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The Mammals of Manitoba

by

J. D. Soper

CANADIAN WILDLIFE SERVICE

THE MAMMALS OF MANITOBA

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J. DEWEY SOPER

Illustrated by the author

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Introduction

An up-to-date summary of the mammals of Manitoba has long been needed. Widely scattered publication of new and interesting facts makes it increasingly difficult to gain a clear comprehension of the provincial situation and to keep abreast of developments. What, for instance, is presently known about the different kinds of native species and subspecies to be found in Manitoba? What is their status and distribution? Have recent advances been made as to newly detected races and where they are found? Have interesting, extralimital occurrences been added to the list of Manitoba mammals?

Answers to these and other questions are desirable. Equally desirable, in a single paper, is a brief consolidation of both older and very recent records that are vital to an understanding of specific occurrences and provincial range. The presentation of such a review is the aim of this paper.

In 1927 I made a study of mammals along the International Boundary, in the Prairie Provinces, for the National Museum of Canada (Soper, 1946). Eventually further work in Manitoba became possible from 1934 to 1948 while I was with the Canadian Wildlife Service and had headquarters at the Winnipeg office.

These 14 years provided opportunity for extensive field work in most parts of southern Manitoba. As a result I gained much information on the various races, their better indicated, but not conclusive, geographic ranges, over-all distribution and more recent status. Not least among the gratifying results was the addition of some species and newly discovered races to the list of species of Manitoba mammals.

In the following summary of species and races personal records are partially based upon the 710 mammals collected in Manitoba from 1927 to 1948. The number of trap-nights involved was approximately 14,000. All specimens are now deposited in the permanent collections of the National Museum of Canada and the Department of Zoology, University of Alberta, respectively. Except where otherwise mentioned, and credit given, most statements are based on personal field investigations, together with the related specimens.

This is the first separate and complete summary of Manitoba mammals since the publication of Seton's work in 1909 and it prompts interesting reflections concerning the progress of Manitoba mammalogy in the past 50 years. Seton was aware of only 59 forms of mammals in Manitoba a half-century ago.

The present account contains 119 species and subspecies. Of these, one (*Sorex f. fumeus*) is hypothetical; two other varieties, only casually mentioned in the text, and which may eventually be found in southeastern Manitoba, are *Mustela e. cicognanii* and *Mustela l. spadix*.

In relation to the above review it should be noted, however, that the province of Seton's day extended north only to about the 53rd parallel of latitude. The delimiting boundary, therefore, automatically excluded about 17 species and subspecies of mammals then known to occur in that section of the District of Keewatin that now lies in Manitoba. After due recognition of this circumstance, nevertheless, since 1909 an additional 43 forms have been added to the provincial list.

Despite this advance, much field work is required before a good basic knowledge of Manitoba mammals is more or less achieved. The situation is replete with fresh and continuing opportunities and additions of new subspecies remain a possibility.

Scientific terminology and sequence of species follow Miller and Kellogg (1955); *Sorex vagrans soperi*, however, is the term of Findlay (1955). In the former work, vernacular names are not usually supplied. Accordingly, for uniformity, the common names used here are mostly those employed by Anderson (1946). Statements regarding geographic ranges, not revealed to me by personal field work, new material, or recent records of resident co-operators are based essentially on those given in the latter volume.

All measurements of small mammals are given in millimeters in the order of total length, tail vertebrae and hindfoot; figures in parentheses, often following average measurements and weights, represent the extremes in size of the various series collected. Weights, when available, are presented in grams for the smaller species and in pounds for the larger ones.

Acknowledgments

For results that grew out of the investigations I owe a great deal to the facilities and opportunities routinely provided by the Canadian Wildlife Service. I am also greatly indebted to the late Dr. R. M. Anderson (National Museum of Canada) for the subspecific determination of all mammals collected in Manitoba. This place also provides a pleasant opportunity for acknowledging kind assistance received on many occasions from the staff of Riding Mountain National Park; Mr. G. W. Malaher, Director, Manitoba Game Branch; Messrs. L. T. S. Norris-Elye and Richard Sutton, past and present directors of the Manitoba Museum; Mr. Stuart Criddle, formerly of Treesbank; and Messrs. A. Hochbaum, R. Ward and Lyle Sowls, Delta Research Station, Lake Manitoba.

Earlier Investigations

The earliest scientific work on Manitoba mammals is now shrouded in a dim and distant past. Just who, among Caucasians, made the first observations and written records is uncertain. Historically, at least, it is interesting to note that the first white men to see Red River, in southern Manitoba, were Pierre Gaultier de Varennes La Vérendrye and his sons, about 1732. Apparently little of zoological value developed from these explorations.

The earliest important work on the Hudson Bay region is Edward's *Natural History,* published in four volumes from 1743 to 1751. Between 1751 and 1772 various officers of the Hudson's Bay Company (Light, Isham, Graham, Hutchins and Hearne) contributed extensively by means of memoranda, published accounts and collections of specimens.

Results of a highly significant character grew out of the inquiries of Dr. John Richardson (1829) and Thomas Drummond early in the last century. At that time Richardson was attached to the first two Franklin Polar Expeditions – Drummond on the second – between 1819 and 1827. On these occasions their inland route from and to York Factory, Hudson Bay, cut across what is now northern and central Manitoba by way of Nelson River, Norway House, Cedar Lake and Saskatchewan River.

Robert Bell reported on mammals in the country west of Lake Manitoba and Lake Winnipegosis, in 1876, and six years later John Macoun published his *Manitoba and the Great Northwest,* in which he devoted 28 pages to notes on mammals. Miller Christy followed in 1885 with a short paper, *Notes on Mammals of Manitoba.*

In 1886, Ernest E. Thompson [Seton] published a comprehensive list of Manitoba mammals, as then known, before which time he had lived at Carberry. Next was his pamphlet *Fauna of Manitoba* (1909). This was succeeded in the same year by a much more elaborate treatment in two volumes (essentially based on Manitoba mammals) entitled *Life Histories of Northern Animals* (1909a); next was a notable work in four volumes, *Lives of Game Animals* (1925-1928), also containing Manitoba data.

During the summer of 1900, Preble (1902) collected in the region from Norway House by way of Oxford and Knee lakes and Hayes River to York Factory, thence north along the coast to Churchill and the vicinity of Eskimo Point. It would be difficult to overestimate the importance of Preble's investigations in this region – not only with respect to the consolidation and verification of old records, but the great amount of original work achieved in relation to the fauna in general. His book is still indispensable for information on the vast hinterland between Lake Winnipeg and Hudson Bay.

Since Seton's time various observers have contributed, in greater or lesser degree, to a knowledge of Manitoba mammals. Especially to be singled out is that veteran naturalist, Mr. Stuart Criddle (1915 and other years), who has so liberally enriched the literature with wildlife articles; his observations have been made over a period of about 50 years, chiefly in the Treesbank–Spruce Woods Forest district. Others to be briefly mentioned are Bird (1927, 1930); Green (1932); Jackson (1934); Shelford and Twomey (1941, 1943); Sowls (1948); Manning (1948); Banfield (1949, 1954); Quay (1955); and Smith and Foster (1957).

Deserving of special mention is Anderson's unique and scholarly *Catalogue of Canadian Recent Mammals* (1946), which contains important information on Manitoba species. In it he has dealt with historical classification, the latest nomenclature, new Canadian races, specific and subspecific ranges, and other matters, relating to the whole of Canada.

Physical Geography

Up to 1912, Manitoba had an almost square shape, with all sides approximating 290 miles in length; the northern boundary lay in about latitude 53°. In the year mentioned, however, it was extended north to the 60th parallel and eastwards to Hudson Bay. Thus Manitoba acquired a seacoast. What is now northern Manitoba was formerly situated in the District of Keewatin, Northwest Territories. Consequently, the earlier published records of such men as Franklin, Richardson, Preble, and others, associated with the latter territory south of the 60th parallel, now properly belong to the Province of Manitoba.

Topography of the province is highly diversified. From points about 40 miles east of Red River, the first prairie steppe stretches west to Pembina Hills and northwards to include the lowlands west of Lake Winnipeg that spread to the skirts of Riding, Duck and Porcupine mountains. Most of this nearly flat terrain was once covered by the ancient post-glacial Lake Agassiz. The elevation of this practically featureless lowland varies between 720 and 1300 feet above sea level, but averages about 900 feet.

Immediately to the west is the second prairie steppe, which rises several hundred feet above the Red River Plains. It begins at the conspicuous Pembina Hills escarpment and sweeps west to southeastern Saskatchewan; mean altitude is about 1,750 feet. Much of the surface is rather uniformly flat, or gently rolling, but some parts are more undulating, or distinctly hilly. Outstanding features include Pembina, Tiger and Brandon hills.

In this region Turtle Mountain is particularly prominent. It rises to a maximum elevation of 2,500 feet, or some 600 feet above the surrounding plains. Principal bodies of water on the second steppe are Rock, Pelican, Whitewater and Oak lakes. The ancient Lake Souris covered a wide expanse in the southwestern corner of the province, the prairie floor of which is now called the Souris Plains.

The southeastern extremity of Manitoba and northwards, east of Lake Winnipeg, is of rugged character in marked contrast with the topography of south and south-central areas; here the leading features are hills, rocky ridges, innumerable lakes and clear, fast-flowing streams. This is notably true of the land lying north of latitude 53 or 54 degrees.

The abundance of small lakes is especially remarkable in the region between Lake Winnipeg and Hudson Bay and in the entire northwestern part of the province from latitude 54° north to the District of Keewatin. The whole of northern Manitoba is characterized by this type of topography; in addition there is a profusion of glacial moraines, sand eskers, bogs and muskegs. A strip of true Arctic tundra flanks the entire Manitoba coast at Hudson Bay, becoming increasingly wider to the north.

In the extreme west-central part of the province, immediately north of the parklands, three high erosion plateaus lend marked effect to the scenery. These are Riding, Duck and Porcupine mountains; their altitudes approximate 2,000 feet above sea level. Directly to the east and north they are bounded by vast lowlands cradling a bewildering array of shallow ponds, lakes, marshes

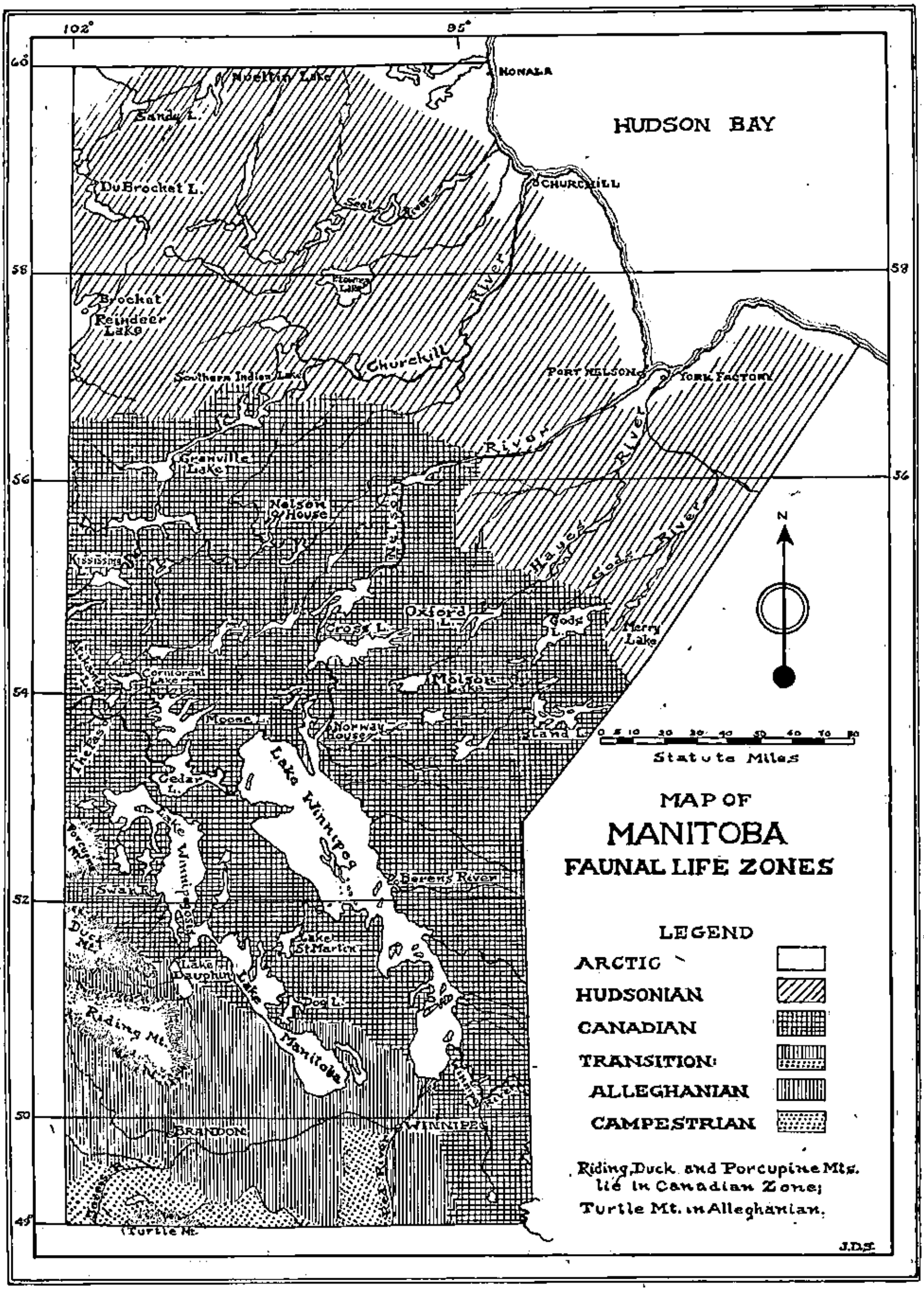

Figure 1. Outline map of Manitoba showing the faunal life zones of the province.

and streams. In this same depression lie the great lakes of south-central Manitoba—Winnipeg (713 feet); Manitoba (814 feet); Winnipegosis (831 feet); and Dauphin (854 feet)—the largest existing in the whole prairie belt of the West. Primary drainage of all this region is by way of Nelson River to Hudson Bay.

Faunal Life Zones

An understanding of faunal life zones is essential to a ready comprehension of animal distribution and other matters. Mammals, for example, are controlled in their horizontal and vertical dissemination by ingrained preferences for certain types of environment; this holds true not only for major zones, but commonly for the local type of habitat within these zones. Specifically, they rarely stray far from the respective ecological niches for which they have been fitted; this adherence is imposed by such factors as temperature, heredity and adaptation.

There exist in Manitoba five distinct, major types of environment. These superior kinds of flora–climate areas are categorized by zoologists as life zones. In the present instance the Merriam system of classification has been employed, adapted from Anderson (1946). From south to north these zones are called, respectively, Transition (subdivided into Campestrian and Alleghanian subfaunas), Canadian, Hudsonian and Arctic life zones (*see* zonal map, Figure 1). Some species are confined to a single zone; others of greater adaptability are found in two, or more. When a species ranges through several zones, or subfaunal areas, it is more or less commonly represented in each by a recognizable geographical race.

A brief analysis of the Manitoban life zones follows.

Transition Life Zone. All of southern Manitoba south and west of the lower limits of the mixed-wood (Canadian Zone) forest falls within this zone. It is characterized by two distinct environments:

(a) *Campestrian Subfaunal Division.* As the name implies, this area embraces the entire section that was originally true, primitive prairie (Figure 2). In Manitoba it represents the absolute northern limits of the treeless Great Plains. A broad tongue extends north between Red River and the second prairie steppe to about the latitude of Winnipeg. Except for a short break at Pembina Hills (and exclusive of Turtle Mountain), it covers a band of country of varying width (up to about 25 miles), north of the 49th parallel, from the vicinity of Red River Plains west to the Saskatchewan boundary. The area is progressively dryer to the west; at times semiarid conditions prevail in the southwestern corner of the province. Formerly this was typical range for the bison and antelope.

(b) *Alleghanian Subfaunal Division.* This is the territory usually referred to as the aspen grove belt or parklands (Figure 3). An extensive band occurs

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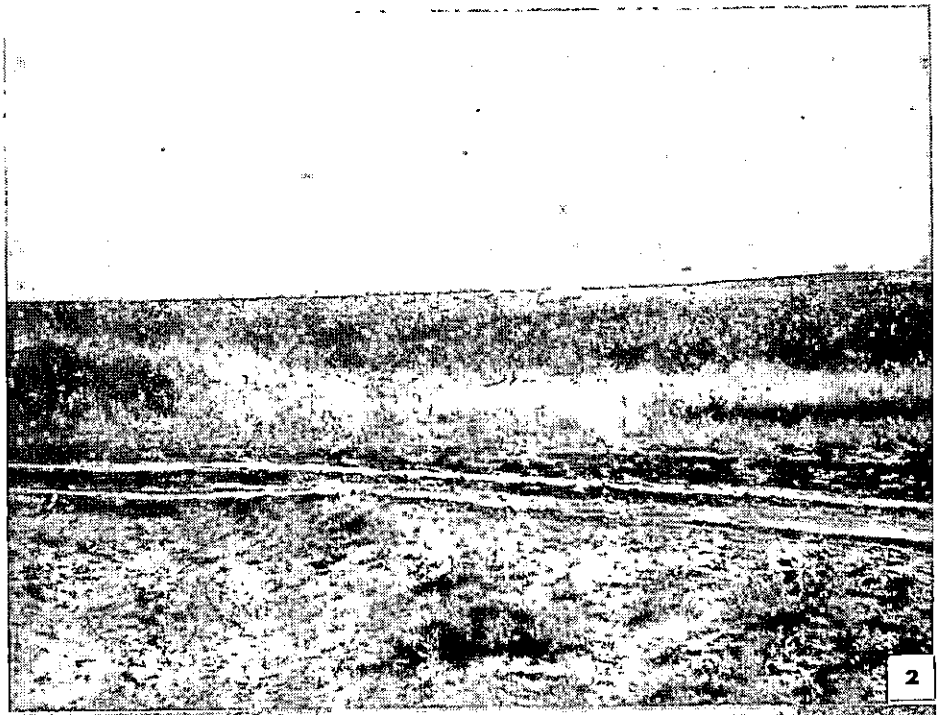
Figure 2. Rolling grasslands near Souris River, south of Melita, characteristic of the Campestrian subdivision of the Transition Life Zone.

Figure 3. La Salle River, three miles west of Sanford; Alleghanian or parklands subdivision of the Transition Zone.



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on the first prairie steppe east of Red River and northwest to Lake Dauphin, but the greater expanse exists on the second steppe west of Pembina Hills escarpment. It is chiefly typified by woods of aspen or bur oak and a sturdy undergrowth of willows, alders and chokecherry; here and there this cover is interspersed with patches of prairie supporting low copses of such shrubs as snowberry and silverberry. There are also local stands of Manitoba maple, green ash and white elm.

It seems best to include Turtle Mountain in this subdivision, as there is a lack of conifers; however in some aspects of the mammalian fauna it is definitely somewhat more boreal in character than the Alleghanian parklands (*see* Bird, 1927, 1930).

Canadian Life Zone. This biotic area occupies the greater part of Manitoba. It is chiefly mixed-wood forest with bogs, muskegs and clear, cold lakes and streams (Figure 4). Vegetation is mostly black and white spruce, larch, Banksian pine, balsam fir, paper birch and aspen and balsam poplar. The southern margin of the zone runs approximately from Pine Valley (in the southeast) northwards past the southern end of Lake Winnipeg to about Dog and Dauphin lakes, thence along the eastern and southern flanks of Riding mountain; from here it crosses the Manitoba–Saskatchewan border in about latitude 51° 30′ N.

