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Lepus arcticus.

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Lepus arcticus Ross, 1819

Arctic Hare

Lepus arcticus Ross, 1819:151. Type locality Possession Bay, Bylot Island, lat. 73°37′N (Baffin Land, southeast of Cape Bowen—Elliot, 1905:358).

Lepus glacialis Ross, 1819:170. Type locality Possession Bay, Bylot Island, lat. 73°37′N.

Lepus groenlandicus Rhoads, 1896*a*:237. Type locality "Robinson's Bay, North Greenland" (Robertson's Bay (N. lat. 78°), Greenland—Elliot, 1905:359).

Lepus labradorius Miller, 1899:39. Type locality "Fort Chimo, Ungava, Labrador."

CONTEXT AND CONTENT. Order Lagomorpha, Family Leporidae, Subfamily Leporinae, Genus *Lepus*, Subgenus *Lepus* (Hall, 1981; Lyon, 1904). There are ca. 19 species of *Lepus* (Honacki et al., 1982). Nine subspecies of *L. arcticus* are recognized (Hall, 1981):

L. a. andersoni Nelson, 1934:85. Type locality "Cape Barrow, Coronation Gulf, Northwest Territory, Canada."

L. a. arcticus Ross, 1819:151, see above (*glacialis* Ross is a synonym).

L. a. bangsii Rhoads, 1896*a*:236. Type locality "Codry [=Codroy], Newfoundland."

L. a. banksicola Manning and Macpherson, 1958:8. Type locality "Banks Island, at 71°35′N., 123°30′W."

L. a. groenlandicus Rhoads, 1896*a*:237, see above (*persimilis* Nelson is a synonym).

L. a. hubbardi Handley, 1952:199. Type locality "at 350 feet elevation, near Cherie Bay, 5 miles NE of Mould Bay Station, Prince Patrick Island, District of Franklin, Northwest Territories, Canada (76°20N. lat., 119°08W. long.)."

L. a. labradorius Miller, 1899:39, see above (*canus* Preble is a synonym).

L. a. monstrabilis Nelson, 1934:85. Type locality "Buchanan Bay, Ellesmere Island, northern Canada."

L. a. porsildi Nelson, 1934:83. Type locality "near Julianehaab, Greenland (60°20′N. lat.)" [should be 61°20′N—Poole and Schantz, 1942:209].

DIAGNOSIS. *Lepus arcticus* (Fig. 1) is geographically separated from *L. othus* and *L. timidus* (Anderson, 1974). *L. a. andersoni* is similar to *L. o. othus*, but averages smaller, has grayish rather than brownish summer pelage, the upper incisors are less strongly recurved, the rostrum is shallower, and the upper molars are not as heavy. Compared with *L. a. monstrabilis*, the skull of *L. o. othus* is similar in size, but the incisors of *L. o. othus* are strongly recurved, the rostrum is heavier, and the upper toothrow is longer. The skull of *L. o. poadromus* is similar in size to that of *L. a. andersoni*, but the nasals average smaller and the upper toothrow is longer (Howell, 1936).

Although northern subspecies of *L. arcticus* are larger, body size in some other populations is about that of *L. timidus*; also, *L. timidus* is darker and more brownish (less grayish) in summer pelage than *L. arcticus* (Howell, 1936). Compared with *L. americanus*, the fur of *L. arcticus* is white all the way to the base (Peterson, 1966). The skull of *L. arcticus* (Fig. 2) has a relatively broad braincase and a pronounced depression in the anterior region of the frontals (Howell, 1936).

GENERAL CHARACTERS. The upperparts of *L. arcticus* are gray in summer in southern subspecies and white in the others. In winter, all subspecies are white, except for the black tips of the ears (Bittner and Rongstad, 1982; Hall, 1951). The ears are blackish in front and white behind, with a subterminal whitish band isolating a black tip (Nelson, 1909).

On Axel Heiberg Island, Northwest Territories, average mass of adult males is 4.1 and 4.0 kg for summer and winter, respectively, and 4.5 and 3.9 kg for females (Parker, 1977). On Ellesmere Island, Northwest Territories, mass is 4.0 kg; range, 2.5–4.5 kg (Feilden, 1877). On Southampton Island, mass of one Arctic hare was 4.8 kg (Sutton and Hamilton, 1932). In Greenland, mass is 3.2–6.3 kg (Richardson, 1829). Other estimates of mass are 4.6–6.8 kg (Audubon and Bachman, 1852; Garland, 1983; Hall, 1981).

Average measurements (in mm) of *L. a. andersoni*, *L. a. hubbardi*, *L. a. labradorius*, and *L. a. monstrabilis*, respectively, are: total length, 633, 626, 558, 607; length of tail, 61, 100, 45, 61; length of hind foot, 159, 158, 153, 146; length of dried ear, 76, 88, —, 110; greatest length of skull, 100.9, 110.7, 95.4, 106.8; basilar length, 76.0, 80.6, 72.2, 79.3; diagonal length of nasals, 41.1, 42.8, 40.2, 41.5; greatest width of nasals, 21.5, 22.2, 20.4, 21.1; depth of rostrum, 23.8, 25.3, 22.2, 24.0; cranial breadth, 35.5, 35.6, 35.3, 36.4; zygomatic breadth, 50.2, 51.1, 48.5, 50.7; length of maxillary toothrow, 18.8, 20.2, 16.7, 18.4 (Handley, 1952; Howell, 1936). Average measurements (in mm) of *L. a. arcticus*, *L. a. bangsii*, and *L. a. groenlandicus*, respectively, are: total length, —, 596, 664; length of tail, —, 63, 73; length of hind foot, —, 164, 146; length of dried ear, 80, 81, 75; basilar length of skull, 74.4, 73.7, 78.0; length of nasals, 42.5, 39.9, 40.0;

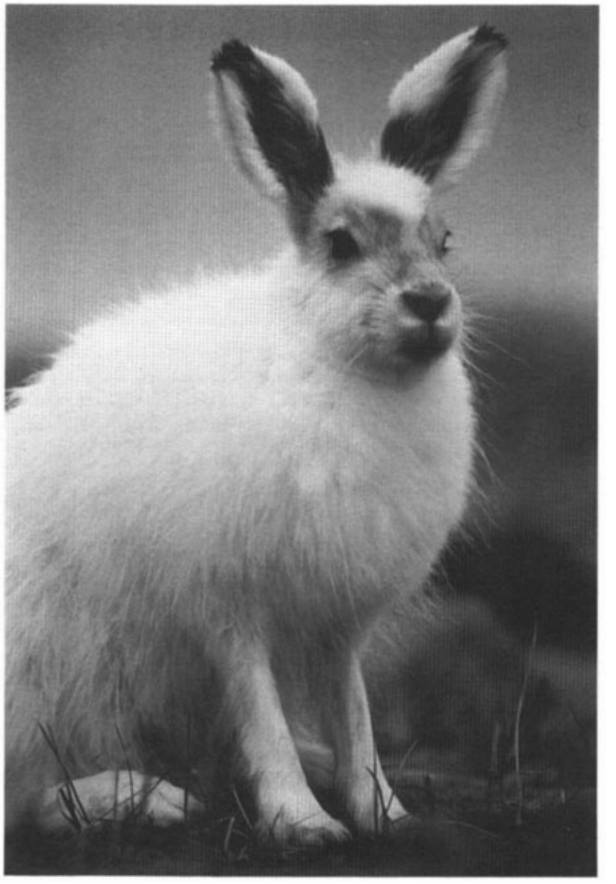

FIG. 1. *Lepus arcticus* on Ellesmere Island, Northwest Territories. Photograph courtesy of L. D. Mech.

