

**Article V.—SOME RESULTS OF A NATURAL HISTORY
JOURNEY TO NORTHERN BRITISH COLUMBIA,
ALASKA, AND THE NORTHWEST TERRITORY,
IN THE INTEREST OF THE AMERICAN MUSEUM
OF NATURAL HISTORY.**

By A. J. STONE.

[INTRODUCTORY NOTE.—Mr. A. J. Stone, in planning the journey, of which the following pages give some of the principal geographical and zoölogical results, visited the American Museum of Natural History in the hope of securing aid from the Museum authorities in carrying on his work. Upon careful consideration of Mr. Stone's itinerary, and of the results he hoped to attain, the enterprise was promoted by pecuniary aid generously furnished, in the interest of the American Museum, by Mr. James M. Constable. As shown by the itinerary set forth below, the journey was an arduous one, and as planned involved extended travel through country that could be traversed only by dog teams, or by means of improvised boats, thus precluding the transportation of bulky collections. Mr. Stone procured, however, on portions of his trip, valuable collections, some of which have been made the subject of papers in this Bulletin (Vol. IX, 1897, pp. 111-114; Vol. XII, 1899, pp. 1-9; Vol. XIII, 1900, pp. 1-18), and some are still on the way to the Museum. In addition to collecting specimens, where means of transportation rendered it feasible, Mr. Stone has gathered in his note books a large amount of new information regarding not only the geography of the region traversed, and the Eskimo and Indian tribes inhabiting it, but also respecting the distribution and habits of the larger game animals met with in different parts of his route. This information seems of sufficient importance to warrant permanent record, and is here presented as a part of the results of Mr. Stone's expedition. In preparing his rather voluminous notes for publication Mr. Stone has allowed me discretionary power to select, condense, and arrange the matter as seems to me most fitting. I am also responsible for the technical names of mammals given in the following notes.—J. A. Allen.]

INTRODUCTION.

I was impelled to undertake the explorations here imperfectly detailed by the belief that the natural history of the northern parts of North America, from about the fifty-second parallel of latitude northward, had been as yet very imperfectly explored, and that the field was therefore an inviting one for research and discovery. Furthermore, the dearth of specimens of the larger mammals in

our museums, and the fact that some of them are becoming rapidly extirpated, seemed an additional reason why their collection in series, for exhibition and study, should be entered upon without further delay. While knowing that the undertaking involved hardship and danger, and a considerable outlay of money, it seemed to me that the results of a protracted and well conducted expedition would far more than warrant the risk incurred. If successfully accomplished, the journey would furnish not only much-needed material for scientific research, but yield much valuable information regarding the variety and distribution of animal life in these forbidding regions.

The trip as originally planned involved three years of travel, through regions devoid of all regular means of transportation, and to a large extent uninhabited, except by scattered native tribes, and in large part thus far only superficially explored. Aware that my own limited means was quite inadequate for such an enterprise, I naturally sought to connect myself with some public institution, and felt myself fortunate in securing an alliance with the American Museum of Natural History, through the liberality of the First Vice-President, Mr. James M. Constable. While I successfully accomplished the itinerary as laid out for the first two years, I failed, in consequence of numerous unforeseen difficulties in the way of securing food and proper means of transportation, in securing some of the animals I unfortunately made it my special quest to obtain. On reaching the Mackenzie Delta, and also at some other points on the long inland journeys, it was exceedingly difficult to secure either the necessary assistance from the natives, or a proper outfit of dogs for sledding purposes. Again it was impossible to rely upon the information obtained in respect to the nature of the country, or the haunts of the larger game animals, especially the ranges of the Musk-ox along the Arctic coast east of the Mackenzie River.

ITINERARY.

My work began in 1896, when I made a trip, by way of Fort Wrangel, to the headwaters of the Stickine River, in northern British Columbia, the central point of my field of exploration being latitude 58° N. and longitude 130° W. The principal scientific result of this journey was the discovery of the Mountain

Sheep, described by Dr. Allen in this Bulletin (Vol. IX, 1897, p. 111) as *Ovis stonei*, the series of specimens on which it was based being now the property of this Museum. This trip proved very satisfactory as preliminary work, and prepared me for the difficulties of the more extended journey I then had in view.

The following year I left Seattle, Washington, for Fort Wrangel, Alaska, July 9, 1897. From Fort Wrangel I ascended the Stickine River to the head of navigation, at Telegraph Creek. From Telegraph Creek I made an expedition into the Cheonnee Mountains, returning to Telegraph Creek the latter part of August. I then crossed the divide to the head of Dease Lake, a distance of 75 miles, at which point I left my baggage and made an extended trip through a great wilderness of country into the Cassiar Mountains, penetrating the mountains to a distance of about 100 miles from the lake and bringing out on our backs specimens collected about 60 miles from the head of the lake.

I descended Dease Lake in an open boat to where it empties into the Dease River, and followed down the Dease River to the Liard, thence down the Liard to a point where, for one hundred and twenty miles further, it could not be considered navigable on account of dangerous rapids and waterfalls.

It was the 20th of October, when we reached this point on the Liard, at the mouth of Black River, a large stream, which here joins the Liard. The ice was already rapidly forming on both streams, and preparations were made for winter. In December, I ascended the Black River to Walker Mountains, a distance of about one hundred miles. After the holidays we transported by dog-sled all our equipage down the river on the ice, a distance of one hundred and twenty miles, to a point below Hell Gate Cañon, where boating in the spring might be resumed. The work was one of very great labor and extreme difficulty, but was accomplished, and the second long portage overcome.

When I reached my cache in April not one of the three white men who were to help in boat-building was available. Indian help from the people upstream I knew could not be had, and, harassed by a lot of murderous renegades, collected near my cache with the hope of looting it, I was a prisoner in the great wilderness for over thirty days, when the ice went out of the river, and the large canvas boat I had constructed all alone,
March, 1900.]

proved its capability of floating a ton of stuff, which I managed without help among fields of heavy ice, snags, and rapids, until I reached Fort Liard, a Hudson Bay trading post, one hundred and fifty miles below my point of departure.

At Fort Liard I secured help, and descended the river another one hundred miles, where I left it for a trip into the Nahanna Mountains.

During the latter journey I traced the exact northern limits of the range of *Ovis stonci* and the southern limits of the range of *Ovis dalli*.

On my return I continued down the Liard River, reaching Fort Simpson, on the Mackenzie, the middle of June, 1898.

Descending the Mackenzie I stopped at Fort Norman, a Hudson Bay trading post, from which place I took a party of Indians and travelled into the main range of the Rocky Mountains to the neighborhood of where the Arctic Circle crosses them, at which place I spent considerable time. I travelled many miles of that part of the Rockies, and sent from there the most perfect series of specimens of *Ovis dalli* ever taken for any natural history institution.

Returning to Fort Norman I continued down the Mackenzie, to the head of the delta, reaching there about the 10th to 12th of October, just as the ice had closed over the Peel River, which flows into the Mackenzie at this point. I reached Fort McPherson, the most northerly of the Hudson Bay Company's trading posts, in lat. $67^{\circ}30'$, thirty miles by dog-sled, travelling on the river ice.

From Fort McPherson I made a trip in October to the west with dog-sleds, crossing the Rockies, and returning again to Fort McPherson, after a month spent in a fruitless hunt for Caribou. On reaching their range we found they had moved too far southward to be overtaken, owing to our scanty supply of provisions, and the worn-out condition of the dog teams.

In November I traversed the Mackenzie Delta, and the Arctic coast westward for 250 miles, as far as Herschel Island, returning in December. This 500-mile sled trip enabled me to learn something of the country in that direction, and of the natives and larger mammals inhabiting it. The intense cold of an Arctic winter, however, precluded the preparation of specimens.

