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**GEOGRAPHIC VARIATION
AMONG BROWN AND GRIZZLY
BEARS (*URSUS ARCTOS*) IN
NORTH AMERICA**

E. RAYMOND HALL

Museum of Natural History
The University of Kansas
Lawrence, Kansas 66045

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(*Ursus arctos*) in North America

By

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Museum of Natural History
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GEOGRAPHIC VARIATION AMONG BROWN AND GRIZZLY BEARS (*URSUS ARCTOS*) IN NORTH AMERICA

E. RAYMOND HALL

Three species of bears of the genus *Ursus* inhabit the North American continent (Fig. 1), and up to the present (1983) at least 96 names have been proposed for American bears of the *Ursus arctos* group. These names are to be found in Merriam (1918 and 1929), 84 having been proposed by Merriam himself. All 96 names were proposed for material of Recent geologic age (material of post-Pleistocene age).

Rausch (1963) commented meaningfully on geographic variation in *Ursus arctos* in North America and introduced (pg. 43) the term "local demes" to account for local variations, many of which Merriam had named as subspecies or even species. Rausch did not, however, formally synonymize these names.

Kurtén (1973) explained the morphological variation in skulls of *Ursus arctos* and color variation in its pelage as inheritance from an ancestral population in eastern Asia and western North America and in the connecting land (now under water) that joined the two continents at an earlier time. Kurtén expressed variation in terms of "isophenes" at right angles to clines showing gradual changes in characters from one place to another.

Hall and Kelson (1959) and Hall (1981) listed all names based on North American specimens of *Ursus arctos* (without formally using that name for a single inclusive species) and showed on a map (no. 498, 1981) the type localities and some marginal records of occurrence.

The ninety-some names proposed for supposed kinds of these bears in North America is only about a third as many as the number (271) that Kurtén (1973:2) wrote have been proposed for the corresponding

bears in the Old World—a number he characterized as a waste of systematic effort.

The time of arrival in North America of the ancestral stock of the modern Grizzly—Big Brown Bear (*Ursus arctos* Linnaeus) is not certainly known at this time. However, the species now occurs on both sides of the Bering Strait that narrowly separates (presently less than 80 miles of water) the New and Old World continents (Figs. 3, 4). The Diomed Islands near the center of the Strait reduce the land-to-land distance to less than 50 miles. Snow-covered ice may in season completely bridge the water in the Strait.

Against the preceding background of information, nine subspecies of *Ursus arctos* are here recognized as having occurred in North America in Recent time (Fig. 2). Were it not for uncertainty about the provenience of some specimens from certain islands and the adjoining mainland of southern Alaska, it might be possible to recognize in North America a few more than the nine subspecies listed below.

In the period 1962-1968 I measured certain dimensions of the crania of adults and some subadults of *Ursus arctos*, and dimensions of the upper permanent teeth of those and younger specimens. Most measurements were recorded by my wife, Mary F. Hall, or by Charles Long as a Research Assistant, or by some other assistant. For rearrangement and other help with the measurement forms, I acknowledge the invaluable skill of Mrs. Eleanor Lohmann. Of the 2,476 skulls examined, 912 were from adult or old animals. The remainder were: juveniles (permanent dentition not all in place); young (certain bones less than full size as shown by open cranial sutures); and subadults (sagittal crest short or wanting in males and in fe-

males temporal lines separated or barely touching).

Anyone especially interested in cranial change with age should consult Zavatsky (1976) who listed dental and cranial features characterizing individuals of the "Brown Bear" according to eleven age groups ranging from group 1 ("Cubs to 5 months of age") to group 11 ("Both sexes—older than 18 years").

Any person who works with variation in American grizzly and big brown bears and wishes to understand why Merriam named as "species" many specimens that subsequent taxonomists would have identified as "subspecies," or "local demes" (to use Rausch's 1963:43, terms), should read Merriam's two articles "Criteria for the Recognition of Species and Genera," and "Why Should Every Specimen be Named?", in volume one, number one of the Journal of Mammalogy.

The kinds recognized by Merriam are here regarded as belonging to nine subspecies of one species. Most of the morphological variants are regarded as "local demes" or individual variants of one or another of the nine subspecies. The precise assignment of each name and of the minor variants it represents is shown in the following synonymies.

Detailed measurements and notes on which the following summary is based are on file at the Museum of Natural History, University of Kansas, and are available for study by later students interested in geographic variation of these bears. Three facts that complicated such study are an unusual amount of variation, the unavailability of adequate material from some areas, and the impossibility of obtaining specimens now that the bears have been exterminated from much of their original range.

Ursus arctos alascensis Merriam
Grizzly or Brown Bear

1896. *Ursus horribilis alascensis* Merriam, Proc.

Biol. Soc. Washington, 10:74, April 13, type from Unalaklik River, Alaska.

1902. *Ursus kидderi* Merriam, Proc. Biol. Soc. Washington, 15:78, March 22, type from Chinitna Bay, Cook Inlet, Alaska.

1904. *Ursus kenaiensis* Merriam, Proc. Biol. Soc. Washington, 17:154, October 6, type from Cape Elizabeth, extreme W end Kenai Peninsula, Alaska.

1904. *Ursus horribilis phaeonyx* Merriam, Proc. Biol. Soc. Washington, 17:154, October 6, type from Glacier Mtn., Tanana Mts., Alaska (about 2 mi. below source Comet Creek, near Fortymile Creek, between Yukon and Tanana rivers).

1910. *Ursus sheldoni* Merriam, Proc. Biol. Soc. Washington, 23:127, September 2, type from Montague Island, Prince William Sound, Alaska.

1914. *Ursus alexandrae* Merriam, Proc. Biol. Soc. Washington, 27:174, August 13, type from Kasilof Lake, Kenai Peninsula, Alaska.

1914. *Ursus innuitus* Merriam, Proc. Biol. Soc. Washington, 27:177, August 13, type from Golofnin Bay, S side Seward Peninsula, western Alaska.

1914. *Ursus internationalis* Merriam, Proc. Biol. Soc. Washington, 27:177, August 13, type from Alaska-Yukon boundary, about 50 mi. S of Arctic Coast.

1914. *Ursus toklat* Merriam, Proc. Biol. Soc. Washington, 27:182, August 13, type from head Toklat River, N base Alaska Range, near Mt. McKinley, Alaska.

1914. *Ursus kidderi tundrensis* Merriam, Proc. Biol. Soc. Washington, 27:196, August 13, type from Shaktolik River, Norton Sound, Alaska.

1916. *Ursus cressonus* Merriam, Proc. Biol. Soc. Washington, 29:137, September 6, type from Lakina River, S slope Wrangell Range, Alaska.

1916. *Ursus eximius* Merriam, Proc. Biol. Soc. Washington, 29:139, September 6, type from head of Knik, Cook Inlet, Alaska.

1916. *Ursus nuchek* Merriam, Proc. Biol. Soc. Washington, 29:146, September 6, type from head Nuchek Bay, Hinchinbrook Island, Prince William Sound, Alaska.

1929. *Ursus holzworthi* Merriam, Proc. Biol. Soc. Washington, 42:173, June 15, type from last slope of Talkeetna Mts., near headwaters of Oshetna or Black River, Alaska.