FIG. 2. Dorsal, ventral, and lateral views of cranium, and lateral view of mandible of *Lepus a. arcticus* from Pangnirtung Baffin Land (sex unknown, Museum of Vertebrate Zoology, University of California, Berkeley 77351). Greatest length of cranium is 95.3 mm. Photographs by T. H. Henry.

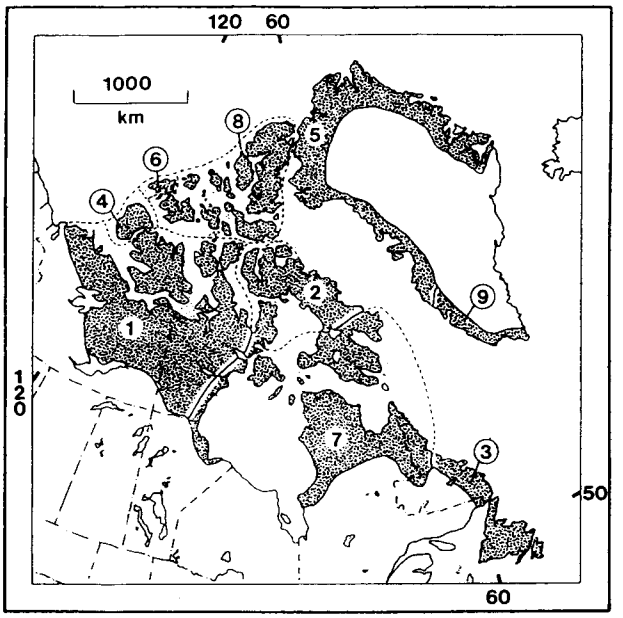

FIG. 3. Distribution of *Lepus arcticus* in North America (Hall, 1981): 1, *L. a. andersoni*; 2, *L. a. arcticus*; 3, *L. a. bangsii*; 4, *L. a. banksicola*; 5, *L. a. groenlandicus*; 6, *L. a. hubbardi*; 7, *L. a. labradorius*; 8, *L. a. monstrabilis*; 9, *L. a. porsildi.*

breadth of rostrum above premolars, 26.9, 26.3, 27.7; depth of rostrum in front of premolars, 27.6, 22.3, 23.8; interorbital breadth, 32.8, 31.0, 34.1; parietal breadth, 34.7, 34.0, 35.5; diameter of bullae, 12.3, 11.3, 12.5 (Nelson, 1909).

The skull is robust (Fig. 2). The posterior lobes of the supraorbital processes stand out prominently from the skull, but the anterior lobes are represented only by slight notches. The zygomatic arches have two distinct flattened dorsal planes (Banfield, 1974). The average ratio of measurements to length of skull are: greatest width of skull, 0.52; length of nasals, 0.43; width behind nasals, 0.22; width before nasals, 0.22; distance from front of upper incisors to molars, 0.33; distance from front of upper incisors to posterior margin of palate, 0.44; length of upper molars, 0.19; distance between upper molars, 0.19; length of lower jaw, 0.73; height of lower jaw, 0.50 (Coues and Allen, 1877).

The skulls of *L. a. arcticus* and *L. a. bangsii* are strong and massive. The rostrum is broad, deep, heavy, and slightly tapering, and the nasals are broad, heavy, and slightly arched. The frontal area is strongly depressed with a hump-like swelling on the crown immediately posterior to the depression. The supraorbital processes are rather small, irregularly rounded, triangular in form, stand high above the plane of the frontals, and project wing-like from the skull. The posterior ends of the postorbital processes form blunt points that make contact with bony processes on the squamosals in old animals. The anterior notches of the postorbital processes are broad, deep, and irregular, whereas the posterior notches are broad and ovate. The top of the braincase is depressed, with median and lateral ridges giving it an indistinct angular form. Premaxillaries form a shorter, stouter upper jaw compared with that of *L. a. groenlandicus*. The short, strong incisors are abruptly down-curving, and the molars are broad and heavy. The incisive foramina are broad posteriorly, and the postpalatal fossa is broad and deep. The bullae are comparatively small and flattened below, creating an oblong form transverse to the axis of the skull, and deeply embedded in bony tissue. The upper outline of the skull has two arches, one in front and one behind the depressed frontal area. The skull of *L. a. groenlandicus* differs from that of *L. a. arcticus* in that the premaxillaries taper anteriorly to a long narrow point, from which extend extremely long, slightly curved, and outreaching upper incisors, giving the upper jaw a slender beaklike form (Nelson, 1909).

Univariate analyses revealed clines of decreasing size in most of 21 cranial characters from the polar regions southward, although width of the jugal–maxillary ridge exhibited a reverse cline, and width of the orbital process of the maxilla varied irregularly among samples. Phenetic positions of samples in discriminant space were approximately congruent with their geographic locations. The larger size in colder climates may represent a thermoregulatory adaptation (Baker et al., 1978).

DISTRIBUTION. The Arctic hare is found (Fig. 3) north of the treeline in Canada to the northernmost point of land on Ellesmere Island, Northwest Territories, and also on the rock-strewn plateaus and mountains of eastern Newfoundland. In Greenland, the Arctic hare is common on most of the ice-free coastal region (Parker, 1977). It also occurs on tiny islands off Greenland that are accessible when ice is present (Manniche, 1910), and frequently is found on ice 3–5 km from land (Armstrong, 1857). *L. arcticus* occurs at elevations from sea level to 900 m (Soper, 1928, 1944).

FOSSIL RECORD. The genus *Lepus* had its origin in the late Pliocene or early Pleistocene in the Holarctic (Dawson, 1967). A fossil of an unidentified *Lepus* ca. 2×10^6 years old was found in the Pliocene–Pleistocene Kap København Formation of eastern Greenland (Bennike et al., 1989). Remains of *L. arcticus* have been

found in a 34,000-year-old deposit on Banks Island, Northwest Territories (Maher, 1968), in a ca. 1,200-year-old Eskimo site in northern Greenland (Bennike et al., 1989), and in a Norse refuse heap in Greenland (Degerböl, 1929). Sangamonian and Wisconsinan fossils also have been found in Alaska, now in the range of *L. othus* (Kurtén and Anderson, 1980). *L. a. banksicola* so resembles *L. othus* in size and color as to suggest a north Beringian origin. *L. a. banksicola* in turn may be ancestral to *L. a. andersoni*. The eastern forms of *L. arcticus* may have had a common southern origin (Macpherson, 1965). Fossils resembling *L. arcticus* were found at Canyon Creek roadcut, a late Rancholabrean site in Alaska, but these remains may be of *L. othus* (Weber et al., 1981). Fossils from Charlie Lake Cave, northeastern British Columbia, dated at 10,700–10,000 years ago closely resemble *L. arcticus*, but may represent *L. townsendii* (Driver, 1988).

