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***Schizorchis yamashitai* sp. n. (Cestoda : Anoplocephalidae) from the  
Northern Pika *Ochotona hyperborea* Pallas in Hokkaido**

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ABSTRACT

*Schizorchis yamashitai* sp. n., from the northern pika in Hokkaido, is described and its morphological characteristics compared with those of the three previously known species of *Schizorchis* Hansen, 1948. The zoogeography of *Schizorchis* spp. in pikas is briefly discussed.

Three species of cestodes, all from pikas, *Ochotona* spp. (Lagomorpha: Ochotonidae) are recognized in the genus *Schizorchis* Hansen, 1948. *S. ochotonae* Hansen, 1948, and *S. caballeroi* Rausch, 1960 are known from North America; while *S. altaica* Gvozdev, 1951, occurs in eastern Eurasia. Since the cestodes of this genus are highly host specific, additional species might be expected in other Palearctic regions where the helminth fauna of pikas has not been investigated. The geographically isolated populations of the northern pika *Ochotona hyperborea* Pallas on the islands of Hokkaido and Sakhalin are especially interesting from this standpoint.

While collecting mammals in northern Japan during July to August 1962, I secured five specimens of *O. hyperborea yesoensis* Kishida in central Hokkaido. This paper describes a new species of *Schizorchis* found in three of these animals. The cestode is named in honor of Professor Jiro Yamashita, Head of the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University, who provided laboratory space and invaluable assistance in connection with the field work in Japan.

The material consisted of eight cestodes, of which six possessed gravid segments. One specimen, stained with 2% methyl-green-pyronin, was partially dissected; the others were stained with Semichon's acetic carmine or Ehrlich's acid hematoxylin and mounted in toto.

*Schizorchis yamashitai* sp. n.

(Figs. 1 to 3)

(All measurements in millimeters.)

**Diagnosis:** Strobila 100 to 185 long, with as many as 338 segments; maximum width, 3.5 to 3.75, attained in gravid segments. Strobila widens abruptly just posterior to scolex, gradually increasing in width through about one-fifth of its length; thereafter, strobilar width essentially uniform. All segments wider than long; mature segments with length/width ratio of about 1:6; gravid segments, about 1:3. Gravid segments somewhat arched in dorsoventral view. Margins of strobila slightly serrate, with serrations more strongly defined toward posterior end of strobila. Scolex small and weakly developed, from 0.236 to 0.250 in width; suckers about 0.085 in diameter. Unsegmented neck very short or lacking. Accessory longitudinal excretory canals numerous. Genital pores irregularly alternate, situated in posterior half of segmental margin. Genital primordia appear very early; that of ovary visible within 1 mm of scolex, and those of male genital organs within 10 mm. Genital ducts dorsal to longitudinal excretory canals. Cirrus sac elongate, 0.286 to 0.428 long by 0.042 to 0.064 in maximum width (average 0.344 by 0.052) in mature segments; diameter greatest near distal end. Cirrus sac infrequently extending anteromediad as far as lateral margin of oral ventral excretory canal. Everted cirrus protruding about 0.130, with diameter of about 0.025; spines present. Internal seminal vesicle ovoid and small, situated in proximal portion of cirrus sac; external seminal vesicle much coiled, extending mediad from cirrus sac to level of ovary. Testes subspherical, averaging 0.050 in diameter in mature segments, and numbering 34 to 53 per segment (average 44). Testes distributed across segment near posterior margin and not separated into two discrete lateral groups; usually confluent posterior and dorsal to vitelline gland as best seen in post-mature segments. Testes never extending laterally

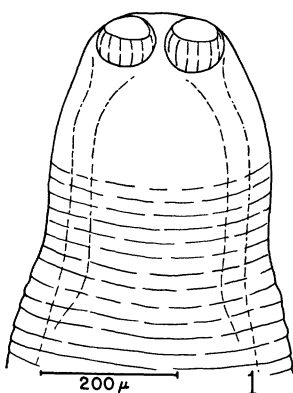


FIGURE 1. Scolex *Schizorchis yamashitai* sp. n.

as far as longitudinal excretory canals; greater number of testes aporal. Vagina, opening into genital atrium posterior and somewhat ventral to cirrus sac, extending mediad from genital pore, paralleling cirrus sac and external seminal vesicle, and enlarging to form small seminal receptacle on ventral surface of ovary. Multilobed vitelline gland coarsely lobed, situated posterior and ventral to ovary near posterior margin of segment; vitelline gland persisting in gravid segments. Uterus appearing as simple transverse tube in mature segments, slightly arched and situated posterior to male genital duct, paralleling latter on poral side, and largely ventral to ovary. Uterus in mature segments extending laterad as far as proximal margin of ventral longitudinal excretory canal on both sides; in postmature and gravid segments extending beyond latter canals, or displacing them toward segmental margin. Distal ends of uterus enlarging first in postmature segments, posterior and anterior sacculations appearing later; latter retaining identity in terminal gravid segments. Eggs approximately spherical, 0.036 to 0.062 in diameter (average 0.049); pyriform apparatus well developed. Embryo 0.013 to 0.019 in diameter (average 0.015).

