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<th>OHBAYASHINEMA ABEI SP. N.(NEMATODA : HELIGMOSOMIDAE) FROM THE NORTHERN PIKA, OCHOTONA HYPERBOREA PALLAS, IN HOKKAIDO, JAPAN</th>
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HOKKAIDO UNIVERSITY
**OHBAYASHINEMA ABEI SP. N.**
*(NEMATODA: HELIGMOSOMIDAE)*
FROM THE NORTHERN PIKA,
**OCHOTONA HYPERBOREA PALLAS, IN HOKKAIDO, JAPAN**

Shin-ichiro FUKUMOTO,¹ Masao KAMIYA² and Masashi OHBAYASHI²

(Received for publication August 4, 1986)

An intestinal nematode, *Ohbayashinema abei* sp. n., from the northern pika, *Ochotona hyperborea yesoensis*, in Hokkaido, Japan, was described and its morphological characteristics were compared with those of the previously known *O. ochotoni* DURETTE-DESSET, 1974 and *O. dubinini* (GVOZDEV, 1966) DURETTE-DESSET, 1974.

Key words: *Ohbayashinema abei* sp. n., *Ochotona hyperborea*, Japan

Only two species have been recognized in the genus *Ohbayashinema* DURETTE-DESSET, 1974 from pikas in Eurasia: *O. ochotoni* DURETTE-DESSET, 1974 from *Ochotona macrotis* in Nepal, and *O. dubinini* from *O. alpina* in the U.S.S.R. The geographically isolated populations of the northern pika on Hokkaido Island, northern Japan are interesting from the view point of phylogeny of related genera in the family Heligmosomidae (fig. 1).

**MATERIALS AND METHODS**

In May of 1978, 5 northern pikas, *Ochotona hyperborea yesoensis* KISHIDA, were collected at a rocky area near Shikaribetsu Lake, Hokkaido, Japan. Five species of endoparasites had been detected (tab. 1; OHBAYASHI et al., 1979).

Heligmosome nematodes were collected from the small intestine of the pikas. All the specimens were fixed with 10% formalin, preserved in 5% formalin and treated with lactophenol. Drawings and measurements were done with the aid of a camera lucida. The synlophe was examined on whole mounts and on cross sections of nematodes using a microscope. The cross sections at midbody were made by cutting with a blade using a dissection microscopy.

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FIGURE 1 Geographical distribution of the three species of the genus Ohbayashinema
DURETTE-DESSET, 1974 from pikas, Ochotona spp. in Eurasia

Oa: O. abei sp. n. (Hokkaido, Japan)
Od: O. dubinini (GVOZDEV, 1966) DURETTE-DESSET, 1974 (Altai, USSR)
Oo: O. ochotoni DURETTE-DESSET, 1974 (Nepal)

TABLE 1 Endoparasites from the northern pika, Ochotona hyperborea yesoensis.
in Hokkaido, Japan*

<table>
<thead>
<tr>
<th>PARASITES</th>
<th>HABITAT</th>
<th>PREVALENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nematoda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohbayashinema sp.</td>
<td>Small intestine</td>
<td>4/5</td>
</tr>
<tr>
<td>Labiostomum sp.</td>
<td>Caecum</td>
<td>3/5</td>
</tr>
<tr>
<td>Trichuris sp.</td>
<td>Caecum</td>
<td>1/5</td>
</tr>
<tr>
<td>Cestoda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schizorchis yamashitai RAUSCH, 1963</td>
<td>Small intestine</td>
<td>2/5</td>
</tr>
<tr>
<td>Protozoa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sarcocystis sp.</td>
<td>Muscle</td>
<td>1/5</td>
</tr>
</tbody>
</table>

*After OHBAYASHI et al., 1979
**Ohbayashinema abei sp. n.**

**RESULTS**

*Ohbayashinema abei* sp. n.