FORM AND FUNCTION. Guard hairs have an average transmittance of radiation of 0.54, a reflectance of 0.95, and the hair has a white and matte appearance (Øritsland and Ronald, 1978). The white coloration of the Arctic hare may prevent excessive heat gain during the day (Hamilton, 1973). Winter pelage is long and soft (Pedersen, 1962). During molt, *L. arcticus* removes loose tufts of hair by rolling in snow (Manniche, 1910). At this time of the year, there are loose tufts of hair scattered on the ground (Johnsen, 1953) or clinging to vegetation (Banfield, 1974). An Arctic hare sitting on the snow or near a patch of snow is almost invisible (Pedersen, 1962).

Molt to summer pelage begins on the face and feet (Sutton and Hamilton, 1932), then on the ears, legs, and shoulders, with the back molting last. Females appear to molt earlier than males (Banfield, 1974).

On Southampton Island, the Arctic hare changes its color with the seasons. In late summer, it loses its blue-gray coat, becoming white first on the underparts, but retaining a brown area down the middle of the back until about the time of the first deep snows. Winter pelage is silken white with a yellowish gloss, except for the black tips of the ears. Summer pelage appears in late April, May, or June. The inside of the skin is blotched with gray during the molt (Sutton and Hamilton, 1932).

Lepus a. labradorius on Baffin Island has a grayish-brown coat for only ca. 2.5 months (Soper, 1944). The color change becomes noticeable in late June, and hares are at their darkest for a brief time in early August. By late August, they already are rapidly changing to the white winter coat, and by early September are completely white again (Watson, 1962). From the viewpoint of protective coloration, the hare may be at a disadvantage, for the first permanent snows may not arrive until the 2nd week of October (Soper, 1944). Summer molt begins before dark patches are visible, and white winter pelage is growing underneath in autumn when the animal still is dark. White hares are seen in every month, but there is no proof that some stay white all summer (Watson, 1962).

On Ellesmere Island, spring molt is later and carries on into July. The summer coat is carried only to mid-September, when the autumn molt to the silky white winter pelage has commenced. In this population, the ears seem to molt first, followed by the belly, flanks, shoulders, and back. By the end of October, the face has lost its grizzled appearance and becomes snow-white (Banfield, 1974).

Lepus a. groenlandicus has a heavy wool-like coat of fur. In spring molt, old pelage is so matted that it is shed in large patches, leaving shreds and ends hanging to the still attached portions, thus giving animals a rough and ragged appearance (Nelson, 1909).

As in all *Lepus*, the dental formula is i 2/1, c 0/0, p 3/2, m 3/3, total 28 (Nowak and Paradiso, 1981). *L. arcticus* has highly modified incisors that are used to feed on small snow-covered Arctic plants, and are diagnostic of Arctic-dwelling hares (Bittner and Rongstad, 1982; Degerbøl and Braestrup, 1934). The incisors are white and four-sided. The upper ones have a conspicuous, but rather shallow, groove near their inner margins anteriorly, and another groove on their sides. The posterior or supplemental upper incisors have two grooves on their posterior faces, giving them a prismatic form. The cutting edges of the incisors are nearly even (Richardson, 1829). The sulcus on the upper incisors is filled with an indurated cementum, which obliterates the groove; the sulcus is apparent only as a broad yellowish streak, set off sharply from the white of the rest of the incisor (Sutton and Hamilton, 1932). The protruding incisors of Arctic hares from northern Greenland are likely related to the character of the food procurable in extreme northern localities, as compared with that of the more southern areas, where incisors are not as protruding. In northern Greenland, plants are not only reduced in size and number of species, but the difficulty of procuring food is increased by the depth and long continuance of snow (Rhoads, 1896*b*).

One Arctic hare from Ellesmere Island had a distorted skull; nasal bones were twisted to the right side and the incisors of the upper jaw were deflected in the same direction. In the lower jaw, only the left incisor was developed, and that protruded in a nearly horizontal direction. The animal had a mass of only 2.5 kg, but otherwise was in good condition (Feilden, 1877).

The large feet of *L. arcticus* are padded with a heavy, soiled-yellowish brush (Banfield, 1974). The claws on the front feet are dark brown, long, and curved. The hind claws are broader than the foreclaws, dark at the roots, and pale at the tips (Richardson, 1829). The claws are strong and well adapted to digging through snow (Sutton and Hamilton, 1932), especially so in *L. a. groenlandicus* (Nelson, 1909).

The eyes are yellowish-brown, darkest along the outer edges, and the pupils are slightly oval (Sutton and Hamilton, 1932). Mass of the eye lens is useful for estimating the age of *L. arcticus* (Hearn and Mercer, 1988).

Lepus arcticus has 2.5 g of fat/100 g fat-free body mass, and 91.2 g of fat in the body; the caloric value of fat at an average body mass of 3,809 g is 848.2 kcal (Thomas, 1987). Kidney mass in winter is 11–12% lower for males and 33% lower for females than occurs in summer. Overall body mass and heart mass also are significantly less in winter than in summer. This may be a physiological response to a decrease in forage quality and quantity, and to a reduction in basal metabolic rate (Parker, 1977).

Basal metabolic rate is 0.36 $cm^3\ O_2\ g^{-1}\ h^{-1}$; minimal thermal conductance is 0.010 $cm^3\ O_2\ g^{-1}\ h^{-1}\ °C^{-1}$, and normal body temperature is 38.9°C. Daily energy consumption between ambient temperatures of −24.0–12.5°C is 262–133 kcal. A low surface area to volume ratio and effective insulation allows *L. arcticus* to maintain a normal body temperature with a low basal metabolic rate; such a reduction of metabolism is energetically adaptive for a species living exclusively in a cold and relatively barren habitat (Wang et al., 1973).

The fecal pellets are roughly spheroidal, flattened, and are 19 by 17 by 11 mm (Harper, 1956). Other than humans, no other animal is known to eat the feces of the Arctic hare. When the feces are dry, they are light and the wind can carry them far over the ice. The feces also have the property of retaining their form even when wet, and can float across a lake without disintegrating (Freuchen, 1935).

The penis is exposed to the air during the mating season. It is dry and shrivelled, resembling the navel string of young mammals, yet it retains a passage through which urine can pass (Seton, 1929).

ONTOGENY AND REPRODUCTION. Male gonads enlarge in April and regress to the non-breeding state by mid-September, indicating the potential length of the breeding season. Mating usually occurs in April and May (Banfield, 1974). In Newfoundland, the average date of conception is 19 April (Hearn et al., 1987). On Axel Heiberg Island, ovulation occurs ca. 1 May and the gestation period is ca. 53 days (Parker, 1977).

