Polar Bear Specialists
Seventh Meeting
Paper No. 7

THE EFFECTS OF HUMAN MENSTRUATION AND OTHER SUBSTANCES ON POLAR BEARS - INTERIM REPORT

Bruce S. Cushing
University of Montana, Missoula 59812

Abstract: Preliminary results indicate that menstrual odors of the human female may act as an attractant to polar bears (Ursus maritimus). In laboratory and field tests, used tampons elicited a stronger bear response than any other test stimuli except for seal oil and seal blubber. Tests also indicate that seal scents are valid to use as a baseline criterion for an indication of relative attractiveness.

Introduction

With the increasing contact between people and bears it is becoming ever more important to understand what types of products might lead to conflicts. By learning more about the animals and what attracts them, it may be possible to reduce these conflicts and thereby benefit both man and animal.

There are several aspects of humans that have been postulated as possible attractants to bears. One of these is that of a menstruating female (Glacier National Park 1967). This question, "Does a menstruating female attract bears?", is of great interest. For years, both the National Park Service and the U.S. Forest Service, have advised in brochures that women should not go into the back-country during their period in order to prevent conflicts with bears. This theory has never been tested, and with the increasing number of men and women backpacking and camping this question becomes one of particular worth to investigate. The question has another aspect also. That of the possibility of an interaction between different species of mammals caused by scents or even pheromones. Menstrual odors and their

effects on bears is not the only possible attractant that will be investigated, but it is the major initial thrust of this research.

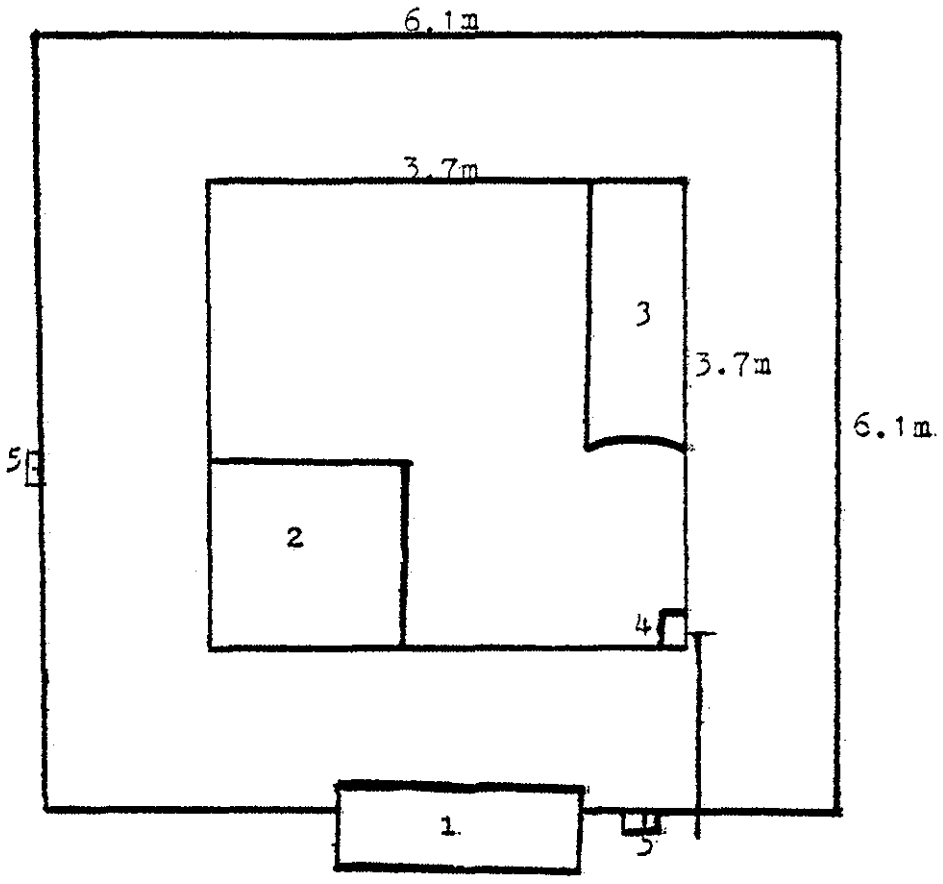
Attractants to animals above the level of the Insecta are very difficult to work with because of the problem involved in attempting to define what an attractant is for an individual species. This difficulty makes the polar bear an excellent species to use for an attractant study, because during the year the bears' major source of food is the seal. The polar bear uses sight, scent, and possibly hearing to locate lairs or the seals (Stirling 1974, Smith and Stirling 1975, Stirling 1973). Seals can therefore, in a sense, be considered as a natural attractant for the polar bear. The bears' various responses to the sounds and odors of the seal can be used as a baseline criterion to determine what other stimuli may also be acting as attractants.

