for the expression of these attitudes in a manner consistent with fundamental thought modes of the old culture.

That these spirit entities are a response to white contact seems certain. However, the explanations of the functions of belief in the Angnasheotik advanced here, plausible though they may be, are little more than guesses. Systematic study would be necessary to establish or refute them and might at the same time add something to our knowledge of the processes of acculturation.

KENNETH DUNCAN*

* University of Western Ontario, London, Ontario, Canada.

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THE BARREN GROUND GRIZZLY BEAR IN NORTHERN CANADA

Although little is known of the ethology and ecology of the Barren Ground grizzly bear in the Northwest Territories, its occurrence there is none the less very interesting from a zoogeographic viewpoint. The present note is prompted by Dr. A. W. F. Banfield's recent review of its distribution[1]. Banfield supports his thesis that the species has only recently spread eastward from the Coppermine River-Bathurst Inlet region with three successive distribution maps on which are shown many early and recent records, both positive and negative. However, we feel that some of the earlier ones, which Banfield considered negative, admit of a contrary interpretation. Moreover, two of them (discussed below) appear to support the more probable hypothesis that the range of the Barren Ground grizzly bear has undergone at least one major fluctuation since the disappearance of Wisconsin ice from the mainland Northwest Territories, which, according to ref. 2, took place some 7,000 years ago. Another point that comes to mind when examining the three maps is the difficulty inherent in comparing the records of early explorers with those of more recent observers, whose coverage tends, on the whole, to be more systematic. Finally, the apparent trend in the data depends partly on the limits selected for each map-period.

Banfield writes that Hanbury (ref. 3, pp. 14, 40) " . . . mentioned black bears in the Thelon Valley but made no mention of grizzlies". However, Clarke (ref. 4, p. 32) says that "He [Hanbury] did not see one [black bear] and because, apart from his suggestion, no evidence has ever been found of such an occurrence, whereas the barren ground bear is well distributed on the Thelon, it must be assumed that the signs he observed were of the barren ground bear". Following Clarke, there is ample basis for the view that both Hanbury's record and the discussion of black bear distribution in eastern Keewatin by Freuchen (ref. 5, pp. 101-2) refer to the Barren Ground grizzly bear and not to the black bear. It should be noted also that Eskimos from Baker Lake, the lower Kazan River, Aberdeen Lake, and Garry Lake, at present know only one dark bear, the Barren Ground grizzly bear, and that the black bear is very rare even at Padlei, on the tree-line[6].

Lyon (ref. 7, p. 175) heard from an Eskimo in 1822 that "both black and

white bears" were numerous in the region of Wager Bay. It can hardly be doubted that the "black" bears were grizzly bears, especially as Ebierbing told Schwatka[8] that several of the latter species were killed by the Eskimos of Chesterfield Inlet, presumably in the 1870's or 1880's. Schwatka also recorded the accounts of Eskimos from Simpson Strait concerning their occasional encounters inland with what can only have been grizzly bears (ref. 8, p. 27). From this evidence it might be concluded that the range of the Barren Ground grizzly bear has shrunk since the 19th century: could a reduction in numbers on the central Barren Grounds have coincided with the presence of people on the major water routes armed with repeating rifles? Clarke's account of historical changes in the distribution of people along the Thelon River[4] supports such a view.

Banfield's statement "It is probable that the bears could not live where ground squirrels are absent" must be regarded as supposition. Between 1950 and 1958 Kelsall has had numerous reports of Barren Ground grizzly bears from forested areas in the Northwest Territories. These include Fort Reliance, where a bear shot by a trapper was examined in 1956; Stark Lake, where grizzly and black bears were commonly seen at mining developments in the mid-fifties; and forested areas around Great Bear Lake, including Port Radium, Contact Lake, the mouth of the Dease River, and the shore around Smith Arm. The Parry ground squirrel is scarce to the point of absence in these forested areas. Adolph Murie's authoritative study (ref. 9, pp. 190-201) on the feeding habits of the grizzly bear in Mount McKinley National Park indicates that, during the months in which bears were active, ground squirrels made up only 5 per cent of their diet. Although a "side dish" of ground squirrels could be important (ref. 10, p. 142), it appears that the bears are labile in their food habits, variations being both seasonal and regional. Because ground squirrels are absent from northeastern Ungava does not, therefore, make impossible the existence or former existence of the grizzly bear in that region.

