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STUDIES ON THE HELMINTH FAUNA OF ALASKA. XXIV.
ECHINOCOCCUS SIBIRICENSIS N. SP., FROM
ST. LAWRENCE ISLAND

ROBERT RAUSCH AND EVERETT L. SCHILLER*

As the result of field and laboratory investigations extending over a period of more than four years, we have amassed considerable information on the life cycle and ecology of a cestode of the genus *Echinococcus* (Rudolphi, 1801). Occurring on St. Lawrence Island, which lies in Bering Sea about 40 miles southeast of Cape Chukotskyi, Northeast Siberia, this cestode not only has an interesting life cycle, but in the larval stage is an important parasite of man.

Two outstanding characteristics serve to differentiate this cestode from the known species of *Echinococcus*: 1) the natural occurrence of the larval stage in microtine rodents; 2) an alveolar-form larva which is produced through exogenous budding. Although this cestode cannot always be differentiated from *E. granulosus* (Batsch, 1786) on the basis of morphological characters in the adult stage, it is nevertheless specifically distinct and is described herein as new.

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Echinococcus sibiricensis n. sp.

(Figs. 1-2)

Diagnosis: Strobila very small, from 1.2 to 3.7 mm. long; 2 segments usually present, sometimes 3 or 4 in old specimens. Testes number 17 to 26 (av. 22); distributed in posterior half of segment. Cirrus sac averages 90 by 50 microns. Rostellar hooks, 26 to 36 in number (av. 30). Large hooks measuring 23 to 29 microns (av. 27); small hooks 19 to 26 microns (av. 21.6). Eggs measuring 30 to 38 microns (av. 34) by 29 to 34 microns (av. 30). Sacculations of gravid uterus not evident.

Final (type) host: Arctic fox, *Alopex lagopus* L. Occurs also in sledge dogs.

Intermediate hosts: Field vole, *Microtus oeconomus inuitus* Merriam, and red-backed vole, *Clethrionomys rutilus albiventer* Hall and Gilmore. (Other microtine rodents experimentally infected.) Also in man.

Habitat: Adult in the small intestine of fox and dog. The liver is the primary locus of infection in the intermediate host.

Type locality: St. Lawrence Island, Alaska. Occurs also on Bering Island, Komandorskii Islands.

Types: Deposited in the Helminth. Coll. U. S. Nat. Museum, No. 49442 slide with type and paratypes, and Nos. 49443 and 49444 paratypes *in situ* in two field voles.

DISCUSSION

Rausch (1953a)¹ concluded that four species of *Echinococcus* are valid; viz., *E. granulosus* (Batsch, 1786), *E. oligarthrus* (Diesing, 1863), *E. lycaontis* Ortlepp, 1934, and *E. felidis* Ortlepp, 1937. *E. sibiricensis* n. sp. is readily differentiated from all but *E. granulosus* on the basis of morphological characteristics in the adult stage. When compared with *E. granulosus*, *E. sibiricensis* n. sp. has fewer testes having a more restricted distribution, and the hooks are smaller in average size. However, when compared with adult cestodes from the Arctic Coast of Alaska and from Nunivak Island (occurring in both *Alopex lagopus* L. and *Vulpes vulpes* L.), the St. Lawrence Island form cannot always be differentiated. Morphological variation in *E. granulosus* has been considered in detail by Rausch (1953a).

The St. Lawrence Island cestode is, however, readily differentiated from *E. granulosus* on the basis of larval form and host-species parasitized by the larval stage. While *E. sibiricensis* n. sp. occurs naturally, as far as we have determined, only in the field vole and red-backed vole on St. Lawrence Island, we have succeeded in infecting experimentally microtine rodents of other species; viz., *Microtus pennsylvanicus* Ord, *M. californicus* Peale, *Lemmus sibiricus trimucronatus* Merriam, and *Ondatra zibethica* L. A single specimen of *Peromyscus* sp. was infected, but rodents of this genus appear to be relatively refractory. We have not attempted infection of the varying lemming, *Dicrostonyx torquatus* Pallas, but further observations are needed in this case, since this lemming also occurs on St. Lawrence Island (see Rausch, 1953b). We have been completely unsuccessful in establishing experimental infections in any of these animals through the administration of the eggs of *E. granulosus*. The experimental work will be discussed in detail in another publication.

E. sibiricensis n. sp. differs markedly from *E. granulosus* in larval form and in mode of larval growth. Detailed comparisons with the larval stage of *E. granulosus* have been made, and consistent differences exist. Detailed observations on larval development and morphology have been reported in another publication (Rausch, 1954).

¹ In this paper the dorsal longitudinal excretory canals were unintentionally portrayed as having transverse connections in the St. Lawrence Island species (page 243, text fig. 2).

The larval form of the St. Lawrence Island cestode closely resembles the alveolar larva of *Echinococcus* sp. which sometimes occurs in man in southern Europe and Russia, although there is no knowledge of any involvement of microtine rodents in the life cycle of the latter. There has been no adequate study of the Eurasian cestode, and no one has ever succeeded in obtaining the alveolar larva experimentally. Nevertheless, in the opinion of the writers, it is probable that the two forms are identical.

