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The UNEXPLOITED WEST



A compilation of all available information as to the resources of Northern and Northwestern Canada.

By ERNEST J. CHAMBERS, Major, Corps of Guides.

PUBLISHED
UNDER THE DIRECTION OF
F.C.C. LYNCH, Superintendent
RAILWAY LANDS BRANCH

Hon. W. J. ROCHE, Minister. W. W. CORY, C.M.G. Deputy Minister.
Department of the Interior, Ottawa.
1914.

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THE UNEXPLOITED WEST ***

THE UNEXPLOITED WEST

A COMPILATION

of all of the authentic information available
at the present time as to the
NATURAL RESOURCES OF THE UNEXPLOITED REGIONS
of
NORTHERN CANADA

By
Major ERNEST J. CHAMBERS, Corps of Guides
Gentleman Usher of the Black Rod

Published under the direction of
F. C. C. LYNCH
Superintendent of the Railway Lands Branch
Department of the Interior
Hon. W. J. ROCHE, Minister

OTTAWA
Printed by J. de L. TACHE, Printer to the King's Most
Excellent Majesty
1914

DEPARTMENT OF THE INTERIOR,
Ottawa, September 19, 1913.

HONOURABLE W. J. ROCHE,
Minister of the Interior,
Ottawa.

SIR,—I have the honour to transmit herewith the manuscript of a compilation of all available information on the Unexploited West by Major Ernest J. Chambers, Gentleman Usher of the Black Rod. This work, which was undertaken by Major Chambers under instructions from this Department, is drawn from all known sources. The information contained herein covers the whole of the unexploited portions of Canada, west of Hudson bay, and it is intended to fill a growing demand for complete information regarding this territory.

I have the honour to
be, Sir,
Your obedient servant,
F. C. C. LYNCH,
Superintendent of Railway Lands.

PREFACE.

The stream of immigration steadily flowing

westward in ever-increasing volume is rapidly exhausting the reserves of vacant land in that part of the Canadian west which used to be known, to the detriment of the territory farther to the north, as "The Fertile Belt."

Already settlement has overflowed the northern frontier of the "belt of supposed limited fertility" and many thousands of acres of agricultural land have been surveyed by the Dominion Government immediately north of the North Saskatchewan and in the Peace river valley, and the surveys are being rapidly extended to keep up with the pressure of advancing settlement. While the trend of immigration is turning northward, the eyes of the capitalist are attracted in the same direction. Information concerning the resources of the country once ignored is now sought for. Facts about the climate, the soil, the timber, the rivers, the lakes, the minerals, the fish, the game obtained at the risk of life and limb by fur trader, explorer, missionary, geologist and sportsman, even those facts regarded not so long ago as merely interesting, have now a practical value.

The once prevalent notion that the whole of the immense territory north of the North Saskatchewan was a sterile, frost-bound waste destined for all time to remain a wilderness, is now largely a thing of the past, and the opportunities which the latent resources of the silent places of the unexploited northwest afford to the enterprising and adventurous at the present moment challenge the attention of the world.

With interest powerfully attracted to the more easterly sections of the country under review by the recent extensions northward of the limits of the prosperous provinces of Ontario and Manitoba, and

with easy means of communication with the larger divisions farther west assured, thanks to the progress of the construction of railways northward to Port Nelson on Hudson bay and to McMurray in the Athabaska country, it certainly looks as though the long neglected Northland were coming to its own at last.

By connecting with the three thousand miles of almost uninterrupted steamboat communication on Athabaska, Peace, Slave and Mackenzie rivers, and Athabaska and Great Slave lakes, the railway being pushed into the Athabaska country will place the whole of Mackenzie basin within easy reach of the prospector, the explorer, the sportsman and the tourist. The line being constructed to Hudson bay, as soon as steamboat connection is established therewith, will lay the very heart of that alluring El Dorado which we call the Barren Lands, with its herds of musk-oxen and caribou and its mineral wealth, open to the prospector and the sportsman, for, via Chesterfield inlet, Baker lake and the Thelon, there is a splendid, uninterrupted waterway from Hudson bay for a distance of five hundred and fifty miles into the interior.

