talpoides*.

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Summary

Four species of nematodes newly found in the Japanese shrews, *Sorex shinto saevus* THOMAS and *S. unguiculatus* DOBSON, were described. *Parastrongyloides winchesi* MORGAN, 1928, from the intestine of *S. shinto saevus* and *S. unguiculatus*, is the first record in Japan. *Syphacia* sp. found in the intestine is considered as a pseudoparasite, because it feeds on dead field mice (*Apodemus* spp.), which are the "true" hosts. Encysted larvae of *Porrocaecum* sp. were found in the submucosal tissue of the stomach and intestine. The larva of Rhabditidae gen. sp. from the nasal cavity is the first recorded in the Japanese *Sorex*.

Key words : *Parastrongyloides winchesi* MORGAN, 1928 ; *Syphacia* sp. ; *Porrocaecum* sp. ; Rhabditidae gen. sp. ; *Sorex* spp. ; Japan.

References

- 1) Asakawa, M., Kamiya, H. & Ohbayashi, M., 1988 a. Studies on the parasite fauna of insectivora II. Four new capillarid nematodes from the Japanese shrews, genera *Sorex* and *Crocidula*. J. Coll. Dairying, 12: 335-347.
- 2) Asakawa, M., Kamiya, H. & Ohbayashi, M., 1988 b. Studies on the parasite fauna of insectivora III. Two new nematodes, *Soboliphyme abei* n. sp. (Soboliphymatidae) and *Stefanskostrongylus yagii* n. sp. (Angiostronglyidae) from *Sorex* spp. in Japan. *Ibid.*, 13: 1-10.
- 3) Chabaud, A. G., Rausch, R. L. & Desset, M. C., 1963. Nematodes parasites de rongeurs et insectivores japonais. Bull. Soc. Zool. France, 138: 489-512.

- 4) Gareeva, L. M., Kuzeev, R. G. & Valiullin, S. M., 1974. (translated title) A study of nematode larvae in the genus *Porrocaecum* RAILLIET et HENRY, 1912 from *Sorex araneus*, In Gel'minty zhivotnykh, cheloveka i rastenii na yuzhnom Urale, Vypusk 1, 107-109, Akademiya Nauk SSSR, Ufa, USSR (in Russian).
- 5) Kamiya, H., 1980. Studies on the parasite fauna of Insectivora I. *Paracrenosoma takikawai* n. sp. from *Sorex unguiculatus* DOBSON in Hokkaido, Japan. Jpn. J. Vet. Res., 28: 95-100.
- 6) Mas-Coma, S. & Gallego, J., 1975. (translated title) On the helminths of Spanish small mammals I. Parasites of *Sorex* spp. (insectivora: Soricidae). Rev. Ibérica Parasitol., 35: 261-281.
- 7) Morgan, D. O., 1928. *Parastrongyloides winchesi* gen. et sp. nov. A remarkable new nematode parasite of the mole and the shrew. J. Helminthol., 6: 79-86.
- 8) Ohbayashi, M., Masegi, T. & Kubota, K., 1972. Parasites of the Japanese shrew mole, *Urotrichus talpoides* TEMMINCK. Jpn. J. Vet. Res., 20: 50-56.
- 9) Ohbayashi, M., Masegi, T. & Kubota, K., 1973. Further observation on parasites of the Japanese shrew mole, *Urotrichus talpoides* TEMMINCK. *Ibid.*, 21: 15-22.
- 10) Railliet, A. & Henry, A., 1912. Quelques nématodes parasites des reptiles. Bull. Soc. Path. Exof., 5: 251-259.
- 11) Sołtys, A., 1952. Pasożyty wewnętrzne ryjowki aksamitnej (*Sorex araneus* L.) Białowieskiego Parku Narodowego. Ann. Univ. Marie Curie-Skłodowska, Lublin, 6: 165-209.
- 12) Thomas, R. J., 1973. On the nematode and trematode parasites of some small mammals from the Inner Hebrides. J. Helminthol., 27: 143-168.
- 13) Wittrock, D. D. & Hendrickson, G. L., 1979. Helminths of shrews, *Blarina brevicauda* and *Sorex cinereus* in Iowa. J. Parasitol., 65: 985-986.
- 14) Yoneda, M. & Nakata, K., 1984. Natural enemy, In Study on wild murid rodents in Hokkaido. (K. Ota ed.), 1st ed., Hokkaido Univ. Press, Sapporo, Japan.

要 旨

北海道産オオアシトガリネズミおよびエゾトガリネズミより新たに寄生の認められた4種の線虫について報告した。*Parastrongyloides winchesi* MORGAN, 1928 が両宿主種の腸にみとめられた。全北区のトガリネズミ科ではごく普通に認められるが、本邦では初報告となった。*Syphacia* sp. (おそらく *S. emileromani* とおもわれる) が両宿主の腸に認められたが、この寄生はアカネズミ属 (真の宿主) の死体を捕食したために生じた擬寄生 (pseudoparasitism) 現象とおもわれた。*Porrocaecum* 属の被囊した子虫が消化管の粘膜下組織に認められた。また、Rhabditidae 科の子虫が鼻腔より検出された。いずれも日本産 *Sorex* 属では初めてであった。