

Observations of a denning-related dermatitis in American black bears

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Abstract: We describe symptoms and prevalence of an undiagnosed dermatitis in American black bears (*Ursus americanus*), characterized by alopecia and edema of the head, neck, and thorax. The dermatitis was primarily associated with hibernation: observed during 23% of 358 den handlings (excluding cubs), but <1% of 521 active season captures. It appears common, but rarely life-threatening; etiology, distribution, and transmission are interesting topics for further study.

Key words: alopecia, American black bear, denning, dermatitis, hibernation, mange, New Mexico, *Ursus americanus*

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During 1992–2000, we observed numerous cases of an undiagnosed dermatitis in American black bears (*Ursus americanus*), while trapping and investigating dens in 2 regions of New Mexico. The Northern Study Area (NSA) was located in the Sangre de Cristo Mountains of northern New Mexico (36°60'N, 105°15'W) and the Southern Study Area (SSA) was located in the Mogollon Mountains of west-central New Mexico (33°43'N, 108°68'W). Although we failed to identify the cause of the condition, summary of our field data revealed interesting patterns in its prevalence by season, sex–age category, and den characteristics. By offering our observations on this dermatitis, we encourage other

bear researchers to watch for the condition and perhaps take further steps to diagnose it. The etiology, distribution, and transmission of this dermatitis may be interesting topics for further study by wildlife pathologists.

Description of dermatitis

We observed dermatitis on 85 occasions, and it was characterized by edema and alopecia around the eyes, muzzle, neck, and thorax. Most often, affected areas appeared dry and scaly, with white to gray coloration. Occasionally, affected areas appeared smooth and red, particularly the eyelids. Affected areas were distinct from unaffected areas, and the boundary between them was usually abrupt. In most cases, the dermatitis was confined to the area around the eyes and down the muzzle (Fig. 1); however, the anterior neck and thorax were affected in a few cases.

We also observed a severe, and apparently chronic, case affecting a NSA adult female (F510). We observed her several times, as her condition deteriorated from similar to other cases (first observed during 1996 when she was ~13 years old) to a more advanced stage (observed during 1998). Extending from the ears to the muzzle, the skin was extremely thickened and fissured (Fig. 2). The lichenification was less apparent around the nose, where skin was soft and exuded fluid. Skin on the posterior neck and thorax was dry, scaly, and partially-haired. Her eyelids were yellow and swollen such that her vision appeared completely obscured. In March 1999, as we attempted to change her radiocollar, she died during immobilization. We conducted a field necropsy. Fat deposition was only apparent on the rump and measured only 0.5 cm. Most internal organs, including heart, lungs, liver, kidneys, and pancreas appeared normal. We collected samples of kidney, liver, lung, and uterus for histopathology analyses, but no signs of disease were identified. We collected samples of skin, but no ectoparasites were detected in skin scrapings.

Based on previous literature (Yunker et al. 1980, Schmitt et al. 1987, Beck 1991, Forrester et al. 1993), we presumed the observed dermatitis was mange; however, we did not obtain a definitive diagnosis. To diagnose mange on a living host, deep skin scrapings are made with a blade to the point of oozing blood (Bornstein et al. 2001). Regrettably, we elected not to

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Fig. 1. Typical denning-related dermatitis on a black bear in New Mexico, showing alopecia, edema, and scaling of skin around the eyes and muzzle (Photo: M.A. Haroldson).

perform these skin scrapings on immobilized individuals handled in the den. We did collect samples of skin from bear F510; however, no mites were detected from scraping of these samples. The clinical signs we observed were consistent with earlier descriptions of bears affected by mange, as was their localization to the anterior portion of the body. Several species of mange mites have been detected in wild black bears, including: *Sarcoptes scabiei* (Schmitt et al. 1987), a highly contagious mite reported from more than 100 species (Bornstein et al. 2001), and *Ursicoptes americanus* (Yunker et al. 1980) and *Demodex ursi* (Forrester et al. 1993, Foster et al. 1998), both occurring only on bears (Desch 1995, Fowler et al. 1979). The facial alopecia we observed in dens bore close resemblance to a case of *Ursicoptis* mange observed in a captive black bear (Gillespie et al. 1984). This captive bear was described with “periorbital alopecia and lesser involvement of the muzzle and forehead” that persisted for several years without other symptoms. The lichenification observed on bear F510 was comparable to descriptions of more advanced cases of mange, particularly *Ursicoptes* (Yunker et al. 1980) and *Sarcoptes* (Schmitt et al. 1987).