In some areas there are pseudoprairies that bear close resemblance to those in the parklands (Figure 5). An isolated outrider of the Canadian Zone is simulated in an area of spruce woods and larch bogs east of Brandon. From the southern perimeter of the mixed-wood cover, as outlined above, uninterrupted Canadian Zone forest blankets the whole width of the province north to about Gods Lake, Kettle Rapids and Southern Indian Lake (see map). Beyond are the stunted woods of the next zone.

Hudsonian Life Zone. Biologically and climatically, this biotic division is a transition between the heavily forested Canadian Zone on the south and the Arctic tundra to the north (Figure 6). It is chiefly typified by sparser and more stunted vegetation; cover consists mainly of the spruces, Banksian pine, larch, birch, aspen poplar and various shrubs. Size and frequency of barren tracts become increasingly greater to the north until they finally merge with true Arctic tundra. The transition from Canadian Zone to Hudsonian is very gradual; it is so subtle, indeed, as to make the dividing line, between the two, the most poorly defined of zonal limits. Of all the zones, the present one contains the lowest number of truly characteristic species.

Arctic Life Zone. This division is probably so well visualized by the general public that little description is needed. A dominant feature, of course, is the complete lack of trees (Figure 7). All vegetation is reduced to small size. Sterile rock and sand ridges often alternate with shallow ponds and lakes,

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FIGURE 4. Mixed-wood forest of the Canadian Zone along Red Deer River, near Dawson Bay, Lake Winnipegosis.

FIGURE 5. Pseudoprairie and parklands within the Canadian Zone of Riding Mountain National Park; about four miles north of Lake Audy.

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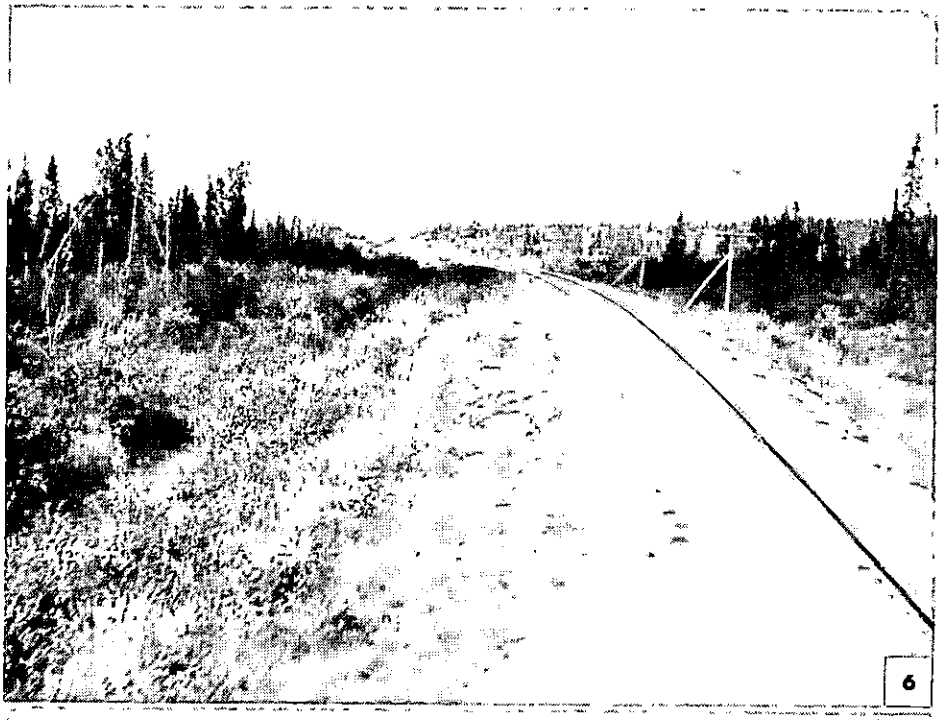

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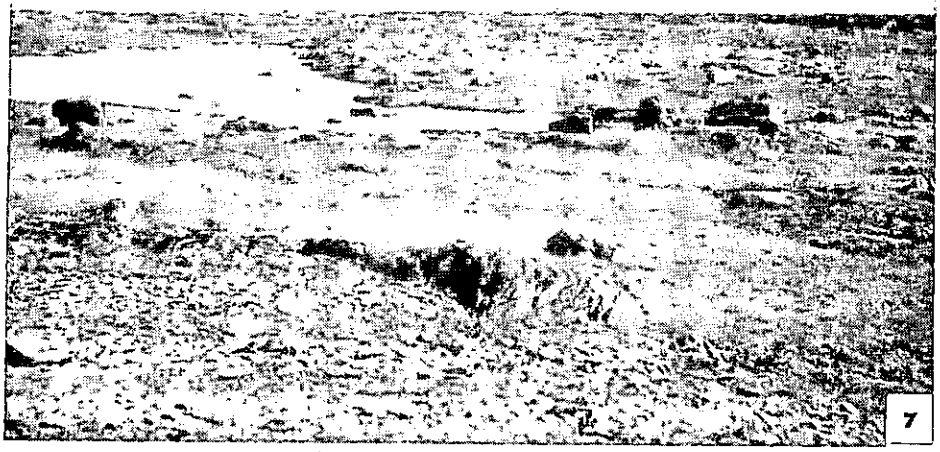

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or boggy terrain garbed in various grasses and sedges. Much of the country is relatively flat, to gently rolling, and often strewn with boulders. It is commonly devoid of vegetation, except for mosses and lichens, and, at best, usually supports a sparse cover of polar grasses, small vascular plants and stunted willows and dwarf birch.

The summers are very short, but characterized by profuse daylight; the winters are long, severely cold, graced with few hours of light, or wrapped in continuing darkness. In the fight for survival, the animal life of this peculiar world has been obliged to develop special adaptations as to general habits and physical equipment. The most familiar mammals include polar bear, Arctic fox and hare, tundra wolf and the two species of lemmings.

Annotated List

Order INSECTIVORA. Insect Eaters

Cinereous Shrew *Sorex cinereus cinereus* Kerr. Widely distributed and usually of fairly common occurrence in the northern coniferous forest; occasionally taken in bordering fringes of the parklands. More northern occurrences include Flin Flon (Rand, 1948); York Factory (Preble, 1902); Churchill (Quay, 1955; Smith and Foster, 1957); and Nueltin Lake (Harper, 1956). It is more abundant in some years than in others, periodically becoming at least locally scarce.

Cinereus was personally collected at Sandilands and Whiteshell Forest Reserves; Caliente; Marchand; Fort Garry; Riding Mountain; Little Salt Lake; Elm Point, Lake Manitoba; Mossy River; Duck Mountain; Dawson Bay, Lake Winnipegosis and Overflowing River. Average measurements of 30 specimens from the above localities: 99.2, 38.5, 11.9 (85, 29, 10.5—108, 45, 13) mm; weight 3.3 (2.9—4.2) grams. Long-time average rate of capture was one per 80 trap-nights, with a low of 1 in 400 and a high of 6 per 100 trap-nights.

Hayden Cinereous Shrew *Sorex cinereus haydeni* Baird. This race replaces *cinereus* over most of southwestern Manitoba south of the Canadian Zone. It chiefly inhabits parklands and brushy prairies; parts of its range verge upon semiarid conditions. Apparently *haydeni* has not yet been detected on the first prairie steppe, but there seems to be no reason for actual exclusion. It is moderately common at times on the second steppe, including Turtle Mountain. Collectively, 12 specimens were taken at Treesbank; William, Breaden and Max lakes, Turtle Mountain; and the junction of Antler and Souris rivers. Average measurements of these are: 97.3, 38.1, 11.6 (91, 32, 10.3—105, 40, 12) mm; weight 3.4 (2.6—4.2) grams.

Smoky Shrew *Sorex fumeus fumeus* Miller. Hypothetical. A shrew thought to be this species was collected by Buckner (1957) near Rennie; it was lost, however, before critical examination could be made. Possibly to be looked for in the extreme southeast where it would rank as a very rare member of the fauna at the western extremity of its geographic range. The nearest authentic record to the east appears to be for Thunder Bay, Lake Superior.

American Saddle-backed Shrew *Sorex arcticus arcticus* Kerr. An insectivore of the Canadian Zone, habitually frequenting spruce-sphagnum bogs and swampy margins of lakes and streams. The Manitoba range is apparently from about latitude 55°30′ in the east (Swampy and Robinson lakes; Preble, 1902), to Riding Mountain and northward more or less throughout the boreal forest to the Northwest Territories. A total of 18 specimens was collected at Whitemouth Lake and River; Delta and Elm Point, Lake Manitoba; Lake Frances; and Riding and Duck Mountains; these average 113.7, 38.6, 13.9 (106, 29, 13—123, 46, 15.5) mm; 7.5 (5.7—8.8) grams. *Arcticus* is rarely com-

Figure 6. Hudsonian Zone, illustrating character of the vegetation about midway between Canadian and Arctic zones; north of Bird, Manitoba, Hudson Bay Railway.

Figure 7. Typical rock-strewn barren grounds characteristic of much of the Arctic coastal tundra north of Port Churchill, Manitoba; polar grasses and dwarf willow in the foreground.

mon; specimens are usually obtained slowly and sporadically.

Southern Saddle-backed Shrew *Sorex arcticus laricorum* Jackson. From adjoining states, this form ranges into the southeastern part of the province and as far west as Turtle Mountain, Aweme (north of Treesbank), Carberry and Spruce Woods Forest Reserve. More information is desirable on its Manitoba distribution. Like *arcticus,* it appears to be local and far from common. My five specimens, derived from Marchand and Breaden and Max lakes, Turtle Mountain, average 117.4, 42, 14.2 (114, 40, 13–123, 44, 14.5) mm; 7.8 (7.1–8.7) grams. Habitat is essentially similar to that of *arcticus,* with which it shows signs of intergradation at Aweme and Carberry.

Plains Dusky Shrew *Sorex vagrans soperi* (Anderson and Rand). Three specimens of this race were personally collected at Whitewater Creek, Riding Mountain (Canadian Zone), on September 20 and 21, 1940—the first record for Manitoba (Anderson and Rand, 1945). Previous to this find, the easternmost specimens in Canada came from Cypress Hills, Saskatchewan. The Manitoba records consequently extended the known range of *S. v. soperi* several hundred miles to the east. Another example was taken at Swanson Creek, Riding Mountain, on July 17, 1942. Average measurements and weight of the four specimens are 108, 44.2, 12.3 (100, 43, 12–117, 45, 12.5) mm; 6.2 (5.7–6.7) grams. The animals were resorting to scattered willow-alder thickets on moist ground near streams.

American Water Shrew *Sorex palustris palustris* Richardson. Sparingly distributed in Canadian Zone woods from southeast to north and northwest beyond the great lakes of the province, to at least the latitude of Churchill (Smith, 1957). It also occurs in isolated boreal 'islands' as far southwest as Spruce Woods Forest Reserve. The normal habitat comprises marshes, swampy grass-shrub margins of streams and lakes, and borders of streams in mixed-wood forest. The species seems never to be common; trapping usually suggests rarity. Ten specimens from Red Rock Lake; Delta, Lake Manitoba; and Riding Mountain (Clear and Whitewater lakes and Swanson and Kennice creeks) average: 151.7, 66.1, 19.5 (142, 61, 19–163, 70, 20.2) mm; 13.7 (12.3–14.7) grams.

American Pygmy Shrew *Microsorex hoyi hoyi* (Baird). Always a prized collector's item because of its rarity. Surprisingly, however, it may at times become locally common (Criddle, 1932a). It occurs erratically in southern prairie-parklands, at least on the second prairie steppe. Stuart Criddle informed me that he had collected specimens at Aweme and South Junction; these are evidently the only well-authenticated records for Manitoba.

Seton (1909) refers to a pygmy shrew from Winnipeg—sub-specific identity unknown. However, any Manitoba *Microsorex* taken south of about latitude 50° is likely to be the present type form. Intergradation between *hoyi* and *intervectus* theoretically takes place in the general vicinity of a line running from about Winnipeg to the base of Riding Mountain. Apparently this race is, on the average, slightly smaller than the more northern *intervectus.*

Northern Pygmy Shrew *Microsorex hoyi intervectus* Jackson. Little data is available on this race in Manitoba. It is thought to range across the province in the extreme upper Transition Zone and well into the Canadian. Limits of range are uncertain. In the east it probably occurs to about latitude 52°, there theoretically intergrading with *M. h. alnorum.* In the northwest it is found at least as far as the Flin Flon district (Rand, 1948).

Four specimens were taken, collectively, at Stony Mountain; Delta and Elm Points, Lake Manitoba; and Swanson Creek, Riding Mountain (Soper, 1952); these average 84.2, 30.2, 10.7 (82, 26, 10–86, 36, 12) mm; 3.15 (2.6–3.4) grams. The more southern examples, while approaching *hoyi,* are considered closer to *intervectus.*

Alder Pygmy Shrew *Microsorex hoyi alnorum* (Preble). Ranges in northeastern Manitoba and extreme northwestern Ontario. This race was first collected in 1900 by Edward Preble (1902) at Robinson Portage (type locality) and the nearby Echimamish River. In Manitoba it is known only from this district. The original description of *alnorum* was based on only two specimens, one of which was badly damaged and almost worthless for study. Because of this, some doubt existed as to the validity of this race. Since 1900, however, a series of

40 *Microsorex* was taken in 1938 by the Royal Ontario Museum of Zoology expedition to Favourable Lake, Ontario, which lies about 120 miles southeast of the type locality; this material fully supports the naming of *M. h. alnorum* as a distinct and well-founded geographical race. It is said to average somewhat larger than *intervectus*.

MANITOBA SHORT-TAILED SHREW *Blarina brevicauda manitobensis* Anderson. A comparatively new subspecies, the type specimen of which was personally collected on October 29, 1927, at Max Lake, Turtle Mountain (Anderson, 1946; p. 23). It is distributed in both Transition and Canadian zones. West of Lake Winnipeg, at least, it ranges as far north as latitude 54° (Krivda, 1957). In some areas, such as Fort Garry, it may be quite common; in others, very scarce or absent (Soper, 1944a). It seems to prefer the vicinity of streams and swamps, but occasionally is found on dry, aspen—bur oak uplands.

Specimens were collected at Sandilands Reserve; Telford; Caddy Lake; Fort Garry; Spruce Woods Forest Reserve; Turtle Mountain; Rock, Dog and Frances lakes; Elm Point, Lake Manitoba; Riding and Duck mountains; Mossy River, Lake Dauphin; Overflowing River; and The Pas. A Lake Winnipegosis trapper stated that these shrews were abundant at Pickerel River, about 1940, and that he had accidentally caught several in steel traps set inside muskrat lodges, as well as at "push-ups." Average measurements and weight of 49 individuals from the above localities: 125.3, 25.7, 16.2 (117, 22, 15—135, 28.4, 17.2) mm; 20.9 (14.7—25.3) grams.

STAR-NOSED MOLE *Condylura cristata cristata* (Linnaeus) (Figure 8). Confined to a comparatively small range in southeast, north to Winnipeg River and westward to Riding Mountain. Occurs in both Transition and Canadian zones. To be regarded as rather rare, as there are few authentic records, or existing specimens. Seton (1909) recorded it at Winnipeg; Harry Van Sickle, a trapper at Lake Jessie, stated that one was caught a few miles north of Whitemouth. Three examples from Manigotogan and one from Pine Falls were recorded by Jackson (1934). Of recent years specimens have been secured by the Manitoba Museum from Great Falls, Falcon Lake, Great Black River, Decinal and Rennie. The northwestern limit of its geographic range in Manitoba (Soper, 1952) appears to be the southeastern angle of Riding Mountain.

Order CHIROPTERA. Bats

LITTLE BROWN BAT *Myotis lucifugus lucifugus* (Le Conte). In suitable situations occurs throughout the southern part of the province and indefinitely to the north, where limits of range are not well known but probably extend almost to the Hudsonian Zone. Bats regarded as *lucifugus* have been seen repeatedly in the Flin Flon district (Rand, 1948). Small bats thought to be this species were noted at Fort Garry, Douglas Lake, Killarney, Birtle and Swan River. Oral reports of occurrences were recorded for Treesbank and Turtle Mountain. The Manitoba Museum has five specimens from Max Lake, Turtle Mountain, taken August 20, 1949; these came from a group of about 80 that had denned up in a shed.

TROUESSART MOUSE-EARED BAT *Myotis keenii septentrinonalis* (Trouessart). Not personally detected. Apparently the only Manitoba record was established by Criddle (1932a) with two specimens secured from J. R. McPherson of Souris in August 1932.

SILVER-HAIRED BAT *Lasionycteris noctivagans* (Le Conte). Generally distributed in Transition and Canadian zones. Fairly common in at least southern districts, diminishing farther north. Comparatively little is known about dispersal of the species in Manitoba.

BIG BROWN BAT *Eptesicus fuscus fuscus* (Beauvois). Very sparingly recorded for some southern localities. It ranges mostly farther south, but occurs in the aspen parklands north at least to lower fringe of the Canadian Zone. Much more information is needed regarding this and other species of bats in the province. Somewhere to the west, probably in eastern Saskatchewan, *fuscus* intergrades with the paler form *E. f. pallidus*.

NORTHERN RED BAT *Lasiurus borealis borealis* (Müller). As a summer visitant, not uncommon in the Alleghanian parklands and north sparingly in at least the lower fringes of the coniferous forest. Seton (1909) mentions it as a summer visitor in all the southwestern part of the province and Criddle (1929) records it as fairly common

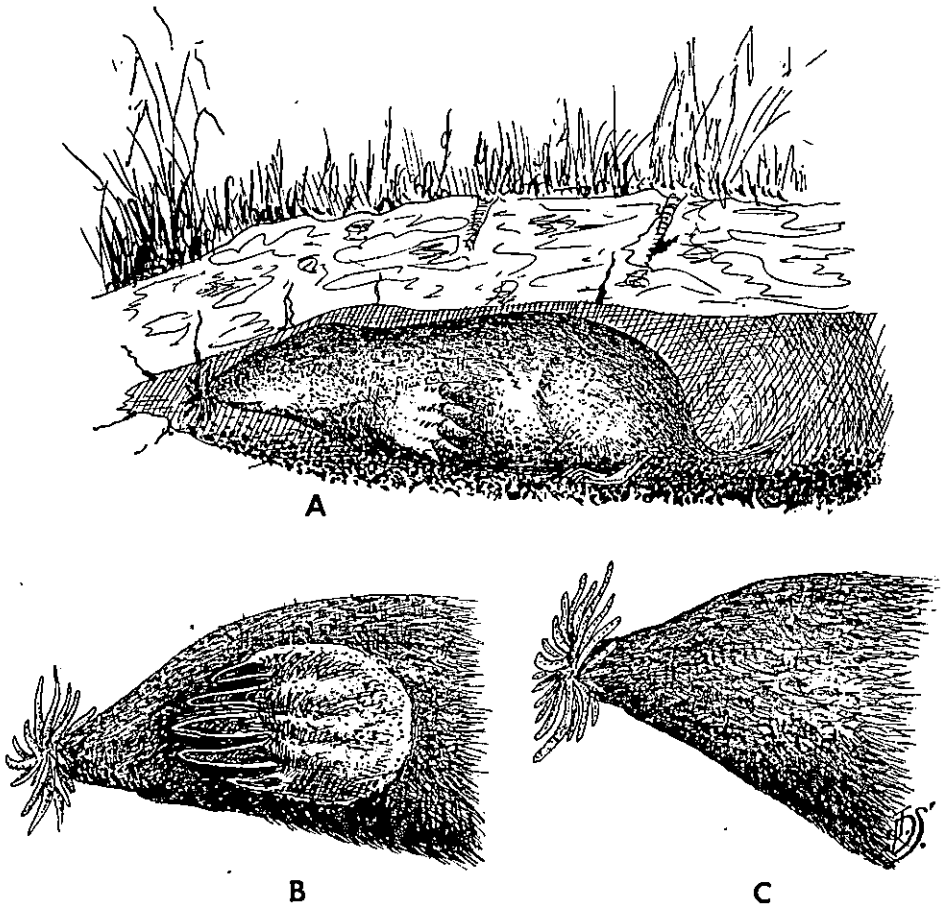

FIGURE 8. *A*, Star-nosed mole in underground feeding tunnel; *B*, the same, with left front foot in forward digging position; C, star-nosed mole, showing fleshy processes on nose which form the nasal disk.

at Aweme. Probably the commonest of the larger bats. On August 29, 1934, the writer secured one at Winnipeg; during the early morning it was found lying on the lawn in a stupor following a rather cold night; it had evidently fallen from a tree overhead. The specimen measures (mm) 115, 45, 10; height of ear 14; tragus 6.5.

