

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

William D. O'Dell
University of Nebraska at Omaha
Omaha

Aelita J. Pinter
University of New Orleans
New Orleans, LA

Objectives

The objectives of this research are:

1. To document the occurrence of Giardia and other protozoan 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 occurrence of intestinal parasites in Microtus during a growth cycle that ranges from years of lowest to years of highest population densities of the hosts; and
4. To investigate the relationship of infection to reproductive success in Microtus.

Methods

Microtus montanus was livetrapped in the study sites used by A. J. Pinter for the past 17 years. 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 was done on all small mammals trapped. Samples were also collected from soil, from water, and from "latrines" of Microtus in the study areas.

The intestines of the hosts were placed in sodium acetate-formalin fixative (SAF). Fecal pellets collected in the field were also fixed in 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 TY1-S33 (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 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 summer of 1986 we trapped 29 Microtus montanus, 5 Thomomys talpoides, 2 Spermophilus armatus, and 2 Sorex palustris. The 1986 season was a very wet year and was also the year with the lowest population levels in over a decade. All of the 29 voles were positive for Giardia duodenalis. Living Giardia were observed in wet mount preparations from the duodenum of 28 animals, including one host that had been dead for at least four 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 four freshly killed voles revealed very heavy infections of Trichomonas muris. Six voles also had infections of Spironucleus muris. The reported inverse relationship in densities of Giardia to Hexamita (Spironucleus) in the same host (Owen, et al., 1979) was observed in only 2 of the 6 voles with S. muris infections. In one vole, S. muris was the dominant parasite in the duodenum, while the reverse was true in the ileum. In contrast, the locations of S. muris and Giardia were completely reversed in the second vole. The remaining voles had mixed infections without any obvious differences in the relative numbers.

G. duodenalis was also found in 4 of 5 gophers and in 1 of 2 water shrews, Sorex palustris. Entamoeba muris trophozoites and cysts were observed in filtered and stained preparations of the cecal contents of 4 voles and of 2 gophers. Two ground squirrels had heavy Trichomonas muris infections but did not contain any Giardia. Both shrews also had infections of Cochlosoma sp.

Conclusions

During a wet year in which the population levels of montane voles are at their lowest, Giardia duodenalis infections occur in all the animals. More work is needed to demonstrate a relationship between the occurrence of Giardia and the population densities of the host.

Literature Cited

- Owen, R. L., P. C. Nemanic, and D. P. Stevens. 1979. Ultrastructural observations in giardiasis in a murine model. I. Intestinal distribution, attachment, and relationship to the immune system of Giardia muris. Gastroenterology 76:757-769.