SEASONAL CHANGES IN THE PREVALENCE OF OVA OF Diphyllobothrium ursi AND Baylisascaris transfuga IN THE FECES OF THE BLACK BEAR (Ursus americanus)

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SEASONAL CHANGES IN THE PREVALENCE OF OVA OF *Diphyllobothrium ursi* AND *Baylisascaris transfuga* IN THE FECES OF THE BLACK BEAR *(Ursus americanus)*

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Abstract: An analysis of 114 samples of feces from black bears *(Ursus americanus)* from La Verendrye Park, Quebec revealed that the prevalence of eggs of *Diphyllobothrium ursi* and *Baylisascaris transfuga* varied seasonally. *D. ursi* ova were most prevalent during the summer and fall and at their lowest in spring while the converse was true for *B. transfuga*. This phenomenon possibly is associated with the cessation of feeding during the winter denning of black bears.

INTRODUCTION

An intriguing but as yet poorly understood aspect of parasitism in bears is the apparent elimination of some parasitic helminths, particularly cestodes and ascarids, before or during the period of winter lethargy.[5] The present study was undertaken to determine any seasonal variation in the prevalence of helminth ova in the feces of black bears, *Ursus americanus*, in northwestern Quebec.

MATERIALS AND METHODS

One hundred and fourteen fresh fecal samples from black bears were collected at the restaurant garbage dump of Le Domaine Lodge in La Verendrye Park, Province of Quebec, Canada, during the fall (August, October and November) of 1971 and the spring (May) and fall (August and October) of 1972. Two grams of feces from each sample were examined for eggs of *Diphyllobothrium ursi* and *Baylisascaris transfuga* by flotation on saturated sodium nitrate ($NaNO_3$) solution taking care to avoid prolonged manipulations. The identity of these eggs was corroborated by necropsy findings of the adult worms in the intestines of bears in an earlier study.[3]

RESULTS

During the fall of 1971, 56 samples of feces were examined for helminth parasites. Most of these samples were collected in October and November, just prior to the denning period. Eggs of *D. ursi* were found in 39 samples (70%), while *B. transfuga* ova occurred in only 7 samples (13%).

The following spring (May, 1972), 24 samples of feces were collected from the same locality and examined for helminth ova. Only 5 samples (21%) were positive for *D. ursi*, while 10 samples (42%) contained ova of *B. transfuga*. The spring prevalence of both parasites was significantly different from the prevalence of the preceding fall according to the G-test *(D. ursi*, G = 17.02; *B. transfuga*, G = 9.49). An analysis of 34 fecal samples in the fall of 1972 revealed that the prevalence of both parasites had returned to levels indistinguishable from those of the previous fall. Seventeen samples (50%) were positive for *D. ursi* (G = 3.45) and 4 samples (12%) contained ova of B. transfuga (G = 0.01).

DISCUSSION

Jonkel and Cowan[4] determined that black bears rarely left their home ranges.

Individual bears tended to be captured or observed from year to year in virtually the same areas. Only a small proportion of bears travelled more than 0.6 km to a park garbage dump. Other bears living close to the dump, however, were regular visitors. Throughout our study the dumping site was frequented by as many as 15 bears during the course of an evening. These observations suggest that we were dealing with a group of at least 15 animals and probably more. The strong home range bonds of black bears[4] probably would maximize the opportunity for sampling feces from essentially the same group of individuals from one season to the next, and thus provide an accurate record of seasonal changes in the prevalence of these helminth ova.

Between fall (1971) and spring (1972) there was a significant reduction in the prevalence of *D. ursi* ova in the feces of black bears. This reduction may be due to the expulsion of egg-laying adult worms before the onset of winter lethargy as has been suggested by Rausch[5] for the Kodiak bear, *Ursus arctos middendorffi.* These bears are thought to re-acquire *D. ursi* during the annual salmon runs. Alternately, it is conceivable that adult *D. ursi* destrobilate but persist during the denning period of the black bears and subsequently resume proglottization as suggested by Rausch.[6] This would be consistent with our findings that by the fall of 1972 the prevalence of *D. ursi* ova in the feces had reached a level indistinguishable from that of the previous fall.

The identity of the second intermediate host of *D. ursi* in La Verendrye Park and the time of transmission to the bear host are unknown. If the infections are transmitted by spawning salmonids, as in Alaska, bears may acquire the infection in fall when brook trout *(Salvelinus fontinalis)* enter the shallow headwaters of streams. If, however, all adult worms were expelled before the onset of winter denning, the presence of *D. ursi* ova in the feces of bears in early spring would be difficult to explain.

While the prevalence of *D. ursi* ova decreased, the prevalence of *B. transfuga* eggs increased significantly from the fall of 1971 to the spring of 1972. This, at first glance, seems to be at odds with the reports of Rausch[5] and Rogers[7] that bears expel large quantities of ascarids prior to denning. If most of the ascarids failed to overwinter, one would expect a decrease in the prevalence of positive stools, not an increase, unless the infections were re-acquired and had time to mature between the time of emergence from the winter den (beginning of May) and the time that large numbers of eggs were demonstrated in the feces (mid-May). This, however, seems too short a period. It would appear much more likely that some ascarids overwinter, perhaps much like the nematode *Physaloptera maxillaris.*[1] Larvae of this parasite of skunks, which are ingested in late summer and fall, fail to develop but persist over the winter. In spring, when the host begins to feed again, overwintering larvae grow into adults and commence egg production. The number of adult worms declines during late fall and winter, probably because they are, unlike the larvae, unable to survive prolonged periods of food deprivation caused by the failure of the host to feed. Indeed, Choquette, *et al,*[2] report that a grizzly bear *(Ursus arctos)* killed in December in northwestern Canada harbored immature ascarids. Furthermore, immature worms outnumbered adults in 26 bears, 19 of which were killed during the summer months. Thus, the maturation of overwintering larvae of *B. transfuga* may account for the increased prevalence of positive feces in early spring. By the following fall (1972) the prevalence of *B. transfuga* ova in feces had once again reached a low level.

In summary, the prevalence of *D. ursi* and *B. transfuga* ova in the feces of black bears show pronounced seasonal variation. Our findings lend support to the

suggestion of earlier workers that the period of winter lethargy has profound effects on these helminth parasites of black bears.

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