

GIARDIA AND OTHER INTESTINAL PARASITES OF  
SMALL MAMMALS IN  
GRAND TETON NATIONAL PARK

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Objectives

The long-range objectives of this research on the biological cost of parasitism to small mammals are: 1) to document the incidence and prevalence of Giardia and other parasites in Microtus and other sympatric small mammals of Grand Teton National Park; 2) to compare parasite loads for these animals during wet and dry seasons; 3) to determine the incidence of intestinal parasites in Microtus during a growth cycle that ranges from years of lowest to years of highest population densities of the hosts, 4) to investigate the relationship of parasite infection to reproductive success in Microtus, and 5) to investigate small mammals as potential reservoirs of human parasites such as Giardia.

Methods

Microtus montanus was livetrapped in the study sites used by A. J. Pinter in Grand Teton National Park at an approximate elevation of 2057 meters. The unbaited traps are also entered by a variety of other small mammals (e.g., jumping mice, shrews, pocket gophers), although these species are captured in much smaller numbers than Microtus. Analyses for the presence of Giardia and other parasites were done on all small mammals that were trapped.

The intestines of the hosts were placed in sodium acetate-formalin fixative (SAF). To confirm the presence of viable trophozoites of Giardia, wet mount preparations were made from scrapings of the mucosa from the upper end of the intestine. Sections of the intestine of these infected animals were transferred to TYI-S-33 (KC Biologicals) medium for axenic (bacteria-free) cultivation. The remaining portion of the intestine and its contents were preserved in 10% formalin.

SAF fixed material was used in the preparation of hematoxylin stained

slides. Portions of intestine fixed in formalin were dehydrated, sputter coated, critical point dried and observed by scanning electron microscopy. Identification of the parasites was by light and scanning electron microscopy according to various authorities and based on accepted morphological criteria.

### Results

During the summers of 1986 and 1987 we trapped 90 Microtus montanus, 4 M. richardsoni, 2 M. pennsylvanicus, 9 Thomomys talpoides, 2 Spermophilus armatus, and 8 Sorex palustris (Pinter, O'Dell and Watkins, 1987). The 1986 season was a very wet year and was also the lowest population levels in over a decade while population levels began to recover in the 1987 season. All of the 90 voles were positive for Giardia spp. Living Giardia were observed in wet mount preparations from the duodenum of 89 animals, including one host that had been dead for at least 4 hours. Giardia were not only found swimming free but also attached to mucosal cells. The voles appeared to have relatively heavy infections since 10 to 20 Giardia were easily seen in each 100X field of magnification. No Giardia trophozoites and only a few cysts were observed in any of the wet or stained cecal preparations.

Examination of the cecal contents of 39 freshly killed montane voles revealed very heavy infections of trichomonads. Twenty-one montane voles also had infections of Spironucleus spp. Giardia spp. was also found in 4 of 9 pocket gophers and in 1 of 8 water shrews, Sorex palustris. Entamoeba spp. trophozoites and cysts were observed in filtered and stained preparations of the cecal contents of 8 montane voles and of 2 pocket gophers. Two ground squirrels had heavy trichomonad infections but did not contain any Giardia. All four water voles and both meadow voles were positive for Giardia. Seven of the 8 water shrews also had infections of Cochlosoma spp. a flagellate genus previously reported only from birds (Tyzzer, 1930).

### Conclusions

This is the first report of Giardia in M. montanus. It is also the first report of Giardia spp. from a small mammal from Grand Teton National Park. During a wet year in which the population levels of montane voles are at their lowest, Giardia duodenalis infections occur in all of the animals. As population levels begin to recover during the following season, the incidence remains at 100%. More work is necessary to demonstrate a relationship between the incidence of Giardia and the population densities of the host. This work supports the hypothesis that small mammals in Grand Teton National Park could represent a significant reservoir of Giardia for human infections and agrees with the observations in Washington state by Pacha et al (1987). Incidental to the Giardia discovery was the report of a new host, Sorex palustris, for the intestinal flagellate genus, Cocholosoma, previously found only

in birds.

References Cited

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