Anthropometric measurements were taken of quite a number of the Noonitagnioots at Herschel Island. During the entire journey not the fluttering of a bird, the hoot of an owl, or the cry of a wolf could be heard. We were completely enveloped in the pervading stillness of Arctic night.

The months of March, April, May, and June, 1898, were employed in a thousand mile sled trip to the east, along the Arctic coast to beyond Cape Lyon, in search of Musk-oxen, which, from information obtained at Herschel Island, I was led to expect would be easily found, with also a reasonable prospect of being able to ship home the specimens by whaling ships from Cape Bathurst. A half-day's travel southwest from Darnley Bay we discovered our first sign of Musk-ox, but they were not very fresh. We then penetrated the rugged country to the south and east of Cape Lyon, day after day, until the food for men and dogs became completely exhausted; our efforts being rewarded by no greater success than the locating of 'signs' of these animals, none of which was very recent. I came to the conclusion that they had wintered in the region we had reached, but that, driven by storms, scarcity of food, or by a natural desire to wander, they had migrated to other pastures, probably moving southward. I returned to Langton Bay to reprovision the sled for a further journey in pursuit of them. But the day we reached Langton Bay, my companion, Mr. Corbusier, was taken so completely snow-blind that he had to be drawn upon the sled, and my Indian assistant became seriously ill with what afterward proved to be scurvy. My own eyes soon gave out, so that for eleven days I was compelled to live in darkness. We were nearly a thousand miles from Fort McPherson, and the ice was already beginning to soften; we thus had to weigh the alternative of returning at once, and as rapidly as possible, to Mackenzie Bay, or of remaining where we were until another winter should make a roadway of ice again. Although the temptation to remain was strong, we left Langton Bay at 8 P.M., on May 11, and reached Fort McPherson June 16, sledding as far as McKinley Bay, when the ice broke up, compelling us to complete our journey in a boat I was fortunate enough to secure, with the services of its Eskimo owner, at this point. This trip of six hundred and fifty miles and return, though devoid of results in the way of specimens,

was fruitful in other ways, giving me a personal knowledge of a portion of country even geographically imperfectly known.

In July I crossed the Rockies and descended the Bell River to the Porcupine, and then down the Porcupine to the Yukon, reaching the Yukon on the 14th of August. I continued down the Yukon to St. Michaels, and thence by ocean steamer to Seattle, Washington, which place I reached just twenty-six months and four days from the time of starting.

During this entire period of travel I availed myself of every possible source of information bearing on the distribution of animal life throughout the regions traversed, and the information thus gathered I have attempted to summarize in the following notes.

While the naturalist seems to have acknowledged the country to be too large or too difficult to explore, the prospector for minerals and the adventurous fur trader have camped throughout its extent.

The fur trader, working along the streams, with his following of natives, has driven the animals well away from the streams into the mountains, as they had previously been driven back from the vicinity of the coast, and now the prospector is aiding the Indian in their final extermination in the mountains.

The Bison of the plains are gone; the few living Wapiti have been driven to the high mountains; the Pronghorn Antelope and the Rocky Mountain Bighorn are almost creatures of the past; and the large game animals of the extreme North will soon meet the same fate.

I found evidence that a species of Caribou which existed plentifully twenty-five years ago in the country west of the Mackenzie and between the Yukon and Arctic coast, is now most likely extinct.

It is not simply the number of animals killed by the rifle that depletes their ranks; this same disturbing element has a wonderful influence in repressing their reproduction.

There are sections of country in the North and Northwest that still abound in mammal life, but their former general distribution has been very much disturbed, there being large areas capable of supporting them in abundance over which the larger mammals are almost entirely absent.

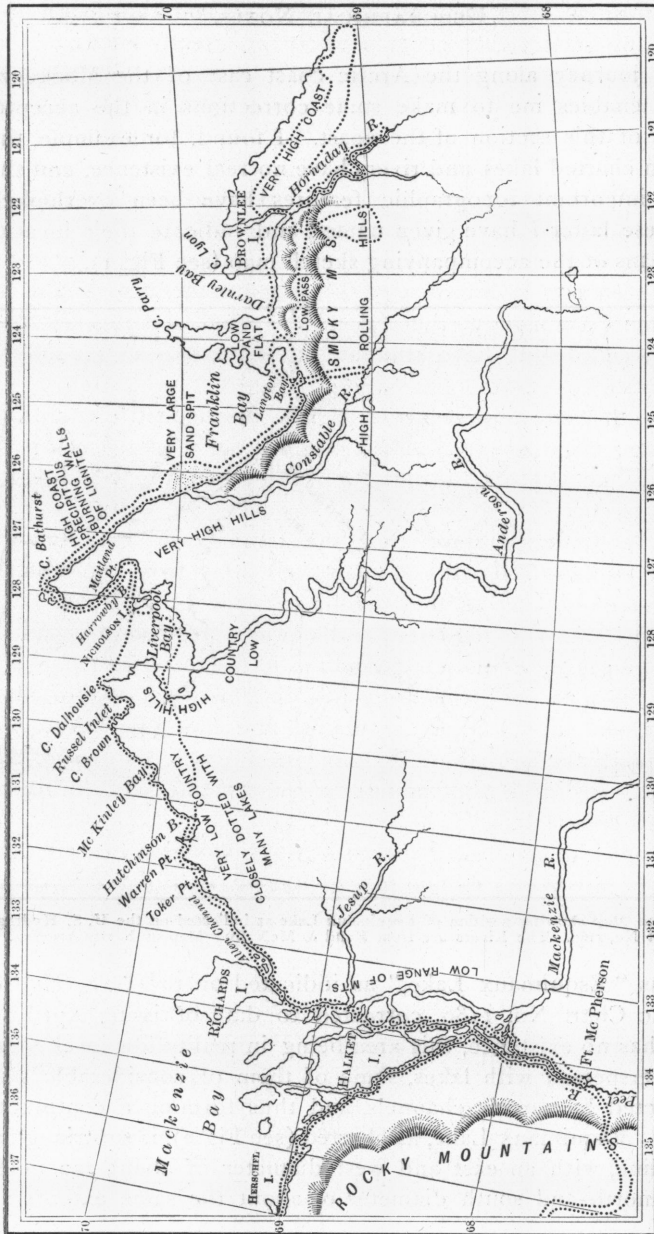


Fig. 1. Sketch Map indicating Geographical Corrections and Observations; also showing a portion of Mr. Stone's Arctic Coast Journey. (The dotted lines indicate Mr. Stone's route.)

GEOGRAPHICAL NOTES.

My journey along the Arctic coast east of the Mackenzie River enables me to make some corrections in the accepted charts of this section of the coast. I found, for example, that certain charted lakes and rivers have no real existence, and that other important topographic features have been overlooked. To these latter I have given names, and indicate their location by means of the accompanying sketch map (see Fig. 1).

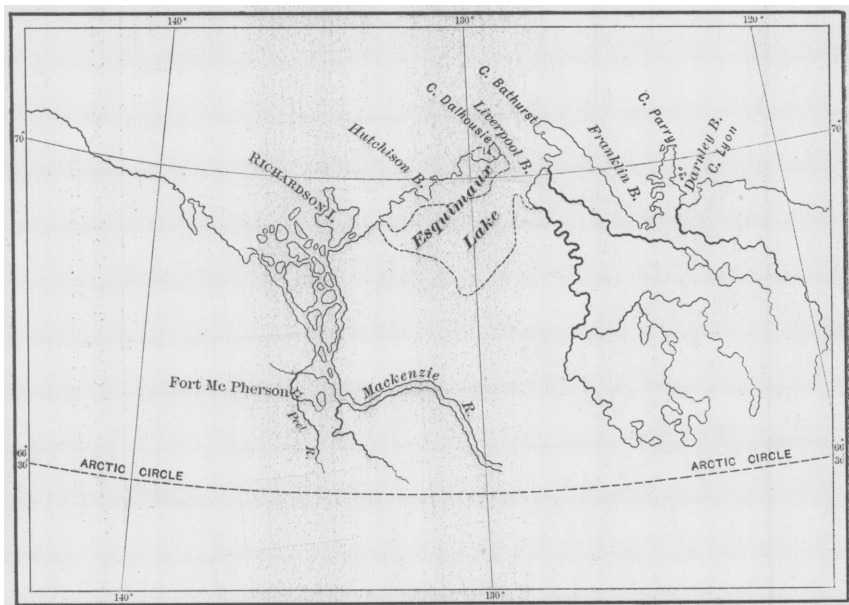


Fig. 2. Sketch Map showing position of Esquimaux Lake as indicated on the U. S. Hydrographic Chart No. 1189. The Rivers are from Rand & McNally's Map of North America.

