

REACTIONS OF BLACK BEARS TO HUMAN MENSTRUAL ODORS

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Abstract: Due to widespread concern that menstruating women might be attacked by black bears (*Ursus americanus*), we recorded responses of 26 free-ranging black bears to tampons from 26 women and recorded responses of 20 free-ranging bears to 4 menstruating women in northeastern Minnesota. Menstrual odors were essentially ignored by black bears of all ages and either sex, regardless of season or the bear's reproductive status. In an extensive review of black bear attacks across North America, we found no instance of black bears attacking or being attracted to menstruating women.

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A common concern among women recreationists in bear country is that menstrual odors might attract bears and precipitate attacks. This concern became widespread when 2 menstruating women were killed by grizzly bears (*Ursus arctos horribilis*) in Glacier National Park in 1967, prompting government agencies to circulate brochures warning menstruating women against entering bear country. Herrero (1974, 1985) examined factors involved in hundreds of grizzly bear attacks, including the attacks on the 2 women, and concluded there was no evidence that menstruation was related to any attack. We are aware of no menstruating woman being attacked by a free-ranging black bear. None is listed in the compilations of black bear attacks by Cramond (1981) or Herrero (1985) despite the fact that women are routinely asked about menstruation after attacks. On 20 February 1989, at the 8th International Conference on Bear Research and Management in Victoria, British Columbia, >300 bear biologists were asked whether they had heard of any menstruating woman attracting or being attacked by a black bear. None indicated they had. We found no published record regarding black bear responses to menstrual blood.

However, polar bears (*U. maritimus*) that were offered used tampons, seal meat, and non-menstrual human blood usually ate the used tampons and seal meat but ignored the non-menstrual blood (Gushing 1983). In light of the attractiveness of menstrual blood to polar bears, it seemed important to test responses of black bears because those are the bears most commonly encountered by campers and hikers.

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METHODS

We conducted a series of experiments to test the attractiveness of menstrual odors to male and female black bears of all ages under various conditions in northeastern Minnesota. When appropriate, we used Chi-square tests to evaluate the results.

Experiment 1.—On 11 August 1988, 15 used tampons, all from different women, were presented in groups of 5 to adult male black bears that were feeding in a garbage dump. We tied each group of tampons to a monofilament line and spin-cast them to foraging bears. The tampons were cast past the bears and dragged back under their noses. We considered 22 presentations to 5 bears as an acceptable sample because the bears sniffed the tampons or the tampons rested <30 cm from bears' noses for >15 seconds. Thus, each presentation gave the bears a choice between tampons and garbage. If the bears (1) ate the tampons as they did garbage and as polar bears ingested used tampons (Cushing 1983); (2) closely sniffed the tampons as bears commonly sniff desirable foods, bear feces, estrous females, or trees marked by bears; or (3) rolled on the tampons as black bears commonly do on carrion (L. L. Rogers, pers. observ.), then we considered the bears to have paid attention to the tampons. Our null hypothesis was that the bears would give as much attention to tampons as they did to garbage.

Experiment 2.—On 26 August 1988, we obtained 6 used tampons from 6 women and presented the tampons as a group, 6-9 hours later,

by hand to each of 7 wild, free-ranging black bears, including 5 adult (>140 kg) males, a lactating female, and a yearling male. The bears had come to an area where they were fed corn in piles on the ground and were fed other foods by hand. We offered the group of tampons to each bear in turn. Each bear left its pile of corn to investigate what was being offered. We considered eating or intensively smelling the tampons as evidence of selection by the bears. We considered a cursory sniff and immediately turning back to the corn as selecting the corn. Our null hypothesis was that the bears would show as much interest in the used tampons as they did the corn.

Experiment 3.—On 19 September 1990, we placed 4 used tampons, a nonused tampon, a tampon containing nonmenstrual human blood, and a tampon containing rendered beef fat on bare ground next to a bear trail. The used tampons were interspersed with the others, 1 cm apart. The tampon containing rendered beef fat was always placed in the middle so the bears could obtain it only by bypassing the other tampons. Tampons that were taken by bears were replaced. The used tampons were 4-5 hours old, from 4 different women. During a 35-minute period, the tampon group was visited by 12 bears that were en route to the corn-feeding area mentioned in Experiment 2. The 12 bears included 3 adult males, 2 adult females (1 lactating, 1 nonlactating), 3 subadult males, and 4 subadult females. Our null hypothesis was that bears would ingest the used tampons as often as they did the tampon containing beef fat.

Experiment 4.—In this experiment, menstruating women accompanied wild, human-habituated black bears as the bears foraged and rested 0-4 m away (Rogers and Wilker 1990), or the women hand-fed the bears. All 11 bears were accustomed to hand-feeding and to close proximity to people; they readily investigated any attractive odors on people. One of the 11 bears, a yearling female, occasionally was in close playful contact with 2 of the women. We considered bears paying attention to the lower torsos of the women to indicate interest. Any sniffing at lower torsos would have been considered selecting menstrual odor, whereas lack of attention to the lower torsos during prolonged, close contact (see below) was considered selection for natural or hand-proffered foods. Our null hypothesis was that the bears would show as much interest in menstrual odors as they did in food or foraging.