Young are born in a nest, which may be a simple depression in the tundra among mosses and grasses (Aniśkowicz et al., 1990; Banfield, 1974), or the nest may be found among rocks in rather high places, sometimes on offshore islands. Usually, the nest is placed under or between rocks, in a well-sheltered place, and is lined with dry grass, moss, and a considerable quantity of fur from the mother (Sutton and Hamilton, 1932).

Young usually are born in late May, June, or July (Bittner and Rongstad, 1982; Freuchen, 1935). Well-developed fetuses have been observed on 23 May (Banfield, 1974), and on Prince of Wales Island, Northwest Territories, near-term fetuses were present on 29 June (Manning and Macpherson, 1961). Litters usually are born by 10 June on the mainland, but often not until the end of June in northern Greenland and Ellesmere Island (Banfield, 1974). Pregnant females occur in Greenland from 11 May to 6 June (Johnsen, 1953), although one was observed on 11 August (Jensen, 1909). In Newfoundland, average date of parturition is 8 June (Hearn et al., 1987). On Axel Heiberg Island, the peak of births is ca. 20 June. In the Canadian Arctic, births usually occur in late June (Parker, 1977).

Compared with most species of *Lepus*, litter size is larger in

the *L. arcticus–L. othus–L. timidus* group (average, ca. 5–6), number of litters per year are fewer (average, ca. 1–2), and average annual temperature is lower (average ca. −5°C—Flux, 1981). *L. arcticus* has two to eight young per litter (Audubon and Bachman, 1852; Bittner and Rongstad, 1982; Feilden, 1877; Freuchen, 1935; Hall, 1951; Macpherson and Manning, 1959; Manniche, 1910; Sutton and Hamilton, 1932), with an average of ca. 5.4 (Banfield, 1974). In Newfoundland, litters average 3.0 young (Hearn et al., 1987). On Axel Heiberg Island, average litter size, as inferred from counts of corpora lutea, is about five. Right and left ovaries contained an average of ca. 3.3 corpora lutea each. Corpora lutea measured ca. 2.5 by 1.5–3.0 by 3.0–5.0 mm (Parker, 1977). In Greenland, the number of fetuses usually is 5–8, but one female on 12 August contained only one large fetus (Johnsen, 1953).

Most females probably bear only one litter a year (Aniśkowicz et al., 1990; Banfield, 1974; Freuchen, 1935; Hearn et al., 1987; Sutton and Hamilton, 1932), but the occurrence of lactating females as late as 25 August suggests that some females may bear a second litter (Banfield, 1974). *L. arcticus* produces two or three litters per year (Parker, 1977), and lactating females occur throughout July and August (Jensen, 1909; Johnsen, 1953; Manniche, 1910; Manning, 1943).

In Greenland, a near-term fetus was blackish-brown on all upperparts and outsides of the extremities (Richardson, 1829). Near-term fetuses from Prince of Wales Island had dorsal hair ca. 10 mm in length. The hairs were black at the base and for ca. 33% of their length. The middle 33% was pale gray with a slight orange tint, and the remaining 33% of length of hair was black. The total effect was mottled gray. The orange tint was darkest on the head and almost absent on the rump. To the side and above the nose was a semicircle of hair lacking, or almost lacking, black pigment. There was an orange patch on the inner side of the ears below the black tip. On the belly, chin, and upper throat, hair was white and rather scant. A band of hair 25–30 mm wide, similar to that on the back, but with less black tipping, crossed the upper chest and lower throat (Manning and Macpherson, 1961).

Young are gray, and flatten out on the ground at the first sign of danger, with eyes closed and ears pressed tightly to the back (Freuchen, 1935). During the first 2–3 days, the mother does not leave the young; even when there is great danger, and she will defend them against an adversary of far superior strength. By the 3rd day, young are able to protect themselves. When danger approaches, they slink away into hiding places among stones. Sometimes they gather closely, one against the other, with their heads in the center forming a rosette pattern, resembling a patch of pebbles (Pedersen, 1962). The coloration of young hares and their habit of remaining motionless behind stones make their detection difficult (Parker, 1977).

Juvenile pelage has more black than does the summer pelage of the adult. The guard hairs are entirely black and short over the forehead, and black and long with white tips over the upper portion of the body. Most of the underparts are white, and the cheeks are pale buff. The upperparts are blackish gray and are darker than those of the adult. The tips of the ears are black, and the tail, posterior margin of the ears, and a spot on the lower lip are white (Peterson, 1966).

The top of the head in *L. a. groenlandicus* in juvenile pelage has various shades of brownish buff, grizzled with whitish tips to the hairs. The sides of the head are buffy whitish. The entire upperparts of the neck and body vary from dull whitish with a slightly buffy suffusion, to dull-whitish buff, darkest on top of the back and palest on the sides. Feet and legs are similar in color to sides of the body. The underparts are pure white. The fronts of the ears vary from dingy yellowish-buff to dull-buffy whitish; insides of the ears are similar, but paler; backs of the ears are white, and the tips have a small dusky point. The top of the head and the ears are darker than the back (Nelson, 1909).

Young that are about one-third grown have whitish coats (Nelson, 1909). By late July, young are nearly as large as their parents, and are white, except for the tips of the ears, which are mouse-gray; a small streak of the same color passes down from the apex of the head to the snout (Feilden, 1877).

When one-half grown, young often will run, but they quickly tire. A young Arctic hare stretches before beginning to run again (Freuchen, 1935). On Axel Heiberg Island, young rapidly disperse to spend the first 2 weeks of life hiding behind rocks, showing themselves only when nibbling on vegetation or when nursing. By the 3rd week of life, young hares assume their gray summer pelage and form nursery bands numbering up to 20 animals. Although adult females still are in the area, and occasionally within a herd of young, nursing may not occur. In mid-July, young hares forage mainly on vegetation, although some milk also may be consumed (Parker, 1977). Often, at the beginning of autumn, a number of litters unite into groups composed entirely of young, but by the onset of winter are adult in size and mingle with their elders (Parker, 1977; Pedersen, 1962).

The young leave the mother at an age of 2–3 weeks (weaning occurs several weeks later), about the time their coats turn white, but they remain together for some time (Pedersen, 1962). Females nurse their young at average intervals of 18–20 h. The young arrive near the nursing site singly or in groups, and congregate 20–90 min before their mother arrives. Nursing commences immediately after the arrival of the female. The duration of each nursing bout is short (range, 1–4 min). Occasionally, one or several young arrive late and miss the nursing. In several instances (when the young are up to 4 weeks old), the female allows a young who arrives late to begin nursing as much as 9 min after the group nursing has ended. In one instance, young were allowed to renurse. The female ends the nursing bout by hopping away. During the first several weeks after birth, the female leaves the young immediately after nursing, but remains at the nursing site or close to it. As the young become older, the female quickly leaves the immediate vicinity of the nursing site when nursing stops. In early summer, the young hares rapidly disperse after nursing, but stay near the nursing site, gradually increasing their range to a maximum of ca. 1 km in mid-August. Young gradually increase the amount of time they spend accompanying the female until, during August, they remain with her for up to 1.9 h after nursing. Young hares may remain together between nursing bouts. The young are weaned at an age of 8–9 weeks (Aniśkowicz et al., 1990).

