HELMINTH PARASITES OF APODEMUS SPECIOSUS AND A. ARGENTEUS FROM THE KOSHIKI ISLANDS, JAPAN, WITH A DESCRIPTION OF SUBULURA SUZUKII SP. N.

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(Received for publication, April 27, 1981)

Helminths of Apodemus speciosus and A. argenteus from Shimo-koshiki Island of the Koshiki Islands group, Kagoshima Prefecture, Japan were studied. Eight helminth species were collected: Protospiruramuris, Rictularia cristata, Tenorarastongylus speciosus, Capillaria sp., Syphacia emileromani, Syphacia sp., Subulura (Murisubulura) suzukii sp. n. and Cladothyridium sp.

The genus Subulura was the first recorded in mammals of Japan. Subulura suzukii was differentiable from S. ortleppi and S. williaminglisi by the structure of the labial lobe, lateral alae and the spicules.

INTRODUCTION

The genus Apodemus represents an Old World rodent. In Japan there are three species, namely Apodemus speciosus TEMMINCK, A. argenteus TEMMINCK and A. giliacus THOMAS. Among these, A. speciosus and A. argenteus are distributed widely from Hokkaido in northern Japan to Yakushima Island in southern Japan. A. giliacus can be found only in Hokkaido.

Although ecological studies of these host animals have been advanced, reports concerning the helminth fauna have been limited to those based on materials from the mainland. In this paper we report helminths of A. speciosus and A. argenteus from Koshiki Islands.

MATERIALS AND METHODS

Twenty-four Apodemus speciosus and two A. argenteus were examined.

The animals were captured in December 1978 in a crop field and in a mountainous area of Shimo-koshiki Island of the Koshiki Islands group, which is located about 50 km west of Kushikino City, Kagoshima Prefecture, in southern Japan.

With the exception of the head, all of the organs were examined for helminth parasites. The skulls were used for the identification of the host animals.

The parasites were preserved in 10% formalin, and the nematodes were treated with lacto-phenol solution for microscopic examination. Scanning electron microscopy
was also carried out to elucidate the detailed surface structure of the specimens.

All of the specimens described in this paper are preserved in the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University.

RESULTS AND DISCUSSION

The following 8 species belonging to 7 genera were collected. Protospirura muris (GMELIN, 1890); Rictularia cristata FROELICH, 1802; Tenorastrongylus speciosus (KONNO, 1958); Capillaria sp.; Syphacia emileromani CHABAUD, RAUSCH et DESSET, 1963; Syphacia sp.; Subulura (Murisubulura) suzukii sp. n. and Cladothyridium sp..

Among these, Capillaria sp., Syphacia sp. and Cladothyridium sp. could not be identified in detail because of insufficient materials. The incidence of these helminths is shown in table 1. A remarkable high infection rate of Tenorastrongylus speciosus was observed. i.e., 100% in both A. speciosus and A. argenteus.

TABLE 1 Helminths of Apodemus speciosus and A. argenteus from Koshiki Islands, Kagoshima Prefecture, Japan

<table>
<thead>
<tr>
<th>HELMINTH</th>
<th>HABITAT</th>
<th>HOST SPECIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A. speciosus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 cases</td>
</tr>
<tr>
<td>Nematoda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protospirura muris</td>
<td>stomach</td>
<td>2*</td>
</tr>
<tr>
<td>Rictularia cristata</td>
<td>small intestine</td>
<td>5</td>
</tr>
<tr>
<td>Tenorastrongylus speciosus</td>
<td>&quot;</td>
<td>24</td>
</tr>
<tr>
<td>Capillaria sp.</td>
<td>&quot;</td>
<td>0</td>
</tr>
<tr>
<td>Syphacia emileromani</td>
<td>large intestine</td>
<td>0</td>
</tr>
<tr>
<td>Syphacia sp.</td>
<td>&quot;</td>
<td>1</td>
</tr>
<tr>
<td>Subulura suzukii</td>
<td>&quot;</td>
<td>6</td>
</tr>
<tr>
<td>Cestoda</td>
<td>liver</td>
<td>8</td>
</tr>
</tbody>
</table>

* Number of cases infected

Concerning the helminth fauna of voles of the genus Apodemus, several reports have been published (YAMAGUTI, 1943, 1954; KONNO, 1958; CHABAUD et al., 1963; ISHIMOTO, 1974; HASEGAWA, 1976). The high infection rate of Tenorastrongylus speciosus in Hokkaido was reported by ISHIMOTO (1974) (95% of 183 A. speciosus and 94% of 67 A. argenteus). We also obtained high rates in other places in Japan: in Unzen, Nagasaki Prefecture, 100% of 11 A. speciosus and 67% of 3 A. argenteus; in Ikeda, Osaka Prefecture, 100% of 9 A. speciosus (data unpublished). The genus Subulura is the first recorded in mammals of Japan.
Subulura (Murisubulura) suzukii sp. n.

