Rat Poison Kills a Pack of Eastern Coyotes, *Canis latrans,* in an Urban Area

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We document the death of a pack of Eastern Coyotes (*Canis latrans*) from high levels of brodifacoum, a second generation poison that is the active ingredient in some forms of rat poison (e.g., d-Con®). The Coyotes died within a week of each other during late March/early April 2005. This incident indicates the vulnerability of wild animals to commercial over-the-counter rodenticides.

Key Words: *Canis latrans* var., Eastern Coyote, anticoagulant, brodifacoum, poison, rat poison, Massachusetts.

Coyotes (*Canis latrans*) live successfully in a variety of habitats ranging from rural to urbanized areas (Gese et al. 1996; Harrison et al. 1991; Patterson and Messier 2001; Riley et al. 2003; Way et al. 2001, 2004). However, in almost all of these settings (except national parks; Gese et al. 1996) people constitute the major source of mortality for Coyotes usually via trapping, shooting and automobile strikes (Grinder and Krausman 2001; Parker 1995). Poison was historically used to kill predators but was banned in 1973 in the United States (Mech 2000; Mech and Boitani 2003). Mech (1970) noted that "poison is no doubt the most effective and efficient method of controlling or exterminating Wolves (*Canis lupus*)." However, the use of poisons is controversial because of their relative non-selectivity and reputation for inhumaneness (Cluff and Murray 1995). Most poisons, such as strychnine, cyanide, and sodium fluoroacetate (compound 1080), are not readily obtainable today. Because these poisons are illegal, many canid populations have greatly increased in the past 30 years (Mech and Boitani 2003; Parker 1995). Anticoagulants are present in urban areas (for rat control), and Riley et al. (2003) found them to be a significant cause of death for Coyotes in southern California. This paper details the poisoning deaths of a family group of Coyotes in urban north Boston, Massachusetts, most likely deliberately poisoned by someone .

Study Area and Methods

Coyotes were captured for an ecological study on the north edge of Boston (42.43°N, 71.06°W), in eastern Massachusetts, in the bordering cities of Everett (4345.0 people/km^2), Malden (4290.5 people/km^2), and Revere (3089.0 people/km^2) (U.S. Census Bureau, 2000 estimates). Box traps were used to capture Coyotes (Way et al. 2002a) except for one ("Jet") captured via a ground-based netlauncher (Coda Enterprises, Inc., Mesa, Arizona). Four Coyotes were radio-collared in this pack: "Maeve" (#BN0404), a 14.5 kg lactating female, captured 17 May 2004, was the breeding female; "Jet" (#BN0403), a 15.9 kg breeding male, captured 29 June 2004, was Maeve's mate; "Jem" (#BN0406), a 10.0 kg 4.5 month-old pup, was captured on 26 August 2004; and "Cour" (BN0405), a 12.3 kg 5 month-old pup, was captured on 15 September. The behavior of Maeve and Jet (i.e., frequently being located with each other and with the pups, including observations of them feeding the pups) indicated that they were the parents of these pups (see Way et al. 2001). The Coyote pack consisted of two to three adults (i.e., one additional uncollared Coyote occasionally sighted in the pack's territory – its status was never determined but it was probably a helper Coyote [see Way et al. 2002b] to Jet and Maeve) and four pups (two of which were not collared). The group was named the Cemetery Pack as it resided almost exclusively at one green area (including some thicker adjacent woods) surrounding four large connected cemeteries. The entire area was about 2.5 km^2 and on the north side, aside from unused railroad tracks the pack's territory was surrounded by high-density housing units and/or commercial spaces (malls) on all sides.

Results and Discussion

The group went from six or seven members in the fall of 2004 to four individuals by mid-winter 2004-2005 when it was presumed that some of the pack members (two of the pups [including Jem] and probably the uncollared adult) dispersed. Jem was last successfully located on 11 December 2004. Snow tracking and sighting data indicate that only one uncollared Coyote (a light yellowish-brown animal) remained along with the breeding pair and Cour. Similarly, Way et al. (2002b) found three to four individuals to be a

typical winter pack size of Coyotes in eastern Massachusetts.

The winter of 2004-2005 was harsh with much snow yet the Coyotes remained in their small territory. Residents often reported to us that they fed the Coyotes and people noticed some of the animals were collared (J. Way, unpublished data), indicating that the group obtained food from people living in and/or around the cemeteries. Aside from their abnormally small home range (see Way et al. 2002b), they behaved much like Coyotes studied in other locations, including the avoidance of people by being nocturnal (Way et al. 2004), crossing streets quite often, denning in wooded or relatively undisturbed (including under a gravestone) regions of their territory (Way et al. 2001), and acting territorial (Way et al. 2002b), including observations of Jet scent marking on the railroad tracks at the north edge of his pack's home range. There was no sign of the Coyotes' ill-health until just prior to them dying.

On 27 March 2005 Maeve was found dead in the middle of a cemetery in the central part of the pack's territory. She was an emaciated 12.7 kg despite appearing normal when sighted on 24 March. A gross necropsy revealed significant internal bleeding and no fetuses, indicating that she was not pregnant. A laboratory (Idexx Veterinary Services, www.vetconnect.com) diagnosis indicated erosive acute gastritis, severe necrotizing hemorrhagic endometritis with retained placental decidual tissue, and subacute suppurative endocarditis and myocarditis.