In the northern third of Alaska, males average 16 percent smaller in condylobasal length than in *gyas* of the Alaska Peninsula, and the one female available from northern Alaska is 18 percent smaller than the average in *gyas* on the Alaska Peninsula. The average difference in zygomatic breadth for males is 17 percent. Zygomatic breadth is not available for the female from northern Alaska. The M^2 is 8 percent shorter and 10 percent narrower in the males from northern Alaska. The length of M^2 of the one female from northern Alaska (33.2) is near the minimum for the Alaska Peninsula (32.0) and width is 17.1, which is less than the minimum (17.7) for the Alaska Peninsula.

The difference in measurements between specimens from northern Alaska and those of *alascensis* from the southern mainland of Alaska (including the Kenai Peninsula) east of the range of *gyas* is much less than between the northern sample and *gyas*, being nine percent smaller for males in condylobasal length, 11 smaller in zygomatic breadth, 4 shorter for M^2 , and 6 narrower for M^2 . The female from northern Alaska is 13 percent smaller in condylobasal length. The length of M^2 of the female from northern Alaska (33.2) is near the minimum (28.5) for the southern mainland, and the width (17.1) is near the minimum (16.7) for the southern mainland. The change in size in *alascensis* appears to be gradual from north to south instead of abrupt at any particular latitude.

Comparisons with *U. a. dalli* and *U. a. horribilis* are made in the accounts of those subspecies.

MARGINAL RECORDS.—Alaska. Vicinity of Barrow, 1 MVZ; Colville River, 1 MVZ; Barter Island, 1; British Mts. between Barter Id. and Demarcation Pt., 1 NMC; Alaska-Yukon Boundary, about 50 mi. S of Arctic Coast (lat. 69°00'30"), 1 NMC; Kandik R., 40 mi. from junction with Yukon R., 1 MVZ; Chitina Glacier, 1; Mt. St. Elias, 1; Malaspina Glacier, 2, thence westward along coast, including Montague and Hinchinbrook islands, to Cape Douglas, 3; Bristol Bay, Kogguing, 1, thence westward along coast to

Good News Bay, Kuskokwim Bay, 2, northward along coast to South Coast Range, Norton Sound, 1; Port Clarence, 1; Pitmegea River, Cape Sabine, 2 MVZ.

Ursus arctos beringianus Middendorff
Grizzly Bear

1853. *Ursus arctos* var. *beringiana* Middendorff, Sibir. Reise, 2, 2:4, pl. 1, figs. 1-6, type from Great Shantar Island, Sea of Okhotsk.

Color pale brown (Geist, 1934:317): for cranial characters of this Asiatic subspecies, see Heptner and Naumov (1967).

MARGINAL RECORD. — Alaska. St. Lawrence Island (Geist, 1934, Jour. Mamm., 15:316, November 15; A. H. Howell, 1940, Jour. Mamm., 21:216, May 16; R. [L.] Rausch, 1953, The Murrelet, 34:19, October 5).

Ursus arctos californicus Merriam
California Golden Bear

1896. [*Ursus horribilis*] subspecies *californicus* Merriam, Proc. Biol. Soc. Washington, 10:76, April 13, type from Monterey, Monterey Co., California.

1914. *Ursus klamathensis* Merriam, Proc. Biol. Soc. Washington, 27:185, August 13, type from Beswick, near mouth Shovel Creek, Klamath River, Siskiyou Co., California.

1914. *Ursus colusus* Merriam, Proc. Biol. Soc. Washington, 27:187, August 13, type from Sacramento River, probably between Colusa and Sacramento, California.

1914. *Ursus californicus tularensis* Merriam, Proc. Biol. Soc. Washington, 27:188, August 13, type from Fort Tejon, Tehachapi Mts., Kern Co., California.

1914. *Ursus magister* Merriam, Proc. Biol. Soc. Washington, 27:189, August 13, type from Los Biacitos, head San Onofre Canyon, Santa Ana Mts., San Diego Co., California.

1914. *Ursus henshawi* Merriam, Proc. Biol. Soc. Washington, 27:190, August 13, type from southern Sierra Nevada, near Havilah, Kern Co., California.

1916. *Ursus mendocinensis* Merriam, Proc. Biol. Soc. Washington, 29:145, September 6, type

from Long Valley, N of Sherwood, Mendocino Co., California.

Compared with *U. a. stikeenensis* directly to the north, the skull of *californicus* averages larger in condylobasal length, zygomatic breadth, depth of skull, and length and breadth of M² in males. The same is true of females except that the depth of the skull is less.

Comparison of *californicus* with *horribilis* of Utah (the geographic ranges of which may not ever have met in historic time in Nevada nor south thereof), reveals that males of *californicus* average larger in condylobasal length, average smaller in zygomatic breadth and depth of skull, and average larger in length and breadth of M². These average differences might disappear if more specimens were available.

MARGINAL RECORDS.—California. E end Siskiyou, near Beswick, 1; Baird, Shasta County, 1; Los Biacitos, head San Onofre Canyon, Santa Ana Mts., San Diego County, 1. Baja California. Sierra Juárez near Santa Catarina Mission (Hall, 1981:953), thence up coast to California. 10 mi. from Blocksburg, Humboldt Co., Lassen Peak Canyon, 1.

Ursus arctos dalli Merriam
Brown Bear

1896. *Ursus dalli* Merriam, Proc. Biol. Soc. Washington, 10:71, April 13, type from Yakutat Bay (NW side), Alaska.
1914. *Ursus nortoni* Merriam, Proc. Biol. Soc. Washington, 27:179, August 13, type from Yakutat, Alaska.
1916. *Ursus townsendi* Merriam, Proc. Biol. Soc. Washington, 29:151, September 6, type from mainland of southeastern Alaska, probably between Cross Sound and Alsek River Delta, but exact locality unknown.
1918. *Ursus orgiloides* Merriam, N. Amer. Fauna, 41:46, February 9, type from Italio River, Alaska.

Compared with males of *U. a. alascensis* of the southeastern mainland of Alaska, males of *dalli* average larger in condylobasal length and smaller in zygomatic breadth and

are essentially the same in depth of skull; M² averages shorter and narrower.

Females of *dalli* average larger in condylobasal length and in zygomatic breadth but smaller in depth of skull; M² averages shorter and broader.

Compared with *U. a. sitkensis*, males of *dalli* average essentially the same in condylobasal length, zygomatic breadth, depth of skull, and length and breadth of M².

Compared with *sitkensis*, females of *dalli* average larger in condylobasal length and zygomatic breadth, and less in depth of skull; M² is longer and broader than in *sitkensis*.

Compared with *U. a. horribilis* from the Yukon, *dalli* differs as follows: males average larger in cranial measurements and smaller in length and breadth of M²; females average larger in all cranial measurements and in length and breadth of M².

MARGINAL RECORDS.—Alaska. *Chaiks Hills, between Mt. St. Elias and Yakutat Bay*, 1; N side Yakutat Bay, between Dalton and Hubbard glaciers, 1; *Hd. Disenchantment Bay*, 2; Alsek River, near forks, 3; Dry Bay, mainland, 3 USNM, 1 MVZ; *Alsek River, near coast*, 1, thence up coast to Yakutat Bay region (Ankow River), 1 MVZ; Point Manby, N. Yakutat Bay, 1.—Italicized type for place names denotes omission of symbols on the map in order to prevent overcrowding.

Ursus arctos gyas Merriam
Brown Bear

1902. *Ursus dalli gyas* Merriam, Proc. Biol. Soc. Washington, 15:78, March 22, type from Pavlof Bay, Alaska Peninsula, Alaska.
1902. *Ursus merriami* J. A. Allen, Bull. Amer. Mus. Nat. Hist., 16:141, April 12, type from Portage Bay, opposite Port Muller, Alaska Peninsula, Alaska.