Host: *Apodemus speciosus* Temminck

Habitat: Large intestine

Locality: Shimo-koshiki Island, Koshiki Islands group, Kagoshima Prefecture, Japan

Date: December 1978

Frequency: 6 out of 24 hosts were infected. In one heavily infected case, 37 parasites were found.

Description: Body slender, white in color when alive. Cervical alae and esophageal bulb present (pl. I, fig. 2). Cervical alae stretching to the anterior of the esophageal bulb. Oral opening with six labial lobes, each of which consists of an outer blunt bifurcate projection and an inner pointed projection (pl. I, fig. 4, pl. II, figs. 1 & 2). Wall of buccal cavity well cuticularized and pharyngeal portion twisted (pl. I, figs. 3 & 5).

Male: Body length 9.6–13.2 mm, width 0.43–0.54 mm. Esophagus including bulb 1.35–1.66 mm in length. Nerve ring and excretory pore 0.259–0.366 mm and 0.406–0.496 mm, respectively, from anterior end. Pre-anal sucker present but without cuticular elaboration, 0.634–1.050 mm from posterior end (pl. I, fig. 7). Caudal alae absent. Ten pairs of caudal papillae present. Spicules blunt without marked barbs (pl. I fig. 6). Gubernaculum tongue-like shape, 0.132–0.180 mm in length.

Female: Body length 16.7–29.9 mm, width 0.433–0.974 mm. Esophagus including bulb 1.60–2.00 mm in length. Nerve ring and excretory pore 0.272–0.390 mm and 0.466–0.575 mm, respectively, from anterior end. Vulva situated 6.80–11.64 mm from anterior end. Tail 0.964–1.640 mm in length. Egg oval, embryonated in uterus 0.080–0.094 by 0.058–0.067 mm.

Inglis (1958, 1960) revised Subuluroidea after a detailed study of its buccal structure, and described *Subulura ortleppi* sp. n. from *Rhabdomys pumilio* and *Rattus (Praomys) namaquensis* found in Cape Province, Union of South Africa. He distinguished *S. ortleppi* from other species of genus *Subulura* by the head structure, which bears six labial lobes at the oral opening. Quentin (1965) described *S. williaminglisi* sp. n. from *Hybomys univittatus, Cricetomys gambianus* and *Thamnomys rutilans* found in the Central African Republic as having six labial lobes. Furthermore, Quentin (1969) slightly modified and completed Inglis’ classification by suggesting that all *Subulura* species which have six labial lobes be classified under a new subgenus *Murisubulura*. Employing this criteria, he placed the above two *Subulura* spp. under the new subgenus *Murisubulura*. Chabaud (1978) stated that *Kaszabospirura* Mészáros, 1975 is synonymous to *Subulura (Murisubulura)*.

Our specimen has six labial lobes, thus it belongs to *Subulura (Murisubulura)*. We could compare our specimen with *S. ortleppi* and *S. williaminglisi* but not with *Kaszabospirura steinmanni* described by Mészáros (1975), because his description lacks detailed information on the oral opening and the male worm. *S. ortleppi* has cervical
Subulura suzukii sp. n.

Alae stretched to the posterior end of the esophagus and an equal length of spicules with marked barbs on their posterior ends. The species also has outer labial projections without bifurcation, and the caudal alae is poorly developed in the male. S. williaminglisi was distinguished from S. ortleppi by the absence of lateral alae and the sharply pointed spicules. Our specimens can be differentiated from the above two species by the structure of the labial lobe, lateral alae and the spicules.

Acknowledgements

The authors wish to express their thanks to Dr. H. Suzuki, Department of Virology, Institute for Tropical Medicine, Nagasaki University for his support in making this research possible. The authors also wish to thank Prof. M. Ohbayashi, Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University and Dr. H. Kamiya, Department of Parasitology, Akita University School of Medicine, for reading and commenting on this manuscript.

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**Explanation of Plates**

**Plate I**

Figs. 1-7 *Subulura (Murisubulura) suzukii* sp. n.

Fig. 1 Lateral view of male

Fig. 2 Ventral view of the anterior end

Fig. 3 Ventral view of the anterior end showing details of the head

Fig. 4 *En face* view of whole head

Fig. 5 *En face* view of the pharyngeal portion showing its helical arrangement

Fig. 6 Details of the posterior ends of two spicules

Fig. 7 Ventral view of the male tail
Fig. 1  \textit{En face} view of whole head $\times 1265$
CP: cephalic papilla  A: amphid

Fig. 2  \textit{En face} view of labial lobes showing details of the structure
$\times 6333$
OP: outer blunt bifurcate projection
IP: inner pointed projection