Thus "Esquimaux Lake," as indicated on the U. S. Hydrographic Chart No. 1189, corrected to date of issue, April 10, 1898, has no existence, this area being in reality low level country interspersed with lakes, some of them of considerable size, connected by narrow channels, and thus forming a continuous chain. Esquimaux Lake, as charted (see Fig. 2), is subtriangular in outline, with an east and west diameter of about 200 miles, and a north and south diameter of about the same extent. I

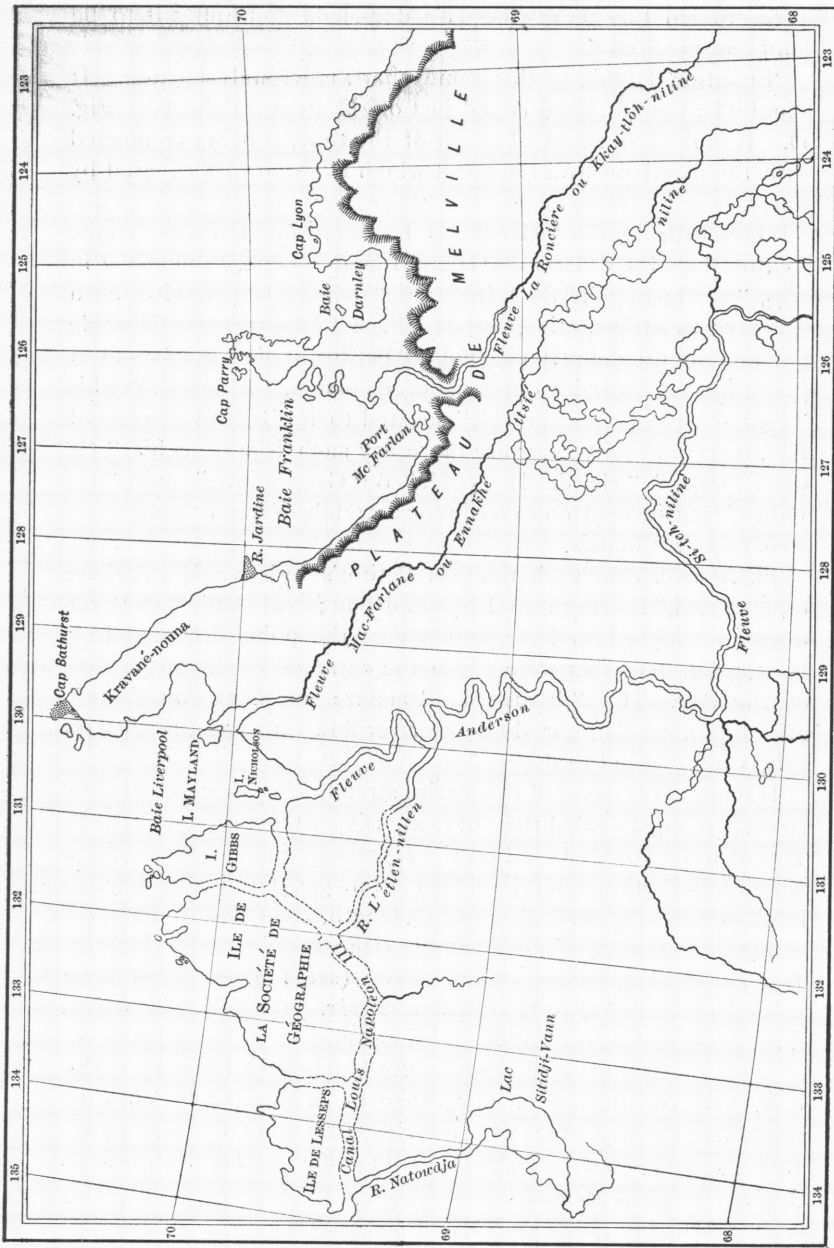


Fig. 3. Transcript of Emil Peitot's Chart. (See pages 38 and 40.)

have crossed this area twice with dog-sleds and found it to be land and not water.

Nicholson Island, of this same chart, is wrongly located. It should be the unnamed island just off Maitland Point (see Fig. 1). It is really a peninsula most of the time, it being connected with the mainland by a sand spit which is not always covered by water.

I had with me the "Carte des Explorations de l'Abbé Émile Petitot, dans les deserts du Grand Lac des Ours," published in 1875 "par la Société de Géographie." This map having been accepted as authoritative, and as I have been over considerable portions of the country charted by Petitot, it may not be out of place for me to point out some of its errors. In brief: (1) his "Canal Louis Napoleon III," located to the east of Liverpool Bay, does not exist; nor are there any such islands as his "Ile de Lesseps," "Ile de la Société de Géographie," and "Ile Gibbs," but instead one continuous stretch of land terminating with Cape Dalhousie.

There is also no such river as Petitot's "Fleuve MacFarlane ou Ennakhi," flowing into Liverpool Bay; and Anderson River does not empty into Liverpool Bay at the point designated by Petitot, but pours its waters into the extreme southwest portion of the Bay. His "Fleuve la Roucière ou Kkay-tlôh-niliné" also does not exist, nor does any river flow into Franklin Bay as this is represented to do.

Having twice covered this entire stretch of coast country with sleds, I am persuaded that the extensive observations of Émile Petitot were largely based on the representations of the natives, which I find quite as unreliable in matters geographical as they are in all other matters relating to size, length, breadth, and distance.

There is a river of considerable size emptying into Franklin Bay about midway its western shore (see Fig. 1), that I have named Constable River, in honor of Mr. James M. Constable, Vice-President of the American Museum.

A large stream that flows into the Mackenzie Delta from the east, breaking through a low range of mountains which runs north and south parallel with the East Branch of the Mackenzie Delta, I have named Jesup River, in honor of Hon. Morris K. Jesup of New York City.

The beautiful channel separating Richards Island from the mainland, fully 75 miles in length, I have named Allen Channel, in honor of Dr. J. A. Allen, of the American Museum of Natural History.

A river of considerable volume emptying into southeast Darnley Bay, that I followed as a sled route for a considerable distance, I have named Hornaday River, in honor of William T. Hornaday, Director of the New York Zoölogical Society.

An island to the west of Darnley Bay, at the mouth of Hornaday River, I have named Brownlee Island, through respect for the Hon. Judge W. H. Brownlee, of Missouri, a friend of my boyhood.

NOTES ON MAMMALS.

The following notes, based on my field observations, relate to some of the larger mammals of the northern districts of North America. I have supplemented my own experience by information derived from various officers of the Hudson Bay Company, and from intelligent white and Indian hunters.

Bison bison athabascæ Rhoads. WOOD BISON. — The Bison, generally spoken of as Wood Bison, is almost extinct. The most reliable information obtainable indicates that a small herd, containing fifteen to twenty animals, exists in the Hay River country, Long. 117° W. and Lat. 59° N., a little to the west of Great Slave River. I was repeatedly informed that there was a similar herd to the east of Great Slave River, a little further north than the Hay River herd, but I have some doubt of its existence.

