

**Cestodes of Some Micromammalians (Insectivora)
from Hokkaido, Japan**

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Abstract

Two species of soricines collected in Hokkaido have been examined for cestode parasites. The following cestodes are recovered: *Insectivorolepis macracetabulosa* sp. nov., *Soricinia japonica* sp. nov., *Neoskrjabinolepis singularis* (Cholodkovsky, 1913), *Coronacanthus parvihamatus* Sawada and Koyasu, 1990, *Skrjabinacanthus diplocoronatus* Spassky and Morozov, 1959, *Choanotaenia baicalensis* (Eltyshev, 1975) and *Choanotaenia* sp. from *Sorex unguiculatus*; *Ditestolepis ezoensis* sp. nov., *D. longicirrosa* Sawada and Harada, 1990, *D. cyclocephala* Sawada and Koyasu, 1990 and *S. diplocoronatus* from *Sorex gracillimus*. The new species are described and figured.

Key words: Soricines, *Insectivorolepis macracetabulosa*, *Soricinia japonica*, *Ditestolepis ezoensis*, Hokkaido

Introduction

While examining the distribution of field shrews (Insectivora) in Japan except for Hokkaido since 1986, the authors clarified the cestode species parasitic on them. The authors then investigated the distribution of shrews in Japan from the point of view of their specificities as host shrews for cestode parasites. In order to carry forward this study, the cestode species parasitic on the shrew of Hokkaido need to be clarified. The cestode parasites of insectivorous micromammalians in Hokkaido have been unknown except for one report by Sato, Kamiya and Ohbayashi (1988), which refers to only the hymenolepidid and dilepidid cestodes with armed rostellum. After that, no attempt has been made to investigate the cestodes. The aim of this work is to gain information on the helminth fauna of soricines which in Hokkaido has not been fully studied.

Materials and Methods

A total of 20 specimens of soricines, *Sorex unguiculatus* and *S. gracillimus* captured at Nakashibetsu-chô from May 13 to 16, 1990, were examined for cestodes. The soricines were autopsied immediately after capture and their intestinal tracts were fixed in Carnoy's fluid and brought to the laboratory. The methods used have been described in the former paper (Sawada and Harada, 1990). Measurements are given in millimeters.

Results

Ten (including three new) species and an unidentified species of cestodes were obtained from two species of soricines. The data concerning the species of cestodes obtained and the host incidence of infection are shown in Tables 1 and 2.

Insectivorolepis Zarnowski, 1955
Insectivorolepis macracetabulosa sp. nov.
(Figs. 1–4)

From May 13 to 15, 1990, of 15 specimens of long-clawed shrew, *Sorex unguiculatus* Dobson, captured at Kutenbetsu, Nakashibetsu-chô, two

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Table 1 Individual cestode burdens in infected *Sorex unguiculatus*

Cestode species	No. of <i>Sorex unguiculatus</i>														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Insectivorolepis macracetabulosa</i> sp. nov.	–	25	79	–	–	–	–	–	–	–	–	–	–	–	–
<i>Soricinia japonica</i> sp. nov.	–	–	–	–	12	7	–	–	–	4	–	–	56	–	–
<i>Neoskrjabinolepis singularis</i>	–	2	6	–	2	2	–	1	4	2	–	–	3	–	–
<i>Coronacanthus parviamata</i>	–	–	12	2	–	–	–	–	–	–	–	–	–	–	–
<i>Skrjabinacanthus diplocoronatus</i>	–	1	–	3	–	–	–	–	–	–	–	–	–	–	–
<i>Choanotaenia baicalensis</i>	–	–	–	–	2	–	4	–	–	4	–	8	6	–	9
<i>Choanotaenia</i> sp.	–	–	–	–	–	–	–	–	–	–	–	–	101	–	–
unidentified species (juvenile)	–	–	–	–	–	82	–	–	–	–	–	–	–	–	–