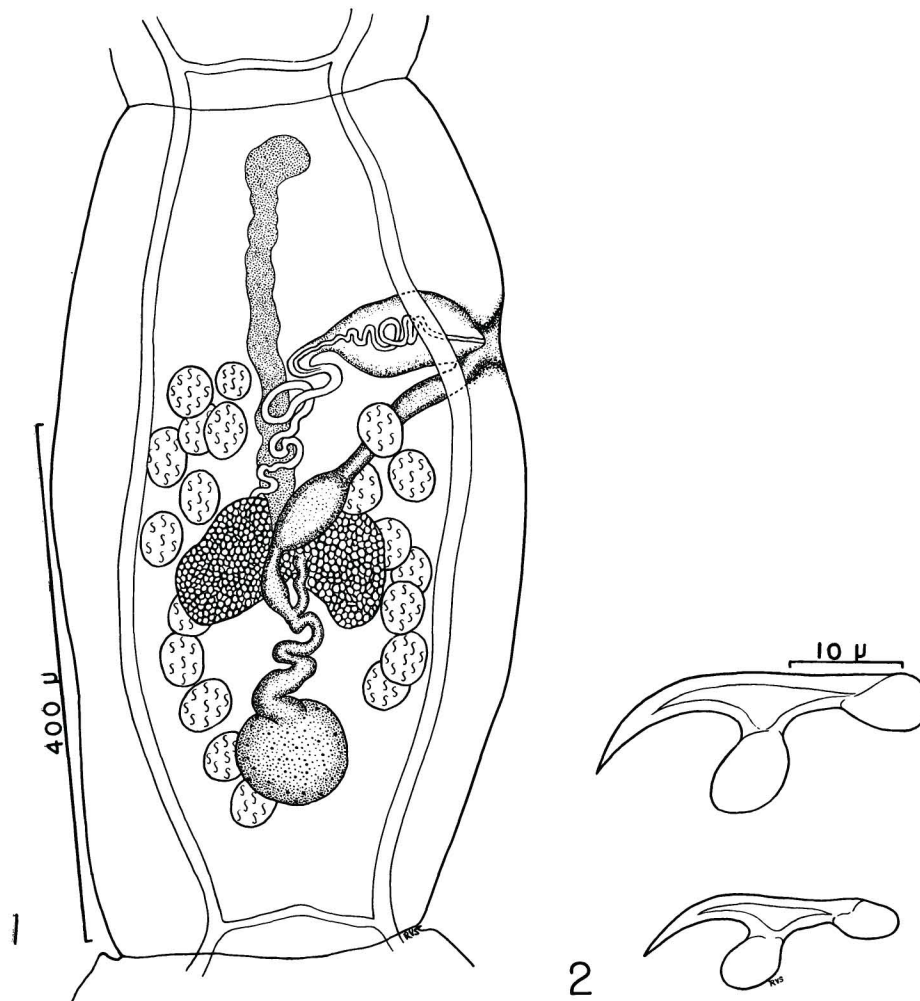


FIG. 1. *Echinonococcus sibiricensis* n. sp. Mature segment, ventral view.
FIG. 2. *Echinococcus sibiricensis* n. sp. Rostellar hooks.

All available evidence indicates that the species described here from St. Lawrence Island (and existing also on Bering Island) is of Siberian origin. It apparently has been brought to St. Lawrence Island by arctic foxes coming in on the pack ice from Siberia (Rausch, 1953b). It was probably established on Bering Island through the introduction of red-backed voles, either accidentally or for the purpose of providing food for foxes. Stejneger (1884, p. 88) stated that red-

backed voles were not present on Bering Island prior to 1870. Barabash-Nikiforov (1943) stated that reports exist on the voles having been deliberately introduced in order to increase the food resources of the arctic fox, and Johansen (1950, p. 47) also believed that deliberate introductions had taken place. The origin of such voles is apparently unknown, but it is perhaps safe to assume that it was the adjacent Siberian mainland. Since the pack ice does not reach Bering Island, the foxes have not come naturally to Bering Island in recent time. As pointed out by Afanas'ev (1941, p. 100), foxes on Mednyi Island are not infected, because no voles are found there. Unfortunately, there is little information on the occurrence of the alveolar larva of *Echinococcus* in Siberia. Pavlovskii (1946, p. 337) stated that human cases are diagnosed annually in Irkutsk, but gave no additional information. Spasskii, Romanova, and Naidenova (1951, p. 49) reported the larvae of "*E. granulosus*" in the liver, spleen, and testicle of muskrats farther to the west in the Kurganskaya Oblast' and Kzyl-Orda. It is unlikely that the species involved here is *E. granulosus*, and it may be *E. sibiricensis* n. sp.

It is possible that *E. sibiricensis* n. sp. may eventually be found identical with the species causing alveolar hydatid disease in man in Eurasia. If such were true, it would be difficult to determine whether any previously existing name can be applied, in view of the considerable amount of confusion concerning the nomenclature of the South-European and Russian species of *Echinococcus*.

We hope that this problem may be resolved through appropriate experimental study of the Eurasian cestodes, since only then can the affinities of *E. sibiricensis* n. sp. be ascertained.

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