The exceptional attractions which the Northland holds out to the sportsman are certain to contribute largely towards the discovery and development of the natural resources of the country. A couple of years ago Mr. W. T. Robson, General Advertising Agent of the Canadian Pacific Railway, submitted to a convention of railway men a thoughtful paper on the value of the tourist sportsman as a means of publicity for undeveloped country, in which he pointed out that the cultured business men who find their greatest pleasure, relaxation and physical benefit from trips into the wilds, are quick to discern

the commercial value of water powers, timber and minerals, and he related a number of instances where hunting trips had resulted either in the discovery of unexpected natural resources or in large investments in the country visited.

The object of the present publication is to present, with some degree of systematic arrangement, all of the authentic information available at the moment as to the natural resources of the less-known and unexploited portions of northern Canada lying west of Hudson bay and James bay and east of the main range of Rocky mountains.

This general definition of area brings within the scope of this volume the whole of that portion of the old provisional district of Keewatin recently divided by act of parliament between the provinces of Ontario and Manitoba, those portions of the provinces of Saskatchewan and Alberta north of the unsettled and unsurveyed territory, the basin of Mackenzie river, and that immense country north of the new provincial lines extending from Mackenzie basin to Hudson bay, which has apparently, undeservedly, come to be known as “Barren Lands” or “Barren Grounds.”

In these immense regions there are wide areas of which we in this year of grace 1912 know as little as was known of Bow river valley in 1812, and that was nothing. On the other hand considerable is known in a general way about certain portions of every one of the great districts which form this vast territory, or, to be quite exact, considerable has been written about them. The subject matter has been so widely distributed that no one could be expected to be familiar with it all.

Practically the first authoritative data as to the

natural resources of Canada's unexploited northland was contained in the published evidence of a British parliamentary committee which sat in 1749 to enquire into the resources of the country administered by the Hudson's Bay Company. With this as a nucleus, a considerable amount of information on the subject has gradually accumulated. The journals of officials of the big fur-trading companies have contributed to this fund of information and so have the writings of missionaries, the reports of British, Canadian and United States official government explorers, the narratives of sportsmen and adventurous travellers, and the patrol records of that inimitable and ubiquitous body the Royal Northwest Mounted Police. A very wide range of information regarding the various sections of these territories, too, has been placed on record as a result of several Canadian parliamentary investigations.

Some idea of the large amount of literature relating to the great northland which has accumulated, can be obtained from the fact that in the preparation of the present book nearly three hundred publications have been consulted, necessitating an amount of reading which was not anticipated when the task was undertaken. Much of this reading was absolutely unproductive, a considerable portion of the books written by men who have lived in or travelled through the country being merely narratives of travel and adventure, containing no direct information of any value as to natural resources.

For various obvious reasons many books written by scientific and observant men who have visited the still new west are of little value in throwing light upon the questions of the natural resources of the country. One of these reasons is referred to by Sir

Alexander Mackenzie, who states in the introduction to his narrative:—“I could not stop to dig into the earth, over whose surface I was compelled to pass with rapid steps; nor could I turn aside to collect the plants which nature might have scattered in the way, when my thoughts were anxiously employed in making provision for the day that was passing over me.” The distances to be travelled in the far Northland are generally so great that the slender stores of supplies carried by the explorer and traveller do not permit of time being devoted to thorough investigation by the way. Again, much of the travelling in the unsettled north has been done in winter, when the surface of the ground was covered with snow, making an examination of the soil and rocks impossible.

Nevertheless, the literature relating to the new Canadian northwest is so voluminous that it contains, scattered throughout it, an aggregate amount of practical information regarding the resources of even the more remote sections of the country that, as assembled within the two covers of a single volume, will probably astonish most readers.

The present volume, according to the instructions the undersigned received from the Department of the Interior, is purely and simply a compilation. Care has been taken to avoid the temptation to try and produce a work of original literary merit, and in the following pages it will be found that the compiler has introduced only as much original writing as is necessary to introduce intelligibly the various quotations, or to establish the connections between them, his aim being to present all the data available in the original text, or as near to it as the exigencies of compilation and space would permit.

With the object of properly introducing some of

the chief authorities quoted and of placing the reader, from the beginning, au fait with the circumstances under which the principal information regarding the resources of the country was obtained, the presentation of the data has been prefaced by a brief historical chapter.

At the end of the book a list of the written authorities from which quotations are made will be found.