Skull averaging largest (Fig. 6) in condylobasal length and zygomatic breadth of the seven American mainland subspecies, and M² averaging 10 percent longer in males and 8 percent longer in females than in the

population of *alascensis* from the northern third of Alaska.

Comparison with *middendorffi* is made in the account of that subspecies.

MARGINAL RECORDS.—Alaska (Alaska Peninsula). Kukak Bay, near Mt. Katmai, 1, southwestward along coast to Wide Bay, 1 MCZ; Morzhovoi Bay, 3; Unimak Id., 2 skins only, collection in which preserved not recorded; Eagle Bay [Unalaska Island], 2, thence northeastward to Isenbek Bay, 3; Port Heiden, 1 MCZ; Becharoff Lake, 1.

Ursus arctos horribilis Ord
Grizzly Bear or Silver Tip

1815. *Ursus horribilis* Ord, in Guthrie, A new geog., hist., coml. grammar . . . , Philadelphia, 2nd Amer. ed., 2:291 (described on p. 299). Type locality, Missouri River, a little above mouth Poplar River, northeastern Montana.
1820. *Ursus cinereus* Desmarest, Mammalogie . . . , p. 164, in Encyclopedie methodique Type locality, not designated. Regarded as a synonym of *U. horribilis* by Merriam, N. Amer. Fauna, 41:17, February 9, 1918.
1822. *Ursus griseus* Choris, Voyage pittoresque autour du monde, Paris (unpaged). Name applied by Choris to the bear of the interior of North America, but Choris identifies his animal with *Ursus griseus* Cuv. Regarded as a synonym of *U. horribilis* by Merriam, N. Amer. Fauna, 41:17, February 9, 1918.
1827. *Ursus candescens* Hamilton-Smith, in Griffith's Cuvier, The Animal Kingdom . . . , 2:229 (fide Griffith, loc. cit.). Regarded as a synonym of *U. horribilis* by Merriam, N. Amer. Fauna, 41:17, February 9, 1918.
1838. *Ursus richardsoni* Swainson, Animals in menageries . . . , p. 54. Type locality assumed to be shore of the Arctic Ocean, on W side Bathurst Inlet about 8 mi. from mouth Hood River, Mackenzie.
1858. [*Ursus*]. *horribilis* var. *horriaeus* Baird, Mammals, in Repts. Expl. Surv. . . . , 8(1): 224, July 14, type from old copper mines near present town of Santa Rita, Grant Co., New Mexico (see V. Bailey, N. Amer. Fauna, 53:357, March 1, 1932).
1904. *Ursus hylodromus* Elliot, Field Columb. Mus., Publ. 87, Zool. Ser., 3:257, January 7, type from Alberta.
1914. *Ursus russelli* Merriam, Proc. Biol. Soc. Washington, 27:178, August 13, type from Mackenzie Delta, Mackenzie.
1914. *Ursus imperator* Merriam, Proc. Biol. Soc. Washington, 27:180, August 13, type from Yellowstone National Park, Wyoming.
1914. *Ursus absarokus* Merriam, Proc. Biol. Soc. Washington, 27:181, August 13, type from head Little Bighorn River, northern part Bighorn Mts., Carbon Co., Montana.
1914. *Ursus phaeonyx latifrons* Merriam, Proc. Biol. Soc. Washington, 27:183, August 13, type from Jasper House, Alberta.
1914. *Ursus shoshone* Merriam, Proc. Biol. Soc. Washington, 27:184, August 13, type from Estes Park, Larimer Co., Colorado.
1914. *Ursus shoshone canadensis* Merriam, Proc. Biol. Soc. Washington, 27:184, August 13, type from Moose Pass, near Mt. Robson, British Columbia.
1914. *Ursus nelsoni* Merriam, Proc. Biol. Soc. Washington, 27:190, August 13, type from Colonia Garcia, Chihuahua.
1914. *Ursus horriaeus texensis* Merriam, Proc. Biol. Soc. Washington, 27:191, August 13, type from Davis Mts., Jeff Davis Co., Texas.
1914. *Ursus navaho* Merriam, Proc. Biol. Soc. Washington, 27:191, August 13, type from Navajo country near Fort Defiance (Mollhausen), Arizona, type probably killed in 1856 in Chuska Mountains, on boundary between northeastern Arizona and northwestern New Mexico.
1914. *Ursus bairdi* Merriam, Proc. Biol. Soc. Washington, 27:192, August 13, type from Blue River, Summit Co., Colorado.
1914. *Ursus utahensis* Merriam, Proc. Biol. Soc. Washington, 27:193, August 13, type from N fork Salina Creek, about 10 mi. SE Mayfield, Sanpete Co., Utah.
1914. *Ursus kennerleyi* Merriam, Proc. Biol. Soc. Washington, 27:194, August 13, type from mts. near Los Nogales, Sonora.
1916. *Ursus apache* Merriam, Proc. Biol. Soc. Washington, 29:134, September 6, type from Whorton Creek, S slope White Mts., a few miles W Blue, Greenlee Co., Arizona.
1916. *Ursus arizonae* Merriam, Proc. Biol. Soc.

- Washington, 29:135, September 6, type from east side Escudilla Mts., Apache Co., Arizona.
1916. *Ursus kluane* Merriam, Proc. Biol. Soc. Washington, 29:141, September 6, type from McConnell River, Yukon.
1916. *Ursus ophrus* Merriam, Proc. Biol. Soc. Washington, 29:148, September 6, type from eastern British Columbia; exact locality unknown.
1916. *Ursus pallasi* Merriam, Proc. Biol. Soc. Washington, 29:149, September 6, type from Donjek River, southwestern Yukon.
1916. *Ursus selkirki* Merriam, Proc. Biol. Soc. Washington, 29:150, September 6, type from Selkirk Mts., Upper Columbia River, British Columbia.
1916. *Ursus washake* Merriam, Proc. Biol. Soc. Washington, 29:152, September 6, type from N. Fork Shoshone River, Absaroka Mts., between Bighorn Basin and Yellowstone National Park, Wyoming.
1918. *Ursus dusorgus* Merriam, N. Amer. Fauna, 41:33, February 9, type from head Jackpine River, near Mt. Bess, close to British Columbian boundary, Alberta.
1918. *Ursus planiceps* Merriam, N. Amer. Fauna, 41:37, February 9, type from Colorado, exact locality unknown, but probably in foothills or on western edge of plains.
1918. *Ursus macrondon* Merriam, N. Amer. Fauna, 41:38, February 9, type from Twin Lakes, Lake Co., Colorado.
1918. *Ursus mirus* Merriam, N. Amer. Fauna, 41:40, February 9, type from Slough Creek, Yellowstone National Park, Wyoming.
1918. *Ursus rungiusi rungiusi* Merriam, N. Amer. Fauna, 41:49, February 9, type from Rocky Mts. on headwaters of Athabaska River, Alberta.
1918. *Ursus rungiusi sagittalis* Merriam, N. Amer. Fauna, 41:50, February 9, type from Champagne Landing, southwestern Yukon.
1918. *Ursus macfarlami* Merriam, N. Amer. Fauna, 41:51, February 9, type from Anderson River, 50 mi. below Fort Anderson, Mackenzie.
1918. *Ursus idahoensis* Merriam, N. Amer. Fauna, 41:54, February 9, type from N fork Teton River, Fremont Co., Idaho.
1918. *Ursus pulchellus pulchellus* Merriam, N. Amer. Fauna, 41:55, February 9, type from Ross River, Yukon.
1918. *Ursus pulchellus ereunetes* Merriam, N. Amer. Fauna, 41:56, February 9, type from Beaverfoot Range, Kootenai Dist., British Columbia.
1918. *Ursus oribasus* Merriam, N. Amer. Fauna, 41:56, February 9, type from upper Liard River, Yukon, near British Columbian boundary.
1918. *Ursus perturbans* Merriam, N. Amer. Fauna, 41:64, February 9, type from a canyon on Mt. Taylor, 12 mi. E San Mateo, Valencia Co., New Mexico.
1918. *Ursus rogersi rogersi* Merriam, N. Amer. Fauna, 41:65, February 9, type from high up on Greybull River, Absaroka Mts., Yellowstone National Park, Wyoming.
1918. *Ursus rogersi bisonophagus* Merriam, N. Amer. Fauna, 41:66, February 9, type from Bear Lodge, Sundance National Forest, Black Hills, Crook Co., Wyoming.
1918. *Ursus kluane impiger* Merriam, N. Amer. Fauna, 41:81, February 9, type from Columbia Valley, British Columbia.
1918. *Ursus pellyensis* Merriam, N. Amer. Fauna, 41:82, February 9, type from Ketzta Divide, Pelly Mts., Yukon.
1918. *Ursus andersoni* Merriam, N. Amer. Fauna, 41:83, February 9, type from E branch Dease River, near Great Bear Lake, Mackenzie.
1918. *Ursus crassus* Merriam, N. Amer. Fauna, 41:90, February 9, type from upper Macmillan River, Yukon.
1918. *Vetularctos inopinatus* Merriam, N. Amer. Fauna, 41:132, February 9, type from Rendezvous Lake, NE of Fort Anderson, Mackenzie.