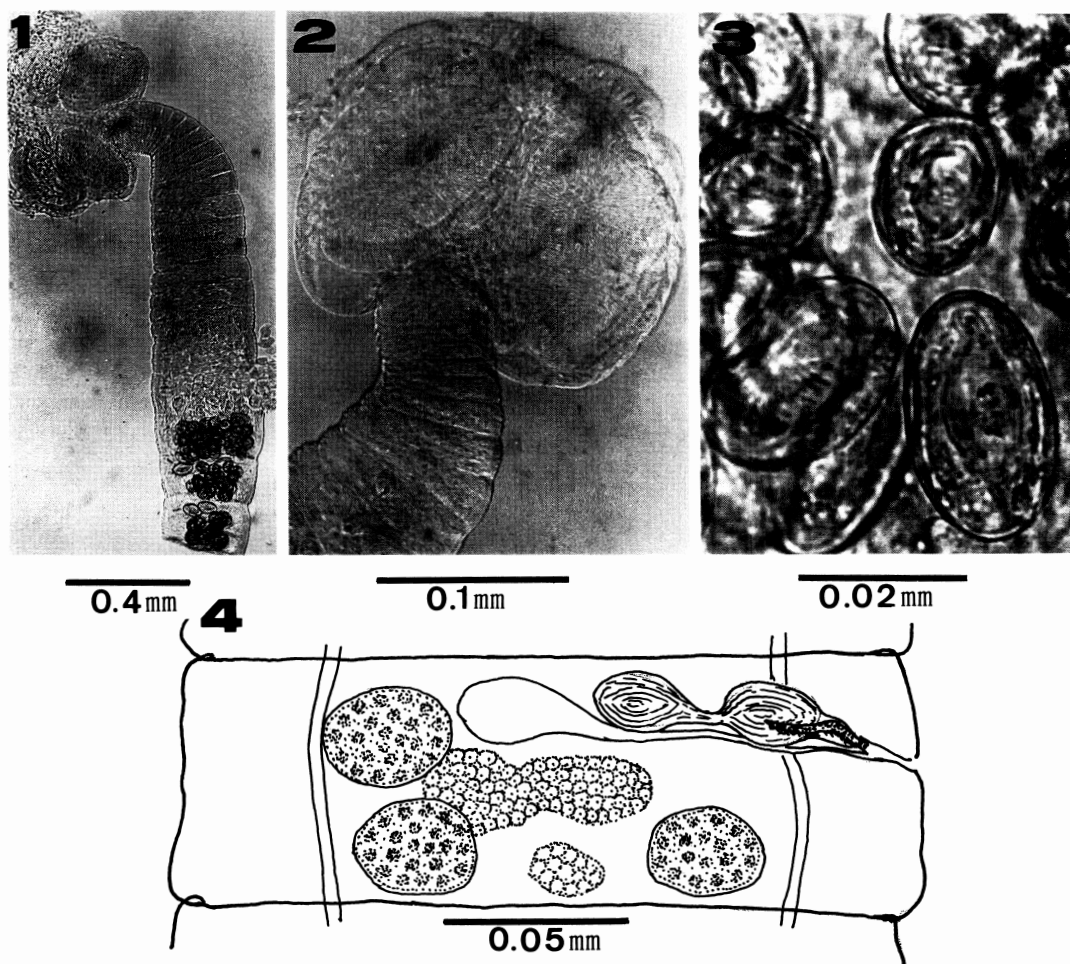
Table 2 Individual cestode burdens in infected *Sorex gracillimus*

Cestode species	No. of <i>Sorex gracillimus</i>				
	1	2	3	4	5
<i>Ditestolepis ezoensis</i> sp. nov.	–	2	2	–	8
<i>D. longicirrosa</i>	–	–	–	–	6
<i>D. cyclocephala</i>	–	–	–	–	9
<i>Skrjabinacanthus diplocoronatus</i>	–	1	–	–	16

were triply infected with *Insectivorolepis macracetabulosa* sp. nov., *Neoskrjabinolepis singularis* (Cholodkovsky, 1913) and *Coronacanthus parviamatus* Sawada and Koyasu, 1990 or *Skrjabinacanthus diplocoronatus* Spassky and Morozov, 1959 (Table 1).