Another point made by Banfield against the possible occurrence of the Barren Ground grizzly bear in Ungava was that it is "incompatible with the present distribution pattern of the species in North America". We believe that Elton's carefully gathered evidence[11] should not be so quickly discarded (see also refs. 12, pp. 104-10 and 31, pp. 83-9).

Grizzly and brown bears belong to a single species, *Ursus arctos,* and do not appear to be readily separable taxonomically. The former is perhaps best considered as a variety characteristic of the mountainous regions and rather dry barrens of Eurasia and North America (ref. 13, pp. 339). Fossil records of which we are aware indicate that the species did not invade the North American continent until possibly late Illinoian time.

Once convinced that the recent increase of grizzly bear records from the eastern Barren Lands demonstrated a major post-glacial range extension, it was natural for Banfield to assume that the species dispersed eastward from Beringia. Although such a speculation may be justified, we are aware of no direct evidence that it inhabited this refugium, whereas there are several records of fossil *Ursus arctos* to the south of the glaciated region, and no obvious reason to suppose that grizzly bears did not follow the retreating ice-edge to the north and east over a wide front, becoming only secondarily separated from their relations on the plains as the northern forests developed. The oldest known fossil grizzly bear, a skull identified by Stovall and Johnston[14], is of probable Sangamon age or slightly earlier and came from Overpeck, Ohio (ref. 15, pp. 772-6; ref. 16, p. 329). The existence of the species in eastern North America prior to the Wisconsin glaciation obviously makes its recent survival in Ungava quite possible. Two other grizzly bear skulls of "Pleistocene" age are from Lawton and Cheyenne in Oklahoma[14], and another, of probable Pleistocene age or later is known from Lenora in the same state[17]. There are also two records of "Schultz's grizzly"

from the Wisconsin deposits of McKittrick and Rancho la Brea, California (ref. 18, p. 462), but Kurtén[30] evidently regards these specimens as belonging to a large-sized subspecies of the black bear *("Ursus americanus amplidens* Leidy"). He subsequently describes a single grizzly bear skull from pit 10, Rancho la Brea, which he states is ". . . perhaps post-Pleistocene . . ." in age. In addition there is the fossil pelvis fragment (presumably Pleistocene in age) mentioned briefly by Freudenberg (ref. 19, p. 13), from Cannada de Aculzingo in Mexico. Erdbrink[13] says of the last specimen "He referred the find to an *Ursus* sp., perhaps *U. 'ferox'* [a synonym of the grizzly]". The earliest remains of the species known to us from the vicinity of Beringia, found in the Firth River region of the Yukon Territory, and believed to be between 3,250 and 4,000 years old (ref. 20, p. 34), are probably too recent to have a bearing on the post-glacial dispersal of the grizzly bear.

13, 1955, as well as two others on July 29, 1956, near Wholdaia Lake (61°00'N. 103°30'W.)[23]. In or near the area between Beverly and Aberdeen lakes Barren Ground grizzly bears appear to be of regular spring and summer occurrence. An adult was seen on July 26, 1959 by Macpherson, and Eskimos reported seeing others about June 10 and July 8, 1960. E. H. McEwen noted a grizzly bear at the mouth of Dubawnt River, and a female with one cub near the west end of Beverly Lake, both in the first week of June 1960[24]. A female and three large cubs were noted by E. Kuyt near the mouth of Dubawnt River on July 12, 1961[25]. According to Eskimos once resident on Garry Lake and Back River, Barren Ground grizzly bears were encountered there with increasing frequency in the late 1940's and 1950's. A Baker Lake Eskimo, Peryouar, reports that a female and her cub were shot near Garry Lake in July 1949 and another female in September of the same year[26]. The same observer heard

Table 1. Numbers and estimated ages of Barren Ground grizzly bears observed in the Thelon River area, 1957 and 1958.

Year	*Bears seen*		
	Adults	*Yearlings*	*Cubs*
1957	11 (55 per cent)	6 (30 per cent)	3 (15 per cent)
1958	25 (57 per cent)	14 (32 per cent)	5 (11 per cent)
Total	36	20	8

The following records, made by members of the Royal Canadian Mounted Police, Geological Survey of Canada, and Canadian Wildlife Service, help to clarify the status of the Barren Ground grizzly bear at the eastern border of its range in recent years. In 1948-9, Constable D. P. McLauchlan, R.C.M.P., recorded the killing of two grizzly bears on the north shore of Aberdeen Lake[21]; a female and cub were shot in the same vicinity during the fall of 1959. While making geological traverses J. K. Fraser saw one about 15 miles west of Beverly Lake on August 14, 1952[22], and G. M. Wright sighted one near the Clarke River (63°30'N. 104°00'W.) on August

of a canoe having been damaged by a grizzly bear at the east end of Schultz Lake in October 1948, and of a grizzly bear being found robbing a cache some 30 miles north of Schultz Lake in 1955. Grizzly bears have not been encountered in winter by either Aberdeen Lake or Garry Lake Eskimos.

