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Studies on the helminth fauna of Alaska. XXXVII.
Description of *Schizorchis caballeroi* n. sp. (Cestoda:
Anoplocephalidae), with notes on other parasites
of *Ochotona*

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Cestodes of the genus *Schizorchis* Hansen, 1948, are known only from pikas, *Ochotona* spp. (Lagomorpha: Ochotonidae). The type species, *Schizorchis ochotonae* Hansen, 1948, was found in *Ochotona princeps* (Richardson) in Colorado. A second species, *S. altaica* Gvozdev, 1951, has been described from *O. alpina* Pallas, from the Altai Mountains, Eastern Siberia.

It is the purpose of this paper to describe a third species, collected on several occasions during the last decade from *O. collaris* (Nelson), in the mountains of southern Alaska. Although rather closely resembling its congeners, this cestode is morphologically distinct, a conclusion supported also by zoogeographical evidence.

Seventeen (55%) of the 52 pikas examined were infected. In 15 infected animals, the number of cestodes ranged from 1 to 8 (average about 4). No other species of cestodes were recorded.

In recognition of the significant contributions to helminthology made by Dr. Eduardo Caballero y Caballero, the name *Schizorchis caballeroi* n. sp. is proposed for this species.

The following description is based upon 25 specimens. These were stained in Semichon's acetic carmine or in Ehrlich's acid hematoxylin, and mounted *in toto*.

Schizorchis caballeroi n. sp.

(Figs. 1-5)

Diagnosis: Strobila up to 64 mm long, with as many as 155 segments; maximum width 2 to 5 mm, attained in gravid segments. Strobila widens gradually from anterior end, but greater part essentially uniform in width. All segments wider than long; mature segments, usually arched, with a length/width ratio of about 5:1; gravid segments have ratio of about 4:1. Strobilar margins become more strongly serrate toward posterior end. Scolex weakly developed, from 160 to 215 μ wide, and may be set off slightly from unsegmented neck; latter measures about 250 to 280 μ long. Suckers about 80 μ in diameter, usually directed anteriorly. Genital pores irregularly alternate, situated near middle of segmental margin. Genital ducts pass dorsal to longitudinal excretory canals. Elongate cirrus sac, with greatest diameter near poral end, extends antero-medial across more than 1/4 of segmental width; it measures 510 to 560 μ long by about 85 μ wide in mature segments. Internal seminal vesicle well developed, comprising

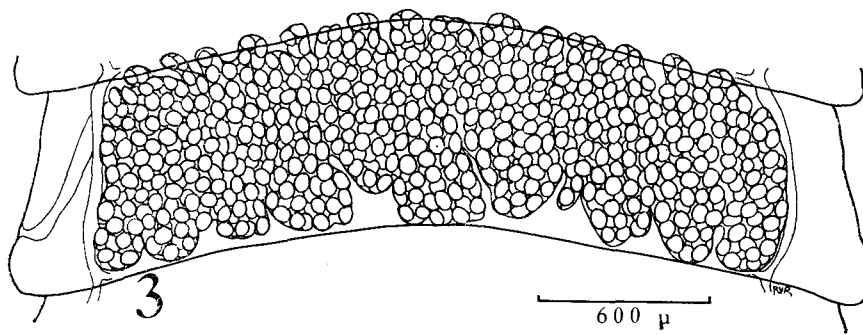
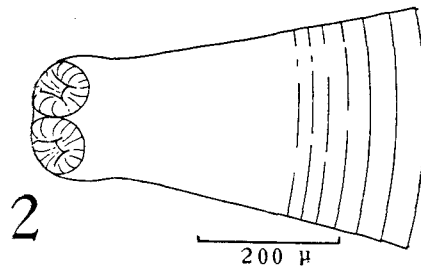
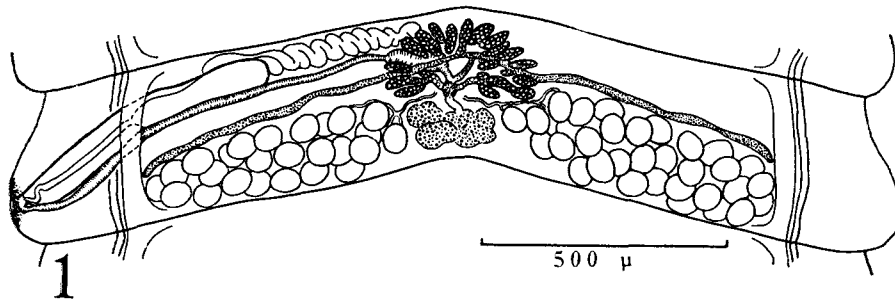