Description: Minute-sized hymenolepidid; whole worm 0.5–0.9 in length and 0.17–0.22 in maximum width. Strobila consisting of 16–30 segments. Metamerism distinct, margins not serrate. All segments wider than long, with a slightly relative increase in length in gravid segments. Strobila consisting of three series of a uniform degree of development of segments. First series comprising 7–10 immature segments; second series comprising 9–17 mature segments; third series comprising 2–3 gravid segments. Scolex well-developed, 0.140–0.245 long by 0.217 wide, sharply demarcated from first series of strobila. Rostellum absent. Suckers strongly developed, elliptical, 0.112–0.140 long by 0.084–0.126 wide. Genital pores unilateral,

located slightly anterior to middle of segment margins. Testes three in number, ovoid, 0.018–0.046 by 0.084–0.126, arranged in a form of triangle, one poral and two aporal. Cirrus sac pyriform, 0.032–0.049 long by 0.014–0.118 wide, extending beyond longitudinal osmoregulatory canals. Cirrus armed with fine spines, 0.014–0.018 long. Internal seminal vesicle 0.018–0.021 long by 0.014 wide, occupying almost whole of cirrus sac. External seminal vesicle 0.028–0.035 long by 0.007–0.014 wide. Vagina opening just posterior to genital atrium, running parallel to cirrus sac and extending to median field, then enlarging, forming a seminal receptacle measuring 0.028 long by 0.011 wide. Ovary transversely elongate, bilobate, 0.035–0.039 across. Vitelline gland weakly developed, 0.025 by 0.014, situated in posterior field of segment. Egg oval or elongate, 0.035–0.039 by 0.018; embryophore 0.028 by 0.021; onchosphere oval or elongate, 0.021–0.025 by 0.011–0.018; embryonic hook 0.007 long.



Figs. 1-4 *Insectivorolepis macracetabulosa* sp. nov.

1: Entire worm. 2: Scolex. 3: Eggs. 4: Mature segment drawn from projected photographic negative, dorsal view.

Host: *Sorex unguiculatus* Dobson, 1890.

Site of infection: Small intestine.

Locality and date: Kutenbetsu, Nakashibetsu-chô; May 13 and 14, 1990.

Type specimen: Holotype: Nara Sangyo University Lab. Coll. No. 9115; Paratypes No. 9116.

Remarks: Five species of the genus *Insectivorolepis* have been recorded hitherto from *Insectivora*. These are *Insectivorolepis globosa* (Baer, 1931), *I. globosoides* (Sohtys, 1954), *I. infirma* Zarnowski, 1955, *I. kenki* (Locker and Rausch, 1952) and *I. pulchra* (Voge, 1955). Of these, the present species most closely resembles

