

PARASITES OF UNGULATES IN THE JACKSON HOLE AREA:  
SCARABAEOID BEETLES ACTING ON LUNGWORM,  
DISTYOCAULUS hadweni, LARVAE IN ELK FECES  
1981

Robert C. Bergstrom  
Division of Microbiology and Veterinary Medicine  
University of Wyoming

Lungworm of elk, Dictyocaulus hadweni (syn: D. viviparus) was first designated as Strongylus filaria in elk and red deer, (Blair, 1903) and lungworm was then and in 1905 reported to cause bronchopneumonia in elk. (Blair 1905). Records of lungworm in elk in Yellowstone and the Tetons were rather incomplete until Rush (1932), Mills (1936), Alderson (1951) and others listed internal parasites found in elk. It is surprising that Mills did not find D. hadweni in 100 elk taken from the Yellowstone herd.

It is interesting to note that a high percentage of the elk in Teton National Park are positive for lungworm in the spring. Fewer elk are infected as the summer and fall vegetation is usually sufficiently good to allow the elk an abundance of food and a resultant physiological condition that is excellent.

Perhaps elk serum proteins are somewhat low in the April-May period when the physiological "low" is reached by the elk. The lack of immunoglobulins may, in part, explain the high prevalence of lungworm infections in elk of the Tetons during early spring months.

### Objectives

The objectives of the present study are:

1. Continue research of the prevalence of Dictyocaulus hadweni in Teton elk during four seasons of the year. (This must be done to find worm-positive elk for the biological predation research). The search has been extended to elk in Yellowstone National Park during the past two years and will be continued.
2. Check, via fecal analyses, for larvae spring-summer and winter and by lung dissections (adult worms) and/or by fecal analyses during the fall for relative numbers of the parasite/elk.
3. Experiment in the laboratory for the effect of Aphodius spp. Canthon sp., other Scarabaeoid beetles against 1st stage larvae of Dictyocaulus sp.

4. Extend field observations to include the action of Aphodius spp. on Dictyocaulus larvae in or on elk feces. (This portion is very time consuming due to the fact that the investigator does not, beforehand, know which elk are positive for the worm).

#### Methods

Fecal analyses were conducted by the use of a jet of water played over 6-100 g of elk fecal pellets in a plastic petri dish. After the water had wetted the pellets, the larvae were allowed 10-20 minutes to move off the pellets. The pellets were again rinsed by a jet of water after which the pellets were removed from the dish by sterile forceps. Dictyocaulus larvae were counted in the sectioned petri dishes via dissecting scope at 45X. Prevalence (% of elk positive for lungworm larvae) and the number of larvae were noted.

During the fall hunting season, elk lungs were gathered by the National Elk Refuge personnel, by the researcher, but primarily by Teton Park rangers. Elk lungs were checked for the presence of adult Dictyocaulus worms by use of bandage scissors as pneumotomes in order to lay open all major bronchioles. With light infections, worms were found in the smaller bronchioles near the periphery of the lobes of the lungs while larger numbers of worms, larger bronchioles were partially or completely filled with worms up to and including the area of the main bifurcation of the trachea.

Worms were collected, sexed, counted, and in some cases, fixed for preservation.

#### Results

Percent of elk positive for Dictyocaulus hadweni was high (as in past years) in both the Teton Park elk and Gibbon River elk (Y.N.P.) at 70 and 80% respectively during the spring.

Percent of elk positive for lungworm is shown in Fig. 1 with the annual high in May.

The difference in mature bulls and lactating or "Wet" cows is shown by the different prevalence levels in Fig. 1. About twice as many lactating cows are positive for lungworms in August as compared to mature (5-7 point) bulls.

Two calves were found positive in late August, 1981. They apparently harbored only a few worms at that time. Larval numbers in their feces were low.

No laboratory work with Aphodius spp. beetles was accomplished in 1981. However, beetles were found in elk feces in the field and were extremely