It will be observed that, to avoid confusion, the vast region under review has been divided into five distinct territorial units, and that the matter relating to each unit is in turn divided into four sections, relating respectively to the resources in the way of arable land, timber, minerals, and fish and game. The compiler found that this system of classification was satisfactory in his two previous volumes of a somewhat similar type, “Canada’s Fertile Northland,” and “The Great Mackenzie Basin,” and a continuation of the system will facilitate reference between the present volume and those which were its forerunners and its inspiration.

Perhaps I might be permitted here a word of personal explanation. I have had only a slight acquaintance with any part of this great waiting Northland, having campaigned a little over its southern margin between North Saskatchewan and Beaver rivers, in Fort Pitt district, during the operations against Big Bear’s Indians in 1885; but what I saw of the country then, with its park-like groves of fine trees, its valleys covered with luxuriant grasses, its sylvan lakes teeming with fish, and every prospect a gem of nature’s own perfect landscape gardening, made such an impression on my mind that I have ever since felt a personal interest not only in that particular section but in the

vast regions beyond which have not the charm of the soft and lovely scenery of Loon lake and Beaver river. Having this feeling towards the country I have followed as a hobby the literature relating to it, and it has been naturally a pleasure to contribute my mite in helping it along towards its ultimate destiny.

The idea of the present volume was not mine but that of the late Mr. Robert E. Young, D.L.S., Superintendent of Railway Lands and Chief Geographer, the most enthusiastic believer in the Northland who ever lived, probably, and whose untimely death was a grievous loss to the country. If this book possesses any merits it is due altogether to his original suggestion, to his wide knowledge and to his enthusiastic and kindly co-operation.

ERNEST J. CHAMBERS.

The Senate, Ottawa.
May 11, 1912.

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"A Fur Shipment of One Season from Mackenzie basin, estimated value over two million, five hundred thousand dollars"

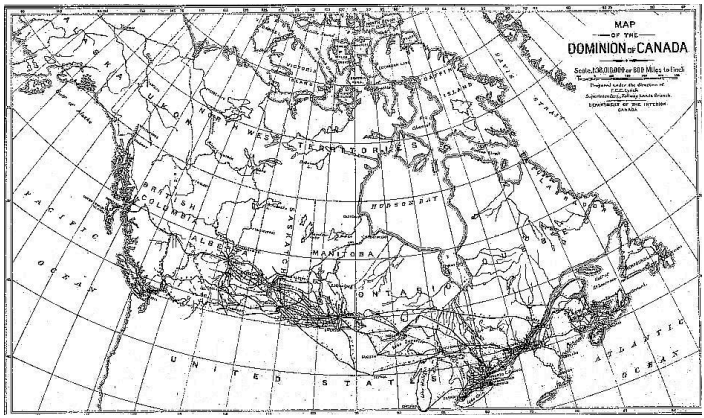
"The 'Conny' or 'Inconnu' "

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"A Survivor of Sir John Richardson's Arctic Expedition wearing the Arctic Medal given him for that Expedition"

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DOMINION OF CANADA

CHAPTER I.

HISTORICAL.

"The Fertile Belt."—Influence of a Catchy Expression.—Northern Canada still a Terra Incognita.—The Hudson's Bay Company.—Early Explorations.—Kelsey, Hearne, Mackenzie, Franklin, Back, Simpson and Dease.—The More Recent Explorers, Official and Unofficial.—Parliamentary Investigations.

When in 1867 the four principal British provinces in the eastern portion of North America were confederated under the British North America Act and became the original Dominion of Canada, the vast regions of the west vaguely known under several designations such as the "Hudson's Bay Territory," the "Northwest Territory" and "Rupert's Land," and extending from the United States boundary to Arctic sea, and from the western frontier of Ontario, James bay and Hudson bay to Rocky mountains, remained under the rule of the Hudson's Bay Company.

The Fathers of Confederation had in view, however, a union of all the British possessions on the continent, and one of the measures passed at the first session of the first parliament of the new Dominion provided for the opening of negotiations for the union of the Hudson bay territory with the confederated provinces. Thanks largely to the diplomatic offices of the British government, the rights of the Hudson's Bay Company were eventually bought out by Canada, and this vast territory, estimated at upwards of two million three hundred thousand square miles, was transferred to the Dominion of Canada in the year 1867.