HOARY BAT *Lasiurus cinereus cinereus* (Beauvois). Ranges in summer over all southern Manitoba and north, perhaps more or less regularly, to the lower part of the Hudsonian Zone. Said by Seton (1909) to be "somewhat common", and by Criddle (1929) as "tolerably common" at Aweme. Such may be the case locally, though on the whole it seems to be rather rarely encountered.

Order LAGOMORPHA. Hares and Rabbits

HUDSON BAY ARCTIC HARE *Lepus arcticus labradorius* Miller (Figures 9 and 10). Only a very limited number of these fine hares inhabit Manitoba, owing to a restricted area of suitable environment. Most are confined to the relatively narrow coastal strip of Arctic tundra lying between Churchill and the Northwest Territories. Up to a point, density of the breeding population increases with the latitude. Lesser numbers resort to the narrowing coastal tundra south of Churchill. Preble (1902) remarks that "In winter they migrate to a slight extent, reaching the neighborhood of York Factory and perhaps farther". Average measurements of this species are about 560, 60, 155 mm and a weight of between 6.5 and 7.0 pounds.

WHITE-TAILED JACK RABBIT *Lepus townsendii campanius* Hollister. In moderate numbers, inhabits nearly all of the prairie districts of the south as well as extensive areas of parklands to the north and east; in the latter direction it has been seen as far as Lake Jessie, Winnipeg River; Whitemouth; Ste. Anne and Marchand. Also occurs in the interlake district (Dog Lake and Oak Point, Lake Manitoba, and probably farther north) and, immediately west of Lake Manitoba north to at least Dauphin Lake. On the west side of the province *campanius* reaches a higher latitude than elsewhere, ranging at least to Riding Mountain and Gilbert Plains. A male taken at Delta measures 604, 84, 156, ear 126 mm and weighed 7.75 pounds.

AMERICAN VARYING HARE *Lepus americanus americanus* Erxleben. Occupies the whole province except the extreme southern portion (but including Turtle Mountain), north to Hudson Bay and the Northwest Territories. It is normally common, to abundant, during the periodic cyclic peaks, then very scarce for a few years following crash declines. Four specimens collected at Turtle and Riding mountains, Dauphin and Overflowing River, have average measurements of 433.3, 40.7, 127.2 (390, 30, 105—505, 48, 145) mm; 3.25 (2.25—4.25) pounds. Some individuals in the northern sections of the parklands show an approach to the following subspecies.

FIGURE 9. Hudson Bay arctic hare in winter coat.

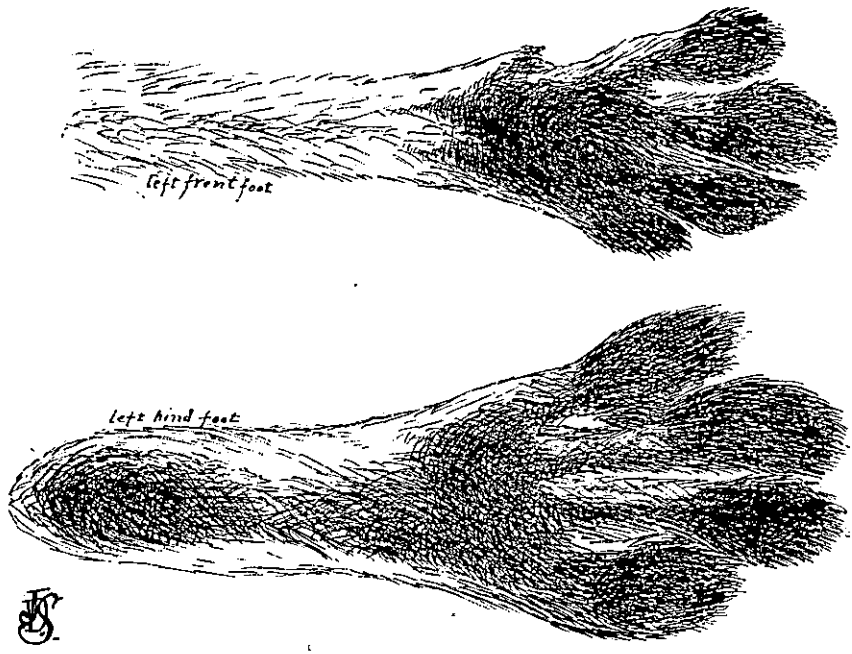

FIGURE 10. Left front and hind foot of the Hudson Bay arctic hare.

MINNESOTA VARYING HARE *Lepus americanus phaeonotus* Allen. Manitoba distribution is not clearly defined. However, *phaeonotus* appears to range in suitable situations on the first and second prairie steppes (west of Red River) for a distance of 90 to 100 miles north of the International Boundary; northward distribution east of Red River seems to be of lesser extent. Five specimens assigned to this race were collected at Marchand, Rock Lake, and forks of Antler and Souris rivers, respectively; these average 399.4, 29.2, 113 (370, 25, 105—432, 36, 127) mm; 2.56 (2.1—4.0) pounds. Other points of known occurrence are Lake of the Woods, Selkirk, Shoal Lake, Fort Garry, Carberry and Aweme. As with *americanus*, great fluctuations in numbers develop; they were locally common, to abundant, in 1942-1943 and apparently declined in 1944. Criddle (1938) gives previous peak years as 1922-23 and 1933-34; his paper contains a wealth of information on *phaeonotus* in the Treesbank district.

NEBRASKA COTTONTAIL *Sylvilagus floridanus similis* Nelson (Figure 11). A comparatively recent newcomer to Manitoba, in modern times at least. Not mentioned by Seton (1886; 1909a). Evidently reached the International Boundary in the Pembina-Emerson area in 1912. Criddle (1929) collected the first Canadian specimen three miles north of Treesbank on February 11, 1914. In 1927 it was reported to me as having appeared only a short time before near the forks of Antler and Souris rivers. It evidently did not reach Lorette until 1942 and by 1946 had become moderately common in the woods along Seine River.

The animals are now more or less familiar residents of Red River Valley north to at least Lake Winnipeg and northwest to Stonewall; common at Morden, Carman and Pembina Hills; known to ocur in some numbers along Pembina, Assiniboine, Antler and Souris Rivers and on Turtle Mountain. Anderson (1940) reported cottontails as far north as Dauphin. For a small mammal, the

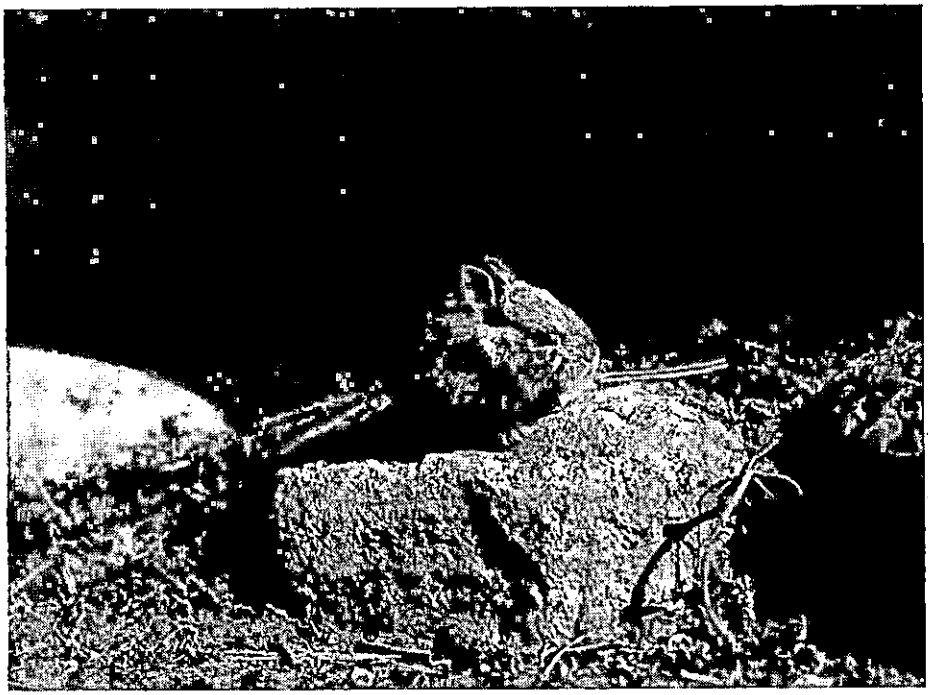

FIGURE 11. Young cottontail rabbit in late spring.

northward spread of *similus* has been accomplished with astonishing rapidity. A male personally collected near Winnipeg in November, 1943, measured 425, 46, 98 mm and weighed 2.25 pounds, and a juvenile at Fort Garry on May 6, 1948: 140, 17, 35 mm; 48.7 grams.

Order RODENTIA. Rodents

CANADA WOODCHUCK *Marmota monax canadensis* (Erxleben). Apparently inhabits the whole of Manitoba where there is a cover of trees and brush, north at least to York Factory and South Indian and Reindeer lakes. While not uncommon in parts of the aspen grove belt, it seems to reach a height of abundance in southern areas of the Canadian Zone. The animals are numerous from Whitemouth Lake north through Whiteshell Forest Reserve and well represented on Riding, Duck and Porcupine mountains. However, they are less numerous in north-central areas than farther south. During the summer of 1940 I noticed more woodchucks across the Prairie Provinces than ever before. Average measurements of three individuals (two melanistic) taken at Lake Jessie, Winnipeg River, are 525, 130, 74 mm; 5.8 (4.9—6.5) pounds.

RICHARDSON GROUND SQUIRREL *Citellus richardsonii richardsonii* (Sabine). A highly characteristic creature of the shortgrass plains; also, a rather common resident of the Alleghanian parklands, and in scattered colonies on isolated patches of pseudo-prairie within the southern limits of the Canadian Zone. Maximum numbers per square mile are found in grasslands of the southwest; diminishing populations east to about the longitude of La Broqueri. Occurs sparingly in the interlake district and, west of Lake Manitoba, north to at least Lake Dauphin, Fork River, Gilbert Plains and Roblin. Four specimens from Carman and Lake Audy Plains, Riding Mountain, have average measurements of 293, 79, 48.2 (280, 75, 45—310, 87, 50) mm. Mean weight of adults is about 300 grams.

STRIPED GROUND SQUIRREL *Citellus tridecemlineatus tridecemlineatus* (Mitchell).

This species has a somewhat greater provincial range than *C. r. richardsonii* but seldom attains the localized abundance of that animal. Development of colonies is not so apparent. Local in the entire south (in Transition and Canadian zones) from Sandilands Forest Reserve and Lake Jessie, Winnipeg River, west into Saskatchewan (including Turtle Mountain) and north to Thalberg, Icelandic River, Moosehorn and Birtle.

In all, eight examples were collected at Whitemouth and Cedar lakes, Mowbray, Pine Ridge, Woodlands and Stonewall; these average 280.8, 95.9, 40.1 (257, 67, 38—300, 110, 42) mm. Weight of two adults: female, 163.3 and male, 170.4 grams. Criddle (1939) gives a mean weight of 152 grams for both sexes. The species is generally more or less common on the lowlands east and west of Red River and the plains from Winnipeg to Brandon. Over extensive tracts of its western Manitoba range, however, it seems to be scarce or absent. For the most part, the animals appear to be more numerous east of the range of Richardson ground squirrel and scarcest where the latter is most plentiful in southwestern districts. It is certain that *tridecemlineatus* is now less abundant and uniformly dispersed than in earlier times; cultivation has destroyed large areas of the preferred, primitive grasslands.

Northern Striped Ground Squirrel *Citellus tridecemlineatus hoodii* (Sabine). *Hoodii* is more northerly than the preceding subspecies; it is found chiefly within the Canadian Zone. Its known range extends from Riding Mountain and Swan River northwest to Prince Albert National Park, Saskatchewan. Eight specimens taken on Riding Mountain (Lake Audy, Vermilion River, Kennice and Swanson creeks) have average measurements of 276.8, 92, 39.2 (258, 60, 36—292, 103, 40) mm; mean weight, 178 grams. It was also personally observed at Roblin, Gilbert Plains, Dauphin, and points north to Ethelbert. Between the latter place and the settled country north of Duck Mountain, the animals appeared to be very scarce or absent. However, they were found sparingly in the Swan River district and north to about Bowsman. Criddle (1939) located it still farther north at Bell River, east of Mafeking.

Franklin Ground Squirrel *Citellus franklinii* (Sabine). Widely distributed in south from the Ontario border to Saskatchewan and north, in the west, to The Pas district. Essentially a native of the Transition Zone, where it is most numerous, but it also penetrates the Canadian for a considerable distance—as, for example, in southeastern Manitoba and from Riding Mountain northward. My northernmost records of occurrence are for Moose Lake, The Pas and Carrot River Valley. The six specimens collected at Whitemouth Lake, Vivian, Anola and Stonewall, respectively, average 373, 138.8, 50.9 (360, 132, 49—381, 150, 55) mm; mean weight of adults is about 450 grams, the males being about 10 percent heavier than females. In some places the animals are notably common and gregarious. They also undergo marked fluctuations in numbers from time to time. An excellent life-history paper was written by Sowls (1948) dealing with *franklinii* at Delta, Lake Manitoba.

Gray Eastern Chipmunk *Tamias striatus griseus* Mearns. Found in most of extreme southern Manitoba. It has been recorded from Whiteshell Forest Reserve, Lake Jessie and Whitemouth Lake, west to Rock and Pelican lakes and Turtle Mountain, and north to Icelandic River, Riding Mountain and Dauphin. Over extensive tracts of this general range the animals are very localized, widely scattered, scarce or apparently absent. Moderate abundance is displayed in parts of Red River Valley and some localities to the west.

Average measurements of six specimens collected at Pine Falls, Oakbank, Fort Garry and Turtle Mountain are 260.8, 103, 35.7 (247, 83, 33—272, 113, 36.5) mm; 111.0 (104.5—116.1) grams. Two gravid females were taken on May 4 and 10; one held six fetuses averaging 52 mm in length, the other eight fetuses with a mean of 16 mm.

Little Northern Chipmunk *Eutamias minimus borealis* (Allen) (Figure 12). Inhabits an extensive territory westward from Red River to southeastern Saskatchewan, north to Porcupine Mountain, and beyond in forested lowlands north and east to about latitude 54°30'N. It is fundamentally a creature of the Canadian Zone where maximum abundance is reached; it also occurs widely, if erratically, in some scetions of the Transition (Criddle, 1943).

Specimens of *borealis* were collected at Mowbray, Turtle Mountain, Antler and Souris rivers, Riding and Duck mountains,

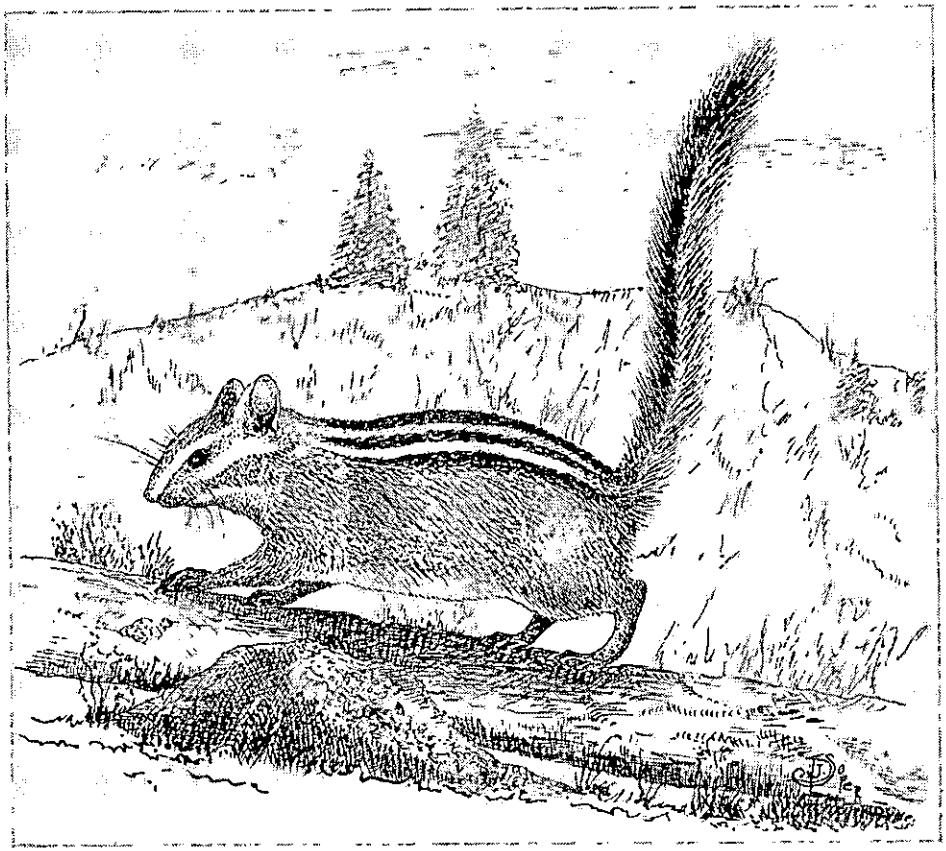

FIGURE 12. Little northern chipmunk.

Overflowing River and Atikameg Lake. Nearby to the north and northeast it intergrades with *hudsonius*. Twenty specimens have average measurements of 215, 75.8, 30.9 (208, 74, 28.5—230, 103, 32.5) mm; 42.9 (35.9—50.3) grams.

HUDSON BAY CHIPMUNK *Eutamias minimus hudsonius* Anderson and Rand. A more northern form than *borealis*, intergrading with the latter from a little north of Atikameg Lake, eastwards for some distance, and there thought to intergrade with *jacksoni* in perhaps the vicinity of Oxford and Gods lakes. *Hudsonius* occupies the upper part of the Canadian Zone and ranges for an undtermined distance northward into the Hudsonian. Carefully identified specimens have been taken at Flin Flon, Thicket Portage, Bird and Herchmer (57°24'N). In some favorable areas it is plentiful, showing preference for open woods, slashings and sandy, brushy ridges. Average size is about 218, 80, 31 mm; weight approximately 45 grams.