According to tradition, the Baker Lake Eskimos who accompanied Radford and Street on their overland crossing to Bathurst Inlet in 1911-12 encountered grizzly bears near Perry River[26].

Thirty sightings of Barren Ground grizzly bears, made in the course of caribou surveys from June to August

1957 and 1958, in or near the Thelon Game Sanctuary, have been tabulated by Kelsall (ref. 27, pp. 75-8). About one half of the observations were made from aircraft. Data of age composition and group size compiled from these records are shown in Table 1 and Fig. 1. It should be remembered that not all bears classed as adults were known to be of breeding age. The proportion of cubs averages 13 per cent and that of yearlings 31 per cent, an age distribution

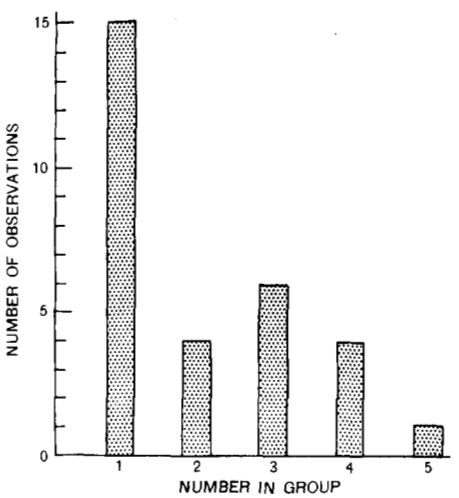

Fig. 1. Group sizes of Barren Ground grizzly bears observed. Thelon River area, 1957 and 1958.

suggesting that females with cubs are less inclined to wander into the area than those with yearlings, and that the animals observed in the Thelon area comprise an unrepresentative segment of a population. Future studies may throw more light on this problem. Anyway, the high proportion of young among the animals seen is remarkable. Half of the sightings were of single adults, and three animals, usually an adult with two yearlings, were more common than groups of two or four. One group of five (two adults and three yearlings) was observed (Fig. 1).

One of the most easterly records of which we are aware is that of A. G. Loughrey, who saw a grizzly bear on May 7, 1958 at MacQuoyd Lake southeast of Baker Lake. According to Mr. Henry Voisey, another eastward wanderer was killed in the neighbourhood of Padlei in April or May 1943[6].

The Barren Ground grizzly bear shot on Banks Island in the winter of 1951-2 demonstrates the capacity of the species to traverse great distances.

In 1962 Harington was informed of two Barren Ground grizzly bears that had been sighted by Eskimo sled parties in the vicinity of Southampton Island. The first one was observed by Pameeoolik and Mikeetook in October 1948[28]. It was walking across new ice on the central part of Duke of York Bay. The second grizzly bear was seen by Pameeoolik and a number of other Eskimos in October 1950[29] on the ice approximately 1 mile northwest of Bear Island in South Bay. These sight records for Southampton Island, with the Banks Island record, suggest the occurrence of a dispersal peak of the Barren Ground grizzly bear at about the beginning of the last decade.

It seems fairly certain that the Barren Ground grizzly bear has recently become more numerous, particularly near the eastern end of its range. However, Banfield's statement that this "migration" seems to be the continuation of a natural post-Wisconsin dispersal from the Beringia refugium of the lower Yukon River valley lacks chronological perspective. It seems more likely that the range of the species has altered many times in the millenia since the disappearance of Wisconsin ice from the mainland of the Northwest Territories. An easterly extension of the magnitude postulated by Banfield, and occurring over a maximum of 244 years, is surely better explained as a minor range fluctuation superimposed on the major dispersal trend of the species since the end of the Wisconsin glaciation.

In presenting our interpretation of the existing evidence we wish at the same time to stress our belief that the history of the grizzly bear in North America is still open to speculation and analysis and that above all further research, both

ecological and palaeontological, is urgently needed.

C. R. HARINGTON*
A. H. MACPHERSON*
J. P. KELSALL†

*Canadian Wildlife Service, Ottawa, Ontario.

†Canadian Wildlife Service, Sackville, New Brunswick.

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