NOTE *Parasitology*

Survey on Wild Rodents for Endoparasites in Iwate Prefecture, Japan

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(Received 27 February 2003/Accepted 7 July 2003)

ABSTRACT. Wild rodents (58 *Apodemus speciosus*, 29 *A. argenteus* and 7 *Microtus montebelli*) were surveyed for endoparasites in Iwate Prefecture, Japan, from October to December 1995 and from April to October 1996. Two trematodes (*Echinostoma macrorchis, Plagiorchis muris*), 4 or more cestodes (*Hymenolepis diminuta, Raillietina coreensis, Cladothyridium* spp., *Cysticercus fasciolaris*), 12 nematodes (*Carolinensis minutus, Eucoleus* sp., *Heligmosomoides kurilensis, H. protobullosus, H. speciosus, Heterakis spumosa, Rhabditis (Pelodera) orbitalis, Rictularia cristata, Syphacia emileromani, S. frederici, S. montana, Trichuris* sp.) and 3 protozoans (*Giardia* sp., *Trichomonas* sp., *Trypanosoma* sp.) were identified. The two species of *Apodemus* were similar to each other, but they were extremely different from *M. montebelli* in parasite fauna.
KEY WORDS: endoparasite, Japan, wild rodent.

J. Vet. Med. Sci. 65(10): 1151–1153, 2003

Wild rodents act as definitive and/or intermediate hosts of many endoparasites including helminthes with zoonotic potential such as *Echinococcus multilocularis*. Therefore, they have been investigated for parasites, especially for helminths, in some districts of Japan [4–6, 13, 21, 22]. Recently, the first human case of babesiosis in Japan has been reported and showed that the etiological agent was an indigenous Japanese parasite which might be a geographical variant of *Babesia microti* involved in rodent infections [16]. This report suggested the importance of parasitic survey on wild rodents from the viewpoint of public health. In the present study, we captured wild rodents in the central area of Iwate prefecture and examined endoparasites including protozoans.

From October to December 1995 and from April to October 1996, rodents were caught using alive-traps in nine sites of forest in Morioka, Shizukuishi, Takizawa and Tamayama. The rodents captured were identified to species level according to Tanaka [18]. The animals were euthanitized. Then, blood smears were prepared by routine technique. The visceral organs and the tissue around eyes were removed from each animal and examined for helminths under a stereoscopicmicroscope. For observation of protozoan parasites, stamped tissues stained with hematoxylin were used. In addition, the muscle of face and legs was examined for the larvae of *Trichinella* species by the trypsin digestion method. The helminths recovered were fixed in 70% ethanol or 10% formalin. For identification of species, flukes and cestodes were stained with hematoxylin-carmine and nematodes were cleared in phenol-lactic acid.

Ninety-four rodents captured were 58 *Apodemus speciosus*, 29 *A. argenteus* and 7 *Microtus montebelli*. The 2 species of *Apodemus* were caught in all the 9 collecting sites. Further, *A. speciosus* was collected in each month except for June and July. The results of survey on parasite fauna are presented in Table 1. Two trematode, 4 or more cestode, 12 nematode and 3 protozoan species were identified. The two species of *Apodemus* were similar to each other in parasite fauna, but they were extremely different from *M. montebelli*. The prevalence of the 2 trematode species was very low, and only 8 immature flukes of *Echinostoma macrorchis* and a single adult of *Plagiorchis muris* were detected from the 2 animals of *A. speciosus* respectively. In contrast, *Heligmosomoides speciosus* and *Trichomonas* sp., and *Carolinensis minutus* and *Giardia* sp. were the most dominant in the 2 species of *Apodemus* and *M. montebelli*, respectively. *Trypanosoma* sp. in *A. speciosus* showed the high infection rate of 40% in August than in the other months. Bladder worms with a diameter of 1.5–2 mm were found in the liver of *A. speciosus* and *M. montebelli*. The protoscolex was invaginated in the body and had a rosterum with large and small hooks arranged alternately. The size of both hooks was 2 μm and 14 μm, and 17 μm and 12 μm in the worms from *A. speciosus* and *M. montebelli*, respectively. From these morphological findings, the worms were considered to be cladothyridia of the genus *Cladotaenia* according to Abulodze [1]. The cladothyridia from *A. speciosus* were very akin to those from *A. speciosus* previously reported in Hokkaido, Japan [13, 22]. In the present study, female nematodes with a measurement of $\leq$34.95 mm $\times$ 0.14 mm were obtained from the gastric mucosa of 5 *A. speciosus*. The vulva was located 10.58 mm distant from the head end, and the intrauterus eggs measured 61 $\times$ 26 μm on average. From these findings the nematodes seemed to belong to the genus *Eucoleus* according to Moravec [15], but we could not identified them into species level since no male worms were obtained. *Eucoleus* sp. was reported from *A. speciosus* in some area of Japan [5, 6]. *Trichuris muris* has been reported sporadically from wild rodents of 18 genera including *Apodemus* [7, 8, 10, 11, 14, 20, 23]. Further, *T. avicolae* has been described recently as a new species in rodents of the family Arvicolidae, and can be clearly differentiated from *T. muris* in vaginal length and egg size [9]. In the present study, 2 female whipworms were recovered

