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## PREVALENCE OF EGGS OF *BAYLISASCARIS PROCYONIS* (NEMATODA:ASCAROIDEA) IN RACCOON SCATS FROM AN URBAN AND A RURAL COMMUNITY<sup>□</sup>

J.E. JACOBSON,<sup>□</sup> K.R. KAZACOS,<sup>□</sup> and F.H. MONTAGUE, JR.<sup>□</sup>

**Abstract:** Twenty-six of 97 (27%) scats from raccoons (*Procyon lotor*) in an urban area and 37 of 121 (31%) scats from raccoons collected in a rural area of Indiana during October and November of 1980 contained eggs of *Baylisascaris procyonis*, an ascarid of animal health significance. Raccoons that were livetrapped from the same areas had similar prevalences of *B. procyonis* eggs in their feces. Therefore, monitoring the prevalence of *B. procyonis* in raccoon populations by analyzing scats appeared to be feasible.

### INTRODUCTION

*Baylisascaris procyonis*, the ascarid of the raccoon (*Procyon lotor*), was first described as *Ascaris procyonis* by Stefanski and Zarnowski (1951) and later reclassified by Sprent (1968). Since then, *B. procyonis* has been identified as the etiologic agent in natural outbreaks of cerebrospinal nematodiasis in rabbits (*Sylvilagus floridanus*) (Nettles et al., 1975; Jacobson et al., 1976), woodchucks (*Marmota monax*) (Jacobson et al., 1976), nutria (*Myocastor coypus*) (Koch and Rapp, 1981), a red squirrel (*Sciurus granatensis*) (Schueler, 1973), domestic chickens (*Gallus gallus*) (Richardson et al., 1980), and bobwhites (*Colinus virginianus*) (Reed et al., 1981). Experiments have demonstrated that this parasite is pathogenic in grey squirrels (*Sciurus carolinensis*) (Tiner, 1953), house mice (*Mus musculus*) (Tiner, 1953; Lindquist, 1978), and squirrel monkeys (*Saimiri sciureus*) (Kazacos et al., 1981).

Because of the animal health significance of *B. procyonis*, this study

was initiated to determine the prevalence of this parasite in an urban and a rural community that harbored raccoons and the feasibility of monitoring the prevalence of *B. procyonis* by analyzing raccoon scats.

### MATERIALS AND METHODS

Two hundred and eighteen raccoon scats were collected in Tippecanoe County, Indiana during October and November of 1980. Ninety-seven raccoon scats were collected at three locations within a 280 ha study area in residential West Lafayette, Indiana, and 121 raccoon scats were collected at three locations within a 230 ha rural study area 9.4 km to the west.

A scat was estimated to be less than or greater than one week old depending on the recent weather and the scat's moisture content and overall weathered appearance. When multiple scats were found at a site, only compositionally distinct and well-spaced scats were collected. This reduced the chance of

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sampling multiple sections of a single scat or having one scat's contents leached into another scat.

The presence of eggs of *B. procyonis* (Fig. 1) in each scat was determined by using a fecal flotation method (Sloss and

Kemp, 1970) incorporating a sugar solution with an approximate specific gravity of 1.2.

In concurrent research, 66 raccoons from the urban study area and 29 from the rural study area were livetrapped during 1979 and 1980. These raccoons were anesthetized and rectal fecal samples were examined for eggs of *B. procyonis* using the same fecal flotation method for scats. Raccoons were released at their capture sites.

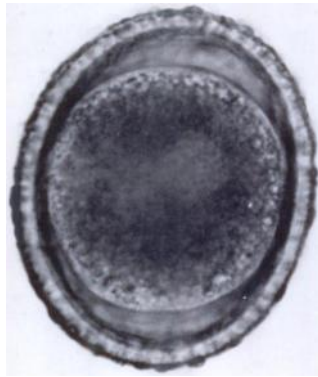


FIGURE 1. Egg of *Baylisascaris procyonis* from a freshly deposited raccoon scat.  $\times 670$ .

## RESULTS AND DISCUSSION

The analysis of scat and rectal fecal samples indicated that *B. procyonis* was a common parasite with similar prevalence in the urban and rural communities (Table 1). If each collected scat originated from a different raccoon, then an estimated 26.8% of urban raccoons and 30.6% of rural raccoons harbored *B. procyonis*. Some scats may have come from the same raccoon, which could have biased the estimates of prevalence for this parasite.