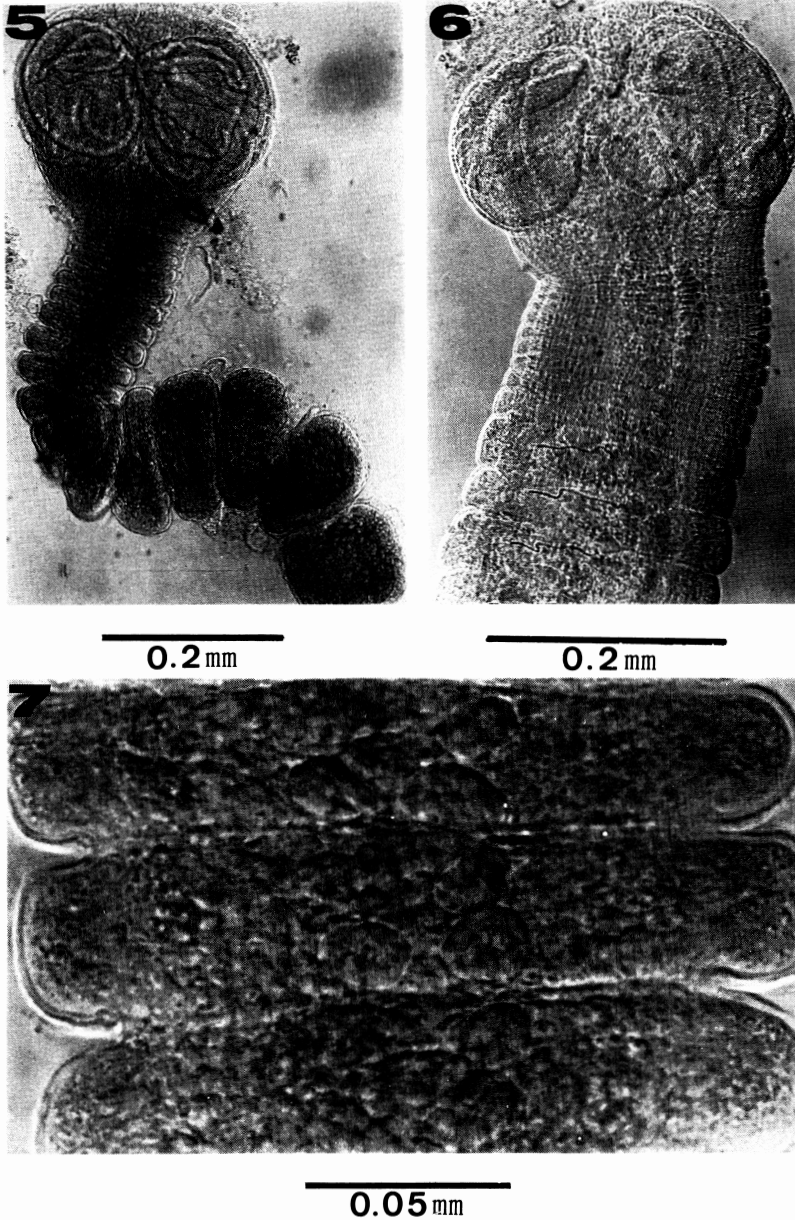
I. kenki from *Sorex* sp. in the shape of the sucker. However, it differs from in the following characteristics; (1) the arrangement of the testes (arranged in a triangle vs. in a straight line), (2) the larger size of the egg (0.035-0.039 by 0.018 vs. 0.019-0.022).

Soricinia Spassky and Spasskaja, 1954

Soricinia japonica sp. nov.

(Figs. 5-12)

From 15 to 16, 1990, 5 specimens of *Sorex unguiculatus* Dobson were captured at Kaiyô and Kutenbetsu, Nakashibetsu-chô. On investigation,



