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### Prevalence of Giant Kidney Worm (*Diocotophyma renale*) in Wild Mink (*Mustela vison*) in Minnesota

ABSTRACT.—Of 138 wild mink (*Mustela vison*) from eastern Minnesota, 27% contained *Diocotophyma renale*, primarily in the right kidney. No significant difference between prevalence in adult male and immature male mink was found, nor between the prevalence in males vs. female mink. Thirteen worms were found in one male mink, representing the highest documented infection intensity of a single wild mink.

#### INTRODUCTION

The nematode *Diocotophyma renale* (Goeze, 1782) infects the kidneys of wild mink (*Mustela vison*) in many areas (Woodhead and McNeil, 1939; Sealander, 1943a; Hallberg, 1953; Schacher and Faust, 1956; Miller and Harkema, 1964; Crichton and Urban, 1970; Fyvie, 1971; Mace and Anderson, 1975; Jorde, 1980). However, the only record in Minnesota was a 6.9% prevalence in fur farm mink (Erickson, 1946). We have found no information about prevalence of *D. renale* in mink of different ages. We report the first prevalence of *D. renale* infection in wild Minnesota mink and the first analysis of the ages of infected mink. Because *D. renale* can be fatal (Graves, 1937; Meyer and Witter, 1950; Mace and Anderson, 1975), this information may allow a better understanding of mink population dynamics and ecology.

#### METHODS

Skinned carcasses of 121 mink caught by fur trappers in northeastern Minnesota (Cook, Lake and St. Louis counties) and of 17 mink from east-central Minnesota (Pine and Kannonabec counties) during fall 1998 were examined for kidney worms. Only the kidneys and abdominal cavity were examined. Male mink were aged by examination of bacula (Petrides, 1950; Greer, 1957), but the females were not aged. Worms from the northeastern Minnesota sample were counted and half of them were measured. The sexes of the worms were not determined in this study. Two specimens were confirmed by the University of Minnesota Veterinary Diagnostic Laboratory as *Diocotophyma renale* (J. E. Collins, pers. comm.).

#### RESULTS

We found *Diocotophyma renale* in 26% of the northeastern sample of mink and in 35% of the east-central sample, with similar prevalence in adult male and immature male mink (Table 1). The difference in prevalence of *D. renale* in male vs. female mink was not significant. The number of *D. renale* found in individual male mink ranged from 1 to 13 and in females 1 to 5 (Fig. 1). The mean numbers of worms in males ( $2.5 \pm 0.5$  SE) and females ( $1.8 \pm 0.7$  SE) were not significantly different. The average length of the worms was 24.6 cm. Two 50.8 cm long worms, the longest in the study, were recovered from two male mink from northeastern Minnesota. Most worms inhabited the right kidney but, in 14% of cases, were found in the abdominal cavity (Table 2). Thirteen *D. renale* were found in the right kidney of one male mink, representing the highest documented infection intensity of a single wild mink host.

#### DISCUSSION

Our findings extend the known range of *Diocotophyma renale* in wild mink to Minnesota, document the highest prevalence of the parasite in mink in the region and include a new record for infection intensity for a single mink. Our findings also suggest that, at least in males, prevalence of infection is not a function of age, contrary to expectations.

Although we did not find a significant difference between prevalence of *Diocotophyma renale* in male and female mink, our ratio of infected male prevalence to infected female prevalence (1.8:1) was greater than in Mace and Anderson's (1975) study (1.5:1), which did find a significant difference. One hypothesis for this gender-based dissimilarity is that males may have larger territories than females (Eagle, 1989), which could mean more exposure to infected prey. Another possibility is that males may consume more intermediate and paratenic hosts. Sealander (1943b) reported, however, that the diet

