A NEW HELIGMOSOMID NEMATODE, HELIGMOSOMOIDES PROTOBULLOSUS N. SP. (HELIGMOSOMIDAE: NEMATODA), FROM THE JAPANESE GRASS VOLE, MICROTUS MONTEBELLI MILNE-EDWARDS

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A NEW HELIGMOSOMID NEMATODE, _HELIGMOSOMOIDES PROTOBULLOSUS_ N. SP.  
(HELIGMOSOMIDAE : NEMATODA),  
FROM THE JAPANESE GRASS VOLE,  
_MICROTUS MONTEBELLI_ MILNE-EDWARDS  

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A new heligmosomid nematode, _Heligmosomoides protobullosus_ n. sp., from the small intestine of the Japanese grass vole, _Microtus montebelli_ MILNE-EDWARDS collected at several sites in Japan, was described. This new species is distinguished from _H. bullosus_ by the absence of a bubble-like membrane in the bursa. This is the first record of the genus _Heligmosomoides_ from the Japanese _Microtus_.

Key words: _Heligmosomoides protobullosus_ n. sp., _Microtus montebelli_, Japan

The phylogenetic system of nematode parasites, which occur specifically in the Japanese rodents, has been studied with regard to the host phylogenetic system.\(^{1,2}\) In this paper, the authors described a new heligmosomid nematode, _Heligmosomoides protobullosus_ n. sp. (Heligmosomidae : Nematoda), from the small intestine of the Japanese grass vole, _Microtus montebelli_ MILNE-EDWARDS. This is the first record of the genus _Heligmosomoides_ from the Japanese _Microtus_.

**MATERIALS AND METHODS**

From 1983 to 1985, 24 Japanese grass voles, _Microtus montebelli_ MILNE-EDWARDS, were collected at several sites in Japan (the sites, date and number of the hosts collected are shown in Table 1), and heligmosomid nematodes from the small intestine of the voles were obtained.

The nematodes were fixed in 5\% formalin solution and cleared in lacto-phenol

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solution for microscopic examination. Some of the specimens were embedded in paraffin, and the cross sections made were stained with hematoxylin-eosin to observe the ridges of synlophe.

**RESULTS**

*Heligmosomoides protobullosus* n. sp. (Figs. 1–9)

**Host:** Japanese grass vole, *Microtus montebelli* Milne-Edwards

**Habitat:** Small intestine

**Localities:** Towada, Ouma, Oku-Tateshina (type locality) and Utsukushi-ga-mori, Japan

**Description (all measurements in mm):**

Body length about 4.0 mm in male and about 7.0 mm in female. Body coiled and reddish when alive. Cuticle with continuous and longitudinal ridges (Fig. 1). Number of ridges 15 in mid-body of two males. Axis inclination of the orientation of ridges to the sagittal axis is almost frontal as shown in Figs. 2–4. Gradient in size of ridges from dorsal side to ventral side on the bilateral sides (the ventral ridges are highly developed). Cervical papillae not obvious. The main measurements are shown in Table 2. Genital organs are shown in Figs. 5–9. Male: Formula of bursal rays type 2–3 (Durette-Desset & Chabaud, 1981). Bursa asymmetrical, right lobe larger than left; bursal lobes large, about 0.46 in width and about 0.26 in length. Prebursal papillae present. Antero-ventral rays shorter than postero-ventral rays and mediolateral rays longest of three laterals; externo-dorsal rays long and straight; dorsal ray reduced and bifurcated twice distally (Fig. 7). Spicules equal in length and brown in color, long (1.6–2.2 in length) and length ratio of spicules and body about 0.5; spicule tips fused and spinous shaped (Fig. 8); gubernaculum absent. Female: Monodelphic.
Heligmosomoides protobullosus n. sp.

Table 2 Measurements of Heligmosomoides protobullosus n. sp. from Microtus montebelli collected at Oku-Tateshina (in mm)

<table>
<thead>
<tr>
<th></th>
<th>Male (N = 10)</th>
<th>Female (N = 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalic vesicle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>length</td>
<td>0.053 - 0.061</td>
<td>0.056</td>
</tr>
<tr>
<td>width</td>
<td>0.031 - 0.041</td>
<td>0.049</td>
</tr>
<tr>
<td>Body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>length</td>
<td>3.6 - 5.2</td>
<td>7.3 - 7.5</td>
</tr>
<tr>
<td>width (mid-body)</td>
<td>0.08 - 0.17</td>
<td>0.12</td>
</tr>
<tr>
<td>Esophagus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>length</td>
<td>0.42 - 0.60</td>
<td>0.53</td>
</tr>
<tr>
<td>Excretory pore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>from head end</td>
<td>0.46</td>
<td>—</td>
</tr>
<tr>
<td>Nerve ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>from head end</td>
<td>0.27</td>
<td>0.21</td>
</tr>
</tbody>
</table>

N: Number of specimens examined

Vestibule about 0.05, sphincter 0.03 and infundibulum 0.10 in length, respectively; uterine eggs not observed; vulva at 0.14-0.15 from tail end, a papilla at vagina vera (Fig. 9); anus at 0.05 from tail end. Tail curving ventrally, with a spine at end.

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

Discussion

The present species accords with the two subspecies of H. bullosus Durette-Desset (1968) because of the general aspect of the bursa and the female tail end, and the host (genus Microtus). However, it was possible to distinguish the present species from bullosus by the lack of a bubble-like bursal membrane. From the morphological and zoogeographical view points, H. protobullosus in Japan and H. bullosus at Chaunsk Gulf in Northeastern Siberia and at St. Lawrence Island and St. Matthew Island in Alaska are closely related phylogenetically, and the former is considered as a progenitor of the latter.

The trichostrongylids except for the genus Heligmosomoides, i.e., Carolinensis minutus and Heligmosomum halli, have previously been recorded from the Japanese Microtus, but this is the first record of Heligmosomoides from the Japanese Microtus.
Figures 1-9 *Heligmosomoides protobullosus* n. sp. from *Microtus montebelli* collected at Oku-Tateshina, Japan (in mm)

Fig. 1 Anterior extremity of male, left-lateral view
Fig. 2 Cross-section of anterior extremity of male, D: dorsal, V: ventral, R: right, L: left
Fig. 3 Cross-section of mid-body of male
Fig. 4 Cross-section of mid-body of male
Fig. 5 Bursa, ventral view
Fig. 6 Bursa, right-lateral view
Fig. 7 Dorsal ray
Fig. 8 Spicule tips
Fig. 9 Posterior extremity of female
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References