The furthest north to which I could trace these animals is the Black River country, where a solitary old bull was killed some years ago, a short distance south of Fort Liard, about Long. 130° W. and Lat. 60° N.

The Canadian Government is making an effort to protect the few that remain, but it will doubtless be ineffective, it being impossible to police these remote regions against the inroads of the Indians, who kill the Bisons at every opportunity. I very much question whether the small remnant now existing will be able to hold out against existing conditions for more than a few years.

Probably three years will accomplish their complete extermination.

I visited Fort Liard with the intention of securing specimens for the American Museum of Natural History, but found that to attempt it might involve me in unpleasant legal proceedings and possibly lead to serious difficulties in the further prosecution of my work.

Ovibos moschatus *Blainville*. MUSK-OX. — I found no trace of these animals anywhere, except in the very hilly, rough country, southeast of Cape Lyon. Nearly all the signs of them I found indicated that their favorite feeding ground in winter is along the slopes of hills just a little above the valleys, where they browse freely on the little patches of dwarf willows. It was also quite evident that when moving from one feeding ground to another they almost invariably travel single file.

Their range is becoming more and more contracted all the time, as roving bands of Indians from the Hudson Bay posts, on Great Slave Lake and near Great Bear Lake, make occasional raids upon them, and almost always destroy the entire herd attacked.

The result of extensive inquiry among the Indians and Eskimo west of the Mackenzie leads me to believe that the Musk-ox has not inhabited that region for a very long period. Indeed, only a few of the Kookpugmoots east of the Mackenzie have any knowledge of their ever having been seen west of Anderson River, or anywhere between that river and the Mackenzie. Their western limit is now far to the east of Anderson River and Liverpool Bay.

Ovis stonoi *Allen*. STONE'S MOUNTAIN SHEEP; BLACK SHEEP. — The range of *Ovis stonoi* extends throughout the Cassiar Mountains, and in the Rocky Mountains, east of the Cassiar, north to where Beaver River, a tributary of Liard River from the north and west, breaks through the Rockies near latitude 60°. I believe that the Rocky Mountain divide, between the headwaters of the Peace River and those of the Fraser River, forms the dividing line between its range and that of the southern *Ovis cervina*. Its western limit very nearly conforms to the Cassiar Mountains and their numerous spurs.

The feeding grounds of both *Ovis stonoi* and *O. dalli* are above timber line. Their habits vary materially, in both species, with sex and age, especially in summer. Old and young, however, congregate together in the fall and winter. During winter they frequent the highest ridges, where the wind keeps the ground free of snow.

Ovis dalli *Nelson.* DALL'S MOUNTAIN SHEEP; WHITE SHEEP. — This beautiful inhabitant of boreal America occupies two separate and distinct ranges, namely: (1) the Alaskan Mountains and the Kenai Peninsula; and (2) the entire stretch of the Rocky Mountains north of latitude 60° , to near the Arctic coast west of the Mackenzie, ranging thence west to the headwaters of the Noatak and Kowak Rivers, that flow into Kotzebue Sound.

Along the Arctic coast they are subject to the same persecution as the Caribou of this region (as detailed below), and will in a few years be only a memory of the past. Further south, through that portion of their range included in the Rockies, their future is only slightly more hopeful. In the Nahanna Mountains (a spur of the Rockies, in about 60° N. Lat.), and in the main Rockies about Lat. 69° N., the natives reported them as very much scarcer than formerly, and the old trails, in the country travelled by me, indicated that a much larger number of these animals formerly existed there.

I found these animals everywhere above the timber line and almost always occupying the most rugged parts of the mountains, the males particularly favoring the most rugged and rocky ridges.

Five out of twenty-two specimens shot by me tumbled over precipitous walls into inaccessible places and were lost. One of the lost five was found in a bunch of three resting on a ledge, seemingly not over a foot wide, on the face of a cliff fully 2000 feet high, from base to summit. They were not over 150 feet from the crest of the summit, over which I leaned and watched them, unobserved, for some time. How they reached the place or left it I could not tell. I had one of my Indians drive them out by throwing stones down, and as I heard them running below I followed along the brink. When they finally appeared

at the top I was a considerable distance from them. I fired at the first two to appear and failed to score, but being a little nearer when the third one came in sight my bullet caught him fair ; he gave two leaps to the right, fell and toppled over the brink and went down for a hundred yards. We could descend part of the distance to where he lay but there was a space beyond so steep and high that it was impossible to pass over it even with ropes ; yet it was just here that the sheep had climbed up.

This was my first effort on this hunting ground, and the result was just a little discouraging, inasmuch as my party had not tasted food during the past thirty hours. I was myself tired and hungry, for during this thirty hours I had carried a pack across the mountains some ten miles, and had been on the tramp climbing and hunting for sheep all the rest of that time, with the exception of about three hours, it being so light that we could hunt night or day ; but there was nothing to do but try again.

Slowly working our way around the point over sharp rocks in our moccasined feet, with thoughts of another day without food uppermost in my mind, I was almost startled by three big rams running out from a clump of rocks, only a short distance ahead of us, and passing so quickly out of sight around another clump as to prevent my getting another shot. It never occurred to me that I was tired, footsore, or hungry, for I was after those rams, jumping from rock to rock as fast as my legs could carry me. After following them for some distance I got in a long-range shot, shooting down a very steep incline, and was delighted to see one of the big fellows go down among the rocks ; the other two being further away, and offering very poor marks, I did not pursue them. It was a difficult task to descend this steep and treacherous slide to take care of this specimen, but we gladly went about it, and finally climbed back to the top, through a rain that was wetting the rocks and making them slippery. Camp was a long way off, but there was fuel there, and we had steaks to go with the fuel, which smoothed the road considerably.

As this animal has been but little observed by naturalists or hunters, I will relate one other adventure, as illustrating its wonderful vitality, agility, and endurance. One of my Indians came in one night and reported having crippled a large ram which he failed to get. The next morning I decided we would hunt in

that direction, in the hope of securing the cripple, as I have the utmost horror of leaving a crippled animal of any kind to die a lingering death. Reaching the level top of a high ridge, we skirted it for a short distance and then separated into two parties. I took with me the Indian who claimed to have crippled the ram the day before ; in reality, however, I did not believe his report. After following along the edge of a deep cañon for about a mile, he proposed that I should watch from above, while he descended to look for the cripple. He had been gone for some time, and was out of sight, when I heard him halloo ; on running along the crest for some distance I finally discovered him making his way up the bottom of the cañon, calling every few steps. I could not at first make out what he was up to, but soon a sheep made its appearance from behind a jutting point, and a little later it was plainly to be seen, creeping along over the rocks ahead of the Indian, up the rugged cañon, seemingly with difficulty. I concluded the Indian could easily get in range and kill the poor beast, and I could not at first understand why he did not do so, but I soon came to the conclusion that he had discovered that the easiest way of getting that skin and bones to the top of the long, hard climb was to drive the animal ahead of him, knowing that I was at the top and would be on the lookout.

As I proceeded to the head of the cañon, in order to be ready to dispatch the beast on its arrival, I could see that one hind leg was broken, and as I watched the poor thing jump from one crag to another as it mounted that long, steep climb, I felt disgusted with such proceedings and would have gladly carried up the skin rather than see the animal suffer, had I been in a position to do so. While I was thinking what this animal must have suffered during the preceding twelve hours, of how exhausted it must be from such a climb on three legs, and wondering if it would really get to the top, to my surprise it suddenly stood on the crest of the cañon wall, seventy-five or a hundred yards distant, fully fifteen minutes sooner than I thought possible.

