

REACTIONS OF FREE-RANGING BLACK BEARS TO CAPSAICIN SPRAY REPELLENT

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A bear repellent is needed that is effective, humane, and can be carried easily by hikers and campers. Of several chemical sprays that have been tested on caged bears, the most favorable results have been with capsaicin ($C_{18}H_{27}NO_3$), an ingredient of cayenne peppers (*Capsicum* spp.) (Jenkins and Hayes 1962, Miller 1980). Capsaicin is a powerful local irritant of sensory nerve endings, but causes no blisters because it has little effect on capillaries or other blood vessels (Osol et al. 1967). Toxicity tests on capsaicin have shown no lasting harm to the skin or eyes of people (Osol et al. 1967), dogs (Jenkins and Hayes 1962), or albino rabbits (Paynter 1962, Becker and Parke 1976). Jenkins intentionally sprayed capsaicin solution into his eye, which then "burned" for nearly 30 min despite washing and blotting, but no effects were evident the next day (Jenkins and Hayes 1962). Capsaicin spray is sold commercially as Halt (Animal Repellents, Inc., Griffin, Ga. 30223)¹ or Dog Shield (Norton Co., Safety Products Div, Rockford, Ill. 61101) and is used widely by mailmen and meter readers as a dog repellent.

Aggressive responses to capsaicin spray have not been reported for any species. Tests have been conducted on 14 dogs, 6 house cats, a captive "wildcat" (presumably *Lynx* sp.), and an aggressive, rutting white-tailed deer (*Odocoileus virginianus*), all of which retreated immediately without aggression (Jenkins and Hayes 1962). Also, 6 trained dogs that were sprayed while fighting stopped within 20 sec and could not be induced to resume fighting

10-30 min later (Jenkins and Hayes 1962). In 3 tests on 2 caged grizzly bears (*Ursus arctos horribilis*), one or the other of the bears charged across their cages until they were sprayed in the eyes with capsaicin, whereupon each stopped and ran to the farthest corner of the cage and rubbed its eyes (Miller 1980). Jenkins and Hayes (1962) used capsaicin spray also to drive 2 caged adult black bears (*U. americanus*) immediately to cover. C. Hunt and C. Jonkel (pers. commun.) obtained similarly favorable results in tests on 5 caged black bears, 1 caged adult grizzly bear, and 2 caged grizzly bear cubs. Despite these results and the lack of aggressive responses, capsaicin has not been field-tested, and it is seldom used against free-ranging bears due to uncorroborated concern that it might anger them.

To test the effectiveness of capsaicin on free-ranging bears and to determine if free-ranging bears tend to react aggressively to it, I visited campgrounds and garbage dumps in Minnesota and Michigan where black bears were reported to be taking food from people. I sprayed bears that attempted to take meat from a box beside me. Five adults (4 males, 1 female) were sprayed in the eye(s) with capsaicin solution at dusk or at night from a distance of 1.5 to 3 m. All immediately blinked hard, whirled away, and fled 7 to 20 m where they stopped and rubbed their eyes with their paws for up to a minute. Four of them then moved out of view, but a male weighing 200-225 kg returned and was sprayed 3 more times. He turned away from the second and third spray attempts, causing the spray to miss his eyes. After each miss he immediately turned back to the bait. The fourth spray again hit his eyes, and he left the area at a fast walk.

¹ Mention of products does not constitute endorsement by the U.S.D.A. Forest Service.

He was not seen for at least 2 days after that although he had been seen daily before the test.

None of the bears made any vocalization, blew, chomped its teeth, extended its upper lip, nor showed any other sign of aggression after being sprayed. The bear that returned appeared intent on the meat and did not show increased attention to the tester although his avoidance reactions showed that he recognized the direction from which the sprays came.

To determine if black bears would react aggressively to a chemical irritant that is purportedly less effective than capsaicin, additional tests were conducted using CN tear gas. Hass (1981) stated, on behalf of the manufacturer of Mace, a tear gas product, that tear gas may be irritating to the mucosa of bears but is generally ineffective in incapacitating them. This substance proved only weakly effective in repelling 4 adults that were sprayed in the eyes, but, like capsaicin, it elicited no overt aggression. Two of the sprayed bears stood blinking for a few seconds before turning and walking away. Two others left immediately at a fast walk or trot but returned in a few minutes.

Major limitations of capsaicin spray are that it must hit an eye to be effective and that, with available equipment, it has a typical range of only 3 m (Halt) or 6 m (Dog Shield). Range may be longer or shorter depending on wind direction; but in my experience, most bears approached from downwind, which gave the spray additional range. Advantages are that full canisters of Halt or Dog Shield weigh less than 80 grams and that the material has a long shelf life. Material used in this test was stored at room temperature for 8 years prior to use.

Results of capsaicin tests on free-ranging bears were similar to previous results using caged bears, confirming the validity of using caged bears in preliminary tests of repellents. Moreover, there has been remarkably little individual variation in responses of all bears

tested, whether caged or free-ranging (12 black bears, 5 grizzly bears); all were repelled vigorously without aggression. The tests indicate that capsaicin has considerable potential as a bear repellent and that it merits further testing on free-ranging bears. Questions remain concerning its effectiveness on bears highly motivated to attack and concerning whether the spray causes any permanent avoidance of people or locations. Tests to date also have not adequately shown the range of individual variation of bear responses or the range of circumstances in which chemical spray repellents may be useful. New equipment is needed to give the spray greater range.

Because of the timidity of most bears, it is difficult to test a large sample of free-ranging individuals. Bears tested in this study did not make themselves available for follow-up testing. Large sample sizes of bear responses to capsaicin spray probably will be developed only through cooperative efforts of researchers, wildlife managers, conservation officers, park rangers, and others who deal professionally with bears, each contributing their observations on the effectiveness and limitations of this repellent. Spray repellents should not be regarded as substitutes for sanitary camping practices or other preventive management practices designed to minimize encounters between people and bears.

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LITERATURE CITED

- BECKER, J. AND G. S. E. PARKE. 1976. Acute dermal toxicity study of Halt (70-6-3) on New Zealand albino rabbits. Environ. Protection Agency Accession No. 227558. Washington, D.C. 5pp.
- HASS, R. 1981. Animals and Mace. *Outdoor Life* 169(8):8.
- JENKINS, J. H. AND F. A. HAYES. 1962. Studies on a useful method for repelling dogs and other animals. Animal biol. file: dog repellents. U.S. Dep. Agric., Washington, D.C. 5pp.
- MILLER, G. D. 1980. Behavioral and physiological

characteristics of grizzly and polar bears, and their relation to bear repellents. M.S. Thesis. Univ. Montana, Missoula. 106pp.

PAYNTER, O. E. 1962. Dog repellent: repeated eye application in rabbits. Environ. Protection Agency Accession No. 107803. Washington, D.C. 5pp.

OSOL, A., R. PRATT, AND M. ALTSHULE. 1967. The United States Dispensatory and Physicians' Pharmacology. J. B. Lippincott Co., Philadelphia, Pa. 1277pp.

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