During their 1st month of life, average gain in mass is 45–50 g/day (Parker, 1977). Young begin their breeding cycle as yearlings (Banfield, 1974). The criterion commonly used for distinguishing between young and adults is the degree of development of the anterior portion of the supraorbital process and of the notch formed by it (Manning and Macpherson, 1958).

Annual survivorship of adults is 0.78, and for 1st-year juveniles is 0.15. One-year-old individuals comprised 18% of adults in May. The sex ratio is biased toward males (Hearn et al., 1987). There is no information on longevity (Banfield, 1974).

ECOLOGY. The Arctic hare is widely distributed in tundra regions of northern Canada and Greenland (Fig. 3), primarily beyond the tree line (Bittner and Rongstad, 1982; Hall, 1981). On the Ungava Peninsula, *L. arcticus* is restricted to the Arctic life zone (Harper, 1961). Conditions are more favorable for it farther north; its numbers are greater there, it is larger, and its fur is much finer than farther southward (Freuchen, 1935). It is highly adapted to cold and barren habitat. Throughout most of the range, it spends the summer north of the tree limit, but in winter it may penetrate >160 km into the northern border of timber (Bittner and Rongstad, 1982).

On Axel Heiberg Island, *L. arcticus* occurs in Mokka Fiord Valley. The slopes west of the valley support *Salix arctica, Luzula nivalis, Poa, Alopecurus alpinus, Arctagrostis latifolia, Dryas integrifolia, Saxifraga*, and a variety of other forbs. Gravel ridges support a wide variety of forbs and several grasses; *Carex stans, Eriophorum*, and mosses dominate meadows. The gravel-strewn and rock-strewn slopes east of the valley support occasional tufts of grasses (*Poa* and *Puccinellia*), *Carex repestris, Kobresia myosuroides*, and scattered mats of *Salix arctica*. Occasional forbs include *Papaver radicatum, Oxyria digyna, Saxifraga oppositifolia*, and *Dryas integrifolia*. Lichens are common, but not abundant; dominant species are *Cetraria nivalis, C. cucullata, Thamnoilia vermicularis*, and *Parmelia*. An area occupied by Arctic hares on Ellesmere Island is dominated by *Salix arctica, Saxifraga oppositifolia*, and *Papaver radicatum*. Other common vegetation included *Dryas integrifolia, Ranunculus, Oxyria digyna, Cerastium alpinum, Melandrium affine, Draba, Saxifraga caespitosa, S. cernua, S. flagellaris, Alopecurus alpinus, Poa abbreviata, Puccinellia, Festuca*, mosses, and lichens (Aniśkowicz et al., 1990). On Ellesmere Island, average annual snowfall is 37.5 cm and total precipitation is 6.8 cm. Average daily winter temperatures are among the coldest in the Canadian Arctic; the average for November to March is −26.9°C (Parker, 1977).

The Arctic hare is the most characteristic animal of hilly and mountainous areas of southern Baffin Island, and is the most frequently encountered land mammal. It usually is more abundant in hills at the heads of sheltered coastal bays, and on lower slopes of mountains bordering fiords on the eastern side of the island (Soper, 1944). It also occurs in regions of low relief, and appears throughout the year to shun low, flat country. Essential requirements are that the country be broken, thereby affording sheltered situations where vegetation may grow during the short summer, and that there be acclivities and ridges that during winter will be wind swept and comparatively free of snow, thus permitting Arctic hares to reach vegetation (Soper, 1928). The abundance of *Salix*, a light covering of winter snow, and broken terrain providing adequate escape cover may explain high densities of Arctic hares on parts of Axel Heiberg and Ellesmere islands (Parker, 1977).

Lepus arcticus often is only abundant locally (Banfield, 1951). It may be rare for a number of years at a locality, then it suddenly is common (Banfield, 1974). Average intervals of peaks of population abundance are no longer than expected in random series, but the apparent spacing of major low periods in southern Greenland at ca. 10-year intervals is worthy of note (Keith, 1963).

In Newfoundland, the Arctic hare is restricted to Arctic alpine or exposed coastal barren areas, and there is no evidence that the number of Arctic hares has changed significantly since the 18th Century (Mercer et al., 1981). Density here is ca. 1 adult/km^2. In summer, the size of the home range of adult females (52–69 ha) averages ca. 50% that of adult males (116–155 ha). Movements increase in March and April with the onset of breeding activity. Food supply probably does not affect survival, because hares in May have kidney fat and relatively high levels of bone-marrow fat. Predation on juveniles may be responsible for low population densities (Hearn et al., 1987).

Lepus arcticus may be migratory. Most hares disappear during summer, apparently by migrating northward. This migration takes place no later than June, before the ice has gone from rivers that cross migratory paths. *L. arcticus* migrates southward in November (Harper, 1956). However, Banfield (1974) did not believe mass migrations were undertaken by *L. arcticus*.

Woody plants are the basic year-round food of the Arctic hare (Hansen and Flinders, 1969). It eats mosses, lichens (Sutton and Hamilton, 1932), buds and berries of *Empetrum*, and young blooms of *S. oppositifolia*; other foods are mountain sorrel (*Oxyria digyna*) and various kinds of grasses. It eats the leaves, buds, bark, and roots of *Salix* (Freuchen, 1935). It displays great diversity in summer diet, but mainly feeds on *Salix arctica*, *D. integrifolia*, and grasses. *S. arctica* is the main species consumed in all seasons and makes up 95% by mass of the winter diet (Parker, 1977). On Baffin Island, dwarf willows (*S. arctica* and *S. herbacea*) and crowberry (*Empetrum nigrum*) form the chief foods (Soper, 1928). In Greenland, *L. arcticus* eats *S. arctica* and *O. digyna* (Johnsen, 1953). Numerous fecal pellets were found around low patches of dwarf birch (*Betula*) and willows in the Keewatin area, Northwest Territories (Harper, 1956).

The Arctic hare will eat meat (Johnsen, 1953), including frozen fish (Sutton and Hamilton, 1932) and meat used as bait for traps (Freuchen, 1935). It regularly feeds on stomach contents of eviscerated caribou (*Rangifer tarandus*—Harper, 1956). In captivity, one Arctic hare ate pea soup, plum pudding, bread, barley soup, sugar, rice, and cheese (Audubon and Bachman, 1852). *L. arcticus* obtains water by eating snow (Freuchen, 1935; Manniche, 1910).