Skulls of males of *horribilis* from the Yukon, compared with those of *alascensis* from east-central Alaska, averaging smaller in condylobasal length, zygomatic breadth and depth of skull, but M^2 is longer and wider. In females the three cranial measurements average smaller, as in males, but the length and breadth of M^2 average less.

Skulls of three males of *horribilis* from northeastern British Columbia, compared with those of 26 specimens of *U. a. stikeenensis* from northwestern British Columbia, average larger in the five measurements mentioned above except for condylobasal

length, which averages smaller. The three females from northeastern British Columbia, compared with 23 specimens from northwestern British Columbia, average smaller in all of the five measurements.

Complete intergradation between *stikkeenensis* and *horribilis* is evident in south-central British Columbia, as shown by the adult male (USNM 215440) from Kamloops. Its dark but not brown color provides evidence of intergradation, as do the cranial measurements.

Comparison with *U. a. californicus* is made in the account of that subspecies. More specimens of both subspecies might reveal that the pelage of *horribilis* always was less brownish. Comparison with *U. a. dalli* is made in the account of that subspecies.

MARGINAL RECORDS.—Mackenzie. Baillie's Cove, S end of Arctic Sound, Bathurst Inlet, 1 NMC; Stapyhton Bay, Union Strait, 1 NMC; Kugaryuak River, Coronation Gulf, 4 NMC; "type locality [of *U. richardsoni*] assumed to be shore of the Arctic Ocean, on W side Bathurst Inlet about 8 mi. from mouth Hood River" (Hall, 1981:956). Keewatin. Baker Lake (Hall, 1981:953). Mackenzie. Beaverhill Lake, 1 NMC; Barren Grounds E of Great Slave Lake, 1 NMC; W tip of Aylmer Lake (109°13'W, 64°08'N), 3 NMC; Contwoyto Lake, 1 NMC; Copper Mines Valley between Great Bear and Dismal lakes, 1 MCZ; East Branch Dease River, near Great Bear Lake, 1 AMNH; Sekwi River, E side of McKenzie Mt., Canol Road, mi. 174E, 1 NMC. Alberta. Smoky River, 5; N of Slave Lake, 1 U. Alberta; Red Willow Creek, 1 U. Alberta. Saskatchewan. *Found in Crane Lake when it dried up, pick up in May of 1937*, 1 Old Timers Museum at Maple Creek; Dollard, 1 NMC. Minnesota. Sandhill River in southern Polk Co. (Hall, 1981:953). North Dakota. Ft. Clark, 1; near Middle Butte, now generally Bullion Butte, 1. Wyoming. Bearlodge of Sundance Natl. Forest, 1; Fort Laramie, 1; Lone Tree Canyon, between Hawk Springs and Chugwater, 1 Scotts Bluff Nat. Monument Museum. Kansas. Trego Co. (Hall,

1981:953). Colorado. type locality of *Ursus planiceps*, 1; 12 mi. NE Saguache, 1. New Mexico. 25 mi. NE Taos Saw Mill Park, 1; *Taos, 20 mi. SE on Rio Chiquito*, 1; Magdalena Baldy, 1. Texas. Davis Mts., 1. Coahuila. vic. Cuatro Ciénegas (Hall, 1981:953). Durango. Southern Durango (*ibid.*). Chihuahua. Arroyo del Nido, 600 ft., 25 mi. SW Gallego, 1 MVZ; Colonia Garcia, 6. Sonora. Los Nogales, 1. Arizona. SW slope of Baldy Peak, 10,000 ft., near head Hurricane Creek, Apache Co., 1 MVZ; 8 mi. N Payson, near Green Valley, 1; 30 mi. S William, 1; San Francisco Mts., 1. Utah. Pine Valley Mts., 1; N Fork Salina Creek, about 10 mi. SE Mayfield, 2; Logan Canon, 1. Idaho. Minidoka, 1. Oregon. From dry bed of Malheur Lake, 1; South Ice Cave, 40 mi. S Bend, 1. British Columbia. Rossland, 1 MVZ; near Vernon, 1; *Okanagan*, 1; Shuswap, 4; Canim Lake, 1; Slough Creek Mts., above timber, Barkerville District, 1 MVZ; Omineca River, 1 ANSP; Gundahoo Pass, 5000 ft., 1 MCZ. Yukon. Upper Liard River, near B. C. Boundary, 1; 50 mi. S Whitehorse, 2 ANSP. British Columbia. Rainey Hollow, 2. Yukon. Dalton House, 5; hd. Alsek River, 1; Duke River, Kluane, 4; Caldern Cr., 30 mi. E Mt. Natazat, hd. White River, 1; headwaters, White River, 1; Divide, White, Glacier and Tanana, Yukon side, 1; Ogilvie Range, Klondyke headwater, 1. Mackenzie. Foothills W of McKenzie River Delta, 1 NMC; Richards Island, Mackenzie Delta, 1 NMC.

Ursus arctos middendorffi Merriam
Kodiak Brown Bear

1896. *Ursus middendorffi* Merriam, Proc. Biol. Soc. Washington, 10:69, April 13, type from Kodiak Island, Alaska.
1911. *Ursus kadiaki* Kleinschmidt, Outdoor Life, 27:3, January. Name applied to the big brown bear of "Kadiak Island, Alaska Peninsula, Montague Island, and Yacutat," all in Alaska.

Zygomatic breadth and depth of skull (Fig. 5) in both sexes from Kodiak Island average larger than in any other subspecies.