LAKE SUPERIOR CHIPMUNK *Eutamias minimus jacksoni* Howell. Presumably it is this form that replaces *borealis* in the coniferous forest of southeastern Manitoba (Jackson, 1957). Individuals from this area were formerly referred to *E. m. neglectus*. Limits of range to the north (east of Lake Winnipeg) are not known. Specimens now inferentially assignable to *jacksoni* were collected at Whitemouth Lake, Sandilands and Whiteshell forest reserves, Whitemouth River (near Reynolds) and Cedar Lake. Average measurements of 15 specimens: 207, 102.4, 31.7 (185, 73, 31—222, 107, 32.5) mm. A male from Red Rock Lake weighed 51.7 grams.

Examples were also sighted at Winnipeg and Brokenhead rivers, Tyndall and Pine Ridge. Specimens from the latter localities are likely to show intergradation with *barealis*. To the east and north of Lake Winnipeg *jacksoni* intergrades with *hudsonius*, possibly in about the latitude of Cross, Oxford and Gods lakes.

Minnesota Gray Squirrel *Sciurus carolinensis hypophaeus* Merriam. A comparatively recent addition to the list of Manitoba mammals. Seton (1909a) did not mention it. At first the species was known only from points in, or near, upper Red River Valley; eventually it spread north as far as Lockport and Lake Winnipeg. Now we have additional records of occurrence at Lake Jessie (Winnipeg River); Lowe Farm, west of Morris; Pembina Hills; Portage la Prairie; Delta and Treesbank. The animals are obviously spreading north and west with the passage of time. Two females taken near North Winnipeg measure 490, 230, 69 and 491, 233, 77 mm, respectively.

Hudson Bay Red Squirrel *Tamiasciurus hudsonicus hudsonicus* (Erxleben). This race inhabits almost all of the province, except the extreme southern part; that is from about Whitemouth River west to Saskatchewan, approximately south of Assiniboine River. Roughly north of this line it is to be found in varying numbers almost everywhere in suitable upper Transition parklands and the Canadian Zone; also, in similar environment east of Red River south to Lake of the Woods. It ranges north to the Hudsonian Zone, as at Churchill and Nueltin Lake (Harper, 1956), there showing signs of intergradation with *T. h. preblei*.

A series of 31 specimens was taken at Whitemouth Lake, Sandilands and Whiteshell forest reserves, Marchand, Icelandic River, Riding and Duck mountains and Overflowing River; these average 317.1, 126.9, 48.6 (299, 100, 46—332, 133, 50.2) mm. Mean weight of seven examples: 217.3 (162.1—271.6) grams. It evidently intergrades with *T. h. preblei* in the extreme northwest.

Minnesota Red Squirrel *Tamiasciurus hudsonicus minnesota* Allen. Only a comparatively recent discovery added this race to the fauna of Manitoba. It apparently occupies a restricted territory in and adjacent to Red River Valley north to about Lake Winnipeg and westward, on the second prairie steppe, from Pembina Hills possibly to about Brandon. The limit of its Manitoba range is somewhat obscure, but the race is clearly confined to the Alleghanian parklands. Intergradation with *hudsonicus* is to be expected to the east and north, and with *pallescens* to the southwest. Seven specimens assigned to this form were collected at Birds Hill, Oakbank and Pine Ridge, the average measurements of which are 318.8, 129.4, 42.9 (308, 115, 47.7—325, 139, 51) mm. Presumed examples of *minnesota* were seen, also, at Letellier, St. Norbert, Sanford, Fort Garry, Lake Francis, Douglas, Rock and Pellican lakes, Carberry and Killarney.

North Dakota Red Squirrel *Tamiasciurus hudsonicus pallescens* Howell. This paler race inhabits Turtle Mountain and wooded parts of Souris River Valley on both sides of the International Boundary. As yet the amount of material collected is insufficient to determine the northern and eastern limits of range in relation to *minnesota*. Seven specimens taken at Max and William lakes, Turtle Mountain, average 319.3, 128.3, 49.7 (305, 124, 48—330, 135, 57) mm. Weight of four examples: 198.1 (181.2—210.2) grams.

Hudson Bay Flying Squirrel *Glaucomys sabrinus sabrinus* (Shaw). Occupies the Canadian Zone throughout the province from Lake of the Woods northwest to Riding Mountain and northwards to the Hudsonian Zone and Hudson Bay. It is, with few exceptions, not common anywhere, but as it is active only at night, it could well be more numerous than the records show. Rand (1948, p. 146) stated that during the trapping season of 1945-46, in the Flin Flon district, R. W. Bryenton captured over one hundred of these squirrels in sets made for other fur bearers.

It is well known that flying squirrels are fond of frozen meat and that such baits are responsible for their accidental capture during the winter months. They appear to be much less readily attracted to trap sets in summer, which at least partly explains the poor success in securing good series of scientific specimens.

From wardens, woodsmen and professional trappers, the writer has oral reports of occurrences at Lake Jessie; Riding, Duck and Porcupine mountains; Overflowing River; Swan River and The Pas. A male secured at Whiteshell River measured 286, 127, 38 mm and weighed 130.2 grams.

PALLID FLYING SQUIRREL *Glaucomys sabrinus canescens* Howell. The type locality, Portage la Prairie, was designated by Howell in 1915. Little additional knowledge of the race has been acquired since that time in Manitoba. However, it is now known to inhabit the full length of the wooded valleys of the Red River and the Assiniboine, west to at least Treesbank, and south through Pembina Hills and other timbered tracts into North Dakota. Northern and western limits of range are not well defined.

Canescens has been collected at Morden, Treesbank, Aweme, Carberry, Portage la Prairie, Winnipeg and Poplar Point Lake (3 miles south of Lake Winnipeg). In heavy mixed woods of the latter locality I secured two specimens on January 22, 1944; a male measured 292, 128, 40 mm and weighed 156.6 grams and a female 302, 130, 40.5 mm and 171.4 grams. To the northwest, *canescens* may occur as far north as the southern slopes of Riding Mountain. A mounted specimen in the park museum at Wasagaming (examined shortly after capture at East Gate), is so pale as to appear referable to this race.

On February 3, 1944, Art Anderson of Poplar Point Lake examined a wood duck nesting box occupied by a pair of flying squirrels; in the soft nesting material he found three slightly furred juveniles with a body length of about 2.5 inches. Mr. Anderson stated that from their appearance they must have been at least two weeks old and, therefore, were born about January 20. This is clearly an extraordinarily early birth date for flying squirrels, especially in view of prevailing latitude and subzero temperatures. Mr. R. Sutton informed me that at Headingly on May 21, 1955, he found a nest of *canescens* containing several young; they were furred, with eyes open, but in the nestling stage and too small to travel.

RICHARDSON POCKET GOPHER *Thomomys talpoides talpoides* (Richardson). This race inhabits prairie-parklands and certain Canadian Zone areas of western Manitoba above the range of *T. t. rufescens*, that is approximately north of latitude 50°30'. It was found as far north as Swan River and Bowsman, where the animals were locally abundant.

A series of 11 specimens was collected at Riding Mountain (Lake Audy; Kennice and Swanson creeks); Lake Dauphin; Watjask Lake, Duck Mountain; and Swan River; these averaged 226.8, 66.6, 33.6 (209, 59, 28—234, 75, 32) mm. Mean weight of four examples: 137.3 (120—168.9) grams. A melanistic individual was captured in the latter locality. Numerous signs of occurrence were also noted on the trip from Minnedosa by way of Birtle to Roblin and at Gilbert Plains, Fork River and Garland.

DAKOTA POCKET GOPHER *Thomomys talpoides rufescens* Wied-Neuwied. Ranges throughout the Alleghanian parklands and some purely campestrian areas. In extensive tracts the animals are irregularly dispersed, scarce or absent; on the other hand, particularly favorable localities are profusely populated. West of Red River, *rufescens* may be said to occupy the country roughly south of 50°30'N., but with some minor extensions to the north. It is scarce east of Red River. However, a few workings were seen at Pine and Green ridges, Ste. Anne, Otterbourne, and east to about the longitude of Woodridge.

The 12 specimens collected at La Broquerie, Rineland, Mowbray, Oak and Louise lakes and Breaden Lake, Turtle Mountain, have average measurements of 226.7, 63.8, 30.8 (207, 55, 29—242, 72, 32) mm. Mean weight of five individuals: 140.3 (117—153.7) grams. Gopher workings were also seen at Notre Dame de Lourdes; Swan, Pelican and Douglas lakes; Souris and Elkhorn. Criddle (1930) has given a painstaking account of this rodent in southern Manitoba.

MISSISSIPPI VALLEY POCKET GOPHER *Geomys bursarius bursarius* (Shaw). This distinctive species was at last added to the Manitoba list when I took specimens near the International Boundary, 11.5 miles east of Emerson, on May 15, 1943 (Soper, 1944). Average measurements of 10 adults: 272.7, 83.6, 35.2 (241, 72, 33.5—298, 86, 36.5) mm; 253.3 (220—343) grams. Fresh earth mounds assumed to be those of *bursarius* were also seen from near Emerson, east for about 20 miles, or to within 11 miles of Roseau River; the calculated band of occupation appeared to be no more than three or four miles in width; it is the only place in which the species is known to occur in Canada. In view of the above findings, it was later thought that the animals might also inhabit similar lowlands along the border west of Red River, but trapping at several likely points west, to beyond Gretna, yielded only *T. t. rufescens*.

Maximilian Pocket Mouse *Perognathus fasciatus fasciatus* Wied-Neuwied. Confined to the southwestern region in Campestrian and lower Alleghanian Subfaunal divisions where it occurs, locally, from about the sandy skirts of Spruce Woods Forest Reserve west and southwest to Saskatchewan and North Dakota. Three specimens secured at Treesbank and forks of Antler and Souris rivers, average:. 129.3, 61.3, 16.7 (125, 57, 16.5—135, 64, 17) mm. Weight of one inidividual—9.9 grams. It has also been taken at Aweme (Criddle, 1915, 1929) and Oak Lake (Anderson, 1946). The species appears to resort only to those locations with sandy or very light soils; for this reason occurrence is irregular and communities are widely scattered. In some places it is fairly numerous or common. Habitat is variable, from semiarid, treeless Upper Sonoran plains, to thin grasslands in the aspen grove belt.

Canada Beaver *Castor canadensis canadensis* Kuhl. This remarkable quadruped was once more or less abundant over most of the province, but was seriously decimated by the beginning of the century, if not sooner. In many areas it became very rare, or completely exterminated. However, with highly effective conservation and restocking procedures of more recent times, the species has made amazing recovery.

In a recent letter, Mr. G. W. Malaher, Director of Game, remarks: "The streams of southern Manitoba are full of beaver, as well as the north country. Their lodges [Figure 13] are even to be found on both the Red and Assiniboine Rivers within the City of Winnipeg and its suburban municipalities. Last year [1958] we took 30,000 beavers... the highest on record for over half a century. In fact, it is the highest record we have".

Labrador White-footed Mouse *Peromyscus maniculatus maniculatus* (Wagner). Ranges along the eastern border in the Canadian Zone, north to at least the latitude of York Factory and westward nearly to, or into, northern Saskatchewan. Intergrades with *borealis* in the latter region and with *bairdii* along the southern fringe of the mixed-wood forest from about west-central Manitoba southeast to the vicinity of Whitemouth River. Specimens (determined by National Museum of Canada as *maniculatus*) were obtained at Marchand; Whitemouth, Red Rock, Jessica and Caddy lakes; Vivian; Whitemouth River; Telford; Pine Falls and Lake Jessie, Winnipeg River; The Pas and Atikameg Lake.

Twenty-three specimens from the above localities have average measurements of 179.9, 86.5, 20.5 (166, 70, 19.1—194, 100, 22) mm; 24.7 (24—28.1) grams. Anderson's (1946:135) omission of *maniculatus* in eastern Manitoba is an apparent oversight. At times these little rodents may be very plentiful, or again, surprisingly scarce. Average capture rate from 1935 to 1947 was 5.3 individuals per 100 trap-nights; the highest, 15 per 100 in 1938; the lowest, one in 300 at The Pas in 1947. The Pas specimens exhibit some approach to *P. m. borealis*.

Mackenzie White-footed Mouse *Peromyscus maniculatus borealis* Mearns. Has limited and dilute representation in upper west-central Manitoba, intergrading with *maniculatus* to the eastwards and with *bairdii* to the south along the Manitoba-Saskatchewan border. In the latter section a perplexing interfusion of racial values prevails in a complex of *borealis-bairdii-osgoodi* intergradation. Typical examples of the present form are to be found a short distance to the west in at least the Hudson Bay Junction—Melfort, Saskatchewan, latitude and northward. No typical material was personally acquired in Manitoba. This race averages a little larger than *bairdii*. A series of *borealis* from nearby Saskatchewan has mean measurements and weight as follows: 164.4, 70.5, 20.1 mm; wt. 23.9 grams.

Osgood White-footed Mouse *Peromyscus maniculatus osgoodi* Mearns. This pale-colored subspecies is basically a resident of the dry southern plains, but it also penetrates the semiopen outskirts of the Alleghanian parklands to a certain extent. Recognizable intergrades with *bairdii* occur well into south western Manitoba (Souris River; Oak and Pelican lakes; Aweme; Spruce Woods Sandhills). Moreover, some individuals so closely resemble unequivocal *osgoodi* from much farther west that it is justifiable to accord this form proper recognition as a part of the Manitoban fauna. It is true, nevertheless, that *bairdii* characters are increasingly dominant east of about longtitude 102°W, and that numerous individuals cannot, with finality, be assigned to one race or the other.

To the east, *osgoodi* coloration may be said to finally taper off into essentially typical *bairdii* in about the longitude of Rock Lake and, to the northwest, in the

FIGURE 13. Beaver lodge in winter in the northern forest.

general neighborhood of Qu'Appelle River. (Refer to racial comments under *borealis*.) *Osgoodi* and *bairdii* agree closely as to size. A large series of the former from Saskatchewan have average measurements and weight of 153.1, 61.7, 19.9 mm and 23.2 grams.

BAIRD WHITE-FOOTED MOUSE *Peromyscus maniculatus bairdii* (Hoy and Kennicott). A somewhat dusky form associated, for the most part, with the more humid Alleghanian parklands of the Transition Zone. It reaches the northwestern limits of its geographic distribution in southwestern Manitoba; here it undergoes an almost imperceptible synthesis with *osgoodi* to the west, with *borealis* to the northwest and with *maniculatus* to the north and east. On the perimeter of its range, numerous intergrades are extremely puzzling and defy subspecific identity with any accuracy (Soper, 1946). Color confusion seems most marked in the extreme southwest (*bairdii—osgoodi* complex) and in the lowlands west of Lake Winnipeg to and around Lake Manitoba (*bairdii* + *maniculatus*).

Specimens referred to *bairdii* (typical, or subtypically nearer this race) were collected at Mowbray; Rock, Louise, Pelican, Douglas and Oak lakes; forks of Antler and Souris rivers; Treesbank; Turtle Mountain; Winnipeg; Stony Mountain; Lake Francis; Elm and Leffura points, Lake Manitoba; Dog, Little Salt and Dauphin lakes; Mossy River and Riding and Duck mountains. Even in some of the above localities, along the southwestern and northeastern perimeter, some individuals are nearer to *osgoodi* and *maniculatus*, respectively.

A series of 61 specimens from the localities cited above have average measurements of 155.6, 64.8, 19.3 (142, 57, 18—169, 81, 20) mm. Mean weight of 26 examples: 22.1 (17.1—27.2) grams. Two females taken at Lake Louise, June 16, 1937, contained six and seven embryos, respectively; another at Stony Mountain, June 28, with five fetuses averaged 15 mm in length.

Bairdii is abundant at certain times and places, but it can also slump to low numerical levels. The long-time average rate of cap-

ture was only one per 100 trap-nights; the highest, 20 per 100 (Pelican Lake, 1940); the lowest, one in 360 (Little Salt Lake, 1947). It was locally common from 1937 to 1939 and exceptionaly scarce in 1935-36 and again from 1941 to 1943. Criddle (1950) wrote an unexampled account of this race in the Spruce Woods—Aweme district covering the period 1928 to 1947.

Maximilian Grasshopper Mouse *Onychomys leucogaster leucogaster* (Wied-Neuwied). Found only in the southwestern portion of the province where it is of sparing and capricious distribution. The species resorts to both open campestrian country and the Alleghanian parklands a little farther north and east. Seton (1909a) captured one at Carberry on June 1, 1884. The eastern limit of occupation appears to be Red River Valley (near the 49th parallel); the northernmost record in Manitoba is by Green (1932), who took specimens along the southern edge of Riding Mountain National Park. Criddle (1929) reported the species as "tolerably common" at Aweme, and Anderson (1946) records a specimen from Oak Lake. In August 1949, Mr. R. Sutton secured a specimen in the vicinity of Melita and another near Boissevain. This race intergrades with *missouriensis* in southeastern Saskatchewan. Average measurements of these mice are about 150, 39, 21.5 mm.

Gray Bushy-tailed Wood Rat *Neotoma cinerea* ssp. (Figure 14). There is one accidental occurrence of this species in the province—plainly an exotic far from its normal haunts. Mr. R. Sutton, Manitoba Museum, informed me that one was captured not long ago in the Canadian Pacific Railway shops in Winnipeg, and that he still has it alive in captivity. As he says, "It probably arrived in a carload of manila rope from the Pacific coast."

Richardson Varying Lemming *Dicrostonyx groenlandicus richardsoni* (Merriam). This lemming is an inhabitant of the Arctic Barren Grounds. In Manitoba it occupies the strip of coastal tundra from a low, sandhill tract south of Cape Churchill northward over a wide area to and in southern Keewatin District, N.W.T. Preble (1902) reported the animals as common from Fort Churchill (type locality) north along the coast to about Cape Eskimo. On August 9, 1931, I saw many signs of *richardsoni* on sandy uplands north and west of old Fort Prince of Wales. Preble likewise found the

Figure 14. Gray bushy-tailed wood rat.

FIGURE 15. Richardson varying lemming in winter coat.

animals plentiful on sand ridges south of the river and west of the Churchill townsite.

Subsequently, several biologists (*see* References) found the animals in various stages of relative abundance in the latter district. Like the brown lemming, this species has cycles of about 4.5 years; recent peaks of abundance appear to have been in 1948—49 and 1953—54. This is the lemming that turns white and develops heavy claws on the forefeet during the winter months (Figures 15 and 17*B*). Average adult measurements are about 130, 12, 18 mm; mean weight, approximately 65 grams.

COOPER LEMMING VOLE *Synaptomys cooperi cooperi* Baird. From wide distribution in the east, this little vole ranges westward into a restricted area of Canadian Zone bogs and muskegs in the southeastern corner of the province. Northern limits of range in Manitoba are not known. Two specimens were collected by Stuart Criddle in 1912 and 1929 near Dawson (Sandilands Reserve); Green (1930) records *cooperi* from Pine Falls, Winnipeg River; and Buckner (1957) took specimens near Rennie. These appear, as yet, to be the only points of capture in Manitoba.