On Axel Heiberg Island, a herd of 250–300 hares spent the winter within an area of ca. 35 km^2. Their winter movements could be traced in March by the distribution of fecal pellets, remains of broken and uprooted willows, and trampled snow. An area used by *L. arcticus* in early winter becomes virtually unavailable for subsequent use by hares, muskoxen (*Ovibos moschatus*), or caribou. Loose snow cover is quickly compacted by hares, and the extreme temperature and wind abrasion create a firm layer that adheres to the ground. Although only a few centimeters thick, this layer becomes extremely hard (Parker, 1977).

Presumably in response to parasites, a female Arctic hare had scratched off patches of fur and cut the exposed skin with her claws (Parker, 1977). Parasites include: the protozoans *Eimeria exigua*, *E. magna*, *E. perforans*, and *E. sculpta* (Madsen, 1938); unidentified nematodes (Johnsen, 1953); the nematodes *Filaria* (Feilden, 1877) and *Oxyuris ambigua* (Hall, 1916); the lice *Haemodipsus lyriocephalus* and *H. setoni* (Ferris, 1951). The Arctic hare is host to an extraordinary number of fleas (Freuchen, 1935), including *Hoplopsyllus glacialis* (da Costa Lima and Hathaway, 1946; Holland, 1958; Johnsen, 1953), *Euhoplopsyllus glacialis* (Cotton, 1979; Holland, 1985), and *Megabothris groenlandicus* (Holland, 1985). *L. arcticus* has not been found infected with tularemia (Jellison and Parker, 1945), specimens from Greenland did not have *Trichinella* (Connell, 1949; Johnsen, 1953), and of 15 examined from Ellesmere Island, none contained the helminth *Dirofilaria scapiceps* (Bartlett, 1983). No internal parasites were found in *L. arcticus* on Axel Heiberg Island (Parker, 1977).

The geographic ranges of *L. arcticus* and *L. americanus* slightly overlap. *L. arcticus* occupies treeless barrens or tundra, whereas *L. americanus* inhabits forest (Fitzgerald and Keith, 1990). In Newfoundland, the replacement of *L. arcticus* by *L. americanus* may be an example of competitive exclusion (Cameron, 1958). However, the limited distribution of *L. arcticus* in Newfoundland may be the result of increased predation by lynx (*Lynx canadensis*) after *L. americanus* was introduced. The southern edge of its range may depend in part on availability of habitat affording escape, and abundnce of lynx (Bergerud, 1967). It is unlikely that interference competition with *L. americanus* is responsible for the current restriction of *L. arcticus* to barrens and tundra (Fitzgerald and Keith, 1990).

In behavioral trials, *L. arcticus* dominated *L. americanus*—even in trials where *L. americanus* had a greater mass or was in breeding condition and *L. arcticus* was not (Fitzgerald and Keith, 1990). In demographic studies, neither *L. americanus* nor *L. arcticus* was affected by sympatry with the other species. Survival, reproduction, recruitment, habitat use, size of home range, and change in mass through winter did not differ among single-species and mixed-species treatments. When forced to occupy habitat typical of *L. americanus* (forested areas), *L. arcticus* died from starvation in 1–3 months, after losses in mass of 20–30% and reductions of marrow fat to <15%. Such responses occurred during winter and early spring, regardless of whether *L. americanus* was present. In contrast, *L. arcticus* at similar densities in its typical barrens habitat maintained mass and survived well. Lack of suitable food during winter, rather than interspecific competition, apparently has been a major constraint on the ability of *L. arcticus* to populate forested regions of Newfoundland (Barta et al., 1989).

The Arctic hare may be an important competitor of muskoxen and caribou during winter when all three species feed on willows. Such competition would occur only where *L. arcticus* reaches high densities, as on Axel Heiberg and Ellesmere islands. Caribou and muskoxen are not as species-restricted as the Arctic hare in their winter diet. Caribou feed extensively on upland grasses and sedges, whereas the winter diet of muskoxen may contain a high proportion of lowland sedges (Parker, 1977). There was little overlap in the browse consumed by *L. arcticus* in Newfoundland compared with that consumed by moose (*Alces alces*). The Arctic hare utilized white birch (*Betula papyrifera*) as the primary food source, whereas moose used a variety of species, including white birch (Wood, 1974).

Mammals occurring in the same habitat as *L. arcticus* include *Lemmus trimucronatus*, *Dicrostonyx groenlandicus*, *Alopex lagopus*, *Canis lupus*, *Thalarctos maritimus*, and *Mustela erminea* (Bennike et al., 1989; Manning and Macpherson, 1961; Pedersen, 1930; Rasmussen, 1927; Smith and Foster, 1957). In Greenland, there is no significant predation on adult Arctic hares. *C. lupus* rarely hunts them, and *A. lagopus* catches them only rarely; *L. arcticus* can outrun these canids. The agility of *L. arcticus* protects it so well that camouflage is of little importance during the short Arctic summer. However, young Arctic hares often are hunted by foxes (Pedersen, 1962). Elsewhere in its range, predators include *Vulpes vulpes* (Harper, 1956; Hearn et al., 1987), *A. lagopus* (Aniśkowicz et al., 1990; Braestrup, 1941; Kennedy, 1980; Macpherson, 1969; Parker, 1977; Soper, 1944), *C. lupus* (Harper, 1956; Parker, 1977; Riewe, 1975; Tener, 1954), *L. canadensis* (Bergerud, 1967, 1983), *M. erminea* (Freuchen, 1935), *Nyctea scandiaca* (Freuchen, 1935; Parker, 1977), *Falco rusticolus* (Muir and Bird, 1984; Poole and Boag, 1988), and *Buteo lagopus* (Banfield, 1974).

Alopex lagopus carries young hares to its den. In August, when young hares approach 2 kg and become difficult for an Arctic fox to carry intact, the fox transports the hare carcass in pieces (Parker, 1977). *M. erminea* attacks hares in long bounds and clings to their neck, which it bites deeply, often being carried long distances (Freuchen, 1935). On Southampton Island, no remains of Arctic

hares were found in pellets of snowy owls, and there was no evidence of capture of hares by foxes or wolves. During years when lemmings are scarce, foxes, owls, and wolves probably prey on Arctic hares (Sutton and Hamilton, 1932).

The Arctic hare is difficult to maintain in captivity. It usually has a good appetite, but soon dies (Freuchen, 1935). At St. George's Bay, Newfoundland, however, it had been domesticated and reared for food. Here, the hares were easily tamed (Audubon and Bachman, 1852).

Lepus arcticus provides a source of food (Geraci and Smith, 1979; Johnsen, 1953) and clothing for native peoples, and a potentially valuable recreational resource (Bittner and Rongstad, 1982; Rasmussen, 1927). Fur has been used by Eskimos for bandages and also for menstruation pads because of absorbent properties of the hair. Sometimes skin also is used for making trousers. It also is used for sleeping rugs and stockings, but skins are thin and tear easily (Banfield, 1974; Freuchen, 1935). On Southampton Island, Eskimos use pelts as towels, and small wads of fur are used for plugging the ends of their rifles, but they do not use the pelts for clothing (Sutton and Hamilton, 1932). Wool can be spun into thread; gloves (Audubon and Bachman, 1852) and caps have been knitted from the wool (Brown, 1868).