Although symptoms most resembled those of mange, other possible causes for the observed dermatitis include ringworm, pyoderma, and zinc deficiency. We found no

cases of these reported in the literature for black bears. Ringworm, caused by fungi in the genera *Microsporum* or *Trichophyton*, has been observed on captive Malayan sun bears (*Helarctos malayanus*), wild red fox (*Vulpes vulpes*), wild Florida panthers (*Puma concolor coryi*), and captive red pandas (*Ailurus fulgens*) (Groves 1969, Gates et al. 1980, Citino et al. 1999, Kearns et al. 1999). Pyoderma, in response to zinc deficiency, was observed on a young captive red wolf (*Canis rufus*) (Kearns et al. 2000).

Prevalence by season and sex–age category

We observed dermatitis among adults (≥ 5 years old), subadults (2–4 years old), and yearlings (1 year old); however, no dermatitis was observed on 185 neonate cubs (approximate 6–10 weeks) handled in dens, even when mothers were affected. Excluding cubs, we observed dermatitis during 23% of 358 den handlings (Jan–Apr), but during <1% of 521 active season captures (May–October). Only 1% of 305 individual bears showed signs of dermatitis when captured, but 31% of 177 bears displayed dermatitis at least once when handled in dens. In 48 of 82 cases of dermatitis recorded in dens, later observations allowed us to de-



Fig. 2. Chronic dermatitis on an adult female black bear in New Mexico, showing alopecia, edema, and lichenification of the head and neck (Photo: K.S. Quigley).

termine subsequent condition of bears. Signs of dermatitis were no longer present for 77% of cases when bears were handled 2.5 months to 2 years later.

In dens, prevalence was highest among adult females (29%), subadult females (36%), and subadult males (21%), and lowest among adult males (10%) and yearlings (7%). By individual, prevalence was 41% among 106 females, but only 17% among 71 males. Among 49 family groups (adult females denned with yearlings), at least 1 family member showed dermatitis in 24% of cases. In all cases when dermatitis was observed the mother was affected, but yearlings were affected in only 4 of 11 (46%) cases.

Whatever the cause of the dermatitis, the temporary manifestation of symptoms may have been due to an apparent reduction in immune function during hibernation (Hellgren 1998). Parturient females, taxed by the energy expenditure of gestation and lactation, may have been especially susceptible. The single case of chronic dermatitis, with its advanced symptoms, also may have

been due to a compromised immune system in the older female.

Prevalence by den type, bedding, and den reuse

In Colorado, Beck (1991) observed 3 individuals with facial alopecia during den investigations and presumed the condition was mange. He further suggested bedding material in dens might provide temporary habitat for mites and a means of transmission through reuse of dens. Red foxes have been infected with *Sarcoptes scabiei* by inhabiting dens previously used by infected foxes (Bornstein et al. 2001). We found no relationship between prevalence of dermatitis and den type, based on use of 7 den types ($P = 0.29$), use of excavated versus non-excavated dens ($P = 0.60$), or use of dens associated with rocks versus trees ($P = 0.59$). Prevalence did not differ relative to use of a bed ($P = 0.74$), or use of any of 9 categories of bedding material ($P \geq 0.12$).

We recorded prior use of dens as definite (previous visits to the same den), probable (vegetation growth or soil compaction on the dirt berm of excavated dens, aged claw marks on hollow trees), none, or unknown. Prevalence of dermatitis differed relative to previous use of dens, but not as expected. Excluding cases when prior use was unknown, prevalence was 44% in dens with no previous use, but only 17% in dens with definite prior use and 24% in dens with probable prior use ($\chi^2 = 5.8$, $df = 2$, $P = 0.06$, $n = 126$). The cause of this apparent difference is not known.

Management implications

The dermatitis observed among black bears in New Mexico appears to be common, but rarely life-threatening. Only 1 of 55 individuals observed with dermatitis appeared to have succumbed to a chronic case of the condition. Following the first signs, the dermatitis developed for another 3 years before death of this adult female. Although her death was caused by our immobilization, examination of her body condition suggested mortality was imminent. We suspect her poor condition was partly attributable to her obscured vision, which probably compromised her ability to forage effectively, even in a year of high mast abundance (Costello et al. 2001). Despite her deteriorating condition, this female was able to produce and raise 2 cubs following onset of dermatitis. This is noteworthy, given the relatively low productivity of bears in New Mexico. Among bears in her reproductive class, only 85% of eligible females produced cubs in any given year (Costello et al. 2001) and mean cub survival was only 62% (Costello et al. 2003).

The dermatitis described here may be limited to the southwestern USA. Other than cases reported from Colorado (Beck 1991), we found no mention of denning-related alopecia in the literature. Nor have we observed it during den investigations conducted in other regions of the country.

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