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First Record of Coccidiosis in Wolves, *Canis lupus*

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Three 4-month-old Wolf (*Canis lupus*) pups in the Superior National Forest of Minnesota died during August and September 1997, apparently from coccidiosis. This appears to be the first record of coccidiosis in Wolves.

Key Words: Wolf, *Canis lupus*, coccidiosis, disease, pathology, protozoa.

Coccidiosis infects a variety of species including such canids as Coyotes (*Canis latrans*) and domestic dogs (*Canis lupus familiaris*) (Pence and Custer 1981). However, to our knowledge the disease has not been reported for Wolves (*Canis lupus*) (Brand et al. 1995), despite the radio-monitoring of many hundreds of Wolves for survival and mortality, including over 600 in the Superior National Forest, Lake County, Minnesota, alone (Mech and Frenzel 1971; Mech 1986, and unpublished; Van Ballenberghe et al. 1975). The present report documents the occurrence of coccidiosis in three Wolf pups from two litters in the Superior National Forest, and the death of at least two of them from this disease.

We live-trapped, weighed, and obtained blood samples (Mech 1974) from four Wolf pups (671, 673, 675, and 699) from one litter in July 1997, and a pup (723) from the litter of an adjacent pack in November 1997 (Table 1). Three of the pups were 31-36% lighter than the expected weight for well-fed wolves of their age and sex (Van Ballenberghe and Mech 1975), and two to four of their six hematological values were aberrant (Table 1). Veterinarians implanted 24.6-gm, mortality-sensing radio-transmitters intra-abdominally in the four littermates, and we released the pups back in their rendezvous sites where caught within 24 hours and monitored their signals at least twice daily. Based on radio-tracking, all these animals moved around similarly, but after 13 and 53 days, two of them died (Table 1). The other two survived at least through 19 November 1998 and 21 October 1999. We live-trapped, weighed, blood-sampled, and radio-collared the fifth pup of our sample (Wolf 723) 14 km east of the other two pups on 4 November 1997, but he never recovered from his capture and handling.

We retrieved Wolf 675 within 24 hours of her death and froze the carcass. Within 8 hours of Wolf 699's death, we found only his transmitter, a length of small intestine, and a fecal bolus. The rest of his remains apparently had been eaten by his pack mates. We froze both specimens. We also froze the carcass of Wolf 723.

On 6 January 1998, the junior author examined all the specimens. Toxicological testing for antimony, bismuth, mercury, and inorganic arsenic (Reisch test) and strychnine and brucine (thin layer chromatogtraphy) were all negative. Electron microscopy of feces (Muneer et al. 1988) from all three Wolves and the fecal sample revealed no virus. Histopathological examination of the intestines showed no evidence of parvoviral enteritis. However, both carcasses had hemorrhagic feces in the large intestines, and the severely autolyzed intestine of the third Wolf (Wolf 699) also had hemorrhage. The intestinal mucosa of both Wolves had many various develop-

TABLE 1. Clinical information about Wolf pups that died from coccidiosis and their littermates that survived, Lake County, Minnesota, 1997.

Wolf Number	Sex	Date Caught	Weight Kg	% Under-Weight[1]	Date Died	Hematology[2] Hct	Hgb	RBC	MCHC	MCV	WBC
671	M	6 August	8.3	41	–	42	13.4	4.4	32	96[2]	22.5[2]
673	M	6 August	8.1	42	–	48[2]	15.7[2]	5.0	33	97[2]	15.0
675	F	7 August	8.3	32	29 September	50[2]	15.5[2]	5.1	31	98[2]	27.9[2]
699	M	6 August	8.9	36	19 August	34[2]	10.8[2]	3.7[2]	32	91	30.4[2]
723[3]	M	4 November	15.5	31	5 November	37	10.0[2]	4.8	27[2]	78	13.7

[1]Compared with data from Van Ballenberghe and Mech (1975).
[2]Outside of standard error of mean values of large sample of Wolf pups from same area, 1969-1972 (Seal et al. 1975).
[3]From pack adjacent to the other Wolves.

mental stages of *Isospora* oocysts in both enterocytes and in the lamina propria.

We concluded that Wolves 675 and 723 died of severe coccidiosis, and that is also the most probable cause of death for Wolf 699. This is the first record that we could find of coccidiosis in Wolves.

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This study was supported by the Biological Resources Division of the USGS and the USDA North Central Forest Experiment Station. We thank Michael E. Nelson, Thomas J. Meier, Paul Frame, Craig Campbell, Michael Lucid, Julianne O'Reilly, and Dan Stark for assisting with the field work and veterinarians Peter Hughes and R. E. Hanson for implanting the transmitters.

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Breeding of Steller's Eiders, *Polysticta stelleri*, on the Yukon–Kuskokwim Delta, Alaska

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Flint, Paul L., and Mark P. Herzog. 1999. Breeding of Steller's Eiders, *Polysticta stelleri*, on the Yukon–Kuskokwim Delta, Alaska. Canadian Field-Naturalist 113(2): 306-308.

Historically, an unknown number of Steller's Eiders nested along the outer coastal fringe of the Yukon–Kuskokwim Delta, Alaska, but no nests had been found since 1975. We located six nests from 1991-1998 and we conclude that Steller's Eiders are still a regular breeder at low densities on the Yukon–Kuskokwim Delta.

Key Words: Steller's Eider, *Polysticta stelleri*, threatened, breeding distribution, Alaska.

The Steller's Eider (*Polysticta stelleri*) is a high arctic breeding bird, and little is known of its life history. Surveys of fall molting areas along the Alaska Peninsula suggested an overall decline in numbers, and the number of birds breeding in Alaska may have also declined (Anonymous 1997). From these trends the Alaska breeding population of Steller's Eiders was listed as *Threatened* under the provisions of the U.S. Endangered Species Act (Anonymous 1997). Historically, within Alaska, Steller's Eiders were only known to have nested regularly on the Yukon–Kuskokwim Delta (Y–K Delta) and along the Arctic Coastal Plain near Barrow (Kertell 1991). Kertell (1991) summarized the population status of Steller's Eiders breeding on the Y–K Delta and noted that no nests had been discovered since 1975 during nest searches conducted for other species. Kertell (1991) concluded that Steller's Eiders were "apparently extinct" as a breeding bird on the Y–K Delta. In this paper we present recent

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Wolf

Sex

Date

Caught

Weight

Kg

% Under-

weight'

Date

Died

Hematology2

Number

Hct

Hgb

RBC

MCHC

MCV

WBC

671

M

6 August

8.3

41

–

42

13.4

4.4

32

962

22.52

673

M

6 August

8.1

42

-

48^

15.72

5.0

33

972

15.0

675

F

7 August

8.3

32

29 September

502

15.52

5.1

31

982

27.92

699

M

6 August

8.9

36

19 August

342

10.82

3.72

32

91

30.42

723-^

M

4 November

15.5

31

5 November

37

10.02

4.8

272

78

13.7

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