Table 1 Endoparasites detected from wild rodents in Iwate Prefecture

Parasite species	Incidence (%)		
	A. speciosus	*A. argenteus*	*M. montebelli*
(Trematoda)			
Echinostoma macrorchis	1.7	0	0
Plagiorchis muris	1 7	0	0
(Cestoda)			
Hymenolepis diminuta	18.9	3.4	0
Raillietina coreensis	53.4	44.8	0
Cladothyridium spp	13.8	0	28.6
Cysticercus fasciolaris	3.4	3 4	0
(Nematoda)			
Carolinensis minutus	0	0	100
Eucoleus sp.	8.6	0	0
Heligmosomoides kurilensis	46.6	3.4	0
Heligmosomoides protobullosus	0	0	28.6
Heligmosomoides speciosus	100	96 6	0
Heterakis spumosa	51 7	3.4	0
Phabditis (Pelodera) orbitalis	0	0	28 6
Rictularia cristata	32.8	3.4	0
Syphacia emileromani	5.2	27.6	0
Syphacia frederici	3.4	0	0
Syphacia montana	0	0	14.3
Trichuris sp.	0	0	14 3
(Protozoa)			
Giardia sp.	67 2	13.8	100
Trichomonas sp.	87.9	69	0
Trypanosoma sp.	13.8	0	0

from the cecum of a single *M. montebelli*. Although we could not measure the length of vagina, the eggs collected from the uterus were 67 × 33 μm in average size, closely resembling those of *T. muris*. *Giardia duodenalis* (syn. *G. intestinalis; G. lamblia*) and *G. muris* are morphologically recognized as valid species [19]. These 2 species are differed from each other in the body size and shape of median bodies of the trophozoite. Since *Giardia* trophozoites found in this study were 9–12 × 6–8 μm in size and had small round median bodies, they were likely to be *G. muris*. A case of *Trypanosoma* sp. infection has been described in *A. speciosus* in Japan [2]. In the present study, the trypomastigotes obtained from blood of *A. speciosus* were 21 μm in average size that was identical to that of *Trypanosoma* sp. in the previous record [2].

From the results obtained in the present study, it is suggested that the endoparasites detected showed some host specificity. Further, helminth parasites from each rodent species were mostly identical to those found in the previous surveys [4–6, 13, 21, 22]. *Plagiorchis muris* and *Hymenolepis diminuta* are known as zoonotic pathogens. However, public health importance of these 2 helminths has been nearly ignored, because human infections caused by them are extremely rare [3, 23]. Hydatid cysts of *E. multilocularis* were reported in *A. argenteus* in Hokkaido [22]. However, the cysts were not detected in the present study as well as in the previous studies carried out in the Honshu district [4, 6, 12]. On the other hand, there are few reports on protozoan parasites from wild rodents [2, 17]. Moreover, all the reports delt with blood protozoans such as *Babesia* sp. [17] and *Trypanosoma* sp. [2]. Therefore, *Giardia* sp. (probably *G. muris*) will be first recorded in this report from *A. speciosus, A. argenteus* and *M. montebelli*. Thus, further investigation will be required to identify the protozoan parasites in wild rodents.

This study was supported in part by a Grant-in-Aid for Scientific Research (The 21st Century Center-of-Excellence Program) from the Ministry of Education, Culture, Sports, Science and Technology of Japan (E-1).

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