Experimental conditions were as follows:

- (1) On 29 June 1988, a 23-year-old woman wearing an internal tampon on her fourth day of flow walked and rested within 4 m of a wild, human-habituated mother and 2 cubs for 6 hours.
- (2) On 27 July 1988, a 23-year-old woman wearing an internal tampon on her fourth day of flow hand-fed a yearling male for 20 minutes.
- (3) On 27 July 1990, a 24-year-old woman began menstruating while accompanying a human-habituated yearling female. The woman remained with the bear for >5 hours while fresh menstrual blood soaked her clothing. The yearling foraged, rested, and occasionally played with her.
- (4) On 22 August 1988, a 23-year-old woman wearing an internal tampon on her second day of flow hand-fed a mother and 2 cubs for 5 minutes.
- (5) On 26 August 1988, a 23-year-old woman wearing an internal tampon on her last day of flow hand-fed 4 adult males and 2 subadult males during a 3-hour period, with each bear being < 1 m away for >5 minutes.
- (6) On 23 September 1988, a 23-year-old woman wearing an internal tampon on her last day of flow hand-fed and walked with a pregnant, 3-year-old female for 45 minutes.
- (7) On 30 September 1990, a menstruating woman wearing an internal tampon (fourth day of flow) accompanied a wild, human-habituated 61-kg yearling female for >4 hours. The bear was frequently in playful contact with the woman and tried to obtain food from her vest pocket. This yearling was also involved in the 27 July encounter.

Experiment 5.—A 20-year-old woman who lived at an experimental feeding site (Rogers and Wilker 1990) hand-fed 2 adult females and 2 yearling females almost daily and frequently walked within 2 m of 3 adult males (65, 95, and 135 kg) during May-July 1986. She wore external pads during menstruations on 2-6 June and 30 June-4 July 1986.

Experiment 6.—On 7 June 1988, 5 tampons, 1 from each day of flow from a 23-year-old woman, were presented as a group to a free-ranging male-female pair of black bears 5 hours before the pair mated. The tampons had been frozen and were thawed for the test. They were tied together and thrown to the bears as a group.

RESULTS

Experiment 1.—The 5 adult males ignored 20 of the 22 tampon presentations and twice gave cursory sniffs (<1 sec) to moving tampons before continuing to forage for garbage. Consequently, the bears selected garbage over used tampons in every case. The observed results differed significantly ($\chi^2 = 5$, 1 df, $P < 0.05$, $n = 5$ bears) from expected (2.5:2.5), and the null hypothesis was rejected.

Experiment 2.—Six of the 7 bears gave a cursory sniff to the tampon group and immediately returned to the corn. The yearling male tasted 1 tampon, immediately dropped it, and also returned to the corn. Thus, we considered corn to be selected over used tampons in all 7 trials. The observed results differed significantly ($\chi^2 = 7$, 1 df, $P < 0.01$, $n = 7$) from expected (3.5:3.5), and the null hypothesis was rejected.

Experiment 3.—One adult male sniffed the tampon group in passing, continued walking, and was not included in the analysis. Ten bears swept their noses closely over the group, ate the tampon containing beef fat, and walked on. One adult male ate the tampon containing beef fat and remained for an additional ½ minute, pawing and sniffing a used tampon and the tampon with nonmenstrual human blood. However, both of these might have touched the tampon containing beef fat. He then walked on. Thus, all 10 bears selected the tampon containing beef fat over the used tampons. The observed results differed significantly ($\chi^2 = 10$, 1 df, $P < 0.01$, $n = 10$) from expected (5:5), and the null hypothesis was rejected.

Experiment 4.—During 12 encounters with 10 bears (plus cubs) on 7 days between 29 June and 30 September, bears paid no attention to the lower torsos of 3 menstruating women. Eleven of the encounters involved women with internal tampons during their second through last days of flow. One of the encounters (27 Jul) involved a menstruating woman on her first day of flow with fresh menstrual blood soaking her clothing. The observed lack of interest in menstrual odors in the 12 encounters differed significantly ($\chi^2 = 12$, 1 df, $P < 0.001$, $n = 12$) from the expected (6:6), and the null hypothesis was rejected.

Experiment 5.—The woman received no at-

tention to her lower torso during any day of her menstrual flow even though both of her menstrual periods occurred during bear mating season.

Experiment 6.—Each bear approached and sniffed the tampons <2 seconds and went on foraging for ants, with the male giving frequent attention to the female's hindquarters.

DISCUSSION

No bear showed appreciable interest in menstrual odors regardless of the bear's age, sex, reproductive status, or the time of year. The lack of interest by black bears in menstrual blood contrasts with polar bears' attraction to it (Gushing 1983). That polar bears are more carnivorous than black bears might not explain the difference because 3 black bears that had killed deer fawns (*Odocoileus virginianus*) prior to experiments in our study showed little or no interest in used tampons. The 2 studies differ in that black bears in Minnesota probably had more food available to them than did polar bears at Cape Churchill, Manitoba, where essentially no bear food was available when the studies were conducted. Lack of food could cause bears to show unusual interest in low preference items. The lack of interest by black bears that we observed does not necessarily indicate that menstrual odors are never attractive to black bears. However, under conditions of our study, menstrual odors were essentially ignored.

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