As it turned toward me and caught sight of me I raised my rifle and fired. It fell, turning completely over ; then it jumped up and was away across the ridge like a shot, its broken leg swinging like a pendulum at every jump. As soon as I recovered from my surprise, I followed as fast as I could run, only to see it

disappear over the side of the next cañon ; it circled the side of the cañon wall and took a stand on a jutting ledge of rock, upon which, if I shot it, it would topple off down on to the rocks, several hundred feet below, and be ruined as a specimen ; so I sat down to await its possible change of position. After a short while my white man and natives arrived, and two of them decided to go around and chase him down. As they approached him, down he went, apparently as lively as ever, and another chase took place, lasting until the white man was played out.

From the edge of the cañon I could watch every move ; twice the native tried his smooth-bore without effect, and I began to think the ram would get away from him. It climbed a deep cut between two high turrets in the side of the cañon wall nearest me and found its way into a deep cavity in the side of one of the great natural abutments and lay down. The Indian could not get to the place, but threw stones at the poor beast until it ran out. As it left this big cavity it either had to leap directly down fifteen or twenty feet or pass out by the Indian ; and here was just where it displayed its wonderful capabilities in a most daring manner. As it emerged from the cavity it crept along the wall, which to all appearances was almost perpendicular, and continued straight on for twenty-five or thirty feet. It then turned around and came back to the edge of the cavity and leaped down, falling as it struck the rock below ; but it was immediately up and away, seemingly as game as ever. The Indian, who was within a few feet of the animal at the time, said that he could not see anything in the shape of a projection on the face of the rock for the animal to walk on, nor could any of us do so at a distance of perhaps two hundred yards with the aid of powerful field-glasses.

I stood carefully watching every movement of the animal, and how it was possible for it not only to walk the side of such a wall, crippled as it was, but actually to turn round and walk back, is beyond my conception, for I am sure there was no place on the face of the wall to which I could have clung for even a moment.

The Indian again went in pursuit, finishing the animal soon after with a lucky shot. I went down to measure and skin the animal, but found the greater part of its coat so thoroughly filled with blood, much of which had dried and set fast, that I only saved the head.

The shot the Indian first gave it had completely smashed the left thigh. My shot had entered the left side just back of the shoulders and a little above the heart, ranging backward and upward, and passing out at the right flank, tearing a fearful gash, through which I could thrust my fist. It had bled much, internally and externally; had lived nearly twenty-four hours after its thigh was smashed; four hours after the wound I gave it, suffering from the loss of blood, making wonderful climbs on three legs, and performing feats hardly to be believed even by those who witnessed them. The animal was a four-year old ram, and a magnificent specimen.

From my experience with these animals I believe they seek quite as rugged country in which to make their homes as does the Rocky Mountain Goat. They brave higher latitudes, and live in regions in every way more barren and forbidding.

Although they are a very wary animal where hunted, they are rapidly dwindling in numbers, for their white bodies in summer can be seen at a great distance by the keen eye of the native, and very few of our best natural history collections will be graced by their beautiful forms before the last of them have disappeared.

The females, with their lambs, generally keep to the high tablelands, well back in the mountains, and are often much more difficult to locate than their mates. Broken jawbones, reunited, were so frequent among the females killed as to excite comment.

Oreamnos montanus (*Ord*). ROCKY MOUNTAIN GOAT. — The Rocky Mountain Goat is found in limited numbers throughout the Rocky Mountain Range as far north as latitude 63° or $64^{\circ} 30'$, but are here nowhere so plentiful as in the coast ranges. They frequent many places in the Cascades, the Coast Range of southeastern Alaska, and the Alaskan Mountains as far west as the headwaters of the Sushitna River.

Alce americanus *Fardine*. MOOSE. — The Moose is the best known of the Deer that inhabit the vast extent of country comprising British Columbia, the Northwest Territory, and Alaska. It can be safely asserted that every wooded section of this immense area is, to a more or less degree, frequented by these animals. It ranges westward almost to the limits of the

Alaskan Peninsula, and it approaches the Arctic coast throughout to the very limits of tree growth.

The Upper Liard River, with its tributaries, the Dease, Francis, Highland, Black, and Coal Rivers (longitude 125° to 130° west, and latitude 58° to 60°), includes, perhaps, the most prolific Moose range in America. The tributaries of the Upper Yukon, Pelly, Stewart, Macmillan, White, and Tananna Rivers, also drain a country well populated with Moose, and the Kenai Peninsula and the region about the head of Cook Inlet is another large area that seems to abound with them.

The native and the wolf are its most aggressive enemies; but it is highly probable that it will outlive the former, regardless of the fact that modern firearms may be found in the possession of members of almost every native tribe in the North.

The Moose, in the regions within the Arctic Circle, will be the last to succumb to its enemies, for the reason that in this great interior country, it will be but little pursued east of the Rockies by the white man. The atmosphere in this country is comparatively dry in winter and the snowfall consequently light, and owing to the shelter from the winds afforded to a great extent by brush and woods, the snow does not crust or acquire a firm enough surface to admit of a wolf running on the surface, except on lakes and rivers; and without this aid the wolf can make but slight inroads upon the numbers of an animal so wary and cunning, of such wonderful endurance, and so capable of self-defence.

It is also well known that these animals, in the North and Northwest, do not gather together in herds, nor do they 'yard up,' as do the Moose of Maine and New Brunswick, but constantly roam about, either singly or in small bunches, rarely exceeding five individuals. The natives cannot, therefore, locate and surround them in bands, but must pursue them singly, which forbids at all times any considerable slaughter. Then, too, this animal generally haunts the very worst thickets, tangles, and brushy localities; its hearing is acute, its scent the best, its movements rapid, and it is so universally on its guard that the unusual snapping of a twig is sufficient to cause it so quickly and silently to quit the locality as to be totally unobserved by the average hunter. I have passed through sections of country

where whole tribes of natives have become extinct, but the Moose lives and flourishes in numbers, the rugged country drained by the Nahanni River being an instance of this kind. The headwaters of the Stickine River, occupied by the Tahl-tan tribe, may also be cited as another fair illustration. The tribe is so rapidly dying out as to be perceptibly less in numbers every year; while the Moose is far more plentiful in that country to-day than it was at the time when modern firearms were first introduced among these people twenty-five years ago.

Records of the Hudson Bay Company at Fort Norman, 65° N., give the weight of a dressed animal, with hide, head, and lower limbs removed, at 676 pounds, and Fort McPherson (67° 30' N.) records claim that the meat of an animal received at this post weighed between 1100 and 1200 pounds.

The Indians claim that the Moose of the headwaters of the Koyukuk River and of the headwaters of the Peel River range high in the mountains, and differ in some respects from the animals inhabiting lower levels, but I was unable to verify such statements through personal observations. Mr. Hodgson, for many years in the service of the Hudson Bay Company in that country, assured me that this was known to him to be a fact, stating they were often killed high in the mountains, that their feet were very different from those of other Moose, and that they differed in other particulars. As the Moose of the Kenai Peninsula are now considered to be a distinct form [*Alce gigas* Miller] from those of eastern Canada, it is most probable that the animals referred to as inhabiting the mountains of the headwaters of the Peel River, and those of the Koyukuk and Colville further north, will prove to be a third variety.

The Moose of British Columbia and southeastern Alaska do not inhabit the Pacific slope of the Coast Range Mountains, but west of the Copper River, Alaska, they range in many places to the neighborhood of salt water.

Rangifer, Genus. THE CARIBOUS.—It is to me a matter of deep regret that I cannot see in the future of the North the same bright prospects for the continued existence of the Caribou that there is for the Moose, for the Caribou, the grandest of all northern land animals, is doomed. It is so constituted as to render

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it incapable of so well eluding its pursuers and surviving its enemies as the Moose. For years it has supplied the natives of the North with more food than has the Moose, and in addition clothes the greater portion of the population.

The Caribou found north of latitude 56° are as yet very imperfectly known. I have traversed long stretches of country in the endeavor to learn something more of them, but the question now seems to me a greater problem than ever before. The country occupied by them is so large, the distances are so great, and the means of travel are so inadequate that the task of properly tracing the distribution and relationships of these animals is a gigantic one.