On 31 March 2005 Jet was found dead, 100 m from where Maeve died, and was also emaciated (14.3 kg). Radio-telemetry data indicates date of death was 30 March. He was observed moving normally 2-3 days before his death. Because of massive internal bleeding and similar gross necropsy results as Maeve, we only tested for poisoning (specifically for common chemicals found in household rat poisons) on Jet. Brodifacoum was detected in the liver at 0.733 parts per million (ppm), and the laboratory (Idexx) indicated that the results supported a diagnosis of brodifacoum poisoning.

On 3 April 2005 Cour was found dead in a shallow (< 1 m deep) canal that he frequently (i.e., daily) crossed prior to his death. He appeared healthy and weighed 17.3 kg, heavier than both of his parents. His relatively robust physique support observations from residents indicated that Cour (with a red ear tag) was the radio-collared Coyote most commonly seen eating food left by people. He was previously observed up-close and, besides limping on his right hind leg, appeared healthy on 1 April 2005. Not having obtained the results from Jet or Maeve at the time, we had a full necropsy performed at Tufts University (Grafton, Massachusetts). Internal bleeding (subcutaneous hemorrhage) was noted and based on autopsy findings and toxicological analysis of the liver (brodifacoum = 0.542 ppm), Cour died from an anticoagulant rodenticide. Because of the way Jet and Cour died, and the similar necropsy findings from Maeve (i.e., massive internal bleeding), we conclude that Maeve also died from brodifacoum poisoning.

Because all three of the Coyotes' behavior seemed normal prior to their death and that they all died close together (< 1 week), it appears that someone purposefully poisoned them at high concentrations rather than the coyotes having eaten enough poisoned prey to have died (i.e., from bioaccumulation; Riley et al. 2003). Most likely Maeve and Jet were poisoned around the same time, and then Cour was given a later dose(s) judging by a sighting of him traveling alone after Maeve and Jet were documented as dead. However, Cour's healthier condition might have allowed him to survive longer than his parents. We extensively searched for the source of the poisons (especially near where the coyotes died and where they spent the majority of their time when they were alive), including informally talking to numerous people, but we never managed to locate any substantial leads.

Throughout summer 2005 only a couple of sightings were made by residents and cemetery staff indicating that either the uncollared Coyote survived or, more likely, a new Coyote (i.e., formerly not part of this pack) dispersed into this location. Regardless of those individual sightings, this pack was decimated in a short period of time via rodenticides.

The public should be better informed of the dangers that common household poisons present for wildlife, especially in urbanized areas, and the potential health threat to humans and pets. For example, about two months later, pet dogs (*Canis familiaris*) died or were injured from rat poison in neighboring towns (S. Cifuni, personal communication). The slow, painful death of an animal internally bleeding is not pleasant and should not be acceptable in our society. These animals were diagnosed because they were part of an ecological study; due to the expense of testing and difficulty of finding non-radio-collared animals that die in the woods, it would be difficult to estimate how many non-target (i.e., not rats or mice) animals die from anticoagulants. We recommend that these poisons be strictly controlled either through making the over the counter sale of them illegal to all but licensed, professional exterminators and/or through required public education campaigns explaining the dangers of these poisons.

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A New Record of Deepwater Sculpin, *Myoxocephalus thompsonii*, in Northeastern Alberta

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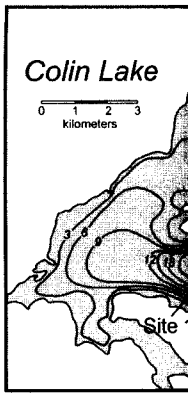
We present the first documented records of Deepwater Sculpin, *Myoxocephalus thompsonii*, from northern Alberta, and the second record for the province. Three specimens of Deepwater Sculpin were taken in gill nets set at 17 to 20 m depth in Colin Lake, Alberta, on 15 September 2001. Colin Lake, located in the Canadian Shield region of northeastern Alberta about 125 km northeast of Fort Chipewyan, drains into Lake Athabasca via the Colin River. The only other known Alberta population of Deepwater Sculpin inhabits Upper Waterton Lake in the southwestern corner of the province. This record is approximately 300 km SSE of the nearest verified record in the Northwest Territories and 400 km NW of the nearest verified record in Saskatchewan.

Key Words: Deepwater Sculpin, *Myoxocephalus thompsonii*, distribution, Colin Lake, Alberta

Three individuals of Deepwater Sculpin, *Myoxocephalus thompsonii*, were collected in two separate gill net sets in Colin Lake, Alberta (59°34'N, 110°08'W) on 15 September 2001. One set was in 17 m of water, and fished for a period of 15 hours. The other was set at 18-20 m depth for 14 hours. Each net set consisted of one 60 m multi-mesh net with six 10 m panels ranging from 10 to 25 mm bar mesh and one 60 m net with six 10 m panels of 10 to 50 mm bar mesh. All nets were 1.8 m in depth. The two nets were fished in series on the bottom of the lake. Both collecting sites were located on the gently sloping periphery of the two deep basins in the lake (Figure 1). The maximum depth of the lake is approximately 25 m. The composition of the substrate at the sampling sites was not determined.

Species taken syntopically with the sculpins included Lake Whitefish (*Coregonus clupeaformis*), Cisco (*Coregonus artedi*), Burbot (*Lota lota*), Northern Pike



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