TABLE 1.—Prevalence of *Diectophyma renale* in Minnesota mink during 1998

Location	Mink examined									
	Immature male		Adult male		Total males		Females		Total	
	n	Positive (%)	n	Positive (%)	n	Positive (%)	n	Positive (%)	n	Positive (%)
Northeast	46	14 (30)	36	11 (31)	82	25 (30)	39	6 (15)	121	31 (26) <sup>1</sup>
Eastcentral	7	3 (43) <sup>2</sup>	—	—	7	3 (43)	10	3 (30)	17	6 (35) <sup>1</sup>
Total	53	17 (32)	36	11 (31)	89	28 (32) <sup>3</sup>	49	9 (18) <sup>3</sup>	138	37 (27)

<sup>1</sup> Difference not significant between NE and EC samples ( $\chi^2 = 0.71$ ;  $df = 1$ ;  $P = 0.40$ )

<sup>2</sup> May have included one adult male

<sup>3</sup>  $\chi^2 = 2.76$ ;  $d.f. = 1$ ;  $P = 0.10$

of male and female mink varied only in size of prey. Many of the prey taken by both sexes are paratenic hosts for *D. renale*.

*Lumbriculus variegatus*, an oligochaete, is believed to be the only intermediate host required by *Diectophyma renale* before infecting mink (Karmanova 1959, 1960, 1962; *vide* Mace and Anderson, 1975). Infected oligochaetes can carry the infection to second and third paratenic hosts that mink feed on (Mace and Anderson, 1975; Measures and Anderson, 1985). *Lumbriculus variegatus* is pollution tolerant (Lafont, 1989; *vide* Lafont *et al.*, 1996) and oligochaetes, in general, have been used as indicators of level of eutrophication of a water system (Howmillier and Scott, 1977; Milbrink, 1983). However, *L. variegatus* inhabits primarily mesotrophic environments (Särkkä, 1987).

The relatively high prevalence of *Diectophyma renale* in Minnesota mink, the serious effect of the infection and the lack of information about many aspects of the ecology of the relationship among mink, worm and hosts, emphasize the need for further research on this subject.

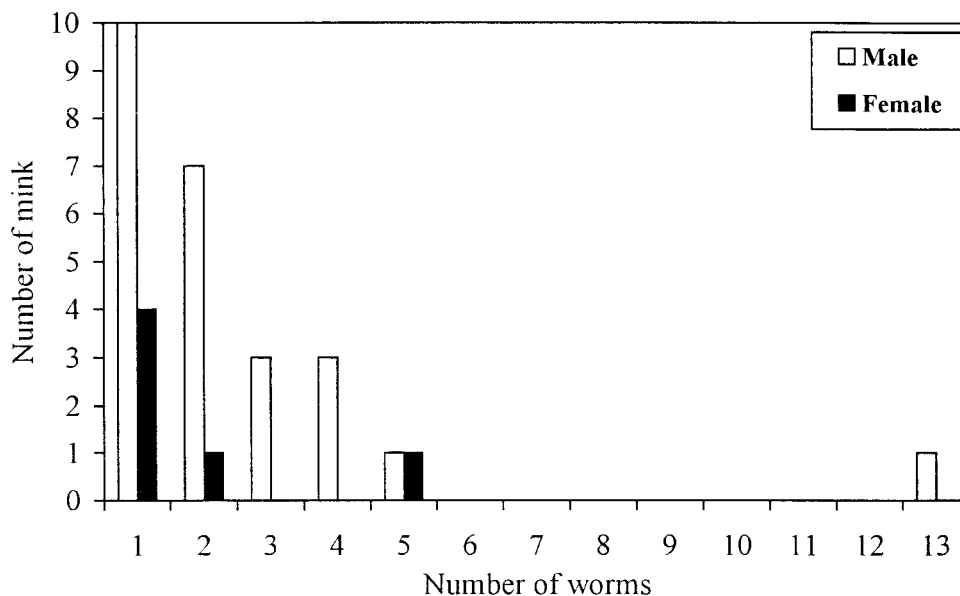


FIG. 1.—Number of *Diectophyma renale* in 121 mink from northeastern Minnesota in 1998

TABLE 2.—Location of *Diectophyma renale* in Minnesota mink during 1998

Location	Male mink		Female mink	
	n	%	n	%
Right kidney	22	79	9	100
Abdominal cavity	5	18	—	—
Both	1	4	—	—

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