The cash consideration obtained by the company from the Dominion for the relinquishment of its rights and titles was the sum of three hundred thousand pounds sterling; but there was also a

provision for the retention by the Company of blocks of land adjoining each of its stations; and the right was allowed the company for fifty years, from 1870, to "claim in any township or district within the fertile belt in which land is set out for settlement, grants of land not exceeding one-twentieth part of the land so set out."

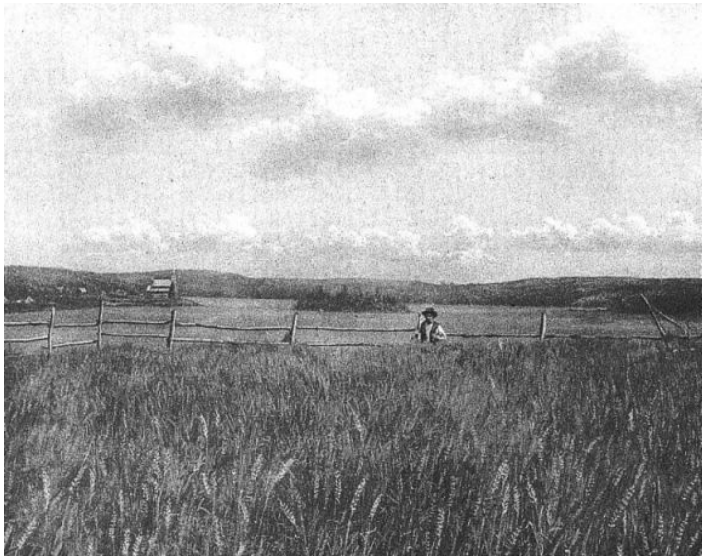
For the purpose of the agreement the "Fertile Belt" was described therein as being bounded as follows:—"On the south by the United States boundary; on the west by Rocky mountains; on the north by the northern branch of the Saskatchewan; on the east by Lake Winnipeg, Lake of the Woods, and the waters connecting them."

THE TERM "FERTILE BELT."

There is some uncertainty as to the origin of the term "Fertile Belt", thus arbitrarily defined in the historical agreement with the Hudson's Bay Company; but this much is certain:—the term came into general use after the publication of the reports of the official exploratory expeditions of Captain John Palliser of the British Army, of S. J. Dawson, C.E., and Professor Henry Y. Hind of Trinity College, Toronto. Captain Palliser was commissioned by the British government to explore "that portion of British North America which lies between the northern watershed and the frontier of the United States, and between Red river and Rocky mountains and to endeavour to find a practicable route through them." The Dawson-Hind expeditions (there were two) were under the auspices of the government of United Canada (Upper and Lower Canada) and were for the purpose of inquiring into the resources of Red river colony and the Assiniboine and Saskatchewan

countries. The British expedition extended over parts of four years—1857, 1858, 1859 and 1860, while the Canadian ones covered two years—1857 and 1858.

In the preface to his report, published in 1860, Professor Hind wrote:—"The establishment of a new colony in the basin of Lake Winnipeg, and the discovery of a FERTILE BELT of country extending from the Lake of the Woods to Rocky mountains, give to this part of British America a more than passing interest." In another place Professor Hind wrote:—"North of the great American desert there is a broad slip of FERTILE COUNTRY, rich in water, wood, and pasturage, drained by the North Saskatchewan, and a continuation of the fertile prairies of Red and Assiniboine rivers. It is a physical reality of the highest importance to the interests of British North America that this continuous BELT can be settled and cultivated from a few miles west of Lake of the Woods to the passes of Rocky mountains, and any line of communication, whether by waggon road or railroad, passing through it, will eventually enjoy the great advantage of being fed by an agricultural population from one extremity to the other."



Wheat field at Stanley, Churchill river.

The terms “Fertile Belt,” “Fertile Strip” and “Fertile Land” appear many times in Captain Palliser’s report, published in 1863, the first of these expressions being used no less than three times in one paragraph of the report.

The influence of a “catchy expression” in attracting the world’s attention is wonderful. Whatever the origin of the term “Fertile Belt” in this connection, its emphatic application by these independent official reports to the particular strip of territory between the United States boundary line and Saskatchewan river had immediate and lasting effects.