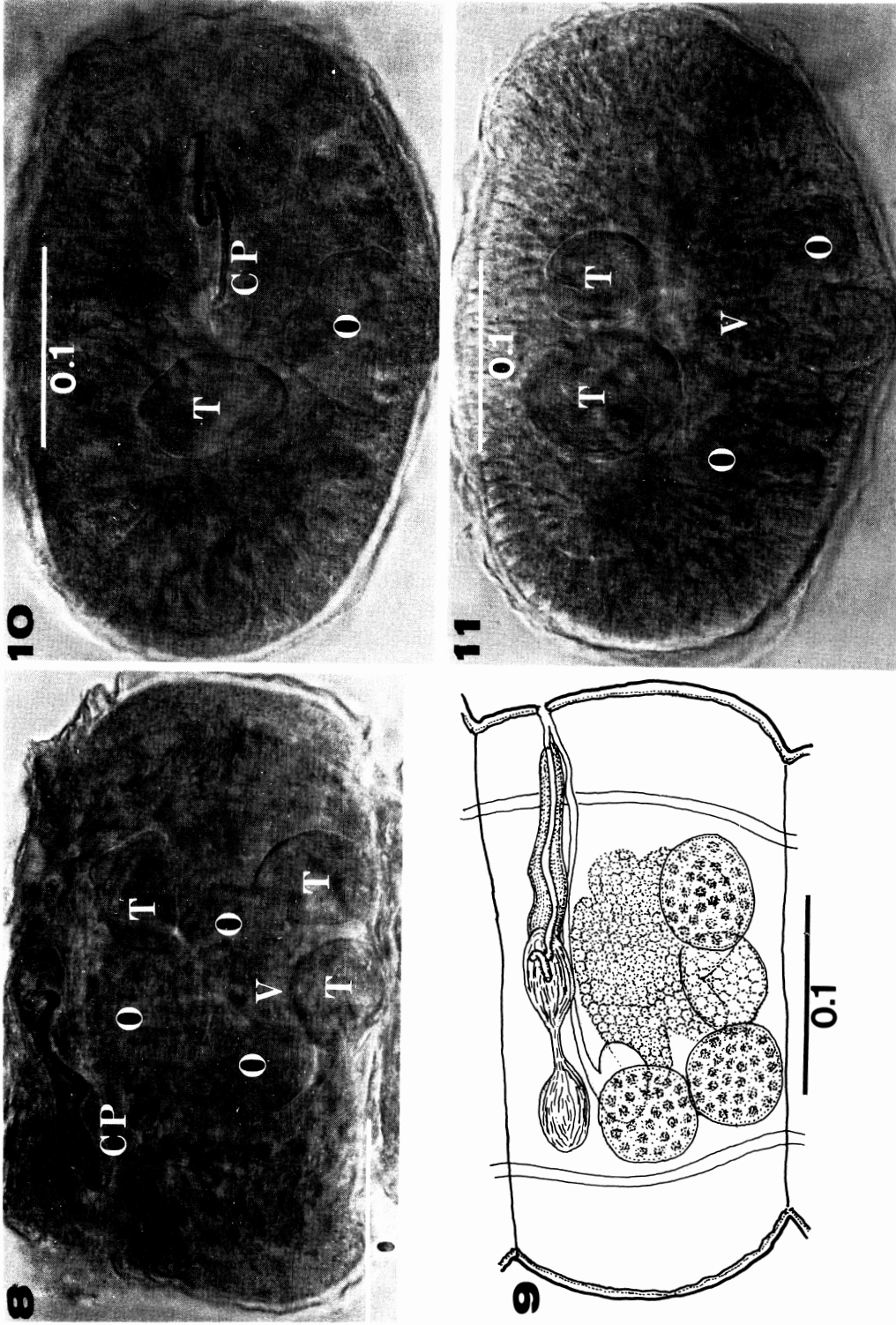
Figs. 5–7 *Soricinia japonica* sp. nov.

5: Entire worm. 6: Scolex and immature segments. 7: Immature segments showing arrangement of testes.

four shrews were found infected with 4–56 specimens of this species (Table 1).

Description: Minute-sized hymenolepidid; entire worm 1.1–1.4 long and 0.2–0.4 wide. Strobila consisting of 21–32 segments. Metamerism distinct, margins not serrate.

Immature, mature and early gravid segments, broader than long, while senile segment as broad as long. Transition from immature to mature segment, and from mature to gravid segment very abrupt; this resulting in tripartite appearance of strobila; usually 6–10 segments in each



Figs. 8-11 *Soricinia japonica* sp. nov.
8: Mature segment, ventral view. 9: Mature segment drawn from projected photographic negative, dorsal view.
10: Mature segment, transversal view at level of cirrus sac. 11: Mature segment, transversal view at level of posterior two testes. Scales in mm. CP: cirrus pouch. O: ovary. T: testis. V: vitelline gland.

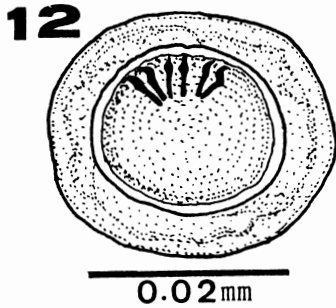


Fig. 12 Egg of *Soricinia japonica* sp. nov.

(immature, mature and gravid) section of strobila. Scolex 0.224–0.245 long and 0.322–0.357 wide, sharply demarcated from strobila. Rostellum rudimentary, 0.032–0.049 long and 0.021–0.028 wide. Suckers confluent, 0.175–0.182 long and 0.105–0.119 wide.