U. a. middendorffi specimens from Afognak average smaller in both sexes (two adults of each sex) than those from Kodiak Island in the three cranial measurements except for condylobasal length which averages more.

The M² averages longer and narrower in *middendorffi* (Kodiak and Afognak islands) than in *gyas* in both sexes.

MARGINAL RECORDS.—Alaska. Afognak Island, 7 (specimens of all ages including 3 KU); Kodiak Island, 116 (specimens of all ages including 44 AMNH, 4 ANSP, 3 Boone and Crockett specimens at Carnegie Mus., 7 CAS, 4 KU, 4 MCZ, 12 MVZ).

Ursus arctos sitkensis Merriam
Big Brown Bear

1896. *Ursus sitkensis* Merriam, Proc. Biol. Soc. Washington, 10:73, April 13, type from near Sitka, Alaska.
1904. *Ursus eulophus* Merriam, Proc. Biol. Soc. Washington, 17:153, October 6, type from Admiralty Island, Alaska.
1914. *Ursus eltonclarki* Merriam, Proc. Biol. Soc. Washington, 27:175, August 13, type from Freshwater Bay, Chichagof Island, Alaska.
1914. *Ursus orgilos* Merriam, Proc. Biol. Soc. Washington, 27:176, August 13, type from Bartlett Bay, E side Glacier Bay, southeastern Alaska.
1914. *Ursus caurinus* Merriam, Proc. Biol. Soc. Washington, 27:187, August 13, type from Berners Bay, E side Lynn Canal, southeastern Alaska.
1914. *Ursus shirasi* Merriam, Proc. Biol. Soc. Washington, 27:195, August 13, type from Bybus Bay, Admiralty Island, Alaska.
1916. *Ursus eltonclarki insularis* Merriam, Proc. Biol. Soc. Washington, 29:141, September 6, type from Admiralty Island, southeastern Alaska.
1916. *Ursus kwakiutl neglectus* Merriam, Proc. Biol. Soc. Washington, 29:144, September 6, type from near Hawk Inlet, Admiralty Island, Alaska.
1916. *Ursus mirabilis* Merriam, Proc. Biol. Soc. Washington, 29:146, September 6, type from Admiralty Island, Alaska.

Compared with males of *U. a. stikeenen-*

sis from immediately east in northwestern British Columbia, males of *sitkensis* average larger in condylobasal length, zygomatic breadth and depth of skull; M² is shorter but broader.

Females of *sitkensis* likewise average larger in condylobasal length, zygomatic breadth and depth of skull; M² is both shorter and narrower.

Compared with males of *stikeenensis* from the area to the south (bounded by Bella Coola, Lagoon Lake, Kleena Kleene, and Ashlulm Creek), males of *sitkensis* average larger in condylobasal length, zygomatic breadth and depth of skull, but M² averages shorter and narrower. Females of *sitkensis* are larger in all measurements except condylobasal length.

U. a. sitkensis, when compared with all specimens referred to *stikeenensis*, averages larger in all measurements of the males, and in females averages larger in the three cranial measurements but smaller in length and breadth of M².

Comparison with *U. a. dalli* has been made in the account of that subspecies.

MARGINAL RECORDS.—Alaska. Headwaters Bear Creek, 40 mi. from Haynes, 1 CAS; head of Chilkoot Lake, 1; Berner's Bay, 5; Taku Inlet, mainland, 1; Sumdum, mainland, 1; Admiralty Island (allegedly), 261 (including 3 AMNH, 5 ANSP, 1 CAS, 1 CM, 6 MCZ, 25 MVZ); Baranof Island, 78 (including 7 MVZ); Kruzof Island, 9; Chichagof Island, 170 (including 1 AMNH, 1 ANSP, 4 CM, 1 MCZ, 3 MVZ); NW side Lituya Bay, 2; Fairweather Glacier, about 15 mi. NW Lituya, 1; *Porcupine, Chilkat*, 1.

From my (E. Raymond Hall's) Diary for August 1, 1962, written at the Division of Mammals, U.S. National Museum, Washington, D.C., I quote: "At Museum E. P. Walker (Phone WO6-5358) phoned having heard from his sister Winifred Deering of U. S. Fish and Wildlife Service, that I was in Washington D. C. He hoped I could nominate someone to get vol. 1 of his 4 vol. work on genera of Mammals ready for the printer. When I told him that I was here examining

skulls of bears with the aim of arriving at a better classification than the current one, Walker said let me tell you something that will help you 'Ignore all specimens obtained by Merriam from fur dealers and persons who sold skulls to Merriam. Dr. Merriam sent word, for example, to Mr. X in Alaska that skulls were wanted from Admiralty Island. Mr. X told the Indians that bear skulls were wanted from Admiralty Island. The Indian hunters brought the skulls to Mr. X and told him that the skulls were from Admiralty Island. No wonder that four kinds of bears were recorded from Admiralty Island that had close relatives on the mainland. After skulls from Admiralty Island had been obtained, Dr. Merriam sent out word that skulls were wanted from the mainland. The fur dealers told the Indians and hunters and the skulls that came in were all from the mainland, according to the hunters, regardless of where the bears were shot.' "

Ursus arctos stikeenensis Merriam
Big Brown Bear

1914. *Ursus stikeenensis* Merriam, Proc. Biol. Soc. Washington, 27:178, August 13, type from Tatletuey Lake, near head Skeena River, northern British Columbia.
1914. *Ursus tahltanicus* Merriam, Proc. Biol. Soc. Washington, 27:181, August 13, type from Klappan Creek ("= 3d So. Fk. Stikine River"), British Columbia.
1914. *Ursus pervagor* Merriam, Proc. Biol. Soc. Washington, 27:186, August 13, type from Pemberton [= Lillooet] Lake, British Columbia.
1916. *Ursus chelan* Merriam, Proc. Biol. Soc. Washington, 29:136, September 6, type from T.30N, R.16E, Willamette Meridian, Wenatchee National Forest, E slope Cascade Mts., northern Chelan Co., Washington.
1916. *Ursus hoots* Merriam, Proc. Biol. Soc. Washington, 29:140, September 6, type from Clearwater Creek, a N branch Stikine River, British Columbia.

1916. *Ursus kwakiutl* Merriam, Proc. Biol. Soc. Washington, 29:143, September 6, type from Jervis Inlet, coast of southern British Columbia.
1916. *Ursus kwakiutl warburtoni* Merriam, Proc. Biol. Soc. Washington, 29:145, September 6, type from Atnarko River, British Columbia.
1918. *Ursus chelidonias* Merriam, N. Amer. Fauna, 41:21, February 9, type from head Jervis Inlet, British Columbia.
1918. *Ursus atnarko* Merriam, N. Amer. Fauna, 41:22, February 9, type from Lonesome Lake, Atnarko River, one of upper forks of Bella Coola, British Columbia.
1918. *Ursus crassodon* Merriam, N. Amer. Fauna, 41:90, February 9, type from Klappan Creek (Third South Fork Stikine River), British Columbia.

Comparison of *stikeenensis* has been made with three geographically adjoining subspecies, *californicus*, *horribilis*, and *sitkensis* in the accounts of those three subspecies.