MANITOBA LEMMING VOLE *Synaptomys borealis smithi* Anderson and Rand. Ranges through Hudsonian and Canadian zones in Manitoba from Churchill (Quay, 1955; Smith and Foster, 1957) south to about Lake of the Woods and northwest, locally, to Riding Mountain, Flin Flon and Prince Albert National Park, Saskatchewan. Seton (1909) was justified in assuming that *S. borealis* occurred in Manitoba.

In 1929 Stuart Criddle collected several examples near Dawson Cabin; Green (1930) took specimens at Pine Falls, Winnipeg River; Breckenridge (1936) caught an adult at Cormorant Lake; and I took one on May 12, 1937, near Larkhall. In 1938 Richard Sutton trapped two individuals near Clear Lake, Riding Mountain (Soper, 1952). On the west side of the province *smithi* probably ranges north almost to the District of Keewatin. Average size is about 120, 23, 19 mm.

Back Brown Lemming *Lemmus trimucronatus trimucronatus* (Richardson) (Figures 16 and 17*A*). Quay (1955) evidently established the first record of this species in Manitoba when he trapped a single individual at Churchill during the third week of August, 1953. The previous southernmost record, along the coast, was for the mouth of Thlewiaza River (approximately 60°15'N) where Preble (1902) found the animals common in early August, 1900. Quay's discovery thus extends the known range of the species about 100 miles south of that previously established. Average measurements of these Arctic rodents are approximately 125, 18, 19 mm.

Dawson Red-backed Vole *Clethrionomys rutilus dawsoni* (Merriam). So far as known, this sub-Arctic—Arctic species has been taken in Manitoba only in the extreme northeastern coastal region where open tundra prevails. In 1935 at Nonala, Manitoba, 80 miles north of Churchill, Breckenridge (1936) captured an individual, which was subsequently identified by H. H. T. Jackson, U.S. Biological Survey. Evidently this is the only Manitoba record. *Dawsoni* is essentially a creature of the Hudsonian Zone with a wide range west to Yukon and Alaska and locally north to the Arctic mainland coast. It is considerably brighter in color than the "redbacks" of the *gapperi* group farther south. In size it is about the same as *C. g. hudsonius*.

Gapper Red-backed Vole *Clethrionomys gapperi gapperi* (Vigors). A Canadian Zone form with provincial distribution from about Lake of the Woods northward; it probably meets the range of *C. g. hudsonius* in about latitude 56°. Specimens from southeastern Manitoba are provisionally referred to *gapperi* until further research can be carried out. Specimens do not appear to be precisely typical *gapperi*, but they are nearer to that race than to *loringi*.

Specimens tentatively referred to *gapperi* were collected at Marchand; Sandilands; Whitemouth Lake and River; Pinawa and Pine Falls. Those from Marchand, Sandilands, Pinawa and Pine Falls appear to be intergrades with *loringi*. The series of 18 specimens from the cited localities average 131.8, 34.9, 18.6 (122, 32, 18—144, 39, 20) mm. Mean weight of seven examples: 22.1 (16.5—25) grams. While usually fairly common, to plentiful, these voles at times become very scarce. Over the years the average rate of capture was 4.7 per 100 trap-nights; the highest, 11 per 100 (Marchand, 1943); the lowest, 0 in 210 (Caddy Lake, 1935).

Hudsonian Red-backed Vole *Clethrionomys gapperi hudsonius* Anderson. Distributed in the upper reaches of the Canadian Zone and the adjacent Hudsonian of northeastern and north-central Manitoba from about latitude 56° (near Ilford) north to Churchill and Sandhill Lake (Anderson, 1946; Manning, 1948). Intergrades with

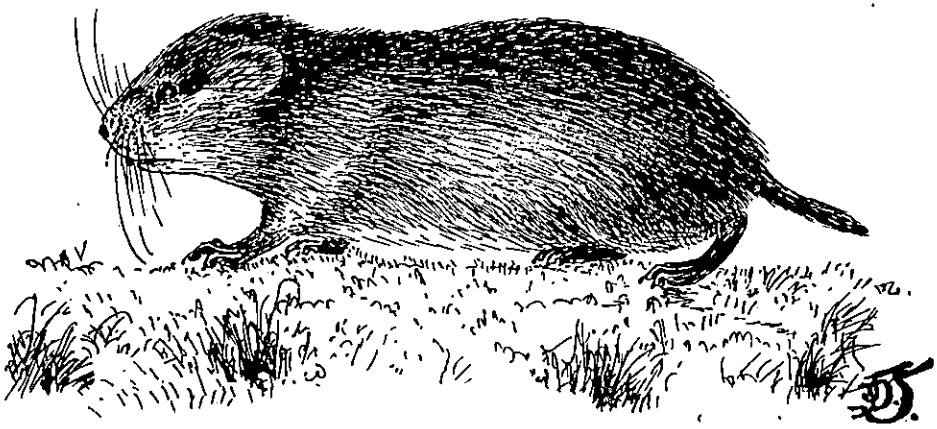

Figure 16. Back brown lemming of the Arctic tundra.

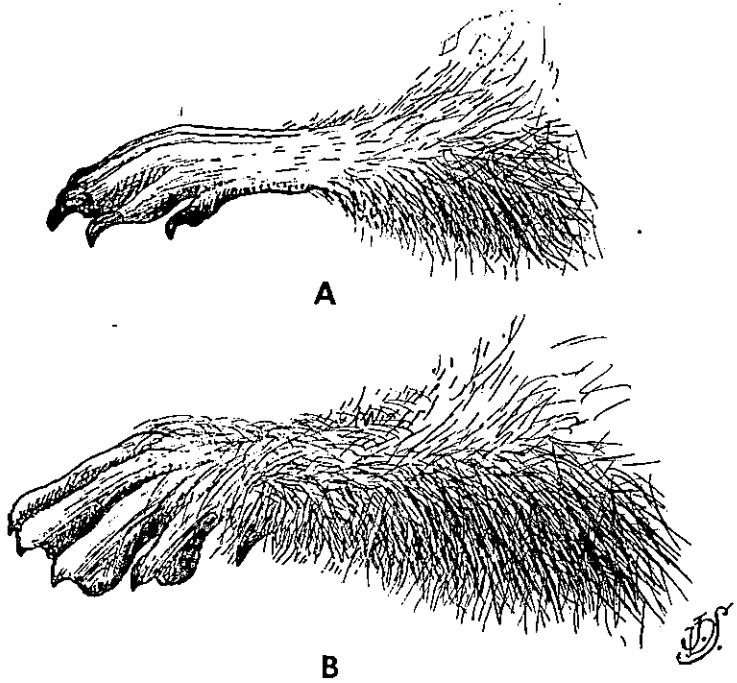

FIGURE 17. *A*, Front foot of the brown lemming (*Lemmus trimucronatus*); *B*, front foot of Richardson varying lemming (*Dicrostonyx groenlandicus*), showing greatly enlarged winter claws.

gapperi in the southeast and with *athabascae* in the northwestern part of the province. Smith and Foster (1957) found these voles very numerous in the Churchill district from 1953 to 1955. The most favored habitat consists of dense, moist, lowland woods and the margins of bogs and muskegs, but the animals also inhabit higher ground in lesser numbers. In the Churchill area, and elsewhere, a few range into neighboring open tundra. Mean measurements approximate 140, 40, 19.5 mm; 27.4 grams.

ATHABASCA RED-BACKED VOLE *Clethrionomys gapperi athabascae* (Preble). Undoubted examples of this race were personally collected only at Atikameg Lake (July, 1947), northeast of The Pas. It inhabits northwestern Manitoba north of *loringi* and west of the range of *hudsonius*. Rand (1948) records *athabascae* for the Flin Flon district and Harper (1956), likewise, for the Nueltin Lake—Windy River area in Manitoba and Keewatin. The four Atikameg Lake specimens average 138, 37.3, 18.3 (130, 36, 17—146, 38, 19.2) mm; 23.3 (17.2—28.9) grams. They were very scarce in 1947 and widely scattered on spruce—poplar uplands.

PLAINS RED-BACKED VOLE *Clethrionomys gapperi loringi* (Bailey). A normally common resident of Campestrian and Alleghanian subdivisions of the Transition Zone (approximately west of Red River), where it lives in brushy valleys of the open grasslands and in aspen or aspen—bur oak woods of the parklands. It also ranges in mixed-wood forest along the western side of the province. In the south, dry uplands is clearly the preferred habitat. In the Canadian Zone, however, it invades moist lowlands, bogs and sphagnum muskegs to a limited extent.

Individuals unreservedly assigned to this form were taken at Fort Garry; Stony Mountain; Pine Ridge; Icelandic River (Arborg); Douglas, Rock, Louise and Oak

lakes; Turtle Mountain; Antler and Souris rivers; Little Salt, Shoal and Dog lakes; Leffura and Elm points, Lake Manitoba; Riding and Duck mountains; and Mossy and Overflowing rivers. In the west-central region it probably intergrades with *athabascae* in about latitude 50°30'N.

A total of 64 specimens was collected in the localities cited. These average 132.5, 35.6, 17.9 (123, 32, 17—148, 42, 19.3) mm. Mean weight of 25 individuals: 22.3 (18.2—24.9) grams. A female taken at Rock Lake on May 14, 1942 (wt. 24.9 grams), carried six fetuses with a mean length of 15 mm.

Like many other small rodents, *loringi* swings at times from states of abundance to marked scarcity. It was also found to manifest these population extremes in different localities during the same season. From 1935 to 1947, at the points mentioned, a total of 260 individuals was taken in 3,950 trap-nights, or a long-time average of 6.6 per 100 trap-nights. The highest rate prevailed at Overflowing River, October, 1941, with 19 per 100 trap-nights; Riding Mountain, October, 1946, with 12 per 100; and Little Salt Lake, October, 1947, with 11 per 100 trap-nights. Lowest rate of catch occurred at Riding Mountain, June, 1941, with only one in 440 trap-nights. For an excellent long-term study of this vole in southern Manitoba see Criddle (1932).

Prairie Phenacomys Vole *Phenacomys ungava soperi* Anderson. Up to the present time, apparently known in Manitoba only from the type locality at Swanson Creek, Riding Mountain National Park (Anderson, 1942); the type specimen was personally taken there on June 5, 1941 (female 135, 33, 17 mm; 26.8 grams); gravid, with seven embryos averaging 8 mm in length; also, a topotype a short distance to the east, on July 16, 1942 (female 135, 30, 17.5 mm; 21.4 grams). The locality is typified by the usual Canadian Zone features of mixed-wood forest and hummocky lowlands clothed with conifers, sphagnum moss and Labrador tea. The species was evidently very scarce, because, despite hundreds of trap-nights in many other localities on the plateau (2,000 feet) no other individuals were secured.

Mackenzie Phenacomys Vole *Phenacomys ungava mackenzii* Preble. Ranges in the upper Canadian Zone and through the Hudsonian to at least Malaher Lake, N.W.T. (Manning, 1948). Few locality records exist for northern Manitoba. Several observers have listed it for the Port Churchill area (Preble, 1902; Anderson, 1942; Smith and Foster, 1957), and Rand (1948) records a phenacomys from the Flin Flon district, where it is rare. The animals were plentiful in the Churchill country during 1954 and 1955; a few were taken on the open tundra several hundred yards from the nearest trees. The favorite habitat was dry, open, white-spruce woods with log and stump litter and scanty vegetation. Average measurements of *mackenzii* are about 131, 32, 19 mm; 27.4 grams.

Keewatin Meadow Vole *Microtus pennsylvanicus aphorodemus* Preble. Type locality: near mouth of Thlewiaza River, Hudson Bay, a few miles north of the Manitoba boundary (Preble, 1902); also taken by Breckenridge (1936) at Nonala, Manitoba, about 20 miles to the south. Various authors (Preble, 1902; Anderson, 1937 and 1946; Rand, 1943; Smith and Foster, 1957) individually regard Churchill specimens as either referable to the present race, or to *drummondii*, or as intergrades between the two. The latter authors list their Churchill specimens under *aphorodemus*, but are open-minded with respect to the occurrence of intergrades. Average measurements of Churchill adults are approximately 147, 37, 19 mm. The animals were abundant in this area from 1952 to 1954.

Drummond Meadow Vole *Microtus pennsylvanicus drummondii* (Aud. and Bach.). This familiar vole ranges over most of the land surface of the province, in suitable habitats north to about the upper limits of the Hudsonian Zone; that is, vicinity of Churchill (Anderson, 1946) and Nueltin Lake (Harper, 1956). It is equally abundant, periodically, in humid parts of the Transition (Alleghanian) and Canadian zones. Lesser numbers usually exist in the dryer grasslands of the campestrian southwest.

Drummondii was personally collected, or observed, in about 40 well-spaced localities across the south from Whitemouth Lake to the Saskatchewan border and north to Driftwood and Atikameg lakes. The 43 specimens collected have average measurements of 151.5, 41.7, 19.1 (136, 31, 17.5—168, 48, 20.5) mm and a mean weight of 35.9 (31.2—49.4) grams. Fluctuations in numbers are very pronounced from time to time, and there are marked, simultaneous differences

in population levels from one locality to another. At Aweme, Criddle (1956) found these voles abundant in the years 1928-29, 1935-37 and 1944, and scarce, or rare, in 1930-34, 1938, 1942 and 1949-50.

The long-time capture index was 3.4 individuals per 100 trap-nights; highest, 15 per 100 (Blue Lakes, Duck Mt., Oct. 1944); lowest, one in 160 (Caddy Lake, May, 1935); and zero in 240 trap-nights (Vermilion River, Riding Mountain, May 1941). Some breeding data is afforded by two gravid females as follows: Rock Lake, May 14, 1942, eight fetuses averaging 20 mm in length; Turtle Mountain, September 20, 1943, four embryos with a mean length of eight millimeters.

Chestnut-cheeked Vole *Microtus xanthognathus* (Leach). Originally described from Hudson Bay (type specimen not known). Knowledge of distribution in Manitoba is very limited. Preble (1902) points out that the species had been collected at or near the mouths of Nelson and Churchill rivers; these are apparently the only records for the province.

Xanthognathus appears to be of very localized and sporadic distribution and subject to violent fluctuations in numbers. Occasionally it has been found common in some parts of its geographic range; again, it may be totally absent in the same places in later years. To many collectors it has been a veritable will-o'-the-wisp. Ordinarily, presence of the species is easily detected, as it digs relatively large, deep burrows with generous quantities of earth thrown out at the entrances; well-trodden trails connect the burrows which are usually located on well-drained land. This is a big, handsome microtine with average measurements of about 215, 50, 26 mm.

Little Upland Vole *Pedomys ochrogaster minor* (Merriam). Occupies southern parts of the province in Alleghanian parklands and Campestrian plains from east of Red River, west to Saskatchewan, and north to isolated grasslands on Riding Mountain. Characteristically a creature of the prairies, it also resorts to scattered shrub-grasslands and, less frequently, similar habitats in open deciduous woods. *Minor* is often found in small colonies—habitually so in winter—but tends to be more withdrawn and semisolitary during the breeding season from May until August or September. The summer homes are marked by diminutive but well-defined burrows, and runways are often many yards long.

A series of 32 specimens was collected in various years near Ridgeville, Fort Garry, Lake Louise, Aweme, and forks of Antler and Souris rivers; average measurements of these are 131.6, 30.6, 15.6 (118, 22, 15—146, 36, 18) mm; mean weight of 9 examples: 23.7 (20.4—30.3) grams. A subadult captured at Aweme on June 15, 1937, was three-quarters adult size (89, 22, 15 mm) and three juveniles trapped at Ridgeville on May 16, 1943, were about one-third grown with respective weights of 8.1, 8.3, and 9.2 grams. Although capriciously distributed and apparently more often scarce, in a few instances it was found locally common.

Eastern Muskrat *Ondatra zibethicus zibethicus* (Linnaeus). Little is known about this form in Manitoba, but evidently it occurs throughout the mixed-wood forest region of southeastern districts in typical, or slightly subtypical form. Two specimens collected at Whiteshell River in late October, 1946, are fairly close to *zibethicus* in color and much too dark for *cinnamominus;* these are: male, 555, 238, 78 mm, wt. 2.5 lbs.; and male, 484, 210, 76 mm, wt. 1.5 pounds. The possible range of the present form in Manitoba is from Lake of the Woods north to about Winnipeg River, but it may go farther north. More inquiry is needed on this question.

Hudson Bay Muskrat *Ondatra zibethicus albus* (Sabine) (Figures 18 and 19). As yet, the provincial range of *albus* is not accurately defined, but it is regarded as generally occupying most of the mixed-wood forest of Manitoba from Nueltin Lake (Harper, 1956) and Churchill (Anderson, 1946), south to about lower Lake Winnipeg, Lake Winnipegosis and Riding Mountain, or, locally, a little nearer to the International Boundary. It intergrades with *cinnamominus* to the south and southwest and is thought to do so with *zibethicus* in the southeast.

Three specimens taken at Whitewater Lake, Riding Mountain; Singoosh Lake, Duck Mountain; and Overflowing River, respectively, measure and weigh as follows: female, 570, 240, 73 mm, 2.75 pounds; male, 475, 220, 72 mm, 1.75 pounds; and female, 466, 206, 68 mm, 1.46 pounds.

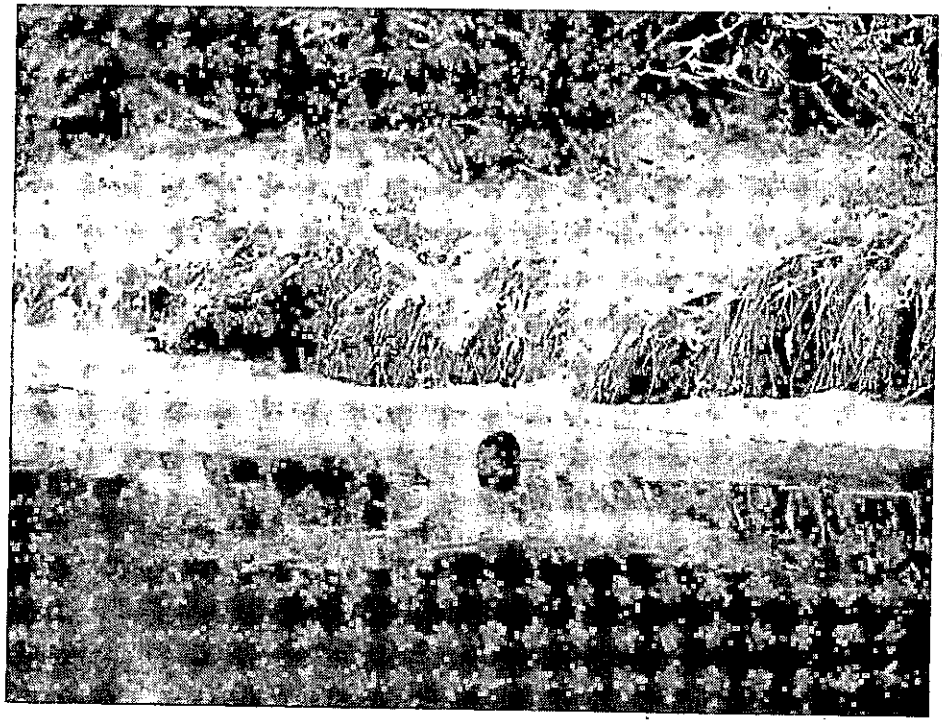

FIGURE 18. Muskrat feeding on edge of ice in early winter.