Genital pores unilateral, located at anterior 1/3 of segment margin. Cirrus sac elongate, 0.098–0.112 long and 0.018 wide; cirrus armed with fine spines, 0.074–0.088 long. Internal seminal vesicle located at inner part of cirrus sac, 0.063–0.084 long and 0.014–0.018 wide. External seminal vesicle 0.056–0.070 long and 0.018–0.025 wide. Testes three in number, spherical or subspherical, 0.025–0.035 in diameter, arranged triangularly, one poral and two aporal. Testes not in contact with longitudinal osmoregulatory canals laterally. Ovary well developed, divided into penta- to hexa-lobes measuring 0.091–0.105 by 0.025–0.028. Vagina initially posterior to cirrus sac, gradually expanding into voluminous seminal receptacle measuring 0.035–0.042 long and 0.025–0.035 wide. Vitelline gland subspherical, 0.032–0.042 long and 0.024–0.032 wide. Egg subspherical, 0.024–0.028 in major axis and 0.021 in minor axis; onchosphere 0.021 by 0.018; embryonic hook 0.0035–0.0053 long.

Host: *Sorex unguiculatus* Dobson, 1890.

Site of infection: Small intestine.

Locality and date: Kaiyō and Kutenbetsu, Nakashibetsu-chō; May 16, 1990.

Type specimen: Holotype: Nara Sangyo University Lab. Coll. No. 9117; Paratypes No. 9118.

Remarks: There have been described the five

species of *Soricinia* from Insectivora. Those are *Soricinia soricis* (Baer, 1925), *S. macyi* (Locker and Rausch, 1952), *S. tripartita* Zarnowski, 1955, *S. bargusinica* Eltyshev, 1975 and *S. cirravaginata* Eltyshev, 1975. The present species completely differs from the aforesaid five species in the following characteristics; (1) differs from *S. soricis* and *S. bargusinica* in the arrangement of the testes (triangular distribution vs. transverse row), (2) differs from *S. macyi* in the shape of the scolex (possessing rostellum vs. absent), (3) differs from *S. tripartita* in the shape of the ovary (polylobate vs. bilobate), (4) differs from *S. cirravaginata* in the genitals in the first section of strobila (present vs. absent).

Ditestolepis Sołtys, 1952

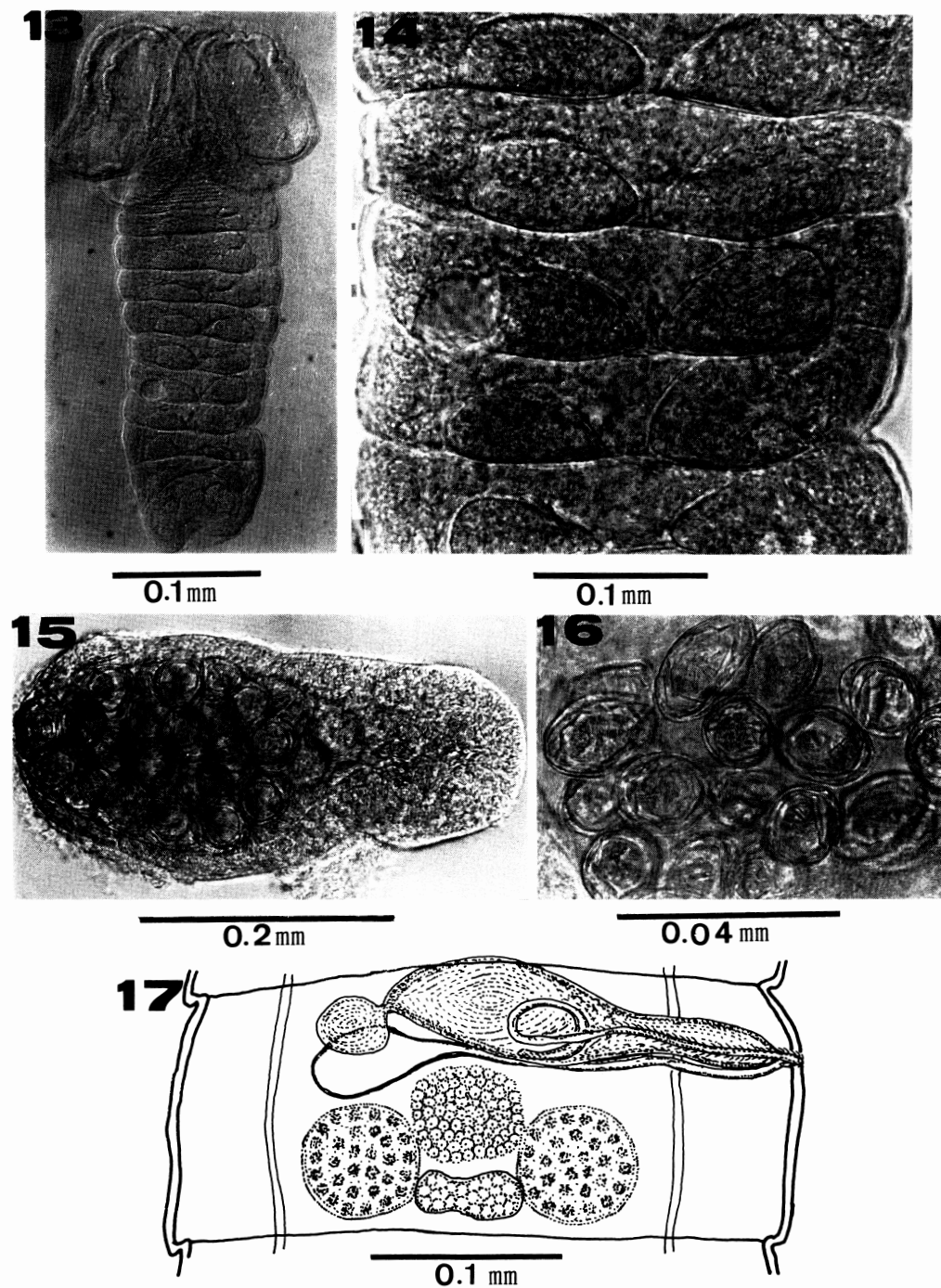
Ditestolepis ezoensis sp. nov.

