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OBSERVATIONS ON EPIZOOTIOLOGY AND DISTRIBUTION OF *Elaeophora schneideri* IN MONTANA RUMINANTS

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Abstract: Seventy-four moose, 111 elk, 20 mule deer, 8 white-tailed deer, 26 pronghorn antelope, 42 domestic sheep and 3 bighorn sheep from Montana or northwestern Wyoming were examined post-mortem for evidence of *Elaeophora schneideri* infection in 1973-74. Fifteen percent of the mule deer and four percent of the moose were positive for adult arterial worms. This constitutes the first report of *E. schneideri* in mule deer in Montana. No gross signs of blindness or other neurologic disorder were evident in the infected animals. Potential horsefly intermediate hosts collected in the enzootic area included *Hybomitra rhombica osburni, H. tetrica, H. metabola, Chrysops noctifer pertinax* and *Atylotus incisuralis.*

INTRODUCTION

Reports of *Elaeophora schneideri* Wehr and Dikmans, 1935, in moose are limited to four recent occurrences in western Montana.[8] Since the presence of the parasite in this region was first recognized in 1971, efforts have been made to determine its distribution in moose more accurately, and to ascertain if other potential definitive hosts in the same geographic area were infected.

MATERIALS AND METHODS

A total of 284 individuals representing seven ruminant species was examined for arterial worms in 1973-74: 74 moose (*Alces alces*), 111 elk (*Cervus canadensis*), 20 mule deer (*Odocoileus hemionus*), 8 white-tailed deer (*Odocoileus virginianus*), 26 pronghorn antelope (*Antilocapra americana*), 42 domestic sheep (*Ovis aries*) and 3 bighorn sheep (*Ovis canadensis*). The localities from which these animals originated included the area in southwestern Montana where previous *Elaeophora* infections had been found.[8] In addition, 69 of the moose, 85 elk and 3 mule deer were from Teton and Fremont Counties in northwestern Wyoming, where large populations of wild cervids coexist under ecological conditions similar to the habitat in southwestern Montana where *E. schneideri* is enzootic. The antelope were collected in Rosebud County, Montana from a sagebrush/grassland prairie ecosystem approximately 385 Km east of the known enzootic area. The domestic sheep were 8-11 month-old lambs and ewes from range bands which had spent the previous summer on mountain ranges in the Gallatin National Forest north of Yellowstone National Park, where contact with mule deer, elk and moose occurs regularly. One bighorn sheep originated from the Ural-Tweed herd in Lincoln County, one from the Thompson River herd in Sanders County and one from the Anaconda-Pintlar Wilderness in Deer Lodge County, Montana.

The terminal portion of the common carotid arteries, and in some instances the proximal portion of the internal maxillary arteries, were examined for adult and larval nematodes after the vessels were dissected free from the head and neck. Following gross examination of the lumen, the artery and its contents were soaked in 0.86% physiological saline and the fluid examined for larvae.

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In about one-fifth of the animals, ear and nose tissue slices were macerated in saline solution and the fluid examined for microfilariae as described by Weinmann *et al.*[6]

RESULTS AND DISCUSSION

Six cases of *E. schneideri* were found in wild cervids in or near areas where the infection had been recognized previously. A male moose (5-6 years old) taken in eastern Park County, Montana on November 21, 1973 harbored 20 arterial worms in its common carotid and internal maxillary arteries. Nine *E. schneideri* were recovered from a 10-12 year-old female moose collected in the Gallatin Canyon in January, 1974. A third positive moose, an 8-9 year-old female, was shot by a hunter in southern Gallatin County, Montana on October 19, 1974. Of 20 mule deer examined to date, three infected animals originated in forested foothills on the eastern slope of the Bridger Mountains in Park County. All were mature does, ranging in age from 4 to 12 years, and were collected in November of 1973-74. Individual worm burdens were 1, 1 and 3 worms respectively. In two instances, female *E. schneideri* containing viable microfilariae were recovered. These are the first records of arterial worms in mule deer in Montana and suggest that *O. hemionus* may act as the normal host for *E. schneideri* in Montana as it does in the southern Rockies.[3] None of the positive hosts showed any apparent signs of blindness or other neurologic disorder. Microfilariae were not demonstrable in the samples of superficial ear and nose tissue examined by the maceration technique.

Based on comparative worm recoveries from Montana ruminants, moose may exhibit a "lack of resistance" to the development of *E. schneideri* similar to the host response characteristic of elk infections.[4] Worm populations averaged 11.4 $\pm$ 9.5 in six moose compared with 2.0 $\pm$ 1.7 in three positive mule deer examined to date. The presence of mature nematodes in both hosts during October and November suggests that exposure occurs during the same period of time, but other, unknown factors influence the apparent differences in susceptibility. The location of adult worms in both deer and moose was near the terminus of one or both common carotids or in the proximal portion of the internal maxillary artery.

Although the extent to which the arterial worm is established in Montana cervids remains largely undetermined, present records indicate that it exists in isolated foci in foothills and mountainous areas above 1590 m elevation in southwestern Montana where overlapping of mule deer and moose range occurs. The potential role of domestic sheep in the epizootiology of the infection is not clear, since no positive *O. aries* were found. However, seasonal use of summer ranges by large numbers of sheep has been practiced for many years in or near three of the six sites where infected cervids were collected. Nevertheless, no positive individuals or clinical signs of infection have been detected in either adult sheep or lambs after two to four summer months in the enzootic area. Previous records of *Elaeophora* in sheep in Montana are limited to 3 animals in the Kalispell area.[7] Likewise, *Elaeophora* has not been found in elk in western Montana despite the extensive distribution of elk herds at higher elevations throughout the area in question.

The presence of arterial worm infection in the northern Rocky Mountain region does not appear to be related directly to the density of the indigenous moose population, since moose numbers in the Wind River/Jackson Hole area of Wyoming are estimated to be considerably larger than that of the *Elaeophora*-enzootic area in southwestern Montana.[2,5] The role of insect vectors in determining distribution of the parasite is also problematic. Based on the results of this study and previous records of elaeophorosis in Montana ruminants, the occurrence of this filarid may be restricted to localized areas where adequate densities of definitive hosts and suitable arthropod vectors exist concurrently. Limited efforts to survey for potential vectors in

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southwestern Montana have indicated that a variety of horseflies occur in midsummer at elevations above 1800 m. Tabanids collected in the vicinity where infected moose have been taken include *Hybomitra rhombica osburni, H. tetrica, H. metabola, Chrysops noctifer pertinax* and *Atylotus incisuralis. H. tetrica* has been incriminated as an intermediate host in the southern Rockies.[1]

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