These animals range throughout the mainland of North America from about latitude 48° to the most northerly limits of the continent at Boothia, in latitude 72° , and they are found from the eastern border of Labrador west, through one hundred and ten degrees of longitude to the extreme point of the Alaskan Peninsula; they inhabit the woodlands, the vast barren plains, and the most desolate rock-bestrewn mountain tops. Vast droves of them [the Barren Ground Caribou, *Rangifer arcticus* (Rich.)] leave the Arctic coast in the fall and travel south toward the timber, returning to the coast in the spring. This same migration occurs in the region to the west of the Mackenzie as well as in the region east of that river, and yet the herds of these two regions never intermingle or come in contact with each other in any way. Notwithstanding this regular migration to and from the coast every year, as winter comes and goes, vast numbers never leave the coast during any part of the year. It has become clearly evident to me that the animals composing one of these herds are larger than those of the other herd; they also occupy areas widely separated, with little if any opportunity for commingling, while other conditions tend to the development of distinct forms. I therefore feel safe in saying, after my limited personal observations, that the Caribou are the least known of any of the more important North American mammals; and that they present a most inviting field for study, with excellent possibilities of ample reward for the labor expended; and I may further add that the time for their investigation is limited. To successfully prosecute such a work would necessitate the ex-

penditure of a considerable sum of money, and require a vast amount of pluck, perseverance, and patience, and entail on the part of the explorer the endurance of much privation and hardship.

On one of the charts accompanying this report [not here reproduced] are represented various sections of the country in the North most prolific in Caribou life. Each of these large areas should be visited for the purpose of studying in life the different varieties of Caribou inhabiting them, and numerous specimens, with complete and careful measurements, should be secured in order to furnish the zoölogist with the means of properly investigating these interesting animals.

The mighty Mackenzie seems to form, throughout its entire length, a well-defined dividing line between eastern and western herds; in fact, we find that at most points this dividing line is a broad belt of country, in places more than one hundred miles wide. The herds that reach the coast in the spring, to the west and east of the Mackenzie Delta, never approach each other nearer than seventy-five miles, and rarely so near as this.

West of the Mackenzie vast numbers have been slaughtered to provide the whalers wintering at Herschel Island with fresh meat. The natives, who are often the regular hunters sent from the ships, shoot them, consume the head, shoulders, and ribs, and cache the saddles until thirty to fifty of them have been accumulated, when the ships' sleds go out and draw them in.

The inhabitants of Herschel Island informed me that the saddles procured there from the mainland generally weighed about thirty-three pounds per saddle, while those coming from Richards Island or Kittygagzyooit, to the east of the Mackenzie, average considerably heavier. In the mountains east of the Mackenzie, both south and north of Bear River and Great Bear Lake, there is a large kind of Caribou which I believe to be different from any of the others here mentioned. A large form is also to be found in the Rockies west of the Mackenzie, which ranges north well into the headwaters of the Peel River.

Again, to the north of the Porcupine, and in the regions of the headwaters of the Koyukuk, Noatak, Kowak, and Colville Rivers, we also hear of large Caribou.

The large Mountain Caribou [*Rangifer montanus* Seton-

Thompson] taken by me in the Cassiar Mountains, September, 1897, I believe to range throughout the Cassiar range and to occupy a considerable territory in the Rockies to the east of the Cassiar Mountains, and it extends for a considerable distance both to the north and south of the latitude in which my specimens were taken. I am very sceptical as to the species having ever extended south to within the borders of the United States. A quite large Caribou inhabits the timbered slopes to the south of the Liard River, down through the Peace, Athabasca, and Saskatchewan districts, and in all probability this is the animal occasionally taken in northern Montana and Idaho.

The species of which I forwarded specimens to the American Museum of Natural History, in the fall of 1897, occupy a habitat almost identical with that of *Ovis stonoi*. They range high in the mountains, winter and summer, are very rarely found in timber, and feed but little in the cañons, even above timber line. Several adult specimens were taken and very carefully measured, these measurements indicating great uniformity in size.

Hudson Bay traders who once occupied posts at old Fort Yukon and at the Ramparts on the Porcupine tell me that there was at one time a red Caribou in the mountains north of these places, and numerous Loucheux Indians gave me the same information, but they had not seen any of them for several years, and did not believe that any were to be found there now. If, however, they ever existed it is highly probable that some yet remain in the region of the headwaters of the rivers mentioned above, as it is a game region little disturbed by natives and never molested by white men.

The color of a very young Moose calf is that known in horses as a deep bay ; at a very early age a line of dark hair makes its appearance along the top of the neck and, continuing along the back, terminates with the end of the tail ; this rapidly becomes very prominent until the young Moose assumes very much the appearance of young mules, which are often marked in the same manner. As the calf begins to assume its winter coat, this stripe gradually loses its prominence, the entire coat becoming dark.

Caribou calves are lighter in color, the shading of red is not so even over the body, being lighter on the lower flanks and on the belly and legs, and it lacks the dark dorsal stripe of the

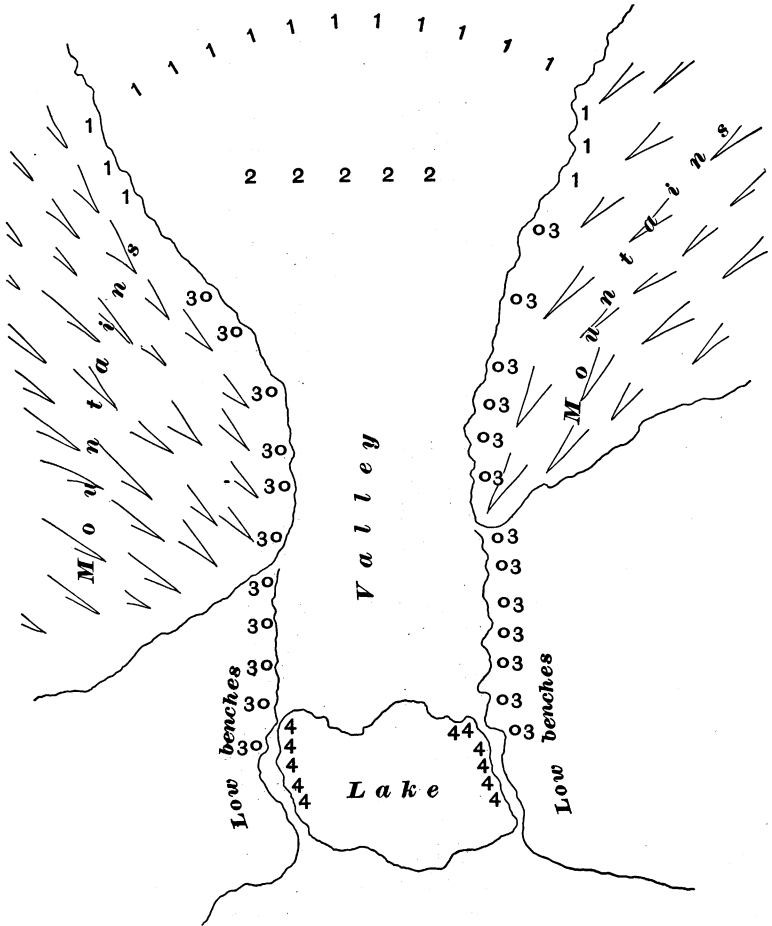
Moose calf. Caribou and Moose calves are both small when first born, the Moose calf being especially small in proportion to the size of its parents, but the calves of both grow very rapidly, far more rapidly than a domestic calf, in proportion to the size of the matured animals.

I believe the antlers of the Caribou are rather untrustworthy in determining species, but I am confident that the average antler of the larger species is heavier than the average antler of the smaller species. I have seen numerous heads of antlers of the Barren Ground Caribou that were very long, but they are always light and delicate in proportion to their length, and never have the weight or strength of antlers of the larger Caribou of the same length. I have in my possession a pair of antlers from a large inland Caribou that I believe will weigh twice as much as the largest pair of Barren Ground Caribou antlers ever found. (See *antea*, p. 8, Fig. 6.)