There is a great difference in the flesh, all according to age and condition of the animal. During the mating season, flesh of males is unpalatable, and as a rule animals are thin (Freuchen, 1935). Otherwise, the meat is white and well-flavored. *L. arcticus* usually is lean, and often it is necessary to add extra fat to make it attractive. Eskimos split the bones of the hind leg and suck out the marrow (Banfield, 1974). They chew the milk glands and milk, apparently as a remedy for nausea. Ear cartilage, which is eaten like biscuits, is tasty. Every part of the hare is eaten, except the intestines. Its feces have been consumed by humans, but they are not palatable and are devoid of food value. If one cannot get blubber to eat with them, they become hard to swallow (Freuchen, 1935).

BEHAVIOR. The usual gait is a series of four-legged hops, each hop carrying the hare ca. 1.2 m. Southern populations use this gait almost entirely, but northern races, found on Arctic islands from northern Baffin Island northward, use a different gait (Banfield, 1974). Hopping on the hind feet without touching the forefeet to the ground has been reported for *L. arcticus* (Hall, 1951). When disturbed, the Arctic hare stands erect on its hind legs, forefeet tucked close to its body (Feilden, 1877), and hops about until the source of danger is located (Pruitt, 1960); if not frightened, the hare resumes feeding. If startled, it runs in a series of bounds, generally with one foreleg lifted up. This gives tracks in snow the appearance of having been made by a three-legged animal (Feilden, 1877). When a group is frightened, the whole group may stand up on their hind legs and without using their forelegs, hop away in every direction in long jumps; only when they have located the danger do they use all four legs to bound away. When they have gone a suitable distance, some may stand up on their hind legs, and with ears raised look to all sides to get their bearings, and then disappear (Freuchen, 1935). Arctic hares may double back on their own trail for 4.5–9.0 m, then leap off to one side. One Arctic hare doubled back for a distance of 300 m (Sutton and Hamilton, 1932).

Lepus arcticus can run up to 64 km/h (Garland, 1983), and can swim freely across small streams that in spring traverse the Arctic barrens in all directions (Nelson, 1909). It will follow a string stretched across its path. It will never jump over it, but always tries to get under (Freuchen, 1935).

The Arctic hare seems to avoid marshy ground or wide, flat plains. It is found in mountains during winter, and in summer comes down again toward the coast. In places where mountains drop abruptly to the sea, it may create pathways along the shore during its journeys from one grazing place to the next (Pedersen, 1962). Throughout winter, it makes trails that usually are associated with hill and mountain slopes where the sparse vegetation is exposed to strong winds that remove most of the snow (Soper, 1944). Trails in snow or gravel are wide and trampled, giving the impression that there are more hares than actually are present (Freuchen, 1935).

Although usually solitary (Pruitt, 1960), Arctic hares may form groups of 100–300 (Parker, 1977; Pruitt, 1960; Tener, 1954). In large groups, most may be asleep, but one usually is awake, alert, and running from one to another keeping a lookout to all sides (Freuchen, 1935). *L. arcticus* rests during the day when the sun is high, but during the dark winter it has no fixed time for resting. When resting it usually sits near a large stone or a low wall of rock, dozing or asleep, sheltered from wind, and if possible warmed by the sun. Usually, it chooses a site a little way up a slope (Manniche, 1910). Arctic hares sometimes sun themselves among rough ice along the edge of frozen saltwater (Sutton and Hamilton, 1932). They often are immobile during their resting time, sitting crouched with ears half erect, and eyes nearly closed; often two to four rest together. If awakened, they begin to forage (Manniche, 1910).

In the afternoon, an Arctic hare often leaves its resting place after yawning (Manniche, 1910) and stretching its body, all limbs, and neck (Freuchen, 1935; Manniche, 1910). It then moves along the hillside and begins to smell and scrape for food (Manniche, 1910). While feeding, *L. arcticus* takes little interest in conspecifics; occasionally, one will start to play, and two or three may hop about together, but they soon resume feeding. After feeding a little, it crouches, holding the ears partially erect and sitting with partially closed eyes (Freuchen, 1935).

When foraging on willow twigs, it bites off a small piece, which it holds in its mouth and bites with the incisors. It seems to prefer roots of *Salix*, which it digs out. The hare then eats the pieces from the ends, but if it is eating short grass, it walks with outstretched body and ears erect. It always faces up the slope; to go lower on the slope, it runs down, then turns to face up the slope (Freuchen, 1935).

Lepus arcticus often selects high places to forage, especially rocky ridges where it finds shelter. It also forages on slopes for lichens growing on faces of exposed rocks, or where it may dig for willow twigs or for moss. It paws away snow with the front feet only. It feeds erratically, digging in one place for a while, then passing to another before exhausting the supply of lichens or willow twigs it has uncovered (Sutton and Hamilton, 1932).

The Arctic hare is able to find food below snow. This is an advantage because there may be long distances between plants. Running over snow, it stops and begins to dig. If the snow is soft, or if there is only a thin covering, it reaches the food by scraping the snow with the nose or forelegs. When the snow has a hard crust that must be broken, it stamps on the crust with the forelegs to make a hole; pieces of snow are then pushed aside with the nose. Below the hard crust, the snow always is loose and easily scraped away with the forepaws (Freuchen, 1935). On Ellesmere Island, the Arctic hare scratches through snow to feed on minute green shoots of *S. oppositifolia* (Feilden, 1877).

As winter approaches and the low-lying regions become covered with snow, *L. arcticus* moves away from the coast toward higher ground that has been swept free of snow by wind. From the approach of winter until the beginning of spring, the Arctic hare forms groups of $\geq$15–20 animals. Individuals frequently move among groups. On the slopes from sea level to $\geq$100 m, its numbers increase with altitude, even though vegetation there is sparse (Pedersen, 1962).

Sometimes grazing hares will "sneer" at each other and lay their ears backward (Manniche, 1910), but they do not bite, even in self-defense (Seton, 1929). When they fight, Arctic hares usually start by snapping at one another, after which they scratch with the claws of the forefeet. They may rise on their hind legs and box one another (Freuchen, 1935).

A male and female may sit and lick each other, and scratch each other with their forepaws (Manniche, 1910). Adults dominate juveniles, but dominance is unrelated to the sex or breeding condition of adults (Fitzgerald and Keith, 1990).

When mating begins in April, groups disperse, pairs are formed, and each pair establishes a small territory. *L. arcticus* lives in family groups that remain independent from one another up to autumn (Pedersen, 1962). In the mating season, testes and penes of males enlarge considerably. The male follows the female about continuously, and during copulation bites her so fiercely in the neck and back that she often is covered with blood. As mating season corresponds with molting time, fur flies during the process. After copulation, the male cleans his penis, sits quietly ca. 30 min, and starts out again to fight another male or secure another mate (Freuchen, 1935).