(Figs. 13–17)

On May 16, 1990, of five specimens of slender shrew, *Sorex gracillimus* Thomas, collected at Kutenbetsu, Nakashibetsu-chō, three were found infected with the present cestode. One of three specimens of *S. gracillimus* were quadruply infected with *Skrjabinacanthus diplocoronatus* Spassky and Morozov, 1959, *Ditestolepis longicirrosa* Sawada and Harada, 1990, *D. cyclocephala* Sawada and Koyasu, 1991 and *D. ezoensis* sp. nov. (Table 2).

Description: Minute-sized hymenolepidid; whole worm 0.6–1.2 in length and 0.18–0.21 in maximum width. Strobila consisting of 25–36 segments. Metamerism distinct, not craspedote, segment margins not serrate. Strobila characterized by a distinctly marked subdivision into three series, each of which possessing uniformly advanced in development. Scolex 0.140–0.175 long by 0.238–0.266 wide, sharply demarcated from immature segments. Rostellum absent. Suckers confluent, 0.175 long by 0.098–0.105 wide. Anterior segments much broader than long, but gradually proportion reversed, posterior ones being much longer than broad.

Genital pores unilateral, located at anterior 1/3 of segment margin. Testes two in number, spherical or subspherical, 0.091–0.098 by 0.049–0.056, one on each side of ovary. Ovary



Figs. 13–17 *Ditestolepis exoensis* sp. nov.

13: Entire worm. 14: Immature segments showing arrangement of testes. 15: Detached gravid segment. 16: Eggs. 17: Mature segment drawn from projected photographic negative, dorsal view.

subspherical, 0.035–0.042 long by 0.024–0.029 wide. Vitelline gland bilobate, 0.028–0.032 long by 0.011–0.014 wide. Cirrus sac well developed, elongate, surpassing center of segment, 0.070–0.077 long by 0.018 wide. Cirrus armed with delicate spines, 0.035–0.042 long. Internal seminal vesicle, located at inner part of cirrus sac, 0.056–0.063 long by 0.032 wide. External seminal vesicle compact, 0.021–0.025 long by 0.011–0.014 wide. Vagina opening in genital atrium, posterior to cirrus sac, passing behind cirrus sac, gradually expanding into pyriform seminal receptacle measuring 0.028–0.035 long by 0.014–0.018 wide. Egg spherical or elliptical, 0.032 by 0.028–0.032; surrounded by four thin envelopes. Onchosphere spherical or elliptical, 0.021 by 0.028; embryonic hook 0.014 long.