FIG. 1. Mature segment of *Schizorchis caballeroi* n. sp., ventral view. FIG. 2. Scolex of *S. caballeroi* n. sp.,
FIG. 3. Gravid segment of *S. caballeroi* n. sp.

up to $1/2$ of length of cirrus sac in mature segments; external seminal vesicle coiled at proximal end of cirrus sac. Subspherical testes 60 to 70 μ in diameter in mature segments; they average about 60 per segment and are situated in two separate, lateral fields extending from margins of ovary to ventral longitudinal excretory canals and as far anteriorly as uterus. Testes somewhat more numerous in aporal group. Vagina opens into genital atrium ventral and somewhat posterior to opening of cirrus sac; it bends anteriorly and runs medially ventral to and paralleling cirrus sac. Vagina enlarges near ovary to form large seminal receptacle, in mature segments. Multi-lobed ovary situated at middle of segment, its length comprising about $1/2$ length of mature segment. Lobed vitelline gland situated immediately posterior to ovary. Uterus has form of simple, transverse tube in mature segments; it extends distally on either side as far as ventral longitudinal excretory canals. Uterus in post-mature segments develops anterior and posterior sacculations, usually visible also in gravid segments; gravid uterus does not extend beyond ventral longitudinal excretory canals. Eggs nearly spherical, 57 to 71 μ in diameter (av. 64 μ); pyriform apparatus well developed; embryo measures about 17 μ in diameter.

Host: *Ochotona collaris* (Nelson) (collared pika).

Habitat: Small intestine.

Type locality: Talkeetna Mountains, about 55 miles northeast of Anchorage; also found in pikas in the Alaska Range.

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

DISCUSSION

The morphological characteristics of the species of *Schizorchis* are summarized in Table I.

Four specimens of *S. ochotonae*, collected by the writer from *O. princeps* in the Teton Mountains of Wyoming, were available for comparison. These cestodes conformed closely to Hansen's (1948) description, except for larger size; they ranged up to 47 mm in length, up to 5 mm in width, and contained as many as 162 segments. Also contrary to Hansen's observations, the seminal receptacle was well developed in the mature segments of these specimens.

The strobila of *S. caballeroi* n. sp. differs distinctly from that of *S. ochotonae*, being more slender and delicate in proportion to its length. Its anterior end is more attenuated, but near-maximum width is usually attained at about the end of the first $1/3$ of strobilar length; in consequence of this, the strobila is never cuneiform as it is in *S. ochotonae*. The segments of *S. caballeroi* n. sp. are longer in proportion to their width than are those of *S. ochotonae*.

The characteristics of the genital organs also serve to distinguish *S. caballeroi* n. sp. from *S. ochotonae*. In the former, the testes have a much less restricted distribution, usually extending laterally to the ventral longitudinal excretory canals. The ovary is not placed as far forward as it is in *S. ochotonae*, so that the testes may in part lie lateral, rather than posterior, to it. The distal ends of the uterus usually extend to the ventral longitudinal excretory canals in *S. caballeroi* n. sp., while in *S. ochotonae* the uterus does not reach beyond the limits

TABLE I
 Differential characteristics of *Schizorchis* spp.