Materials and Methods

The study consisted of a laboratory and a field phase. The laboratory portion was conducted at the Churchill Bear Laboratory located in Churchill, Manitoba. The animals were captured in the wild and then placed in a cage room (see diagram) in the laboratory. The bears were allowed at least one week to adjust to such things as walking on bars. Heart rate and temperature transmitters were then implanted into the bears. After allowing for a recovery period, basal observations were begun. Basal observations consisted of observing but not disturbing the bears over 5 days for a total time of 40 hours. The observations were broken up into blocks ranging from 4 to 10 hours, covering all hours of the night and day. Behavioral and physiological observations were recorded for a one minute period every 10 minutes.

Upon completion of the basal measurements, testing was begun. Test stimuli were presented to the bears once or twice daily for a period of

Cage Room



1) Observation booth
2) Plate
3) Culvert or artificial den
4) Water trough
5) Fan box

25 days. Observations of the bears' behavior began one hour prior to testing and continued for an hour after completion of the test run. The test stimuli were presented to the animals for a period of 20 minutes. During the test run, behavior of the bears was recorded at every minute mark for a duration of 10 seconds, as was any change in behavior between times. Heart rate was monitored throughout the test run with skin and deep body temperature taken every two minutes.

Scents or odors were presented to the bears by placing the scent material in a fan box located outside the room. At test time, the fan was started, controlled from the observation booth, and run for 20 minutes, slowly spreading the odor into the cage area. Not all of the tests were run this way, since the menstruation tests using female volunteers were conducted with the subject in the cage room. The volunteers came in during and before their periods and sat passively for the duration of the test run.

The field phase was of short duration, lasting 5 days. Work was conducted at the Gordon Point tower which is located 15 km east of the Laboratory. Work was done with the cooperation of Don Wooldridge, who is conducting a study of bear deterrents and detection systems for the Fish and Wildlife Service of the Northwest Territories. Two bait stations were set up. Within each bait station were at least two samples. These consisted of one known attractant (seal oil or sardine mash used by Wooldridge as bait) and a test stimuli. The seal oil was placed in a quantity of no more than one tablespoon, but the sardine mash was used liberally. Numbers of bears, numbers of visits, duration of responses, and behavioral response to the test stimuli were compared to that of the known attractant.

Results

The results are divided into laboratory (see Table I) and field (see Tables II and III). In the laboratory, testing was completed on two animals. Bear No. 1, a 4.5 to 5.5-year-old female weighing 204.5 kg, and Bear No. 2, a 12.5-year-old female weighing 272.7 kg. The behavioral responses ranged from none to actively tracking the scent to its source. The duration of the response never exceeded 64 seconds or 5.3 percent of the test run. After the response, the bears returned to activities that were known to occur when there was no test being run. Only three stimuli produced a strong or maximal effect on both bears. These were seal blubber, seal oil, and a used tampon.

The field results consisted of 37 approaches to the two sites by 10 different individuals. Since there was often more than one stimulus present, the 37 approaches added up to 47 samples. The bears approached the test sites from downwind or by turning when crossing the scent in the wind 70 percent of the time, and 30 percent from accidentally crossing the site or using visual clues. Sardine mash was present at both sites for all approaches. The sardine mash was approached first 53 percent of the time. When available, the seal oil was approached first 78 percent of the time, followed next by used tampons 67 percent.

Table II shows the number and type of responses by the bears. Like seal oil, the sardine mash was consumed 100 percent of the time unless it was undetected, with used tampons being consumed 67 percent, which was by four different bears. The only other consumption was of one of the control tampons. This occurred immediately after the consumption of a used tampon by the same individual.

Table I

Test Stimuli	Bear No. 1	Bear No. 2
Animal scents		
castoreum	mod	min
chicken (liquid)	none	none
decaying meat (beef)	min	mod
horse manure (liquid)	none	min
musk	min	min
sardine mash	-	none
seafood (liquid)	none	none
seal blubber	str	str
seal oil	str	str
Controls		
blood (bear)	none	none
fan boxes	none	none
non-menstruating 1	min	mod
non-menstruating 2	none	-
non-menstruating	min	-
sanitary napkin	-	none
tampon	none	none
Menstruation		
female 1	mod	*mod+
female 2	mod	min
female 3	mod	-
sanitary napkin	-	**min
tampon	str	min+
tampon	als	str
Miscellaneous		
bear trail	min	-
seal model	mod	mod
seal model/oil	none	none
treated fabric	-	none

Key

min = Sniffs air 1 to 3 times. Total time less than 8 seconds.

min+ = No movement towards scent but sniffs air many times. 20 seconds or more.

mod = Approaches area from which the odor is being emitted. Sniffs air many times but only in area in front of fan.

mod+ = Similar to mod, but approaches area and sniffs more than one time during test run.

str = Sniffs air several times and then appears to track scent directly to source. Places muzzle through bars and sniffs deeply. Duration 20 to 60 seconds.