It arrested public attention in England and in Canada. That which had often been asserted by independent travellers, and more often stoutly denied by those whose sole interests were centred in the fur trade[1], had been found by scientific explorers of unquestioned veracity to be an actual

fact. As Captain Palliser put it in his report:—"The whole of the region of country would be valuable not only for agriculturists but also for mixed purposes. I have seen not only excellent wheat, but also Indian corn (which will not succeed in England or Ireland) ripening on Mr. Pratt's farm at the Qu'Appelle lakes in 1857." Professor Hind, in his report, quoted interviews with enthusiastic settlers, who, on their prairie farms in Assiniboine valley, had for years been successfully raising prime wheat at a yield of thirty to forty bushels to the acre, "corn, barley, oats, flax, hemp, hops, turnips, tobacco and anything you wish." He showed that similar conditions of soil and climate extended far to the westward, and, quite naturally, he wrote of this area as the "FERTILE BELT."

THE OLDER INFlUENCES.

The Right Honourable Edward Ellice, one of the oldest governors of Hudson's Bay Company, asked, when being examined before the British Parliamentary Committee of 1857, what probability there was of a settlement being made within the southern territories of the company, replied:—"None, in the lifetime of the youngest man now alive." ("The Great Company", p. 480).

Sir George Simpson, who was for forty years governor of the Hudson Bay territories and had visited every portion of them, was examined before the select committee of the British House of Commons appointed in 1857 at the instance of Mr. Labouchere, on the eve of the expiration of the license for exclusive Indian trade issued to the Hudson's Bay Company in 1838, to investigate the state of the British possessions administered by the

Company. Sir George, being asked his opinion as to the general fitness of Rupert's Land for colonization, replied:—"I do not think that any part of the Hudson Bay territories is well adapted for settlement; the crops are very uncertain."

By officially establishing the existence of this rich, arable area in the southern part of the territories governed by the Hudson's Bay Company, and by associating it with such an apt designation, the Palliser and Hind expeditions brought strong popular support to those who in Britain and Canada were at that particular period actively working to secure the introduction of Canadian jurisdiction over the whole of the western part of British North America, and materially contributed to the success of the protracted negotiations which resulted in the ultimate surrender of its rights of government, etc., by the Hudson's Bay Company. If any other proof was required to establish in the popular mind the attractiveness of the "Fertile Belt" as a desirable section for settlement, it was furnished by the written agreement under which the country was handed over to the Dominion of Canada, the term "Fertile Belt" therein receiving the stamp of the highest official recognition, and by the Hudson's Bay Company, famous as a shrewdly managed corporation, stipulating that the grants of land to be made them were to be located within the area so designated.

Settlement of "The Fertile Belt."

The term "Fertile Area" proved a very loadstone to the settler and the capitalist. Ever since the settlement of the troubles which accompanied the transfer of the great northwest to the Dominion of

Canada there has been a stream of immigration flowing into the country, and up to the past few years the Fertile Belt has been the settler's Mecca and El Dorado.

In the summer of 1874 the region west of the original province of Manitoba was 'opened up' by the Northwest Mounted Police as far as Macleod in the south, and Edmonton in the north. In 1885 the completion of the Canadian Pacific Railway main line gave western Canada direct communication with the eastern provinces, and a fair chance to develop her natural resources, particularly in the Fertile Belt, through which the line was constructed.

In 1870 the population of the whole region east of Rocky mountains over which the Great Company had so recently relinquished its rule as Lord Proprietor amounted to but a few hundred; at the present time (census of 1911) it amounts to no less than one million, three hundred and forty-eight thousand, one hundred and seventy two. And with the exception of the partially settled areas in Beaver, Athabaska and Peace districts, and a few small, isolated posts on Hudson bay and along Mackenzie river, the whole of this population is located within the "Fertile Belt" as defined in the Hudson's Bay Company's agreement of 1869. This is not to be wondered at considering the undoubted natural attractiveness of the zone, its rapidly developed advantages in the way of railway communication, and the benefit it derived from being originally introduced to the world as a future paradise of agricultural enterprise under such an apt and alluring designation as "The Fertile Belt."

But while the united energies of the capitalist, the railroad builder and the agriculturist have been devoted to the exploration of the Fertile Belt, the

much larger area of virgin country extending from the northern limits of the strip in question to Arctic sea and lying between Hudson bay and Rocky mountains has been neglected.