*Host:* *Ochotona hyperborea yesoensis* Kishida, 1930.

*Habitat:* Duodenum of host.

*Type locality:* Mountains surrounding Lake Shikaribetsu, Daisetsuzan National Park, central Hokkaido.

*Type:* A slide containing an entire cestode has been deposited in the Helminthological Collection of the U. S. National Museum, No. 59876.

*Comparisons:* The size and form of the strobila serve readily to distinguish *S. yamashitai* from the two Nearctic species, *S. ochotonae* Hansen, 1948, and *S. caballeroi* Rausch, 1960.<sup>1</sup> Other morphological differences exist,

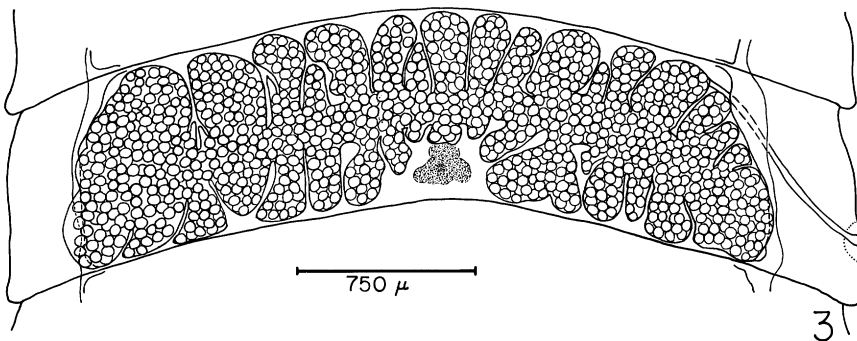
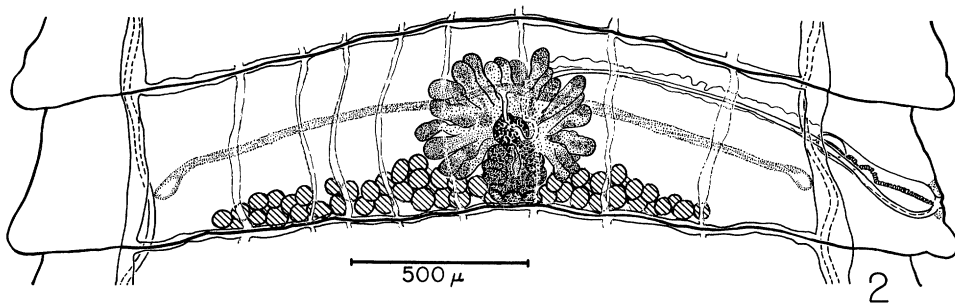
particularly in the details of the genital organs.

The strobila of *S. ochotonae* does not exceed 50 mm in length and, with a width of as much as 5 mm in gravid segments, appears more or less wedge-shaped. It has a larger number of testes (50 to 65), and these form two discrete groups separated by the ovary and vitelline gland. Hansen (1948) noted that the two groups of testes in *S. ochotonae* are rarely connected, and then only by two or three testes; in his figure of the mature segment (p. 755, Fig. 2), the two fields are shown to be essentially discrete, and this was confirmed in four specimens of *S. ochotonae* which I collected from *O. princeps* (Richardson) in the Teton Mountains, Wyoming. The cirrus sac of *S. ochotonae* is both absolutely and relatively larger than that of *S. yamashitai*, and it extends farther mediad in the former.

The strobila of *S. caballeroi* is longer (up to 64 mm) and proportionally narrower than that of *S. ochotonae*, but it is more attenuated and much less robust than that of *S. yamashitai*. In *S. caballeroi*, the more numerous testes (50 to 60) are disposed in two discrete, lateral groups which extend on both sides from the ovary and vitelline gland to the proximal margin of the adjacent ventral longitudinal excretory canal. The somewhat larger cirrus sac of *S. caballeroi* extends mediad across about one-fourth of the width of the mature segment, whereas in *S. yamashitai*, the cirrus sac extends only as far mediad as the poral ventral excretory canal.

*S. yamashitai* resembles *S. altaica* Gvozdev, 1951, in the size and form of the strobila. The former appears to be significantly longer, exceeding the maximum recorded length of *S. altaica* by as much as 25%. According to the published description and figures (Gvozdev, 1951), the female genital organs are situated more anteriorly in *S. altaica*, and the ovary is centrally located rather than nearer the poral margin of the segment as in *S. yamashitai*. The testes are more numerous in *S. altaica* (50 to 60), are disposed in two entirely separate fields, and are situated more anteriorly in the segment, extending on the poral side as far as the margin of the ventral excretory canal. The cirrus sac of *S. altaica* is longer than that of *S. yamashitai* and extends farther mediad. The gravid uterus of *S. altaica* does not extend

<sup>1</sup> The number (USNM Helm. Coll. 39024) of the slide containing the type specimen of *S. caballeroi* was omitted in the description.