* After response, turned and pounced in air at subject.

** Mentrual flow was dry.

Table II + III

Test Stimuli	Response 1	2	3	4	5	6	Total
Castoreum	2	1	1	-	-	-	4
Musk	-	-	-	-	1	2	3
Seal oil	-	-	-	9	2	-	11
Blood	6	-	-	-	-	3	9
Tampon	2	1	1	8	1	-	13
Control tampon	3	-	-	1	-	3	7
							47

Average Duration in Sec.

Test Stimuli	Response 1	2	3	4	5	6
Castoreum	9	16	12	-	-	-
Musk	-	-	-	-	0	0
Seal oil	-	-	-	129*	0	-
Blood	11.5	-	-	-	-	0
Tampon	15.5	16	29	88.5	0	-
Control tampon	19.3	-	-	22	-	0

* Excludes average of 41 for times when there was consumption after site had been visited without further rebaiting.

Response

1. Sniffs
2. Sniffs and licks
3. Chews (does not consume)
4. Consumes
5. No detection (not downwind)
6. Ignores (passes downwind)

Table III has the average duration of response time, excluding the sardine mash. This is because the sardine mash was placed in large quantities and varied from one re-baiting to the next. In general, duration of response was for only a short period, less than 20 seconds. The bears then went to other stimuli, or left the area, depending upon whether the short-term stimulus was approached first or after the other stimuli.

Discussion

In order to undertake a proper study of attractants it is essential to have a substance which can be defined as an attractant. This study was begun with the assumption that the seal or seal products fulfilled this requirement. The laboratory and field results confirm this premise. Also, both animals in captivity were fed a variety of meats. When presented with a mixture of meats, both Bears No. 1 and 2 sorted out the seal meat and consumed it before eating the other kinds of meat.

Although both physiological and behavioral responses were recorded in the laboratory, only the behavioral results are contained in this report. There were difficulties with the heart rate transmitters in that after a short period of time in the animals they malfunctioned. Heart rates were obtained only from Bear No. 1, and these for less than half the test trials.

The heart rate does appear to be useful in analysing the bears' responses. If for no other reason, the change in pattern of the beat can be used to indicate when the animal is asleep (see Table I, Bear No. 1 tampon als) at which time no response would be expected. The changes in skin and body temperature appear to be related to physical

activity, and it also appears that there is no correlation between change in temperature and a response to an attractant.

There is a strong correlation between the bears in the laboratory and those in the wild. The seal oil elicited a strong response in the laboratory and consumption in the field. Used tampons also followed a similar pattern, however, in this case there was a variance in responses, which indicates that while all bears are attracted by seal, a response to menstrual odors may be dependent upon variances in individual odors or bears.

The design of the field experiment does not permit the conclusion that menstrual odors alone will attract bears. This is because there were a variety of scents in the wind. However, once the animals were within 10 m, it was evident that some of the bears were going selectively to the used tampons. This is backed up by at least five occurrences of the bears turning and going directly to the tampon after crossing its scent in the wind. The bears could be seen to stop, raise their heads to the wind, sniff several times, and then track the scent to its source. These results are consistent with the strong response noted in the laboratory. The high percentage of the time that tampons were approached first should also be noted.

Preliminary results of this study strongly suggest that further experimentation should be undertaken. The results indicate that if a bear were in an area of a menstruating female that conflict could arise. Further experimentation should have an emphasis on a design to determine whether or not menstrual odors by themselves will attract bears. There does seem to be an indication that this may be true based upon the laboratory results.

References Cited

Glacier National Park. 1967. Grizzly bear attacks at Granite Park and Trout Lake in Glacier National Park, August 13, 1967. pp. 22; in Herrero, S. 1976. Grizzly bears and people in the National Parks. Alberta Wilderness Association Newsletter. pp.17.

Smith, T. G. and I. Stirling. 1975. In breeding habitat of the ringed seal (Phoca hispida) the birth lair and associated structures. Can. J. Zool. 53(9): 1297-1305.

Stirling, I. 1973. Vocalization in the ringed seal. J. Fish. Res. Board of Can. 30(10): 1592-1594.

1974. Midsummer observations on the behavior of wild polar bears. Can. J. Zool. 52(9): 1191-1198.

P O L A R B E A R S

Proceedings of the Seventh Working Meeting of the
IUCN Polar Bear Specialist Group

Held at the Arktisk Institut, Copenhagen, Denmark
30 January - 1 February 1979

and

Proceedings of the Sixth Working Meeting of the
IUCN Polar Bear Specialist Group

Held at IUCN Headquarters, Switzerland
7 - 10 December 1976

International Union for Conservation of Nature and Natural Resources
1196 Gland, Switzerland
1980