TABLE 1. Prevalence of eggs of *Baylisascaris procyonis* in raccoon scats and live-trapped raccoons collected from urban and rural communities in Tippecanoe County, Indiana.

	URBAN	RURAL	TOTAL
	No. (%)	No. (%)	No. (%)
Scats collected	97 (44.5)	121 (55.5)	218 (100.0)
Scat age			
<1 week	55 (56.7) <sup>a</sup>	51 (42.1) <sup>a</sup>	106 ( 48.6)
>1 week	42 (43.3)	70 (57.9)	112 ( 51.4)
Scats with eggs of <i>B. procyonis</i>	26 (26.8)	37 (30.6)	63 ( 28.9)
Scat age			
<1 week	19 (73.1) <sup>b</sup>	17 (45.9)	36 ( 57.1)
>1 week	7 (26.9) <sup>b</sup>	20 (54.1)	27 ( 42.9)
Raccoons livetrapped	66 (69.5)	29 (30.5)	95 (100.0)
Raccoons with eggs of <i>B. procyonis</i>	14 (21.2)	5 (17.2)	19 ( 20.0)

<sup>a,b</sup>A significant difference at  $p < 0.05$  using a test of proportions for binomially distributed populations.

Fourteen of 66 (21.2%) urban raccoons and 5 of 29 (17.2%) rural raccoons livetrapped in the study areas had eggs of *B. procyonis* in their feces (Table 1). No significant difference in the prevalence of this parasite existed between the raccoon rectal fecal sample and the scat sample for each area. This suggested that the prevalence of *B. procyonis* in a raccoon population could be estimated by the prevalence of this parasite's eggs in raccoon scats from that population.

A significantly greater proportion of scats less than one week old was collected in the urban study area than in the rural study area, and of the urban scats with eggs of *B. procyonis*, a significantly greater proportion were less than one week old (Table 1). This suggested that the age of a scat may also have been a source of bias, since as a scat weathers, eggs may dessicate or leach from the scat.

Urban and rural communities can become contaminated with eggs of *B. procyonis* due to deposits of raccoon scats. Animals may become infected with this parasite by ingesting infective eggs from contaminated soil, water, air, fomes, or raccoon scats. Only eggs that contain second stage larvae can infect a host, and for *B. procyonis* this stage develops approximately 30 days after an egg is shed (Lindquist, 1978; Kazacos et al., 1981). The persistence of eggs of *B. procyonis* under natural conditions increases the possibility of animals becoming infected. Lindquist (1978) has demonstrated that eggs of *B. procyonis* remain infective even after 9 yr of refrigeration, but this situation does not simulate natural conditions. A pet skunk (*Mephitis mephitis*) harboring *B. columnaris*, an ascarid similar to *B. procyonis*, contaminated an area with eggs that persisted 3 to 4 yr under natural conditions and caused cerebrospinal

nematodiasis in an emu (*Dromaius novaehollandiae*) (Kazacos et al., 1982). Kazacos (1982) found that three pet raccoons, harboring a total of 15 female *B. procyonis*, contaminated their enclosure (26.8 m<sup>2</sup>) with an estimated  $1.7 \times 10^6$  eggs per day. This contamination was responsible for 100% mortality in 85 bobwhites housed six weeks later in this enclosure (Reed et al., 1981).

Circumstantial evidence suggests that *B. procyonis* poses a potential health problem for humans. Raymond et al. (1978) reported two cases of ocular larva migrans in humans. In one case a person had contact with a pet raccoon, and in both cases, the sizes (1.6 and 2.0 mm) of the observed nematodes were comparable to the size range of *B. procyonis* larvae (Tiner, 1953; Richardson et al., 1980; Reed et al., 1981). Kazacos et al. (1981) found extensive visceral and ocular larva migrans and fatal cerebrospinal nematodiasis in sub-human primates experimentally infected with *B. procyonis*.

The indiscriminate relocation of raccoons harboring *B. procyonis* should be prevented in order to reduce the spread of this parasite. To accomplish this, raccoons to be relocated could be cleared of *B. procyonis* adults by anthelmintic drug treatments, or raccoon scats from an area considered as a source of raccoons for relocation could first be examined for eggs of this parasite.

Because of the marked pathogenicity of *B. procyonis* larvae in animals other than the definitive host and the persistence of this parasite's eggs in the environment, further investigations concerning the epidemiology of *B. procyonis* should be conducted. Monitoring the prevalence of this parasite in raccoon populations by analyzing raccoon scats appeared to be feasible.

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