When young are about to be born, toward the end of June, the female seeks a patch of dry sand, usually near the slope where she lived with the male during the mating season. The male usually leaves the female after birth of the young, but sometimes remains close to the place where the female shelters and feeds her young. One male was observed helping a female defend the young against a fox (Pedersen, 1962).

Each female Arctic hare approaches her nursing location by only a few routes, frequently using the same path for the last 100 m of the approach. This is not always the shortest distance to the nursing site. She may make her final approach with a few short pauses, then dashes directly to the nursing site. Nursing usually takes place immediately at the meeting place. As the young grow, the female may stop before the young reach her, thus the spot where the young congregate and the nursing spot gradually shifts away from the nest in the direction of the expected approach of the female. When nursing, the female typically sits upright, with ears erect, eyes open, hind feet spread widely under her haunches, front legs fully extended, and front feet rather far apart. After an initial period of intense nursing, one or more young may stop and move around rapidly, burrowing between its siblings or climbing on their backs in an attempt to reach another nipple. As the young grow older, grooming of the young by the mother becomes less frequent during nursing. The female terminates the nursing bout by standing up and turning. She then hops away, leaving the young behind. The female usually immediately leaves the nursing spot along one of the approach routes, and if any young try to follow, the female hops further away (Aniśkowicz et al., 1990).

The Arctic hare usually is silent (Freuchen, 1935), but lactating females may emit a short series of low growls as they approach nursing areas (Aniśkowicz et al., 1990), or when trapped, Arctic hares may scream (Freuchen, 1935; Sutton and Hamilton, 1932). The sound made when an Arctic hare beats or drums against the snow crust in search of food is similar to that of a distant drum roll (Manniche, 1910). On Southampton Island, two young (ca. 100 mm long) were lying still on gray rocks and hardly visible. When picked up, they did not move or show any sign of fear. One then uttered a loud, nasal "how, how, how," and began to struggle. In 2 min, the mother ran up at full speed to within 1 m; seeing the human she then ran ca. 20 m away (Manning, 1943).

On Ellesmere Island, a wolf approached a group of 125 Arctic hares in sunlight at 0300 h on 10 August. The hares were grazing over an area of ca. 0.4 ha on a hillside. The wolf singled out an individual at the edge of the group and chased it through the group. The hare being chased hopped rapidly on its hind legs much like a kangaroo, but the remaining hares, after the initial alarm, paid little attention to the wolf running through the group. The hare being pursued ran in a zig-zag manner through the group, then left it to ascend a hill where the wolf captured it (Tener, 1954).

In areas where it has never been molested by man, *L. arcticus* is easily approached (Pruitt, 1960). It may be fearless around human camps (Banfield, 1951), but behavior is variable when humans approach. Sudden approach usually brings the hare to its hind legs, standing erect on its toes. If the hare is unable to distinguish the object of disturbance and a rapid approach is continued, it usually flees in kangaroo fashion. If pursued, the hare quickly drops to a quadrupedal position and moves up slope to cover, often assuming an upright stance once high ground is reached, to look back at the human. Solitary lactating females often allow humans to approach to within a few meters before slowly hopping away. Herds of young hares in late July and August exhibit a more nervous behavior, often fleeing >1 km on first sight of a human (Parker, 1977).

On Baffin Island from August through January, whenever *L. arcticus* sees a human, it remains motionless until it is approached within 20–30 m. From March to June, it bounds away at the slightest suggestion of danger, and in spring, sits on hilltops, where it can see and be seen from all directions (Manning, 1943). Once a hare identifies its pursuer as neither wolf nor Arctic fox, a human may be able to walk among them and be completely ignored. The behavior of a herd in winter is similar to that in late summer, whereas solitary hares in winter generally display more fear than in summer (Parker, 1977). The Arctic hare becomes extremely wary when it has been hunted (Pruitt, 1960) and will run great distances at amazing speed (Sutton and Hamilton, 1932), usually up a slope (Banfield, 1974; Freuchen, 1935).

When resting the Arctic hare often sits by a large stone (Freuchen, 1935). It may spend the day in the shelter of boulders, or in a rock crevice where it is shaded from the sun (Pedersen, 1962). However, it usually settles where the sun can shine on it, and if the weather is calm, will move around the stone with the sun. Typically it eats in morning and evening, moving to various sides of the hill to keep in the warmth of the sun (Freuchen, 1935).

In winter, *L. arcticus* may protect itself from extreme cold by burrowing into snow (Hamilton, 1973), but typically it uses only a depression in the snow or the lee of a rock for shelter (Peterson, 1966). The winter shelter form may be in a wreath of snow in the lee of a boulder, or the hare may excavate a snow den in a snowbank or become buried in a blizzard. Dens consist of a tunnel ca. 10 cm in diameter and 30 cm in depth, with an enlarged terminal chamber (Banfield, 1974). It often spends its nights exposed (Hamilton, 1973).

On Axel Heiberg Island, adult Arctic hares construct shallow dish-like depressions in gravel ridges and slopes, usually facing south or southwest near a large rock. Hares often use these protected depressions during periods of unfavorable weather (Parker, 1977). On Ellesmere Island, one burrow was ca. 1.2 m in length, and scraped horizontally into a snowdrift. This burrow was regularly occupied, because it was discolored by the feet of the animal passing in and out, and there was hair sticking to the sides (Feilden, 1877). On Southampton Island, one shelter form was in a clump of willows. Some twigs nearby may have been nipped off by Arctic hares (Sutton and Hamilton, 1932).

GENETICS. The karyotype of *L. arcticus* is unknown. However, the diploid number of chromosomes probably is 48 as in other *Lepus* (van der Loo et al., 1981).

REMARKS. *Lepus arcticus*, *L. othus*, and *L. timidus* may be conspecific (Chapman et al., 1983; Dixon et al., 1983; Flux, 1983), but Rausch (reported by Anderson, 1974) has suggested that *L. othus* is a valid species and is not conspecific with *L. timidus* of Siberia or *L. arcticus* of Canada. However, multivariate assessment of phenetic relationships among samples of *L. arcticus*, *L. othus*, and *L. timidus* based upon 20 cranial characters, indicated that the sample of *Lepus* from Chukot Peninsula, Russia, did not link with any of the Eurasian samples, but was closely allied with samples from Alaska, Banks Island, and Prince Patrick Island, Northwest Territories. The discontinuity between the sample from Chukot Peninsula and that from northeastern Siberia indicated that only *L. arcticus* and *L. timidus* should be recognized (Baker et al., 1983).

The Latin word *Lepus* means hare (Jaeger, 1955). The specific epithet *arcticus* refers to the Arctic distribution of this species. Additional common names are Baffin Land polar hare (Rhoads, 1896*a*), polar hare, Bangs' polar hare, hoary polar hare, Labrador hare, Greenland hare (Elliot, 1905), American Arctic hare (Nelson, 1909), Canadian Arctic hare (Corbet and Hill, 1980), alpine hare, oo-ka-lik, ka-choh (Seton, 1929), ukaluk, ukkulirk, ookalik (Sutton and Hamilton, 1932), and ōkōllĭk (Soper, 1944).

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