Host: Sorex gracillimus Thomas, 1907.

Site of infection: Small intestine.

Locality and date: Kutenbetsu, Nakashibetsu-chô; May 16, 1990.

Type specimen: Holotype: Nara Sangyo University Lab. Coll. No. 9119; Paratypes No. 9120.

Remarks: This species closely resembles *Ditestolepis minuta* Sawada and Koyasu, 1991 from *Sorex sadonis* in the size of the strobila and the shape of the scolex. However, it differs from that in the larger size of the testes (0.091–0.098 by 0.049–0.056 vs. 0.025–0.028 by 0.032–0.039), the shape of the vitelline gland (bilobate vs. compact), the larger size of the onchosphere (0.021 by 0.028 vs. 0.018) and the longer embryonic hook (0.014 vs. 0.011).

Ditestolepis longicirrosa

Sawada and Harada, 1990

Ditestolepis longicirrosa Sawada and Harada, 1990, pp. 469–475, figs. 7–14.

Host: Sorex gracillimus Thomas, 1907. For state of infection, see table 2.

Ditestolepis cyclocephala

Sawada and Koyasu, 1991

Ditestolepis cyclocephala Sawada and Koyasu, 1991, pp. 86–91, figs. 11–15.

Host: Sorex gracillimus Thomas, 1907. For state of infection, see table 2.

Neoskrjabinolepis Spassky, 1947

Neoskrjabinolepis singularis

(Cholodkovsky, 1913) Spassky, 1954

Hymenolepis singularis Cholodkovsky, 1913, pp. 221–232, figs. 32–35.

Host: Sorex unguiculatus Dobson, 1890. For state of infection, see table 1.

Remarks: There are considerable differences and variabilities as regards the size and shape of the rostellar hooks in *N. singularis*. Moreover, different size of hooks in this species were found in the same hosts. See the description given by Sawada and Koyasu, 1990 for further particulars.

Coronacanthus Spassky, 1954

Coronacanthus parvihatatus

Sawada and Koyasu, 1990

Coronacanthus parvihatatus Sawada and Koyasu, 1990, pp. 187–201, figs. 15–19.

Host: Sorex unguiculatus Dobson, 1890. For state of infection, see table 1.

Skrjabinacanthus Spassky and Morozov, 1959

Skrjabinacanthus diplocoronatus

Spassky and Morosov, 1959

Skrjabinacanthus diplocoronatus Spassky and Morozov, 1959, pp. 182–191, figs. 1–2.

Host: Sorex unguiculatus Dobson, 1890 and *S. gracillimus* Thomas, 1907. For state of infection, see tables 1 and 2.

Choanotaenia Railliet, 1896

Choanotaenia baicalensis

(Eltyshev, 1975) Schmidt, 1986

Molluscotaenia baicalensis Eltyshev, 1975, pp. 135–167, fig. 7.

Host: Sorex unguiculatus Dobson, 1890 and

S. gracillimus Thomas, 1907. For state of infection, see table 1.

Choanotaenis sp.

Of six specimens of *Sorex unguiculatus* collected at Kaiyō, on May 16, 1990, one harbored a great number of minute juvenile tapeworms belonging to the genus *Choanotaenia* (Table 1).

Total length 0.48–0.55 by width 0.14–0.17. Scolex 0.21 long by 0.224–0.280 wide. Rostellum elongate, 0.105–0.140 long by 0.056–0.063 wide, armed with two alternate rows of 12–14 hooks measuring 0.042–0.049 long. Rostellar sac well-developed, extending almost to posterior margins of suckers, measuring 0.154–0.175 long by 0.063–0.077 wide. Genitalia not yet developed in any specimens examined.

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