The animals are commonly dispersed; in some favorable areas they are notably abundant. An outstanding example is that of the Saskatchewan Delta–Summerberry Reserve district where, in 1945, a harvest of 372,000 pelts was taken (Game Trails, June, 1945, p. 10).

In a recent communication, Mr. G. W. Malaher provides the following interesting and valuable information: "From work done by Dr. J. A. McLeod on the muskrat in Manitoba during the past 10 years, it would seem that *alba* is the common muskrat of Manitoba, that *zibethica* is likely to be found only in the southeastern section, and that *cinnamomina* is found only sparingly in the southwestern and south-central portions of the province, in areas overlapped by *alba*. Thus, Dr. McLeod reports only *alba* at Oak Lake and mainly *alba* with the occasional *cinnamomina* at Whitewater Lake.

"As to numbers, it is undoubtedly right that the numbers produced today are not indicative of the original population, but I think it significant that here, again, Manitoba has produced a record number of pelts in recent years. In 1955-56, production was 1,462,474. This record is good for the last half century anyway. Again, the average number of pelts taken in the past 20 years far exceeds the average of the previous 20 years, mainly, I believe, because of managed muskrat production on the Summerberry and other Fur Rehabilitation Blocks".

GREAT PLAINS MUSKRAT *Ondatra zibethicus cinnamominus* (Hollister). This paler race, in typical form, is restricted to extreme south-central and southwestern localities. Its range embraces certain parts of both Alleghanian parklands and campestrian sections of the Transition Zone, on the second prairie steppe, where, however, there is considerable intergradation with *albus* (see Mr. Malaher's remarks above).

A series of six specimens collected at Pelican Lake; Breaden and Max lakes, Turtle Mountain; and forks of Antler and Sauris rivers, were regarded by Dr. R. M.

Anderson as unqualified *cinnamominus*, or closer to it than *albus;* these specimens average: 520, 222, 75 (492, 205, 72–595, 270, 79) mm; 1.8 (1.56–2.10) pounds. Criddle (1929) places Treesbank district muskrats under *cinnamominus*, where, as elsewhere, they live variously in streams, ponds and lakes. Recognizable intergrades occur in many southwestern localities. Although the animals are still moderately common there, apparently the overall population has greatly diminished.

Norway Rat *Rattus norvegicus* (Berkenhout). A more or less recently introduced species, which evidently first reached the province in 1912 or 1913. Seton (1909) had no personal knowledge of it in Manitoba and Criddle (1929) stated that it was first detected in the Aweme-Treesbank district during 1914. Since then, as an obnoxious pest, it has spread in varying degrees of abundance throughout most southern territory.

House Mouse *Mus musculus domesticus* Rutty. With regard to this exotic pest, Seton (1909) remarked: "Introduced with settlers in 1882; now abundant in all towns." It is even more widely dispersed at the present time, one record being from Churchill (Smith, 1957). In summer, large numbers desert barns and houses to roam in the open fields, prairies and woods. Consequently, collectors of small, native mammals often catch these mice far from any towns or farm buildings.

Hudson Bay Jumping Mouse *Zapus hudsonius hudsonius* (Zimmermann). Of wide range, principally in the Canadian Zone, but it also penetrates the Hudsonian. In the more northern latitudes there are positive records for Flin Flon, Ilford, Oxford Lake, York Factory and Churchill. On the whole, this race is replaced by *campestris* near the upper limits of the Transition parklands. Criddle (1929), however, lists *hudsonius* as occurring in the isolated larch bogs of the Aweme

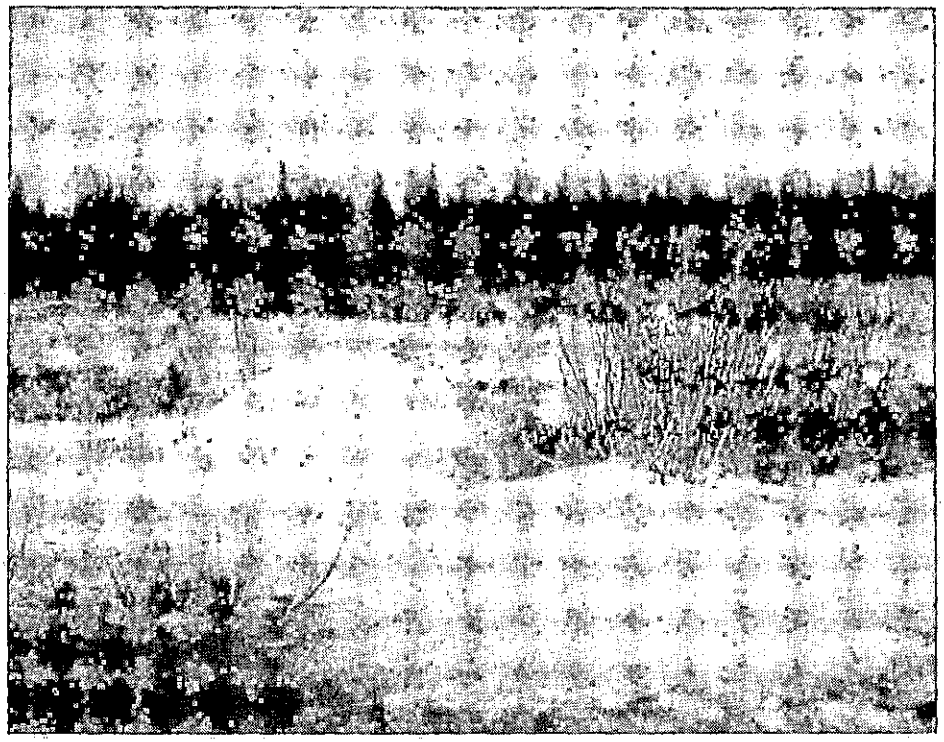

Figure 19. Muskrat lodge at a northern muskeg lake covered with snow.

district. The nine specimens collected in southeastern Manitoba (Sandilands and Whiteshell Forest reserves and Pointe du Bois, Winnipeg River) and Atikameg Lake, average 213.8, 131.1, 30.8 (205, 121, 30–218, 138, 31) mm; wt. 18.4 (16.9—21.3) grams.

These mice were generally scarce, rare, or apparently absent in most of the sampled range. Over the span of a decade or so, the average catch was considerably less than one individual per 100 trap-nights; in many Canadian Zone trapping areas none were caught. The highest score obtained—four in 100 trap-nights—was at Red Rock Lake, Whiteshell Reserve, in late May 1943. The species likes moist, willow-alder flats bordering lakes and streams, but a few also travel about on neighboring uplands.

Prairie Jumping Mouse *Zapus hudsonius campestris* Preble. As the name implies, this is a mouse of the campestrian region. However. it is usually found in association with scattered shrubbery and semiopen woods of stream valleys, or parklands, as distinct from the bald prairie. It occurs locally in the Transition Zone from points east of Red River, west to Saskatchewan, and north in the interlake country and the pseudo-prairies of Riding Mountain. There are records of occurrence for Emerson; Winnipeg; Pine Ridge; Gimli; Portage la Prairie, Mowbray; Carberry; Douglas, Rock, Pelican and Oak lakes; Aweme and Coulter. In all probability, jumping mice seen at Dog and Dauphin lakes were also of this race.

The 12 specimens collected in the above territory average 216.5, 130.9, 29.7 (195, 113, 28–227, 135, 32) mm; mean weight, 17.8 (16.3–20.2) grams. This subspecies is probably as numerous as *hudsonius*. Nevertheless, it has been common at some times and places. Average long term trap-night ratios were almost identical for both races.

These remarkable "jumpers" are not infrequently seen actively abroad in full daylight. In the course of several years I succeeded in catching four by hand in open grasslands. The population level is seemingly rather uniform, but there is some indication of slight periodic fluctuation.

Saskatchewan Jumping Mouse *Zapus princeps minor* Preble. Predominant habitat on the Great Plains embraces the semiarid, to subhumid, grasslands of the Transition Zone, with minor incursions within the aspen grove belt. In Manitoba the species seems to be confined to extreme southern localities (on the second prairie steppe) east to about the Pembina Hills escarpment. Throughout this prairie-parklands territory it appears to be erratically dispersed and comparatively rare. It is more plentiful on the third steppe in Saskatchewan.

Minor is not accorded existence in Manitoba by either Seton (1909), Anderson (1946), or Miller and Kellogg (1955), but Criddle (1929) lists it as rare at Aweme. Also, in 1940 and 1941, I collected four specimens at Pembina River, north of Mowbray, and at Pelican Lake; these average 231.5, 139, 30.6 (226, 132, 29.5—240, 145, 31.5) mm. Weights of two specimens: 22.6 and 23.1 grams.

Wisconsin Jumping Mouse *Napeozapus insignis frutectanus* Jackson. An inhabitant of Canadian Zone forests, with western limits of distribution in southeastern Manitoba. The first and apparently only records for the province are based on two of my specimens as follows: Caddy Lake, Whiteshell Forest Reserve, May 24, 1935, male, 241, 151, 31.5 mm, white tail-tip, 26 mm; Cedar Lake (near Vivian), May 8, 1937, male, 243, 146, 32 mm, white tail-tip, 7 mm (Soper, 1937; 1938). In relation to extensive field work, it appears conclusive that this eastern coniferous forest species is very rare in the region under review.

Eastern Canada Porcupine *Erethizon dorsatum dorsatum* (Linnaeus) (Figure 20). Generally, but usually sparingly, distributed in the Canadian Zone from the southeastern corner of the province northward to York Factory; to about Churchill River, in the north-central area; to Reindeer Lake on the west; and south over Porcupine, Duck and Riding mountains. Criddle (1929) recorded this race locally south to the Spruce Woods —Treesbank district. A few widely scattered individuals were noted as far west (on the first prairie steppe) as Red River, from about Morris north to Lake Winnipeg.

While the animals are common in some southeastern tracts, they are evidently very scarce, or totally absent at the present time, over much of the Manitoban range. Mr. G. W. Malaher has recently informed me that about six years ago there was a pronounced upsurge in numbers throughout Sandilands and Whiteshell forest reserves. An immature female collected on May 12, near Sandilands, measured 625, 190, 93 mm, and weighed 8.5 pounds.

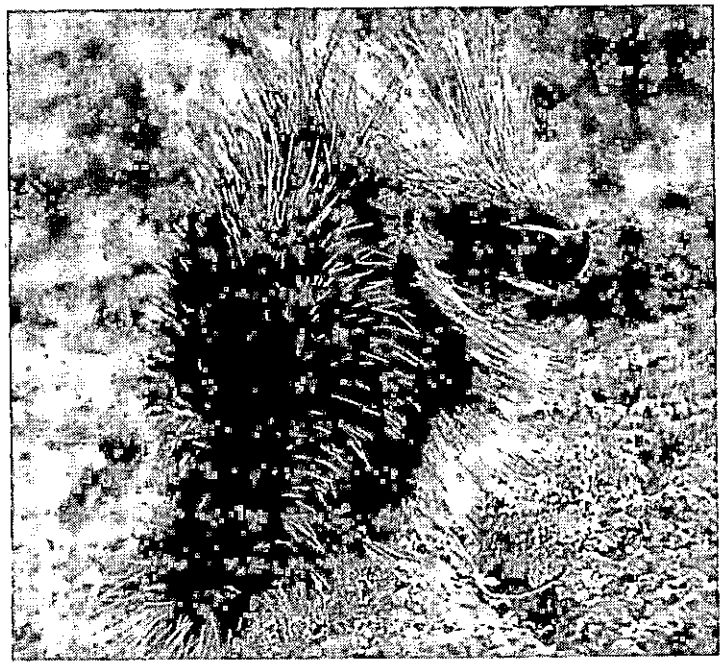

FIGURE 20. Porcupine in defensive position.

NEBRASKA YELLOW-HAIRED PORCUPINE *Erethizon dorsatum bruneri* Swenk. This yellow-haired form, of very sparing occurrence in southwestern Manitoba, can only be tentatively referred to *bruneri*. Little is known about it provincially; more specimens are needed for subspecific clarification. In a letter of July 12, 1939, Mr. S. Criddle stated that a yellow-haired porcupine had been seen near Belmont, Tiger Hills, and another along Assiniboine River a few miles northwest of Treesbank. Mr. L. T. S. Norris-Elye informed me several years ago that the Manitoba Museum has a specimen (without skull) from Lauder.

In a letter during February, 1959, Mr. Malaher stated that "Dr. J. A. McLeod reported a considerable build-up of porcupine in the Spruce Woods Forest Reserve area three or more years ago. He identified one example seen at Hargrave, Manitoba, as the yellow-haired variety and believes that this was the kind then much in evidence. I travelled the Spruce Woods area a good deal last year, but there were then no recent signs of porcupines."

From present information, this yellow-haired type occurs nowhere to the west very far north of the International Boundary. It is more numerous on the third prairie steppe, in Saskatchewan, for some little distance west of the Coteau de Missouri.

Order CETACEA. Whales and Porpoises

WHITE WHALE *Delphinapterus leucas* (Pallas). This little porpoise has been frequently recorded from the west side of Hudson Bay, chiefly in the Manitoban portion and northwards. Schools of several individuals, up to a score or more, have been common during the summer months. They particularly liked to disport themselves in the mouths of Hayes, Nelson and Churchill rivers. In August 1931, the writer saw many swimming and blowing in the harbor of the latter stream. At one time large numbers were killed for their hides and blubber. While the population has declined, many still return to their old haunts.

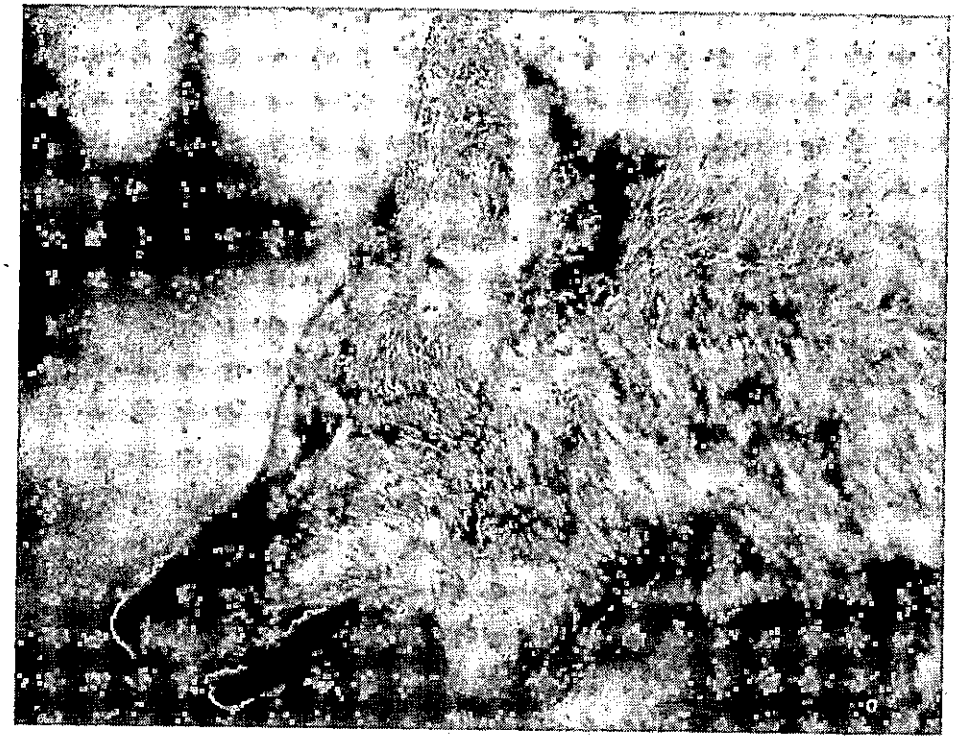

FIGURE 21. Head of northeastern coyote.

BOWHEAD WHALE *Balaena mysticetus* Linnaeus. In the nineteenth century and earlier, bowheads were generally dispersed in Hudson Bay, but they were always more numerous in the extreme northern end and through the floe-ridden waters of Foxe Channel, Frozen Strait and Roes Welcome. A few roamed the sea off the coast of Manitoba. Preble (1902) remarked: "Formerly found as far south as Churchill River, according to Hearne, who says that three were 'killed there in the course of twenty years'." By about 1903 these leviathians had become very scarce, or completely exterminated in some areas; shortly after, commercial whaling came to an abrupt end. There appears to be no recent record of the bowhead in the region under review.

Order CARNIVORA. Flesh Eaters

NORTHEASTERN COYOTE *Canis latrans thamnos* Jackson (Figure 21). This so-called brush wolf ranges over southern Manitoba north to about Elliot and Cross lakes, Thicket Portage and Pukatawagan. Intergrades with *latrans* evidently occur in the extreme southwestern corner of the province (Young and Jackson, 1951). In many districts it is common, but from time to time it may sharply fluctuate in numbers. Though considerably depleted in settled communities coyotes have an almost uncanny ability to survive persistent hunting, poisoning and trapping.

SASKATCHEWAN TIMBER WOLF *Canis lupus griseoalbus* Baird. The type specimen (formerly *Canis lupus-griseus* Sabine and *Canis lupus knightii* Anderson, 1943) was collected by Capt. John Franklin, R.N., at Cumberland House, Saskatchewan River, in January 1820. The race apparently inhabits most timbered regions of the province, intergrading with *hudsonicus* in the Keewatin District, or possibly extreme northern Manitoba (Young and Goldman, 1944, p. 414), with *lycaon* to the southeast, and with

nubilus on the plains to the southwest. The latter race, however, is now regarded as extinct. Although *griseoalbus* is still common, to plentiful, in remote areas, the population during the past 50 or 60 years has dwindled, or disappeared, in the southern parts of its range. In some northern districts wolves are absent in summer; in the same areas tundra wolves (*hudsonicus*) become common in winter as they follow barren-ground caribou herds from the north. A few wolves still wander south to Sandilands Forest Reserve and Riding Mountain, as well as to some of the northern fringes of settlement.

Continental Arctic Fox *Alopex lagopus innuitus* (Merriam). These little foxes of the bleak Arctic tundras ordinarily occur along the coast of Manitoba from the District of Keewatin southward to the vicinity of Port Nelson. They have been recorded as far southeast as Severn River and during very severe winters have wandered inland for a distance of 300 miles or more. On several occasions in the northeast they have been seen south of latitude 55°. There is one old and remarkable record of occurrence near Norway House (Preble, 1902).

Northern Plains Red Fox *Vulpes fulva regalis* Merriam. Found in about three-quarters of the entire province. It is at home alike in the deciduous parklands and northern coniferous forest north to the Hudsonian Zone.

In peak years the animals still range abundantly in the northern wilderness, as well as in some settled districts of the south. They were scarce in 1928-29, but a few years later became much more plentiful, especially after the year 1940. By 1943 they had become abundant. At this time many requests were sent by farmers to the provincial game branch to have a bounty placed on foxes. Periodical cyclic abundance continues. The species is now classed as a predator under the Predator Control Act.

Kit Fox *Vulpes velox hebes* Merriam. In early times ranged the grasslands of the southwest from Pembina Hills to the Souris Plains. It had already become extinct in that region early in the century, if not before (Seton, 1909).