**Host:** Northern pika, *Ochotona hyperborea yesoensis*

**Habitat:** Small intestine

**Locality:** Lakeside of Shikaribetsu Lake, Hokkaido, Japan

(43° 15′ N, 143° 10′ E)

**Description (tab. 2 & fig. 2):** Small nematode. Dark red in color and coiled tightly while alive and after fixation. Cephalic vesicle well developed with fine annulation. Cuticular ridges start from the margin of the cephalic vesicle, and continue the whole body length. The axis of orientation of ridges inclines 90° from the dorso-ventral axis. The size of ventral ridges greater than those in dorsal. Male (7 specimens): Number of ridges 12 or 13 at midbody, 6 or 7 in dorsal and 5 or 6 in ventral. The ridges terminate near bursa. Body 6.1–8.9 mm long and maximum width 129–174 μm. The distance from anterior end to nerve ring and excretory pore 185–207 μm and 217–304 μm, respectively. Esophagus 576–876 μm in length. Bursa well developed, asymmetrical, the right lateral lobe larger than the left one. Small prebursal papillae present on the base of antero-ventral rays. Ventral rays thick and long. Antero-ventral and postero-ventral rays divided at their base with short stem. Lateral rays with common stem, almost same size. Externo-dorsal rays thin and long, originated from the base of lateral rays. Dorsal ray small, and two branches originated at its stem and bifurcated twice at the distal end. Spicules slender and long, fused at the distal end, 944–1424 μm in length.

Female (13 specimens): Ridges decreased in number posteriorly. A few ridges posterior to the vulva, 13 or 14 ridges are observed at midbody, 7 or 8 in dorsal and 5–7 ventral. Body, 6.3–13.9 mm long, 141–207 μm wide. The distance from anterior end to nerve ring and excretory pore, 125–239 μm and 212–304 μm, respectively. Esophagus 543–720 μm in length. Monodelphic. Anus and vulva situated at 50–181 μm and 189–381 μm from the tail end, respectively. Ovejector long, 739–1282 μm in length. Vestibulum longer than infundibulum. The cuticle inflated around the vulval region and the vulva opened at the bottom of the concaved area. A small spine, 12–31 μm long, at the tail end. The eggs in uterus are rather large, 83–111 μm by 47–75 μm in size.

The species name of this nematode has been dedicated to Dr. Hisashi Abe, Institute of Applied Zoology, Faculty of Agriculture, Hokkaido University.

**DISCUSSION**

Durette-Desset (1974) erected the genus *Ohbayashinema* in the subfamily Heligmosominae, family Heligmosomidae, superfamily Trichostrongyloidea. She separated this genus from other genera of the family Heligmosomidae by the following characteristics: 1) the synlophe is dorso-ventrally symmetrical, which means that the number
FIGURE 2  *Ohbayashinema abei* sp. n.

A  Posterior end of female, lateral view  
B  Caudal end of female, ventral view  
C  Prebursal and bursal regions of male, ventral view  
D  Anterior end of female, lateral view  
E  Cross section of male, midbody  
F  Cross section of female, midbody  
G  Extero-dorsal and dorsal rays of male, ventral view  
H  Proximal end of spicules  
I  Distal extremity of spicules  

*d: dorsal, l: left, r: right, v: ventral*
**TABLE 2** Comparison of three species of the genus Ohbayashinema Duret-Desse, 1974

<table>
<thead>
<tr>
<th>Species</th>
<th>O. ochotoni</th>
<th>O. dubinini</th>
<th>O. abei n. sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authors</td>
<td>Duret-Desse 1974</td>
<td>Gvozdev 1966</td>
<td>Present authors</td>
</tr>
<tr>
<td>Host</td>
<td>Ochotona macrotis</td>
<td>O. alpina</td>
<td>O. hyperborea yesoensis</td>
</tr>
<tr>
<td>Locality</td>
<td>Nepal</td>
<td>Altai, USSR</td>
<td>Hokkaido, Japan</td>
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**Male**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Body length (mm)</td>
<td>8.7</td>
</tr>
<tr>
<td>Body width</td>
<td>150</td>
</tr>
<tr>
<td>Length of esophagus</td>
<td>710</td>
</tr>
<tr>
<td>Spicules</td>
<td>560</td>
</tr>
<tr>
<td>Number of ridges</td>
<td>10</td>
</tr>
</tbody>
</table>

**Female**

<table>
<thead>
<tr>
<th>Number examined</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body length (mm)</td>
<td>NI</td>
</tr>
<tr>
<td>Body width</td>
<td>NI</td>
</tr>
<tr>
<td>Length of esophagus</td>
<td>NI</td>
</tr>
<tr>
<td>Caudal spine</td>
<td>NI</td>
</tr>
<tr>
<td>Distance from caudal end</td>
<td></td>
</tr>
<tr>
<td>Anus</td>
<td>NI</td>
</tr>
<tr>
<td>Vulva</td>
<td>NI</td>
</tr>
<tr>
<td>Number of ridges</td>
<td>NI</td>
</tr>
<tr>
<td>Size of eggs</td>
<td>NI</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Measurements in μm unless otherwise indicated.