The 12th day of May, while skirting the west shore of Franklin Bay, a herd of about twenty-five head of Caribou were sighted on the sloping mountain-side inland. By the aid of my glasses I could make them out to be a bunch of females with some of the calves of the preceding year; they were travelling northward at a fair pace, and were among the advance guard to reach the coast, these animals evidently reaching Cape Bathurst by the 15th of the month. They were travelling pretty nearly in single file during the hour they were in view.

When these animals discover the hunter or traveller they will generally run around him in a circle until they get wind of him, when they are off; but in running this circle, I may add that their judgment as to the distance a rifle ball will carry is very good. While thus circling around I have often been amused at the manner in which they carry one hind leg. A novice in the hunting field, after having fired a shot in their direction, would think that he had broken one hind leg of each member of the herd.

The destruction of Caribou is vastly greater among the Barren Ground or small Caribou of the far North than among the larger Caribou further south, and I can hardly agree with a well-known writer who, after a trip down the Yukon on a river steamer that carried him rapidly through the territory, says, "at one time huge herds of reindeer roamed wild over the mossy plains of



- Rock Mounds
- 1. Hunters, Women and Children
- 2. Caribou
- 3. Hunters with bows and arrows
- 4. Kiaks

Fig. 4. Diagram of an Ideal Eskimo Trap for the Capture of Caribou, used previous to the Advent of the Rifle.

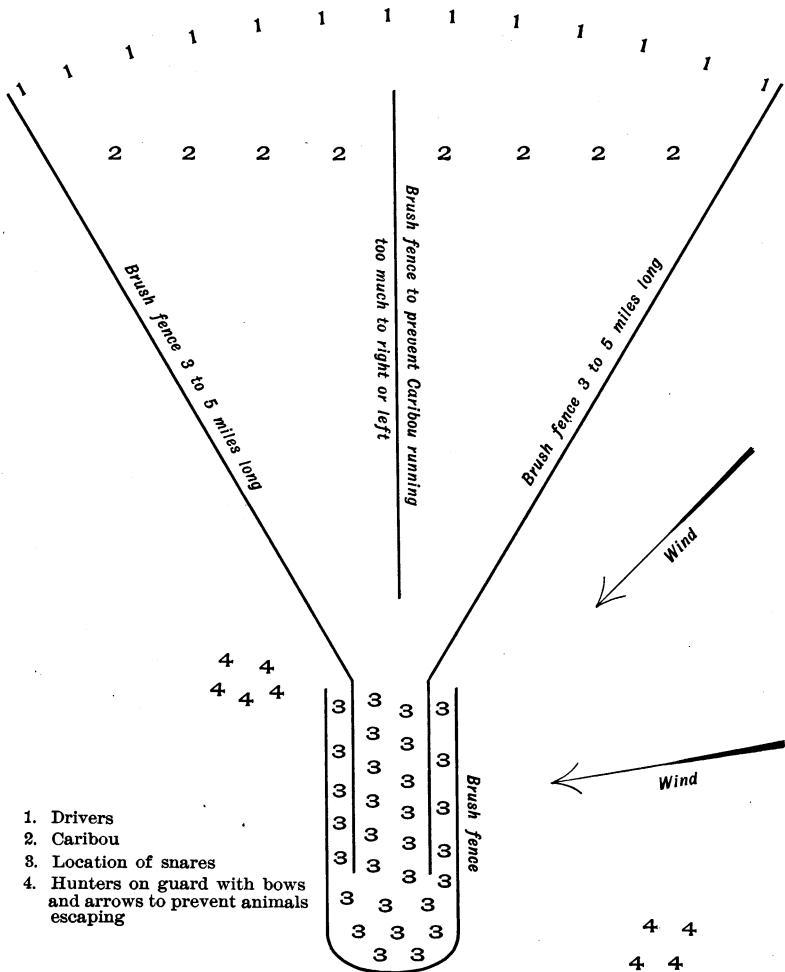


Fig. 5. Method of capturing Caribou formerly employed by the Loucheux Indians.

Alaska ; a time came, however, when the Esquimaux grew so 'civilized' as to possess (and own) guns, the natural result being that the reindeer were exterminated for sport, not for meat."

Very little game do our northern Indians or Eskimo kill for the sport of shooting, and, with or without modern firearms, these people, if left to themselves, would never exterminate their game, and especially is this true of the Eskimo. It is the presence of the white man among the natives that is so dangerous to such animals as the Caribou.

Our northern Indians, as they formerly roamed over their hunting grounds, following the lakes and streams, lived much of the year upon fish, as they do still, although possessing firearms, and they were capable of making beautiful nets of the willow bark for the purpose of taking fish, food being thus acquired with much less labor than attends the hunting of large game.

When they resort to the hunting field it is nearly always for the purpose of obtaining furs ; the flesh of the Bear, Beaver, Lynx, Marmot, and Muskrat, with an occasional Moose, and some birds and fish, furnish the greater part of their food ; they formerly hunted Caribou and Sheep only in the fall when in need of their skins for clothing, at which time the flesh would also be utilized.

But now numerous trading posts must be supplied with both meat and skins, and the natives, while killing this meat for the posts, must live and support their families and dogs on the same flesh, all of which greatly increases the slaughter of these animals. Our Eskimo are practically all fish eaters, and the custom has been for them to obtain the principal part of their food from the water, killing every fall just enough Sheep and Caribou, principally Caribou, to provide them with clothing for the winter ; and the possession of firearms would never have materially changed this, but for the fact that both the Whales and the Walrus in Bering Sea waters have been very much reduced in numbers during the past thirty years by the white man, which has naturally had a tendency to take the Eskimo hunter more inland. But the real key to the problem of extermination of our northern Caribou is the demand of the white man for the flesh and skins of this animal. The large whaling fleets in Bering Straits, and as far north as Point Barrow, have created a demand for the flesh of the Caribou and they are slaughtered by the thousand for the pur-

pose of barter ; now this demand has been extended, by this fleet of whalers, along the Arctic coast as far east as Cape Parry.

One winter fifteen vessels wintered at Herschel Island, and I am reliably informed that these vessels each used from 10,000 pounds to 20,000 pounds of Caribou meat, an aggregate of over 300,000 pounds in one winter, principally the saddles ; at the head of Franklin Bay, in the winter of 1897-98, four ships used of the same kind of meat about 90,000 pounds, and at Cape Bathurst, in 1898-99, one vessel used in the neighborhood of 40,000 pounds.

We may clearly infer from this that it is not the presence of the modern rifle alone, nor is it the sporting proclivities of our Eskimo, that exterminate these animals, but the demand of the white man, who offers in trade for the meat thus obtained, tea, tobacco, molasses and calico.

It would be with considerable hesitation that I should criticise white men wintering in such high latitudes, and subject to frequent and at times serious ills from the constant use of tinned foods, for purchasing this meat in such quantities as they do, even though I know it means the speedy extinction of the Caribou.

Inland from Darnley Bay, and on Bathurst Isthmus, the old stone mounds are yet in place, where the Eskimo formerly drove and impounded the Caribou, slaughtering them with bow and arrow ; and to the east of the Mackenzie Delta, in the Rat River country, and again to the west of the Rocky Mountain range, in the Bell River country, may be found the decaying brush fences between which the Loucheux tribes of Indians at one time, not very long ago, drove the Caribou into the raw-hide snares set for them, thus securing them in large numbers. As I had an opportunity of observing the remains of these pounds, I present herewith diagrams representing these two methods.