Wisconsin Gray Fox *Urocyon cinereoargenteus ocythous* Bangs. The first authentic record of this fox in Manitoba was only recently established. Sutton (1958) recounts that on January 12, 1957, Mr. Marcel Bouchard of St. Adolphe, Manitoba, trapped a gray fox, the pelt and skull of which was obtained some time later by the Manitoba Museum. It was an old male. Subspecific determination was through the courtesy of Dr. A. W. Cameron, National Museum of Canada, and Dr. C. P. Lyman, Museum of Comparative Zoology, Harvard University. Mr. Sutton stated further that "A careful check with local fur buyers reveals but one other probable occurrence in Manitoba. Mr. A. Suchrov, buyer for S. I. Robinson Company, recalls handling a single pelt taken at Sprague in 1946 or 1947."

American Black Bear *Euractos americanus* Pallas. Still fairly numerous to very common, locally, in the greater wilderness areas from Sandilands and Whiteshell forest reserves north and northwest to the Hudsonian Zone. It is equally at home in the mixed-wood forest of the lowlands and those of Riding, Duck and Porcupine mountains. Occasional strays wander into the upper areas of the parklands.

Big Plains Grizzly Bear *Ursus horribilis horribilis* Ord. Formerly roamed the plains of southwestern Manitoba as well as the wilds of Turtle Mountain and Brandon, Tiger and Pembina hills. It appears to have become extinct in that part of its primitive range about 150 years ago, although there may have been somewhat later rare occurrences. The Manitoba Museum has an old unearthed skull from Austin, Manitoba.

Eastern Arctic Polar Bear *Thalarctos maritimus maritimus* (Phipps) (Figure 22). Occurs, or did occur, regularly throughout the length of the provincial coastline at Hudson Bay and as far south as Severn River, Ontario. Many years ago a few were reported from James Bay. The species more commonly resorts to the coast north of Cape Churchill, where it is still often seen. In fact, many individuals boldly visit the Churchill townsite during the night, causing some trouble and inconvenience. No effective means has been found to keep them away; only the Eskimos have the right to hunt and kill them for food and clothing.

Upper Mississippi Valley Raccoon *Procyon lotor hirtus* Nelson and Goldman. At one time fairly common in southern Manitoba, ranging from southeastern localities west to Pembina Hills and Turtle Mountain

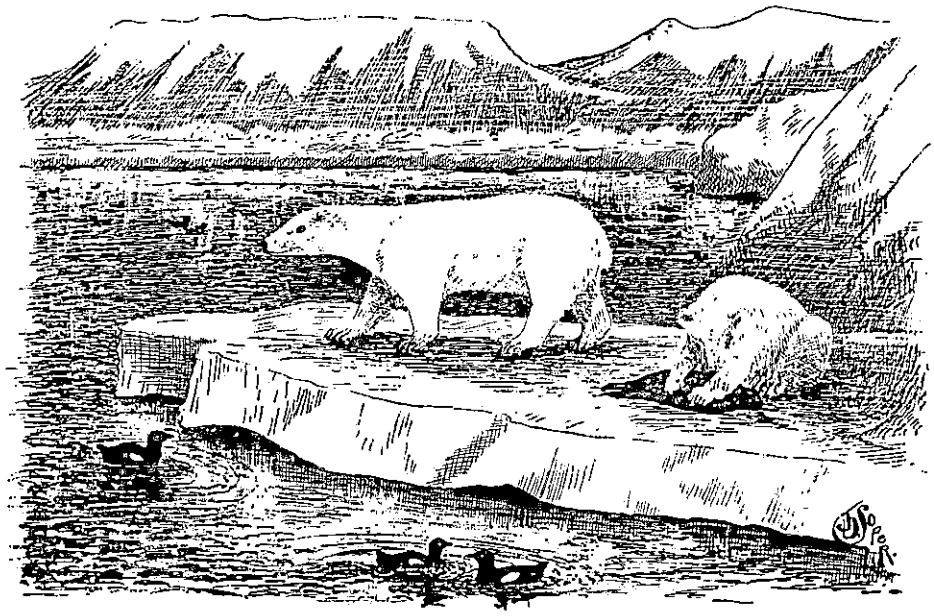

FIGURE 22. Eastern arctic polar bear hunting seal on ice floes, early summer.

and north to Riding Mountain. Early in the century raccoons had become very rare; Seton (1909) then stated that they were confined to the banks of streams in southwestern areas. Fair numbers still inhabited Turtle Mountain in 1927. During the past 10 years they have markedly increased and in some localities have become a pest. The Manitoba Game Branch records 216 having been taken in the season of 1957-58; probably many more were killed that were not recorded. On Riding Mountain the species seems to have disappeared about 1920.

HUDSON BAY MARTEN *Martes americanus abieticola* (Preble). An inhabitant of the boreal forest north to the Hudsonian Zone. In some of the remoter areas it occurs sparingly, but has diminished steadily in modern times. Throughout the southern part of its range it is now consistently rare, or completely wiped out because of overtrapping during the past century. Nevertheless, from 100 to 200 pelts are still taken annually by professional trappers.

FISHER *Martes pennanti pennanti* (Erxleben). Formerly ranged throughout the coniferous forest from the extreme southeast, north and northwest to the Hudsonian Zone. For a long time the species has been scarce even in the wilder districts and totally wanting in some parts of the primitive range, especially in southern tracts of the Canadian Zone. The yearly harvest varies from about 300 to 500 pelts.

RICHARDSON WEASEL *Mustela erminea richardsonii* Bonaparte. Distributed throughout the evergreen forests of all districts north to about the limit of trees. Along the southern border of the Canadian Zone it gradually intergrades with *bangsi*. The animals fluctuate in abundance. They had become common in the winter of 1943-44. At such times large numbers are trapped for the fur trade. Four specimens taken at Lake Dauphin and Audy and Whitewater lakes, Riding Mountain, average 317.7, 91, 42.7 (302, 84, 41—325, 95, 44) mm; 140.8 (129.1—158.2) grams.

MINNESOTA SHORT-TAILED WEASEL *Mustela erminea bangsi* Hall. Occupies the Transition parklands and brushy prairies of the south from east of Red River west to about the Souris Plains. Evidently few scientific specimens are in existence. There are de-

finite records for Winnipeg, Delta and Aweme. Tracks that may have been those of *bangsi* were seen in the snow near Pine Ridge, Carman, Stony Mountain and Libau. Probably intergrades with *M. e. cicognanii* in the extreme southeast near Lake of the Woods.

LEAST WEASEL *Mustela rixosa rixosa* (Bangs). Little is known about this diminutive carnivore in Manitoba, but it apparently ranges widely, if sparingly, in nearly all wooded parts of the province. In some areas it appears to be more numerous than formerly supposed, but it is still relatively rare. Specimens are only very slowly added to scientific collections. In the Flin Flon district Bryenton stated (Rand, 1948) that he trapped, on an average, no more than about one *rixosa* to every 100 Richardson weasels.

In the southwestern grasslands the least weasel resorts to wooded stream valleys and ravines where it hunts assiduously for members of the mouse tribe and possibly immature ground squirrels. Farmers occasionally see them under stooks, the animals doubtless being attracted there by plentiful mice and voles.

Four specimens from Carman, Delta, Big Grass Marsh and Treesbank average 187, 34.5, 22.5 (167, 27, 19.1—230, 45, 30.5) mm; wt. 40.9 (23.3—64.9) grams. There are also reliable reports of occurrences for Aweme; Riding Mountain; Gypsumville; Lake St. Martin; Elm Point, Lake Manitoba; Caddy Lake; The Pas; York Factory and Churchill.

LONG-TAILED PRAIRIE WEASEL *Mustela frenata longicauda* Bonaparte. Widely destributed on the Great Plains in the Transition Zone and farther south. Formerly common in southern Manitoba wherever true campestrian conditions prevailed. Height of abundance was reached in the southwest which provided the most suitable habitat. It is still not uncommon in some districts. Although most are found on the treeless prairies and semiarid plains, the species also roams in the adjacent parklands and lower confines of the mixed-wood forest.

Three specimens taken at Winnipeg and Max and William lakes, Turtle Mountain, average 456.7, 160.7, 53.7 (425, 139, 51—480, 173, 57) mm; wt. 382.7 (368.5—396.9) grams. *Longicauda* has been recorded also, at Morden, Portage la Prairie, Delta, Carman, Carberry, Aweme, Pipestone and the southern portion of Riding Mountain. There is some possibility that the Minnesota long-tailed weasel (*M. f. spadix* Bangs) may reach the southern corner of the province east of Red River.

HUDSON BAY MINK *Mustela vison lacustris* (Preble). This is the common dark mink of the northern forest. Its principal range almost coincides with the Canadian Zone, but to some extent it also inhabits Transition parklands and the Hudsonian Zone, thus occurring in most parts of the province. The animals continue to be fairly common, to plentiful, in various parts of the range and locally abundant where trapping pressure is less pronounced or absent.

In southern Manitoba they have been personally observed, or collected, at Whiteshell Forest Reserve; Netley Marsh, Lake Winnipeg; Assiniboine River; Douglas Lake; Turtle, Riding and Duck mountains; Overflowing River; and Summerberry Reserve near The Pas. Four specimens taken at Whitewater Lake, Riding Mountain in early October, 1946, average 550, 178.2, 61.3 (522, 167, 58—577, 188, 66) mm; wt. 1.90 (1.5—2.0) lbs. The 1957-58 harvest was 37,854 pelts (a long-time record); average take for the past 29 years, 19,255 pelts.

WOLVERINE *Gulo luscus luscus* (Linnaeus). In earlier times, generally distributed in the boreal forest north to the Arctic tundra. By the latter part of the last century it had become exceedingly rare except in the higher latitudes. Now in most parts of southern Manitoba the species has completely disappeared. In the forties a few were said to still exist northeast of Lake Winnipeg and north of Nelson River. At present it is probably most numerous in the Hudsonian and Arctic zones. The annual catch is still between 30 and 40 individuals.

AMERICAN BADGER *Taxidea taxus taxus* (Schreber) (Figure 23). A typical resident of treeless plains, prairies and the more open parklands. In earlier days it inhabited all of the campestrian region in the south; optimum conditions were reached in southwestern localities. By the end of the last century numbers had been appreciably reduced by the inroads of settlement, but the species continued fairly common until about 1925. Greatly increased value of pelts then caused marked decline in the population; however, of late years the animals have been increasing in numbers. The Manitoba

FIGURE 23. American badger at mouth of den.

Museum has specimens taken from a den at Duck Mountain, evidently the most northerly occurrence recorded for the province.

NORTHEASTERN STRIPED SKUNK *Mephitis mephitis mephitis* (Schreber). This geographical race inhabits the entire eastern part of the province from Lake of the Woods north to about the latitude of Oxford Lake. It is abundant in some southern districts, and except for localized areas it becomes increasingly scarcer to the north. It is, or was, locally common in the vicinity of Lake Winnipeg and north to about Norway House. More specimens are needed to clarify the territory of intergradation with *hudsonica*, which occupies a vast region to the west and northwest.

NORTHERN PLAINS SKUNK *Mephitis mephitis hudsonica* Richardson. Westward from about Lake Winnipeg it ranges over most of the southern two-thirds of the province in both Transition and Canadian zones. The animals may be locally common in either, but are most abundant in the parklands and lower fringes of the mixed-wood forest to the north. They are definitely more common in the southern aspen-oak grove belt, on first and second prairie steppes, than farther north and west. In addition to parklands-prairie country, proper, skunks were found notably plentiful on Turtle Mountain and fairly well represented in parts of Riding and Duck mountains.

EASTERN CANADA OTTER *Lutra canadensis canadensis* (Schreber). In early times otters were generally distributed along the waterways of the Canadian Zone, but by the early part of the present century, if not sooner, they had become very scarce, or locally exterminated. As Seton (1909) remarked: "Found all along the rivers, but exceedingly rare now." Reduction in numbers was especially marked in southeastern districts in more or less close proximity to the increasing expansion of settlement. The normal habitat of otters is heavily forested wilderness areas well supplied with streams, lakes and fish.

From a wide range in Eastern Canada this race appears to reach its western limit in east-central and perhaps more southeastern parts of Manitoba. There is some chance that *canadensis* grades into *L. c. interior* within the Whiteshell Forest Reserve and Lake of the Woods districts, since the latter subspecies is found at Elk River, Minnesota. Anderson (1946) says: "There are no

Canadian records of *interior*, but if there are any native otters or skeletal remains from the scantily wooded waters on the southern border of the Prairie Provinces their identity and possible relation to *L. c. interior* are worth investigation."

MACKENZIE OTTER *Lutra canadensis preblei* Goldman. In regard to the over-all provincial population much the same remarks apply here as appear under *L. c. canadensis*. On the whole, perhaps, the northern animals have not suffered such an incisive decline in numbers, but as almost everywhere else across the continent, otters have greatly diminished in abundance as compared with primitive times. The present subspecies occurs over the greater part of northern Manitoba south of the treeline; its range extends eastward to Hudson Bay north of the territory occupied by *canadensis*. The animal has been reported as sometimes ranging along Arctic streams north of the limit of trees (Harper, 1956). Concerning the subspecific status of east-central Manitoba otters, Anderson (1946) says that, "Goldman (1935, Proc. Biol. Soc. Wash., vol. 48, p. 179) states that 29 specimens from central Manitoba (Cross Lake, Oxford House, and Norway House) grade toward typical *L. c. canadensis*, but in size are more properly referable to *L. c. preblei*."

ROCKY MOUNTAIN COUGAR *Felis concolor missoulensis* Goldman. Of occasional occurrence in southern localities. Seton (1925, Vol. 1, p. 49-50) listed the following places where cougars had been reported: Makinak, Riding Mountain, Plum Coulee, Brandon, Elphinstone, and Oak and Swan lakes. V. W. Jackson recorded in the *Winnipeg Tribune*, February 14, 1942, that one was seen a few days earlier near Marquette; the article also mentioned that "a Mr. Mackenzie, cabinkeeper at West Hawk Lake saw what looked like a mountain lion cross the highway on February 9.... Twenty years ago a mountain lion attacked a boy and girl at Birtle, Manitoba, killing the latter. When shot it was found to be blind and half starved." Norris-Elye (1951) stated that since about 1921 he had come into possession of several sight

FIGURE 24. Canada lynx in an Indian trap set.

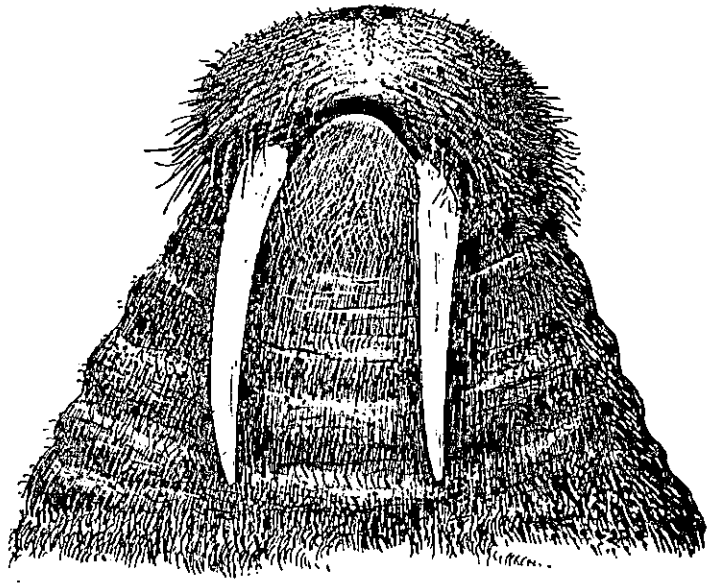

FIGURE 25. Ventral view of Atlantic walrus head, showing long ivory tusks.

records within the province; the more definite of these derived from the following localities: northerly foot of Turtle Mountains; Carman; nine miles northwest of Morris; and Sprague. Mr. R. Sutton informed me that of late years there have been reliable records of occurrence at Riding Mountain; Whiteshell Forest Reserve; and in the vicinity of Manigotagan River.

CANADA LYNX *Lynx canadensis canadensis* Kerr (Figure 24). In earlier days, commonly inhabited all mixed-wood forest north to the limit of trees at the Arctic tundra. Although essentially an inhabitant of the boreal forest, it also roamed to some extent in the parklands, sometimes well south of its normal environment. The lynx is now very rare, or exterminated, in extensive areas of the south. During peak years of cyclic abundance the animals are still fairly numerous over wide tracts of the northern wilderness, but in the 1940's only rare stragglers remained on Riding and Duck mountains. The provincial catch averages about 500 annually.

EASTERN BOBCAT *Lynx rufus rufus* (Schreber). Evidently it is this form of bobcat that occurs and has lately become commoner in southeastern Manitoba. Seton (1925, Vol. 1) referred to occurrences at La Riviere and Pembina. In a letter of March 30, 1951, the late Mr. Norris-Elye, Director of the Manitoba Museum, stated that a bobcat had been trapped recently near Mud Lake, in extreme southeastern Manitoba, and another near Steinbach about the same time; for further, detailed information see Norris-Elye (1951). Mr. R. Sutton has informed me that the Manitoba Museum has a bobcat kitten taken a couple of years ago near Fort Whyte.

Order PINNIPEDIA. Walrus and Seals

ATLANTIC WALRUS *Odobenus rosmarus rosmarus* (Linnaeus) (Figure 25). This huge, ungainly creature has apparently never been common along the coast of Manitoba, probably because of the character of that seaboard, tidal and otherwise. Among other factors, suitable breeding islands are a critical necessity and such are conspicuously lacking in the area under review. Nevertheless, a few animals sometimes ranged down the coast as far south as Cape Henrietta Maria. The

nearest centers of abundance existed in the Belcher Islands and in Roes Welcome. Individuals and small groups that casually appeared off the coast from Port Nelson to Chesterfield Inlet presumably bred in the latter area.

Atlantic Harbor Seal *Phoca vitulina concolor* (De Kay). Occurs locally all along the provincial coastline at Hudson Bay. It is more often found in the mouths of streams discharging into salt water, such as the Hayes, Nelson, Churchill and Seal rivers. Sometimes they swim several miles up such larger streams. Harbor seals also occasionally inhabit fresh-water lakes that are connected by river with the sea; one example is that of Nueltin Lake (Harper, 1956). While widely distributed in Hudson Bay and the Eastern Arctic Achipelago, these seals are usually thinly dispersed, or rare, north of about latitude 60°.

Arctic Ringed Seal *Phoca hispida hispida* Schreber (Figures 26 and 27*A*). Generally distributed in the northern part of Hudson Bay and south along the Manitoba coast to at least York Factory. Formerly occurred abundantly from Port Churchill, northwards, and apparently continues to be the common seal of those waters. In more northern latitudes it is the most prominent member of the Pinnipedia and in many localities reaches a state of abundance. The species was a mainstay in the economy of the primitive Eskimos who used it for food, fuel (blubber), summer clothing, lines and tupeks or summer tents.

Greenland or Harp Seal *Pagophilus groenlandica* (Erxleben) (Figure 27, *B* and C). This species is only of casual occurrence along the Manitoba seaboard and apparently this is true of all the west coast of Hudson Bay. It has been recorded intermittently at various places from Churchill north to Roes Welcome and rarely in more northern polar waters to southern Ellesmere Island. Its center of abundance is in neither Hudson Bay nor Strait, but in the North Atlantic and along the Labrador coast from Belle Isle to Cape Chidley.