*Schizorchis yamashitai* sp. n.

FIGURE 2. Mature segment. Diagonal hatching denotes testes. Uterus is the narrow transverse tubular organ at midlevel of proglottid.

FIGURE 3. Gravid segment.

beyond the ventral excretory canals, according to the original description.

Cestodes collected from pikas *O. alpina* Pallas near Peschan Bay, Lake Baikal, were identified as *S. altaica* by Spasskii and Ryzhikov (1951). According to the information provided by the latter and by Spasskii (1951), this was a smaller cestode (length 60 to 70 mm), possibly even another species of *Schizorchis*. Since gravid segments were present, this appears to be a much smaller form which can be distinguished from *S. yamashitai* by the size of the strobila.

#### DISCUSSION

Twelve Eurasian species of *Ochotona* were recognized by Ellerman and Morrison-Scott (1951). These comprise two subgenera: *Ochotona* s. str. (having palatal and incisive foramina confluent), with *O. daurica* Pallas, *O. koslowi* Büchner, *O. macrotis* Günther, *O. pu-*

*silla* Pallas, *O. roylei* Ogilby, *O. rufescens* Gray, and *O. thibetana* Milne-Edwards; and *Pika* Lacépède (having separate foramina), with *O. alpina* Pallas, *O. hyperborea* Pallas, *O. ladacensis* Günther, *O. rutila* Severtzov, and *O. pallasi* Gray. The two North American species, *O. princeps* (Richardson) and *O. collaris* (Nelson), are also members of the latter subgenus.

The recent review of the helminths in pikas by Gvozdev (1962) indicates that *S. altaica* has been reported from three species of the subgenus *Ochotona* (*O. pusilla*, *O. daurica*, and *O. macrotis*), and from three of the subgenus *Pika* (*O. alpina*, *O. rutila*, and *O. pallasi*). The geographic region from which this cestode has been recorded encompasses the Kazakh Upland, the Altai, Pribaikal', Buriat-Mongolia, and Tian-Shan' (Gvozdev, 1962). Various Eurasian species of *Ochotona* are sympatric (see Bobrinskii et al., 1944, map 38), although they

are more or less segregated ecologically. Cestodes of the genus *Schizorchis* can hardly be expected to exhibit host specificity below the generic level in pikas, but in view of the ecological diversity of the habitats of the various species of *Ochotona* and the vast geographic area involved, the existence of more than one species in Eurasian pikas might be expected. There is some indication of this in the report of the cestode from Lake Baikal by Spasskii and Ryzhikov (1951). I have not obtained the literature in which some of the records have been published (cited by Gvozdev, 1962), so it is uncertain whether the determinations can be considered reliable.

The mammalian fauna of Hokkaido has a large boreal component derived from Siberia, evidently by way of Sakhalin. Since these northern species must have invaded Hokkaido rather recently (i.e., during Pleistocene time), *Schizorchis yamashitai* sp. n. may occur both in Hokkaido (and Sakhalin) and eastern Siberia. *O. hyperborea* is widely distributed in eastern Eurasia, but its helminths evidently have been investigated thus far only by Kapitono (1961), who found no cestodes in a small series examined in the lower Lena River region, in the northwest part of the Verkhoyansk Range.

The possibility cannot be excluded that *S. yamashitai* is limited in distribution to Hokkaido and, perhaps, Sakhalin. The collared pika, *O. collaris*, occurring in Alaska and northwestern Canada, harbors a species of *Schizorchis* unknown in Eurasian pikas, although it appears to be a comparatively recent (late Pleistocene) migrant into North America (Rausch, 1962). Judging from both its helminths and its fleas, *O. collaris* has a closer relationship to the Eurasian *O. hyperborea* than to the Rocky Mountain *O. princeps* (Holland, 1958; Rausch, 1960). Results of zoogeographical interest should be produced from further studies in northeastern Siberia and from the investigation of the helminths of pikas in Tibet, China, and India.

## ACKNOWLEDGMENTS

The collection of mammals in Daisetsuzan National Park was undertaken with Professor Masashi Ohbayashi, Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University; Dr. Hisashi Abe, Zoological Museum, Faculty of Agriculture, Hokkaido University, whose exceptional efforts were responsible for capture of the pikas; Regional Forester Haruo Kusama, Shikaoi, Hokkaido; and Mrs. R. V. Rausch, who also prepared the figures. To these colleagues I express my thanks.

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