	<i>S. ochotoniae</i> Hansen, 1948, and original data	<i>S. altaica</i> Gvoz- dev, 1951	<i>S. altaica</i> Spas- skii and Ryzhi- kov, 1951	<i>S. caballeroi</i> n. sp.
Length of strobila	Up to 47 mm	150 mm	60 to 70 mm	Up to 64 mm
Width of strobila	Up to 5 mm	4 mm	Up to 2.5-3 mm	Up to 3 mm
Diameter of scolex	164-200 μ	200-250 μ	130-150 μ	160-215 μ
Number of testes	50 to 65	50 to 60	40-50	50-60
Distribution of testes	Posterior to ovary, not reaching ventral longitudi- nal excretory canals	Posterior to ovary, reaching aporal ventral longitudi- nal excretory canal	Posterior to ovary	Posterior to ovary, reaching ventral longitudinal ex- cretory canal on both sides
Length of cirrus sac	610 μ	500-650 μ	500 μ	510 to 560 μ
Width of cirrus sac	95 μ	Up to 140 μ	60 μ	85 μ
Diameter of egg	62-63 μ	64-68 μ	47-60 μ	57-71 μ (Average 64 μ)

of the testicular aggregations. The genital atrium is usually situated farther back on the segmental margin in *S. caballeroi* n. sp.

In addition to the original description by Gvozdev (1951), information on the anatomy of *S. altaica* has been published by Spasskii and Ryzhikov (1951), and a synoptic diagnosis of the species was included by Spasskii (1951) in his monograph of the Anoplocephalata. The type material was collected in the Katon-Karagai region of the Southern Altai, while the specimens studied by Spasskii and Ryzhikov were obtained near Peschan Bay, Lake Baikal. Spasskii (1951) pointed out that the cestodes from Lake Baikal were considerably smaller than those from the Altai. Since other differences exist, according to the published descriptions (see Table I), it is possible that two species are involved.

From Gvozdev's (1951) description of *S. altaica*, it is evident that *S. caballeroi* n. sp. is a comparatively small species, its maximum length being less than half that given for the former. It appears also that the testes of the new species have a somewhat different distribution, being situated farther forward in the segment and extending farther laterally. The cirrus sac is proportionally longer in *S. caballeroi* n. sp., although its actual size is similar to that of *S. altaica*. *S. caballeroi* n. sp. is readily differentiated from the cestode described by Spasskii and Ryzhikov (1951) by its more numerous testes and larger egg.

Remarks on Zoogeography. The North American species of pikas, *O. collaris* and *O. princeps*, are markedly allopatric (Fig. 4). They may be descendants of northern and southern residual populations, separated by the Skeena humid intru-