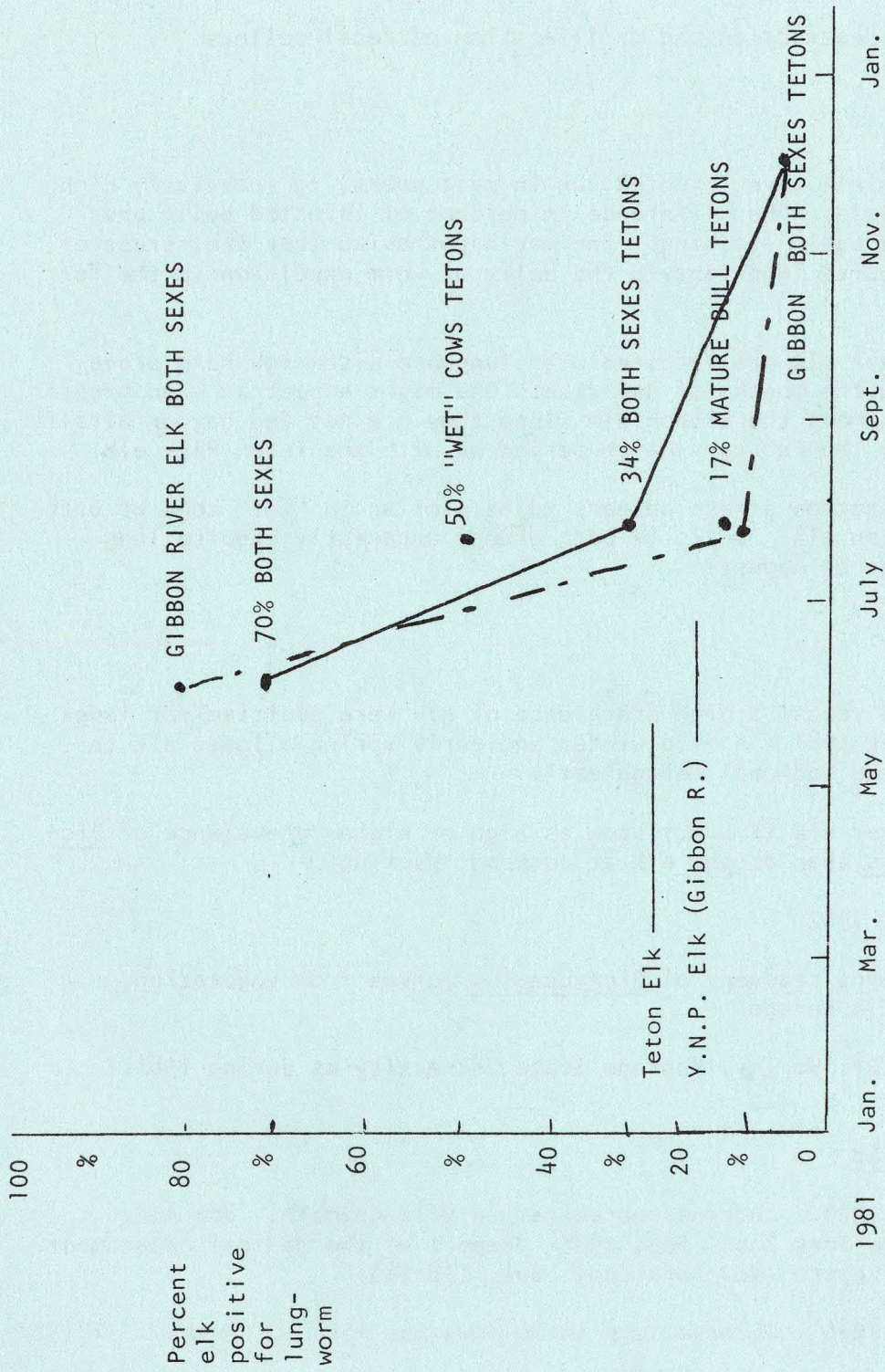


Figure 1. Prevalence of Dictyocaulus-infected elk through summer and fall, 1981.

active in the destruction and proliferation of fecal pellets.

### Discussion

The Teton Park elk were infected, as in past years, to relatively high prevalence levels. The difference in percent of infected bulls and "wet" cows was again striking. One may hypothesize that the stress of lactation is quite important in the delay of worm expulsion in the female wapiti.

The Gibbon River elk are infected with lungworm with high herd prevalence noted in the months of May-June. One might expect an even greater winter stress among the Gibbon elk since they are not fed hay or alfalfa pellets during the February-March period as with the Teton Park elk.

However, the lactation stress appears to be similar in "wet" cows of both Gibbon and Teton elk. Bulls in both groups apparently expulse lung worm infections by August.

### Conclusions

1. As in past years, a high prevalence of elk were positive for lungworm in May 1981. A mild winter and early spring allowed elk to move off the National refuge early.
2. Gibbon River elk (Y.N.P.) show as high or higher prevalence of Dictyocaulosis than do the elk at Jackson, Wyoming.

Work Planned: 1982

Again attempt recovery of Dictyocaulus larvae from vegetation, National Elk Refuge.

Work with Dr. Worley, Montana State University as during 1981.

### Literature Cited

- Blair, W. R. 1903. Internal parasites in Wild Animals. 8th Ann. Report, New York Zool. Soc. 1905. Report of the Medical department. 10th Ann. Report, New York Zool. Soc. 138-143.
- Mills, H. B. 1936. Observations in Yellowstone elk. J. Mammol. 17(3): 250-253.
- Murie, O. J. 1951. The elk of North America. The Stockpole Co., Harrisburg, PA. and Wildl. Mgmt. Inst., Washington, D.C. 376 pp.
- Rush, W. J. 1932. Northern Yellowstone elk study. Montana Fish and

Game Comm., Helena, MT. 131 pp.

Acknowledgements

Thanks are extended to personnel of the National Elk Refuge especially Mr. Russell Robbins, Biologist and to the rangers and Mr. Robert Wood of the Teton National Park Service. The use of laboratory facilities and lodging at the U.W.-N.P.S. Research Center and Dr. Diem's cooperation and counsel in the research effort is appreciated.