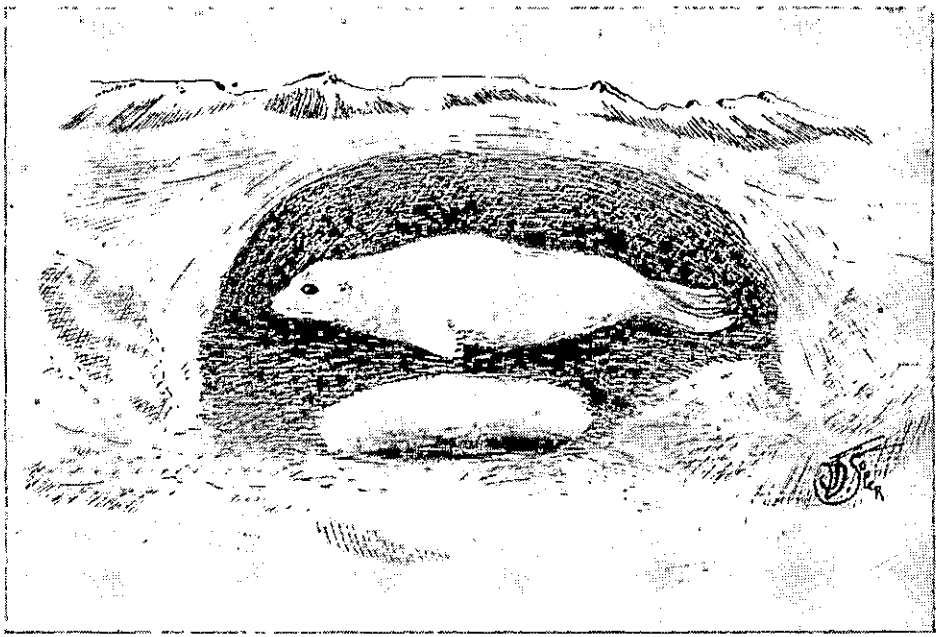

Figure 26. Young 'white-coat' ringed seal in birth chamber under the snow, over the sea ice; diving hole in the foreground.

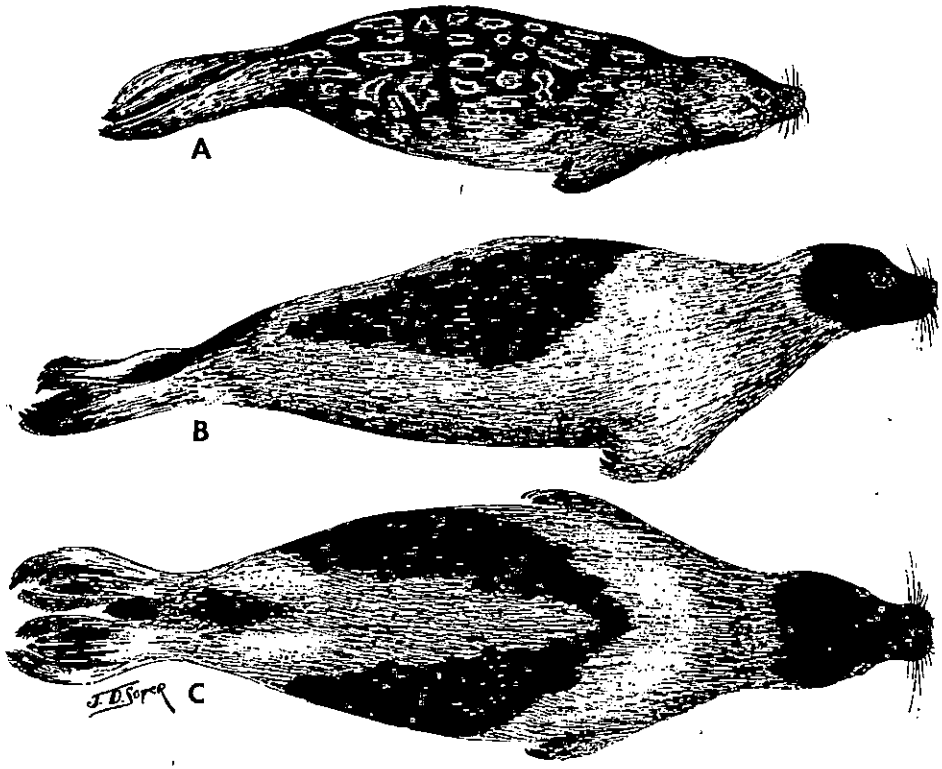

FIGURE 27. *A*, Arctic ringed seal; *B* and *C*, side and dorsal views of Greenland or harp seal.

BEARDED SEAL *Erignathus barbatus barbatus* (Erxleben) (Figure 28). Occurs, or did occur, with fair regularity all along the west coast of Hudson Bay. Many have been killed in the vicinity of York Factory, Fort Nelson and Churchill. The species is locally more numerous to the north. In some Arctic localities it is fairly common, or even plentiful, but, at best, it has never been as abundant as the ringed seal. The bearded seal (ukjuk) is of great importance to the Eskimos, not only because of the superior bulk of meat and blubber provided, but also on account of the greater thickness and strength of the hide. The hide was of great merit in the making of strong lines, dog traces, waterproof boots (kummiks) and other necessities.

Order ARTIODACTYLA. Hoofed Animals

MANITOBA WAPITI *Cervus canadensis manitobensis* Millais. In the early days, occurred abundantly in southwestern Manitoba from Red River and Pembina Hills west in both prairies and parklands, on Turtle Mountain, and, north, in the forests of Riding and Duck mountains. By 1884 it was nearly exterminated except in Pembina Hills (Seton, 1909a). Criddle (1929) stated that in the Treesbank—Spruce Woods district the animals were fairly common until 1887, after which they soon became locally extirpated.

In due course, protective laws saved the more northern remnants from complete extermination. Most of the several thousand wapiti now existing in Manitoba, roam the

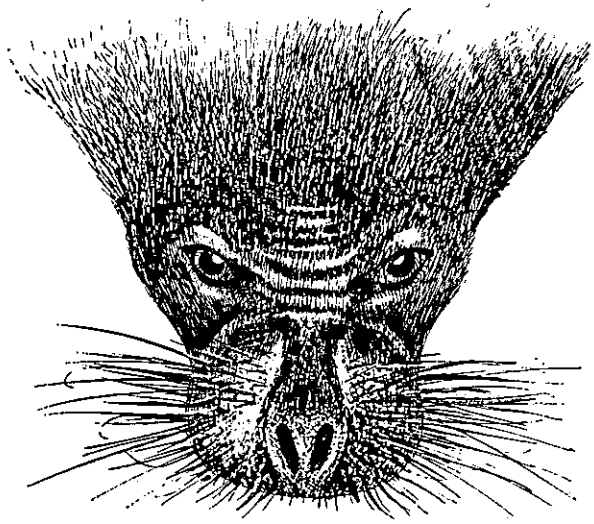

FIGURE 28. Front view of bearded seal head.

wilds of Riding Mountain National Park Banfield, 1949; Soper, 1952) and Duck Mountain. A small residiual population also occurs in the interlake country, now chiefly centered in the Mantagao Lake area and northwest of Gypsumville toward Waterhen Lake.

ROCKY MOUNTAIN MULE DEER *Odocoileus hemionus hemionus* (Rafinesque) (Figure 29). Before the days of settlement this was the common deer in southern Manitoba. It was generously distributed more or less throughout the prairie-parklands districts and north for some little distance into the mixed-wood forest. Preference was shown for the second prairie steppe west of Red River.

Since the early 1920's, mule deer have become steadily scarcer. In many districts they have slowly disappeared with the gradual infiltration of white-tailed deer. This process of displacement continues. Relatively few *hemionus* now remain in the settled parts of the south. About five years ago a herd of 14 individuals was seen in Spruce Woods Reserve when the Game Branch made an aerial census of deer. The most recent known kill was made in that reserve during the fall hunting season of 1958. The few remaining animals appear to frequent the eastern slope of the sandhills toward the flats of Assiniboine River.

Scattered individuals and pairs still exist on Riding and Duck mountains; these are residual from times when they were the common and dominant deer of the region. Elsewhere, north of the parklands, a few widely dispersed individuals and small bands may still exist. At one time mule deer were seen as far north as The Pas and Flin Flon, but Harold Wells, who is familiar with the former area, says that none has been taken there during the past 35 years.

NORTHERN WHITE-TAILED DEER *Odocoileus virginianus borealis* Miller. According to Seton (1909; 1909a) these animals (presumably of this race) spread into Manitoba about 1881, more or less coinciding with the early settlement of the country. Thereafter they increased rather rapidly and spread over wider areas. For Manitoba, Anderson (1946) assigned *borealis* only to eastern districts; it is commonly distributed from the International Boundary north through Sandilands and Whiteshell forest reserves to at least Winnipeg River.

In earlier times, it was either this form, or *dacotensis*, which also spread north along Red River Valley, and the brushy bottomlands of Pembina River, to the rugged terrain of Pembina Hills. In presettlement days and a little later, the latter territory was renowned for its big game resources, including moose and wapiti. Present western and northern limits of *borealis* range are not accurately defined.

FIGURE 29. Mule deer on a pine-forested ridge.

PLAINS WHITE-TAILED DEER *Odocoileus virginianus dacotensis* Goldman and Kellogg. Little is known about the past history of this race in Manitoba. However, it was clearly an early resident of wooded valleys in the dry plains of the southwest and on Turtle Mountain. Now it is the common deer in that area and east to Pembina Hills. It has almost entirely usurped the former range of the mule deer in Manitoba.

White-tails have continued to increase in numbers and expand their range, especially during the last decade. Many occur in the interlake district as far as Waterhen Lake and lower Lake Winnipegosis. In some areas the animals are abundant. For example, while traveling by rail to the west on April 4, 1948, I counted 122 of these deer between the sandhills northwest of Brandon and the vicinity of Rivers, a distance of 18 or 20 miles. Perhaps many more were hidden in the scattered poplar bluffs.

West of the central great lakes the animals are familiar residents of brushy lowlands, Riding and Duck mountains, and territory about Swan River. They now greatly outnumber mule deer in all of that area. Numbers have been reported to the north well beyond The Pas. This deer is assumed to be the present race that resides, throughout, since it inhabits Riding Mountain (Anderson, 1946) and all adjoining areas in Saskatchewan, and west.

In a recent communication Mr. Malaher remarks: "In the northern parts of its range it is not common, but it does occur as far north as Pukatawagan on the Churchill River. A line drawn from there southeastward to the Central Manitoba Mining District would roughly indicate the northern limit of range, although isolated animals would be found north and east of such a line. In certain years it has been quite plentiful in The Pas district, particularly on the flood plains and delta of Saskatchewan River. A severe winter in this latitude, however, seems to set it back very materially."

In the white-tail range as described above, individuals inhabiting the more eastern territory may possibly be assignable to *borealis*, as they are, farther south, along the Manitoba-Ontario boundary.

Northwestern Moose *Alces alces andersoni* Peterson. This new subspecies (Peterson, 1952, p. 24-27) is the moose that ranges throughout the northern coniferous forest of Manitoba. Formerly it also inhabited parts of the northern parklands, timbered fringes of Red River, Pembina Hills, Spruce Woods (near Carberry) and the Turtle Mountain plateau. The animals were evidently never as abundant in the far northern parts of their range as in more moderate latitudes farther south.

Settlement has naturally caused marked changes in distribution and status in the latter region. In more northern districts, however, moose continue to be moderately common, to abundant. As Mr. Malaher remarks (letter, Feb. 13, 1959): "It has made a tremendous come-back in the recent past. We now have all of northern Manitoba open to moose hunting with two seasons in some areas, and, in all, there are six moose hunting areas in the province. Regulations have been liberalized to permit the taking of either sex. We are still under-harvesting our moose. Within the past month, flying down the east side of Lake Winnipegosis, I counted 17 moose before we reached the north end of Waterhen Lake. We were on a direct flight from The Pas to Selkirk and not especially looking for moose.

"Today there are still over 1,000 moose in the Saskatchewan River Delta east of The Pas.... For the past three seasons we have had a moose-elk season on Duck Mountain and have taken over 1,000 moose from this area alone. Aerial surveys indicate no decrease in the population level."

Barren Ground Caribou *Rangifer arcticus arcticus* (Richardson) (Figure 30). These animals undertake periodic winter migrations as far south as central parts of the province. Although a denizen of the Arctic tundras most of the year during the colder months, it habitually wanders south to seek food and shelter in woods and muskegs of Hudsonian and Canadian zones. At this season the normal southern limits of these treks are approximately bounded by Churchill River and an imaginary line running from Southern Indian Lake to Reindeer Lake.

In the bitter winter of 1939-40, however, unusually large numbers of these caribou migrated south to the vicinity of Burntwood River and Nelson House, about 300 miles south of the Northwest Territories (Can. Resour. Bull. 155, March 1940). Another heavy migration overran this area in the winter of 1944-45 (Rand, 1948). Several times since then, winter herds have struck south to the Hudson Bay Railway, some little distance northeast of The Pas. Once they actually went as far as Gods Lake and the vicinity of Cross Lake and Oxford House before receding again, toward spring, in the direction of the Arctic summer range. On this occasion, some Indians who were over 40 years old, and had never before seen this species, shot barren ground caribou at these places.

These caribou once occurred in prolific abundance. Within the past few decades, however, they have been steadily dwindling (Banfield, 1954). The trend now has an alarming aspect; for some reason or reasons, the situation has deteriorated much more rapidly of recent years and there is anxiety about their ultimate fate. At the present rate of decline there would appear to be serious danger of *arcticus* vanishing completely, not only in Manitoba, but throughout its Arctic and subarctic range.

Western Woodland Caribou *Rangifer caribou sylvestris* (Richardson). Over-all provincial range embraces the coniferous forest from Lake of the Woods northward to about Churchill River. In the east the species ranges to the coast of Hudson Bay and north to Cape Churchill, and in the west-central region, south to Porcupine Mountain. In early times it doubtless inhabited the heights of both Duck and Riding mountains, since, in this longitude, woodland caribou once occurred even as far south as Turtle Mountain (Bailey, 1926, p. 33).

Major occurrence, today, is in a belt of country extending from Sherridon, in the west, southeastward to about the acute angle of the Manitoba-Ontario boundary near Elliot Lake. In recent times, *sylvestris* gradually became scarcer until the question of its survival in Manitoba was in doubt. This has been dispelled, however, by the good news that it is now slowly increasing in numbers. The largest known herd is northeast of Berens River, in the Hudwin Lake district, which is estimated to contain between 4,000 and 5,000 individuals.

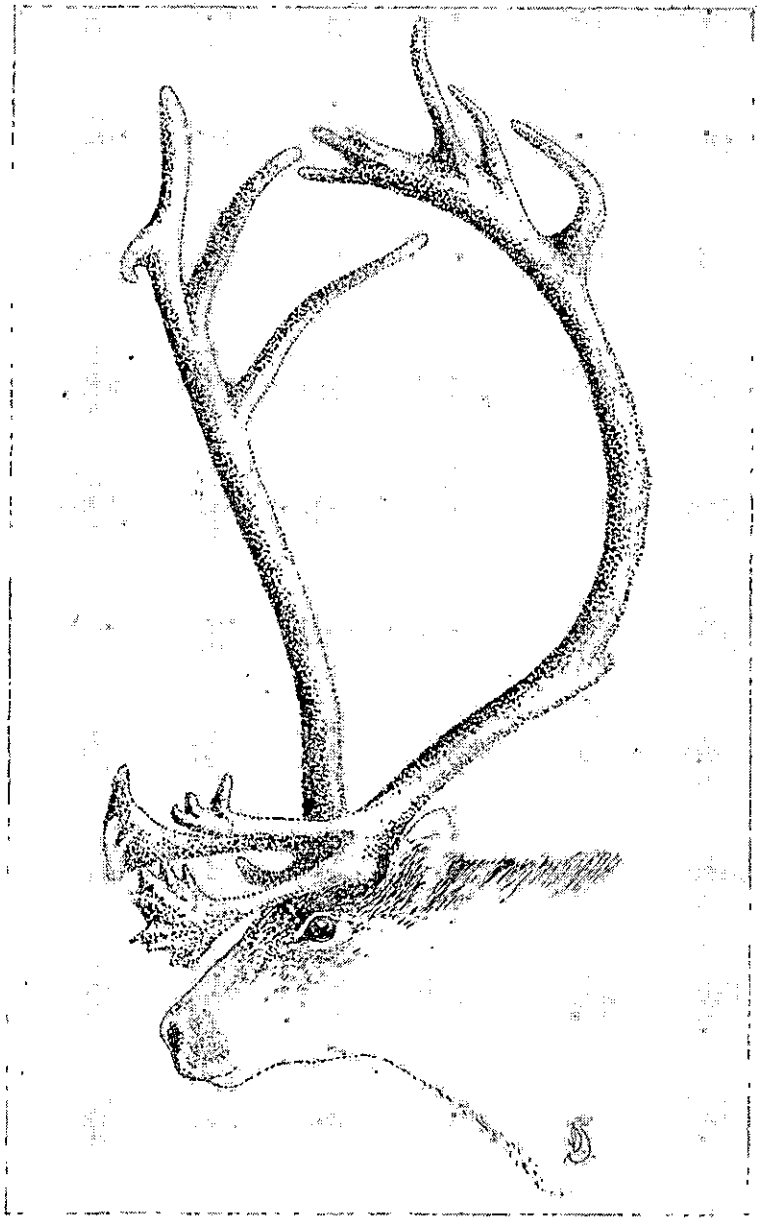

FIGURE 30. Head of barren ground caribou with antlers in the 'velvet'; month of August.

American Pronghorn Antelope *Antilocapra americana americana* (Ord). Formerly existed widely and plentifully over the grasslands of south-central and southwestern Manitoba. A few rarely went as far east as the Red River lowlands, and apparently north to the vicinity of old Fort Garry. Center of abundance lay on the second prairie steppe, north to about Assiniboine River, the heaviest concentrations being on the Souris Plains. In some localities limited numbers foraged north of the Assiniboine, at least in the general vicinity of Pine Creek and Minnedosa River (Little Saskatchewan) and northwest to about the latitude of Qu'Appelle River.

In the eastern part of the range the species had all but vanished by the 1850's. A few wary bands held out for about another 15 to 20 years in more rugged terrain between Pembina and Tiger Hills. The last Manitoba stronghold lay in the extreme southwest around Whitewater Lake, Melita and Coulter, where the last survivors were apparently wiped out in 1881.

Plains Bison *Bison bison bison* (Linnaeus). In early times these lordly beasts provided the greatest wildlife spectacles of the 'Old West.' Gathered in various-sized herds, they roamed the plains in astonishing numbers. At least a few infiltrated the mixed-wood forest as far north as Moose Lake. But they were destined to take the road to oblivion. Seton (1909) remarked: "Formerly found in great abundance on all the prairies of Manitoba. Last seen wild near Winnipeg in 1819. Last great wild herd on the Souris 1867; the last wild individual on the Souris 1883." A moderate-sized herd is now preserved in a fenced enclosure on the Lake Audy Prairie, Riding Mountain National Park.

Barren Grounds Muskox *Ovibos moschatus moschatus* (Zimmermann). Type locality: between Seal and Churchill rivers, Manitoba. The species formerly inhabited the restricted, open, tundra area along the Hudson Bay coast in what is now the northeastern extremity of the province. Preble (1902) recorded the occurrence of two examples, during the summer of 1897, about midway between York Factory and the mouth of Churchill River; this is evidently the most southern authentic record extant for the region. In this tundra triangle of Manitoba's Arctic Zone, the muskox is now extinct. Apparently the nearest living representitives are several hundred miles distant to the north and northwest.

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(Reference to an illustration is in **bold-face** type)

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