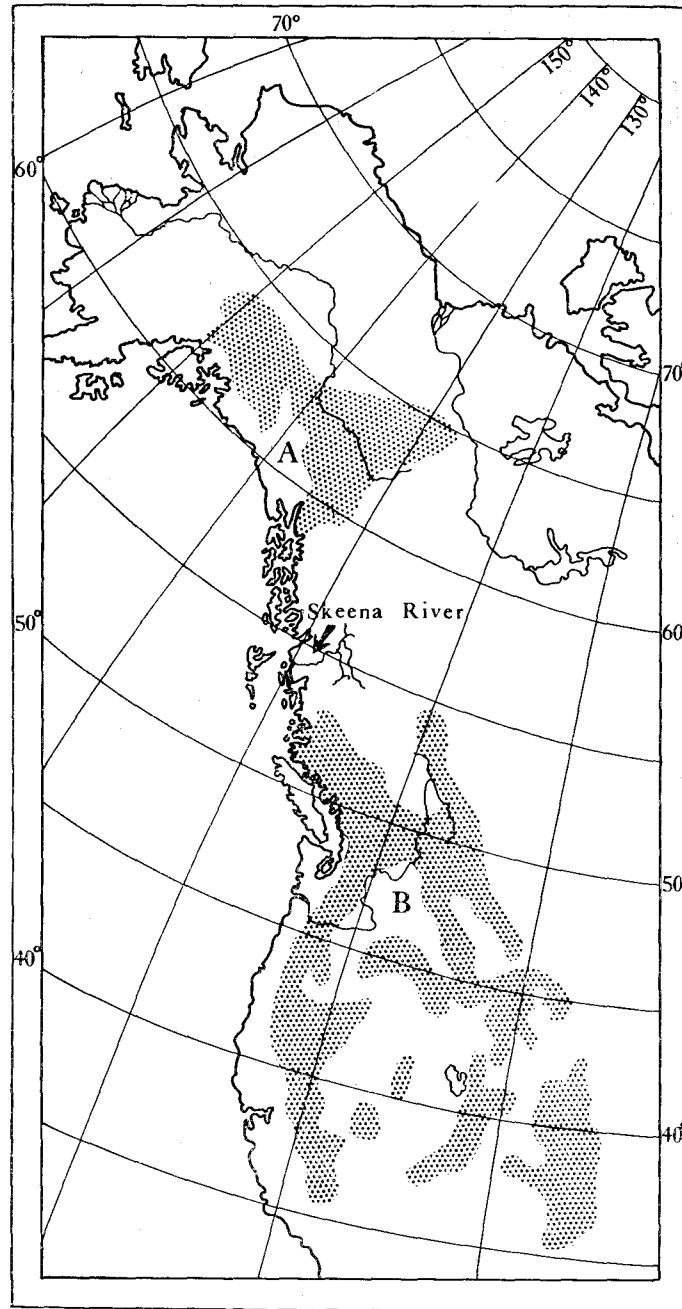


FIG. 4. Map of western North America, showing approximate distribution of the two nearctic species of *Ochotona*: A. *O. collaris*; B. *O. princeps*. (Compiled from Hall and Kelson, 1959, and other sources.)

sion, according to the hypothesis advanced by Munro and Cowan (1947). More recent support for this concept has been provided by Holland (1958), from his studies of the Siphonaptera occurring on these pikas.

Although the faunistic survey cannot be considered complete, the two species of pikas are not now known to share any species of helminth. In addition to the aforementioned cestodes, 7 species of nematodes have been described from these mammals: three, *Murielus harpeticulus* Dikmans, 1939, *Graphidiella ochotonae* Olsen, 1948, and *Cephaluris coloradensis* Olsen, 1949, are known from *O. princeps*; and four, *Eugenuris talkeetnae* Akhtar, 1956, *Labiostomum rauschi* Akhtar, 1956, *Cephaluris collaris* Akhtar, 1958, and *C. alaskensis* Akhtar, 1958, have been recorded from *O. collaris*. This degree of host specificity might be taken to indicate that morphological divergence has occurred in certain helminths isolated in two allopatric host-populations of common origin. It is doubtful that such has been the case, if the isolation of these populations took place as recently as Pleistocene time. The isolation of certain microtine rodents during Pleistocene time would appear to be an analogous situation, yet these animals are parasitized by the same species of helminths as occur in members of the populations from which they apparently were derived (Rausch, 1957).

Nematodes of two genera, *Eugenuris* Shul'ts, 1948, and *Labiostomum* Akhtar, 1941, otherwise known only from palearctic species of pikas, occur in *O. collaris*, which suggests that the affinities of *O. collaris* may lie with the palearctic species of *Ochotona*, rather than with the nearctic *O. princeps*. One might postulate that *O. collaris* has invaded North America more recently than did *O. princeps* or its precursor, perhaps contemporaneously with such species as *Clethrionomys rutilus* Pallas and *Microtus oeconomus* Pallas, which also are quite restricted in their North American distribution.

Twelve palearctic species of pikas were recognized by Ellerman and Morrison-Scott (1951). Their helminth parasites are quite incompletely known, and it is possible that future investigations will yield information contributing to a better understanding of the affinities of these mammals and their helminths.

SUMMARY

Schizorchis caballeroi n. sp. has been described from the collared pika, *Ochotona collaris* (Nelson), from Alaska, and has been distinguished morphologically from its congeners, *S. ochotonae* Hansen, 1948, and *S. altaica* Gvozdev, 1951.

Nine species of helminths have been described to date from North American pikas, *O. collaris* and *O. princeps* (Richardson). These mammals are markedly allopatric and do not share any species of helminth. Nematodes of two genera, *Eugenuris* Shul'ts and *Labiostomum* Akhtar, 1941, occur in *O. collaris* as well as in palearctic species of *Ochotona*. This, along with other pertinent information, is taken to suggest that *O. collaris* has invaded North America more recently than did *O. princeps* or its precursor.

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