Ursus richardsoni *Reid*. BARREN GROUND BEAR.—The Barren Ground Bear is found in the hilly regions east and north of Great Bear Lake, in the low part of the Rocky Mountain range west of the Mackenzie, and in all probability to the Colville, and perhaps in the country forming the headwaters of the Peel River and the upper tributaries of the Yukon, among bald ridges above timber line. It shades in color from a dirty écru to brown,

and in spring, when quite faded, at a distance may be mistaken for a white bear.

***Ursus middendorffi* Merriam.** KADIAK BEAR. — The Kadiak Bear inhabits the Kadiak group of islands, the Alaskan Peninsula, the Kenai Peninsula, the region back of Prince William Sound, the Sushitna and Kuik River regions, and the Alaskan Mountains, but I did not hear of their crossing this range into the interior.

***Ursus dalli* Merriam.** YAKUTAT BEAR. — This Bear appears to occupy the greater part of the coast country between the Copper River and Lynn Channel, but evidently does not extend its range east of Lynn Channel, nor south of Chicagof Island.

***Ursus sitkensis* Merriam.** SITKA BEAR. — This large brown Bear ranges well south through the Alexander Archipelago and into the coast range of the mainland to the east of these islands. The Iskoot, the largest tributary of the Stickine River, is quite noted for its numbers of these huge beasts; and the Indians are afraid to shoot them when hunting alone.

***Ursus emmonsi* Dall.** GLACIER BEAR. — I did not hear of the Glacier Bear except in the St. Elias range of mountains, the headwaters of the Alsek, White, Tananna, Copper, and Sushitna Rivers.

***Ursus horribilis* Ord.** GRIZZLY BEAR. — The Grizzly appears to range throughout the entire limits of the northern Rocky Mountains, and over much of the high mountain country west of the Rockies in Alaska and British Columbia.

***Thalarctos maritimus* (Phipps).** POLAR BEAR. — The occurrence of the Polar Bear along the Arctic Coast in winter is materially influenced by the proximity of open water, it seldom visiting land, except in the neighborhood of the carcass of a whale. As I saw skins of females taken by the Eskimo while hunting seals along the open water at different times during the winter, it seems probable that they do not hibernate for any considerable length of time.

Lutra canadensis (*Schreber*). OTTER.—The Otter becomes somewhat rare in the extreme North, but is found in limited numbers almost to the limit of the growth of spruce forests. Very few of the skins taken furthest north by the Loucheux find their way to the furrier, as these people universally make them into winter caps.

Gulo luscus (*Linn*). WOLVERINE.—The Wolverine is found throughout the North, in timber and on the barrens, and I saw them far out on the ice of the deep bays along the coast.

The Eskimo use every skin they kill for trimming their deer-skin suits, and often buy them from the Indians of the interior for this purpose. The natives claim that the Wolverine and Wolf never meet without doing battle to the death, and that the Wolf is not always, though generally, victorious.

Putorius (Lutreola) vison (*Schreber*). AMERICAN MINK.—The Mink is taken in limited numbers along the banks of nearly all the wooded streams.

Mustela americana *Turton*. MARTEN.—The Marten is found throughout all the timbered regions, and is the principal fur received at the most northerly posts of the Hudson Bay Company. It is reported as being very plentiful at times, but as very scarce at others, and the traders and natives say they die off periodically. At Fort McPherson the trader told me they were as numerous now as when the post was first established, fifty years ago.

WOLVES.—I found the Black Wolf to be very much the most common variety throughout the Stickine and Liard River countries. The Black and the Gray were in about equal numbers along the Mackenzie, and the White or very light Gray Wolf the only one to be found along the coast. These animals are very little hunted for their skins, and were it not for the fact that they so often kill and eat each other they would become dangerously numerous.

FOXES.—Red, Cross, and Silver Foxes are found throughout the mainland of the North, but the skins of these animals in the extreme North do not have, according to my observations, as

perfect and beautiful coats as the animals living further south. The belt of country just inside of, and following the coast range in British Columbia, Northwest Territory, and Alaska, is evidently the most prolific in these animals, and yields the largest per cent. of choice skins of any part of the Northwest.

The skins of the Blue Foxes taken along the Arctic coast are inferior in quality to those of the Alaskan Peninsula and the Pribilofs.

Our knowledge of the Foxes of the North and Northwest is evidently very little in advance of our knowledge of the Caribou. It is, to say the least, very imperfect. There are the Silver-gray or Black, the Cross, the Red, the Blue, and the White. I have heard it said by one who claimed to know that the first three named were all of one common stock. Three years of very careful study and inquiry on my part in the very home of these animals failed to bring to light any positive proof either way, but I satisfied myself that the anatomy of no two of these varieties is alike.

The trading posts at Telegraph Creek, British Columbia, produce very much the largest number of skins of the Silver, Cross and Red Foxes of any one district in the North, and average yearly about 100, 500 and 2000 skins of each respectively. The Liard and Mackenzie River districts produce very few Silver Foxes. Large numbers of White Foxes are taken all through the Northern Hudson Bay and Arctic coast districts, but very few Blue Foxes are taken there. The Alaskan Peninsula and the Pribilofs constitute the real home of the Blue Foxes, and the skins taken there are far superior to those taken along the Arctic coast.

Undoubtedly the finest Red Fox skins produced in America come from the Nushagak River region. The Nushagak empties into Bristol Bay, an arm of Bering Sea. Silver Foxes placed on Afognak Island for breeding purposes reproduced Silver Foxes.

Much additional matter gathered during my travels in the North bearing on this subject might be of interest, but would make this paper of too great length.

Lynx canadensis *Kerr.* CANADA LYNX. — The Canada Lynx is common in the Stickine and Mackenzie River countries,

and especially abundant throughout the Liard River region. Traders and Indians are unanimous in their declaration that this animal is always numerous or scarce according to the number of rabbits in the country ; that during the seasons of scarcity of rabbits, through death from disease or otherwise, the Lynx is proportionately scarce.

RODENTS.—Beaver and Muskrats are found to some extent everywhere about the lakes and streams. The Muskrat is extensively hunted throughout the Mackenzie Delta, Fort McPherson generally receiving from 12,000 to 15,000 skins every spring.

I saw Spermophiles sitting on their mounds among the hills to the east of Darnley Bay early in April, during very cold weather.

Natives informed me of the existence of Flying Squirrels as far north as 60°, but I saw none on my whole trip.

A small rodent, brownish gray in summer and white in winter [Lemming], I found on the Arctic coast, was a peculiarly interesting little animal. The whalers universally claim that they never find them except just after a storm, and that when they find them on top of the hard snow, appearances indicate that they have dropped on the snow from the clouds, and that after running around in a small circuit, they keel over and die. It is probable that they may come up to the surface of the snow during wind storms and are then blown from the ridges for some distance, and falling on the hard snow or ice they die. One secured at Herschel Island and placed on a sheet of sensitized paper spread on a table gave a very clever exhibition of the manner in which it must dig through snow or earth. It would not try to get away but would double up, with its feet seemingly all in a bunch, and then move them with such rapidity as to create a buzzing noise, in its attempt to make a hole through the paper. The movement of its feet was astonishingly rapid.¹

INDIAN AND ESKIMO METHODS OF CAPTURING GAME.

The Indians generally snare the Bear, and in some districts still snare the Moose, Sheep, and Caribou. Beaver are now almost everywhere caught with the steel trap, although not many years

¹ [Mr. Stone obtained specimens of both *Lemmus* and *Dicrostonyx* on Herschel Island.—J. A. A.]

ago they netted them. Foxes are also taken with the steel trap. The Lynx, Rabbits, Marmots, Squirrels, and sometimes Grouse are taken with snares.

The Otter is taken with the steel trap, the Wolverine, Marten, and Mink in dead-falls. The few Wolves that are killed are usually shot.

The Eskimo kill the White and Blue Fox with dead-falls ; they spear the Muskrat, and shoot the Bear, Wolf, and Wolverine.