

HELMINTH FAUNA OF MOOSE (*ALCES ALCES*) IN THE NORTH EAST OF ASIA

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ABSTRACT: The published literature reports a total of 29 species of helminths (5 trematodes, 5 cestodes, and 19 nematodes) from moose of North East Asia. Nine moose examined throughout the year from Chukotka were infected with *Moniezia expansa*, *M. benedeni*, larvae of *Taenia hydatigena* (= *Cysticercus tenuicollis*), *Nematodirella alcidis*, and *Liorchis scotiae*. Larvae of *T. parenchimatosa* were reported previously from moose of Chukotka. The helminth fauna of North Asia moose is poorer than that of animals in the European part of Russia where 37 species have been reported.

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Moose distribution in the North East of Asia covers several different landscape zones. In order to understand certain peculiarities of the ecology of moose, it is important to be aware of their helminth fauna. This can be found in the works of Nazarova and Masarnovsky (1970) providing data for Eastern Siberia; Oshmarin and Belousov (1951), and Abramov (1963) for the Far East; Romanov (1956) for Middle Siberia; Sulimov (1963) for Tuva; Gubanov (1964) for Yakutia; Kadenatsia and Zinovieva (1973) for the Khabarovsk region and Western Siberia. In total, 29 helminth species have been found in moose (Table 1).

In Chukotka, nine moose were examined for helminths and seven species were found (Zheleznov and Sulimov 1985, Zheleznov 1990). The moose were collected throughout the year in the forest tundra zone, generally, in flood-lands, in poplar and willow biotopes, and in lake and bog tundra. This undoubtedly affected the specificity of the helminth species composition. The specificity is characterized by ecological differentiation. They can be grouped into 1) those species having land insects as intermediate hosts - oribatid mites (*Acarina*), 2) those using different aquatic molluscs, 3) those transmitted by haematophagous insects - mosquitoes, midges, wood lice, and gadflies, and 4) a group of

helminths whose larvae develop in carnivores that consume moose meat (wolves, foxes, polar-foxes).

Four of the 9 moose examined had *Moniezia expansa*; one had *M. benedeni*. One female had larval *Taenia hydatigena* (= *Cysticercus tenuicollis*). An old male collected 17 August, 1976, was intensively infected with *Nematodirella alcidis* (350 individuals, 187 females and 163 males). Nonetheless, the physical condition of the animal was considered to be good. It had large fat accumulations on the back, chest, intercostal muscles, and in the body cavity. Yet, dissection revealed that the inner wall of the intestine was covered with ulcerations and haemorrhages. The mucous membranes were hyperemic and the stomach contained considerable blood. Another moose had 94 males and 244 females of *Nematodirella alcidis*. Interestingly, one female moose had 15 *Liorchis scotiae*. Previously, we reported cysticerciae of *T. parenchimatosa* in moose of Chukotka (Zheleznov 1976).

Five of the helminths found in moose are common to both moose and reindeer. These include *Liorchis scotiae*, *Moniezia benedeni*, *M. expansa*, *Taenia parenchimatosa*, and *Echinococcus granulosus*. The cestodes, *Moniezia benedeni* and *M. expansa*, have also been reported in

Table 1. A list of 29 species of helminths reported from moose (*Alces alces*) of North Asia

Helminth species	Western Siberia	Middle Siberia	Eastern Siberia	Southern Siberia	Yakutia	Far East	Chukotka
Trematoda							
<i>Fasciola hepatica</i>	+						
<i>Dicrocoelium lanceatum</i>	+				+	+	
<i>Liorchis scotiae</i>	+	+	+	+	+	+	+
<i>Fischoederius skrjabini</i>						+	
<i>Orientobilharzia turkestanica</i>						+	
Cestoda							
<i>Moniezia benedeni</i>	+	+	+		+	+	+
<i>M. expansa</i>	+		+		+		+
<i>Taenia hydatigena</i> larvae	+		+			+	+
<i>T. parenchimatosa</i> larvae	+						+
<i>Echinococcus granulosus</i> larvae	+		+	+	+	+	+
Nematoda							
<i>Trichocephalus longispicularis</i>	+						
<i>T. ovis</i>					+		
<i>Oesophagostomum venulosum</i>	+						
<i>Trichostrongylus colubriformis</i>	+		+				
<i>Ostertagia antipini</i>	+		+	+	+	+	
<i>O. ostertagi</i>	+						
<i>O. orloffi</i>	+		+				
<i>Spiculoptera dagestanica</i>	+			+	+	+	
<i>S. schulzi</i>	+		+		+	+	
<i>S. spiculoptera</i>	+		+				
<i>Nematodirella longissimespiculata</i>			+		+		
<i>N. alcidis</i>				+	+	+	+
<i>Dictyocaulus eckerti</i>	+				+		
<i>Varestrongylus capreoli</i>	+				+		
<i>Elaphostrongylus panticola</i>	+				+		
<i>Parabronema skrjabini</i>			+		+	+	
<i>Alcefilaria abramovi</i>	+		+		+	+	
<i>Onchocerca cervipedis</i>			+		+	+	
<i>Setaria labiato-papillosa</i>	+					+	
Total:	22	3	14	5	16	16	7

have also been reported in snow sheep of Chukotka (Zheleznov 1980, Zheleznov-Chukotsky 1994) and of Yakutia (Gubnov 1964), testifying to shared habitats where these animals become infected.

Nematodirella alcidis and *T. hydatigena* larvae were only found in moose in Chukotka. The latter species uses the wolf as its definite host in the territory of Chukotka.

According to Dorzhiev (1982), in the territory of the Far North East, *Cysticercus tarandi* and *C. parenchimatosa* (the first in reindeer and the latter in moose) are distributed everywhere. The level of infection in domestic reindeer can be up to $n=2279$. Prevalence of infection ranges from 0.01 to 3.9% and 1.3 to 56% in reindeer and moose, respectively. Their main hosts of these cestodes are huskies and wolves. Two of 7 wolves examined were infected with *Taenia krabbei* but were free of *T. parenchimatosa*.

Thus, according to our data and the published literature, a total of 29 species of helminths have been reported in moose of North Asia: 5 species each of trematodes and cestodes, and 19 species of nematodes. The helminth fauna of North Asia moose is poorer than that of animals in the European part of Russia where 37 species of worms are reported. We believe, the helminth fauna of North Asia moose depends on their biotopic distribution and their trophic connections.

As for regions, the highest coefficient of similarity in the helminth fauna is seen in Yakutia and the Far East - 52.4%. This index is a little lower for Eastern Siberia, Yakutia, Far East, Chukotka and for the Southern Siberia mountains - 33.3%. The helminth fauna of moose in Western and in Eastern Siberia differ considerably in quantitative aspects and species composition. Similarity, coefficients for the 2 regions do not exceed 8.7 and 14.3%, respectively.

On the whole, the helminth fauna of moose in North Asia is similar to that of other deer with which there is considerable overlap of ecological niches.

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