2) NI: Not indicated
and size of ridges are the same on the dorsal and ventral sides of the body, and that
the orientation of ridges inclines 90° to the dorso-ventral axis; 2) number of ridges is
small compared to that of other species of Heligmosomum and Heligmosomoides
(DURETTE-DESSERT, 1974, 1983). She also moved Heligmosomum dubinini into the
genus Ohbayashinema, because of its fewer number of ridges (14) and the phylogeny
of the host. There is no detailed description of the morphology of synlophe, espe-
cially in the cross section.

*O. ochotoni* is distinguished from *O. dubinini* by; 1) the length of spicule is
shorter; 2) the antero-lateral and medio-lateral rays have a common stem and the
postero-lateral ray originates from the stem of the lateral rays. In *O. dubinini*, the
 medio-lateral and postero-lateral rays have a common stem; 3) the morphology of
dorsal ray and 4) the number of cuticular ridges is different from that of *O. ochotoni*.

*O. abei* differs from *O. ochotoni* in the following characteristics; 1) length of
spicule is longer; 2) the number of ridges is larger and 3) the ventral ridges are
larger and more protruded.

*O. abei* is also distinguishable from *O. dubinini* in the following characteristics: 1)
arrangement of the lateral rays; 2) shape of dorsal ray and 3) length of spicules.

DURETTE-DESSERT (1974, 1983) defined that the female of the genus Ohbayashinema
is monodelphic depending on the description of Heligmosomum dubinini. The mor-
phology of female *O. ochotoni*, however, was not described. The present paper
describes for the first time the figures of the adult female. There are no figures or
pictures of the female of the genus Ohbayashinema.

According to the definition by DURETTE-DESSERT (1983), *O. abei* cannot be included
in the genus Ohbayashinema because its synlophe is not symmetrical with respect to
the frontal axis. Moreover, the ventral ridges are larger and more protruded than
those in the dorsal side.

DURETTE-DESSERT (1974) discussed that the synlophe characteristics of the genus
Ohbayashinema might be an intermediate form between the genera Molineus and the
Citellinema. The female is monodelphic. The origin of these genera was supposed
to be a hypothetic didelphic genus related to the genus Molineus. This hypothetic
ancestera 'Molineus' gave rise to two branches; 1) the genus Ohbayashinema in
Lagomorpha and 2) the genus Citellinema in Sciuromorpha, and then to the genera
Heligmosomoides and Heligmosomum in Microtidae (fig. 2).

The authors considered that Ohbayashinema abei might have intermediate charac-
teristics between Ohbayashinema ochotoni and the genus Heligmosomoides. The au-
thors also speculated that the genus Ohbayashinema is more closely related to the
genus Heligmosomoides than the genus Citellinema. Thus, following DURETTE-DESSERT'S
recent hypothesis (DURETTE-DESSERT, 1985), the authors concluded that the genus
Ohbayashinema might be the direct ancestor of the genus Heligmosomoides (fig. 3).
**Ohbayashinema abei sp. n.**

Microtidae *Heligmosomum* (Rodentia) *Heligmosomoides*

Arvicoridiae *Heligmosomum* (Rodentia) *Heligmosomoides* (monodelphic)

Lagomorpha *Ohbayashinema* (monodelphic)

Sciromorpha *Citellinema* (didelphic)

Lagomorpha *Ohbayashinema* (monodelphic)

Sciromorpha *Citellinema* (didelphic)

Hypothetic 'Molineus' type ancestor

(DURETTE-DESSERT, 1974)

(DURETTE-DESSERT, 1985 & present authors)

**FIGURE 3** Phylogeny of the genus *Ohbayashinema* and related genera (DURETTE-DESSERT, 1974 & 1985, modified)

**ACKNOWLEDGEMENTS**

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