MARGINAL RECORDS.—British Columbia. Dease River, Cassiar Range, 2; Tatletuey Lake, near head Skeena River, 1; Bear River, Bear Lake, 1 ANSP; Tacla Lake, 6; "Big Creek, B.C." but printed on front of label is "Williams Lake, Cariboo BC," 1 NMC; Kamloops, 1. Washington. Holman Pass, Hd. Holman Creek, trib. of Wfk. Pasayton River, 1; Twp. 30N, range 16E, WM, Chelan Co., 1. Presumably to coast of Oregon and presumably up coast of Washington to British Columbia. Nass River, 1 U. Alberta. Alaska. Burroughs Bay, Unuk River, 1; *Bradfield Canal*, 1; Groundhog Basin, 8 mi. S mouth Stikine River, 3. British Columbia. Stikine River, 1 mi. above boundary, 1; Stikine River, 50 mi. N boundary, 1; Shesley River, 45 mi. N Telegraph Creek, 4; 12 mi. NE Tulsequah on Taku River at entrance to Zohini Creek, 1 Boone and Crockett specimen at Carnegie Mus.; Ben My Chree, Tagish Lake, 1 CAS; Atlin, 1; 60 mi. E Atlin, 1.

TABLE 1. Average, minimum, and maximum cranial and dental measurements of *Ursus arctos*.

No. of specimens examined	Condylobasal Length	Zygomatic Breadth	Depth of Skull*	Length M ²	Breadth M ²	No. Specimens and Institution**
<i>U. a. alascensis</i> from northern third of Alaska						
11 ' ' '	333	220	124	35.0	18.5	3 MVZ; 2 NMC; 1 KU
	284	182	109	29.8	17.2	
	372	239	144	37.5	20.1	
1 .	285	---	106	33.2	17.1	1 NMC
<i>U. A. alascensis</i> from east-central Alaska						
22 ' ' '	346	232	129	36.7	19.2	2 AMNH; 1 ANSP; 1 MVZ
	313	205	112	32.6	17.7	
	382	260	158	43.4	22.0	
17	298	192	109	36.1	17.9	2 AMNH; 1 ANSP; 1 MCZ
	280	182	103	32.4	16.0	
	311	210	129	39.5	18.9	
<i>U. a. californicus</i>						
14 ' ' '	365	227	129	38.0	20.2	1 MCZ; 1 MVZ; 1 ANSP
	339	203	115	35.5	19.6	
	388	240	149	40.5	21.7	
5 .	319	194	108	36.3	19.1	1 MVZ; 1 CAS
	312	190	103	35.5	18.0	
	330	197	111	37.0	20.1	
<i>U. a. dalli</i>						
11 ' ' '	359	238	130	35.4	18.7	1 MCZ
	327	203	114	31.4	16.6	
	396	270	156	40.0	21.4	
6	328	206	110	34.2	18.2	1 MVZ
	309	192	103	31.1	17.8	
	342	217	113	36.2	18.8	
<i>U. a. gaus</i>						
47 ' ' '	397	264	152	38.1	20.6	7 AMNH; 3 MVZ; 3 MCZ; 3 B&C
	362	201	126	33.0	18.8	
	424	296	173	42.3	22.1	
25	346	217	123	34.9	19.3	5 AMNH; 1 MVZ; 1 MCZ
	322	206	110	32.0	17.7	
	366	240	133	37.4	21.6	
<i>U. a. horribilis</i> from Yukon						
56 ' ' '	332	216	123	37.2	19.4	3 KU; 2 NMC; 1 ANSP
	303	197	110	33.3	17.3	
	360	241	143	45.9	23.0	
35 .	291	184	106	33.7	17.7	1 NMC; 1 MCZ; 1 ANSP
	270	165	98	29.0	15.7	
	311	212	119	37.7	19.8	
<i>U. a. horribilis</i> from NE British Columbia						
3 ' ' '	338	223	128	37.9	19.0	
	332	215	126	36.9	18.2	
	343	228	130	39.9	19.8	
3 .	303	182	108	33.2	17.5	1 MCZ
	297	178	104	31.6	17.1	
	315	188	113	35.2	17.9	
<i>U. a. middendorffi</i> from Kodiak Island						
31 ' ' '	393	284	164	38.2	20.0	8 AMNH; 3 B&C; 3 CAS; 2 KU; 1 T. Dolan, III
	350	243	134	34.7	17.9	
	415	319	189	42.5	21.8	
16	335	227	128	35.2	18.3	6 AMNH; 1 MVZ; 1 CAS; 1 KU; 1 MCZ
	314	209	119	33.3	17.6	
	363	243	142	37.9	19.4	
<i>U. a. sitkensis</i> from the area circumscribed by marginal records provisionally mapped as <i>sitkensis</i>						
113 ' ' '	359	240	131	35.7	18.8	5 CM; 5 MVZ; 1 AMNH; 1 ANSP
	318	198	110	30.5	16.5	
	398	270	160	40.3	20.5	
94 : :	313	200	116	33.6	17.5	6 MVZ; 2 AMNH; 2 MCZ
	283	173	101	28.8	15.0	
	341	223	126	36.6	20.8	
<i>U. a. stikeensis</i> from NW British Columbia						
26 ' ' '	340	222	123	36.2	18.7	2 CAS; 1 AMNH; 1 MVZ
	302	193	111	31.6	16.5	
	372	259	137	42.6	21.7	
23 : :	304	190	111	34.4	17.8	2 AMNH; 1 NMC
	285	175	102	31.3	16.6	
	319	205	120	38.0	19.0	

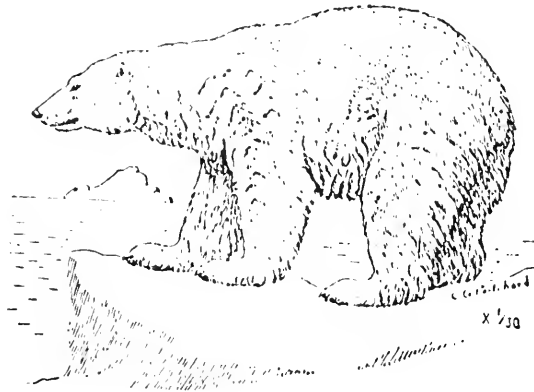
* Measured from sphenoid floor of braincase above posterior margin of palate to highest point on braincase.

** Remaining specimens are from USNM

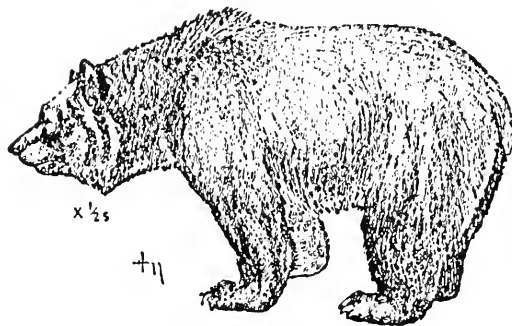
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Ursus maritimus
Polar Bear



Ursus arctos-group
Big Brown and Grizzly Bear



Ursus americanus
Black Bear

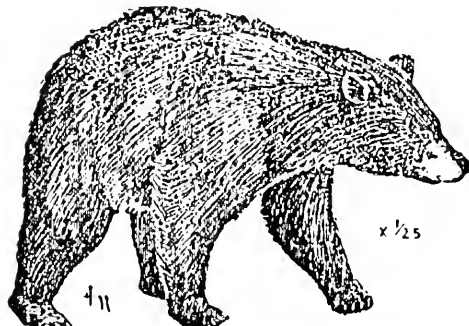


FIGURE 1. The Holarctic and Nearctic bears (genus *Ursus*).

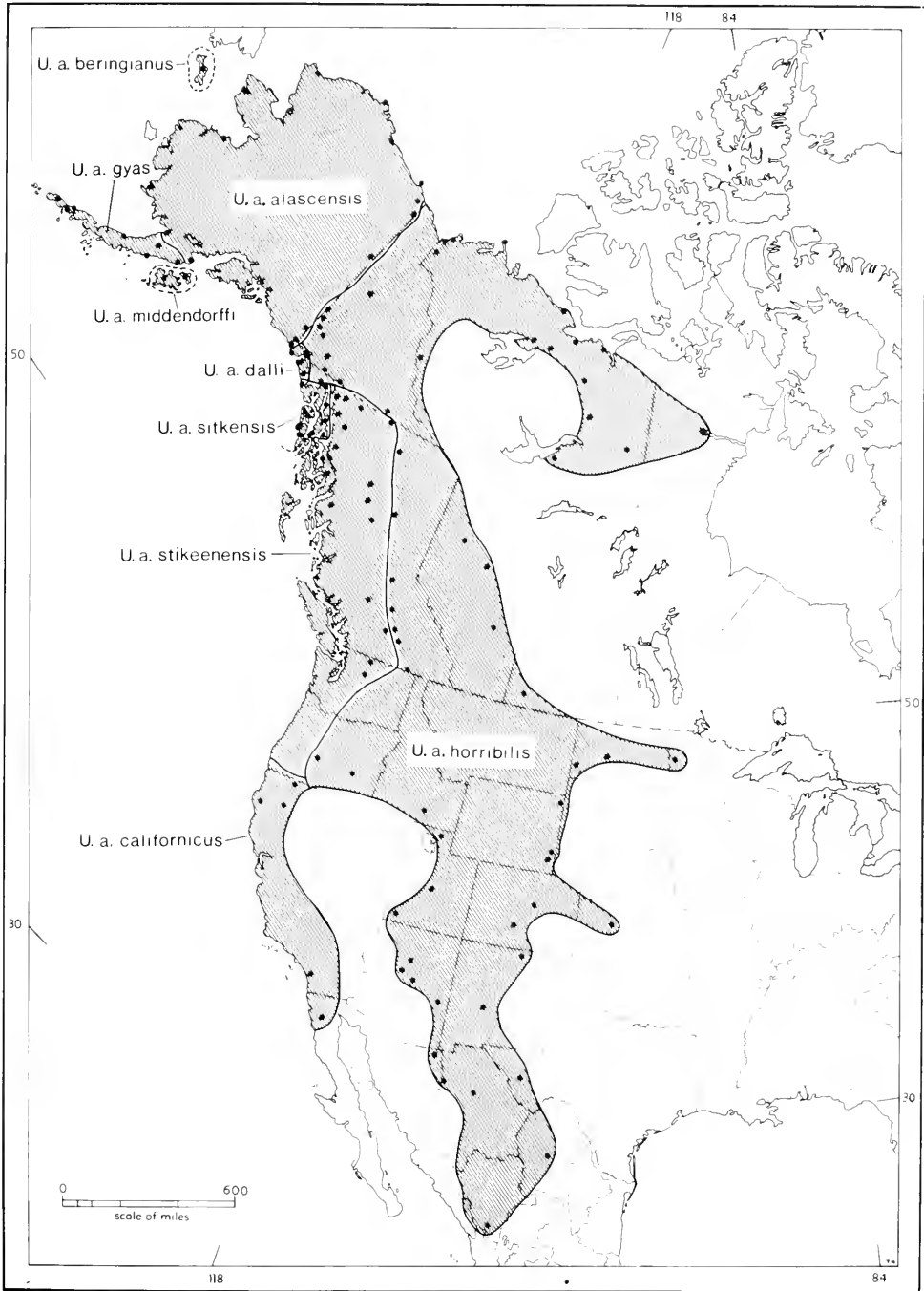


FIGURE 2. Subspecies of *Ursus arctos* in North America.

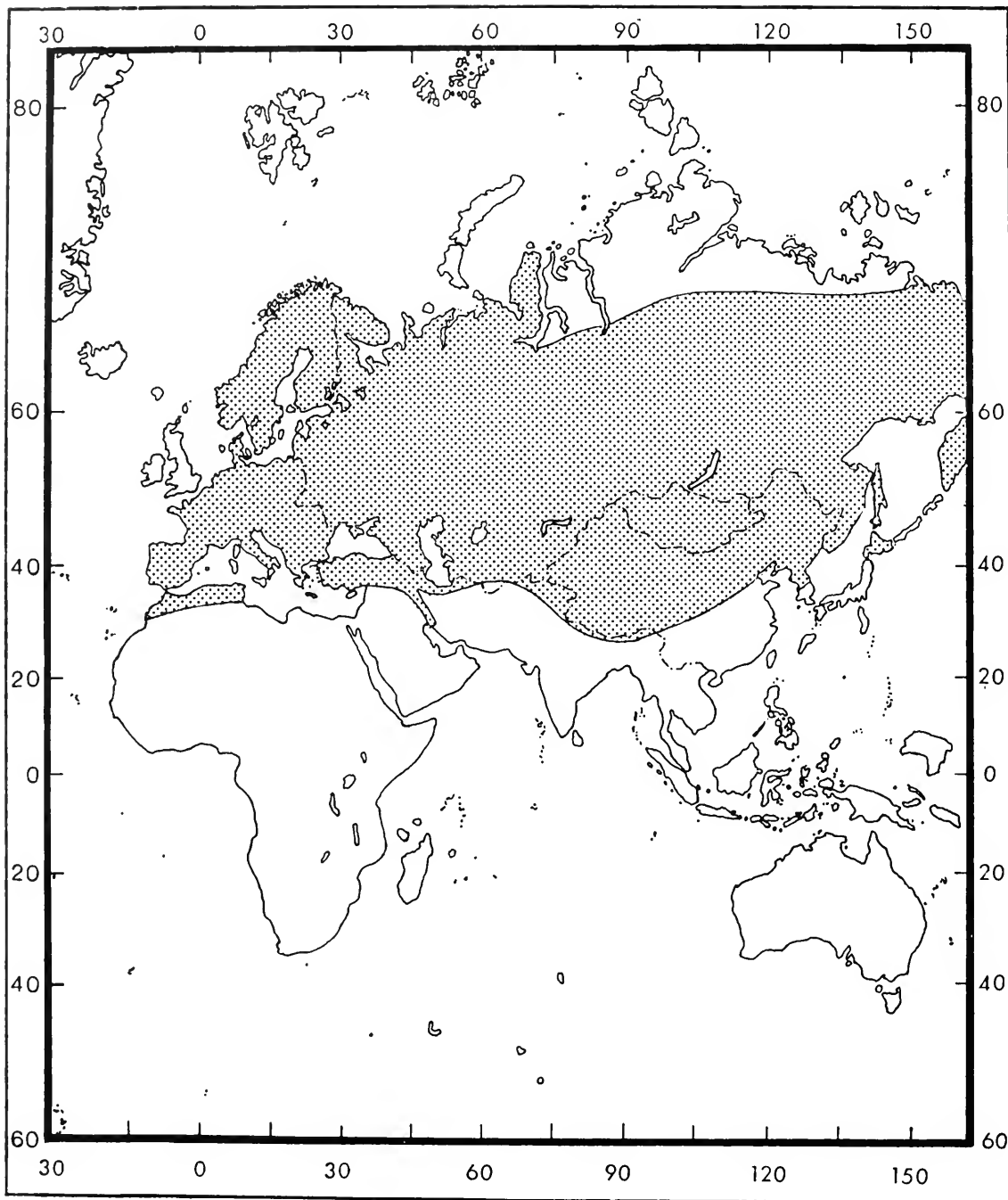


FIGURE 3. Geographic range of *Ursus arctos* in Eurasia at about 1400 B. C.

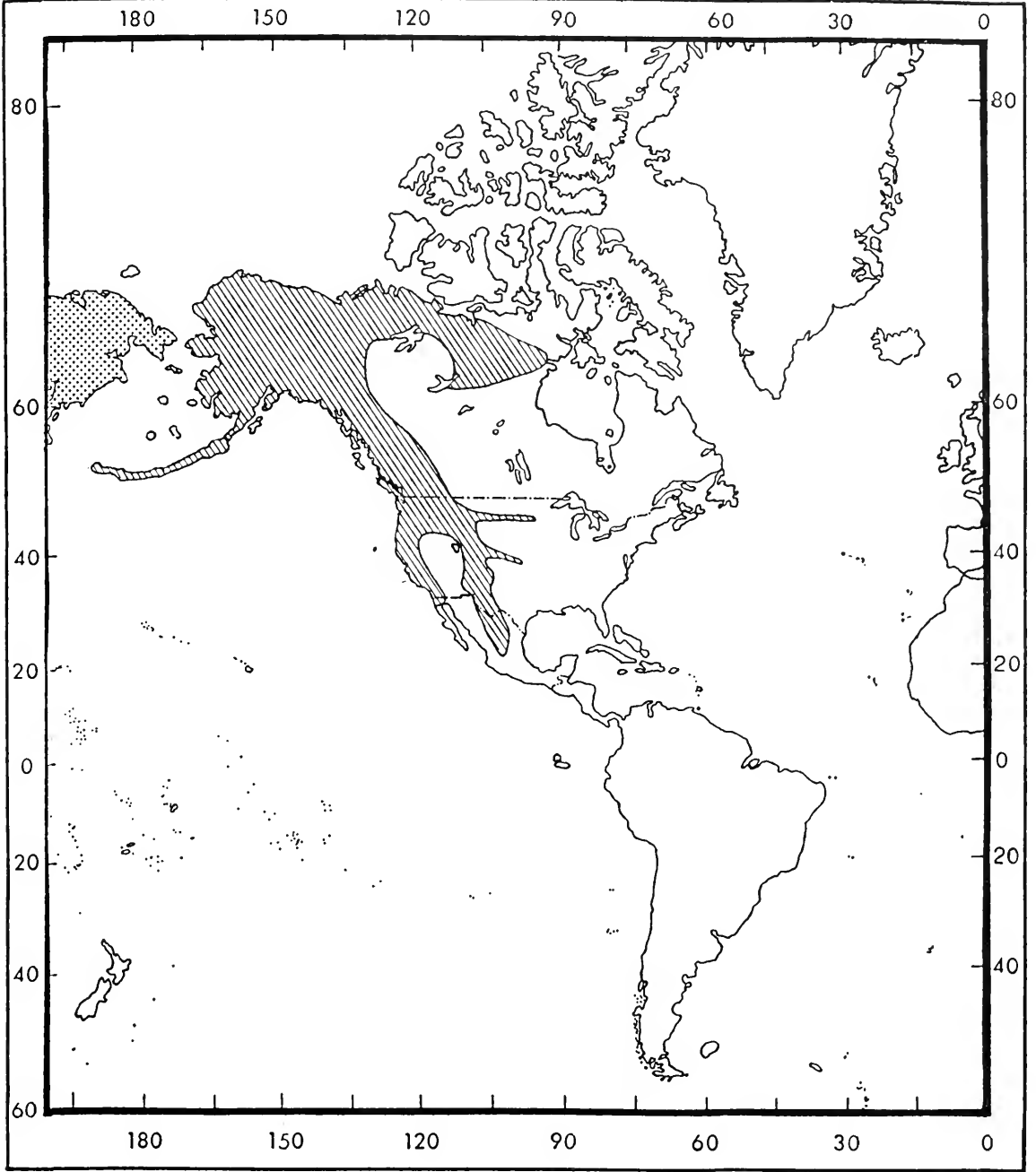


FIGURE 4. Geographic range of *Ursus arctos* in North America and adjoining part of Asia at about 1400 B. C.

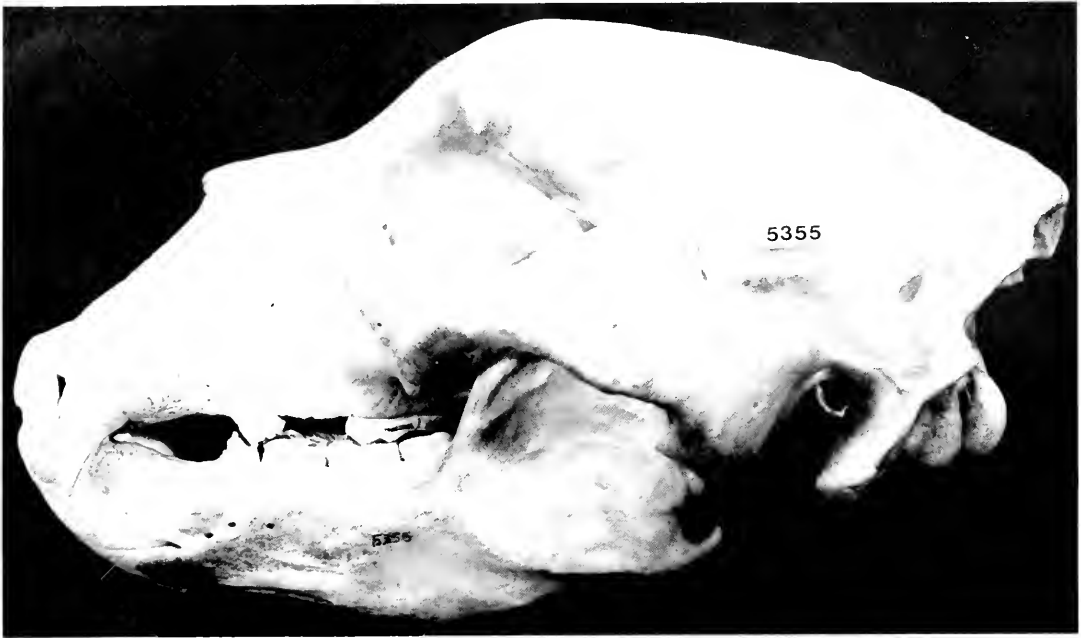


FIGURE 5. *Ursus arctos middendorffi* Merriam, C. H., 1896:69. Collected by Ross Beach. ♂ ad. No. 5355 Fort Hays Kansas State College Collection of Vertebrates. From Upper Spiridon Lake, Kodiak Island, Alaska. $\times \frac{1}{3}$ natural size (condylobasal length of skull is 395 mm).



FIGURE 6. *Ursus arctos gyas* Merriam, C. H., 1902:78. Collected by Colonel Colby. ♂ ad. No. 135502 Amer. Mus. Natural Hist. From Canoe Bay, Alaska Peninsula. $\times \frac{1}{3}$ natural size (condylobasal length of skull is 398 mm).

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