This (not including the Yukon), the most northern section of the vast western region formerly ruled by the big fur-trading company, comprises no less than one and one-half million square miles of country, or considerably more than the combined territory (on March 1, 1912) of the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Manitoba. Its very vastness, coupled with its remoteness from the great centres of population, has tended to keep it, as far as the world at large is concerned, comparatively

A Terra Incognita.

The word “comparatively” is used advisedly, for while it is true that the greater part of the unexploited northland is unexplored and unknown, we have in one way or another obtained considerable useful information about it. Now and again word has come from some missionary station or trading post somewhere up in the far north, hundreds of miles beyond the northern limits of the “Fertile Belt,” of root crops, barley, oats, and even wheat being raised during a long succession of years with phenomenal success. Explorers returned from the great north have related how they were regaled upon potatoes and other vegetables grown a few miles from Arctic Circle. A sample of wheat grown at Fort Vermilion in north latitude 58·4°, three hundred and fifty miles north of Edmonton, was awarded First Prize at the Centennial Exhibition at Philadelphia, in 1876, in competition with the whole world.

Geological explorers have reported vast deposits of coal and other minerals underlying immense areas in the far north. Adventurous travellers, back from the least promising regions of Canada's great northland have disclosed the existence of timber areas and of game and fish preserves of fabulous richness.

And this great northern country long ago had its champions who challenged the attention of the world by predicting for sections of it, at least, an agricultural and industrial future. Mr. Malcolm McLeod, formerly of the Hudson's Bay Company, and, as a son of the North, jealous of its reputation, stirred up the thought that in the glamour attached to the original exploitation of the "Fertile Belt" the natural resources of the vaster country to the north would be overlooked, and in the preface of his book, published in 1872, on Sir George Simpson's canoe voyage from Hudson bay to the Pacific in 1828, wrote:—"The object of the present brochure, at this juncture, is to direct attention—by an account of a canoe voyage through the region—to the fact that BEYOND THAT BELT OF SUPPOSED LIMITED FERTILITY, which is implied in the term "Fertile Belt," there is, in our north west, an area, continuous in every direction and easily accessible to its utmost limits, containing over three hundred millions of acres of wheat and pasture lands, with forests of finest timber, and the largest known coal and bitumen, and also probably the richest gold areas in the world—a land teeming with animal and vegetable life, extending to the very Arctic Circle, and owing its wealth in that respect to exceptional causes. I refer to that area—comprised entirely of Silurian and Devonian systems—watered by the great Athabaska, Peace and Mackenzie rivers, with their countless affluents."

The very year of Confederation the attention of the reading public of the world was forcibly drawn to the latent natural wealth of the northland. The writer of an article published in the Westminster Review of July, 1876, ("The Last Monopoly") pointed out that "nature marching from east to west, showered her bounties on the land of the United States until she reached the Mississippi, but there she turned aside to favour British territory. To the north the good land of the western states is prolonged beyond the forty-ninth parallel, where it enters British territory as the Fertile Zone. The fertile zone curves towards the north as it proceeds westward, so that the western extremity of the belt is several degrees of latitude higher than the eastern, the curves apparently corresponding pretty closely with certain isothermal lines. The forest zone extends to latitude 61° on Hudson bay. Coal crops out at intervals in seams of ten or twelve feet thick from the Mackenzie in the far north to the Saskatchewan. Ironstone has been discovered in the Athabaska. Sulphur abounds on Peace and Smoky rivers. Salt is plentiful near Great Slave lake; plumbago and mineral pitch on Lake Athabaska; copper, native and in the form of malachite, on Coppermine river."

THE NORTHLAND'S FIRST CHAMPIONS.

To find the first champions of the great Northland as a prospective theatre of enterprise and development, and to trace the history of the exploration of the region from the beginning, it is necessary to go back many years, to a date, in fact, only two years more recent than the founding of Quebec by Samuel de Champlain.

Henry Hudson, the great English sea captain, was

engaged in the search for a northwest passage, when on August 3, 1610, he rounded the northwestern shoulder of Labrador and entered the bay which he thus discovered and which now bears his name. The exploration of this great inland sea was begun, not for the sake of gaining a knowledge of the country surrounding it, nor for the development of its resources, but in the delusive hope of finding a passage through it to the western ocean. In 1612, Captain (afterwards Sir) Thomas Button, commissioned to search for Hudson and to look for a northern passage, entered the bay with two ships, and, holding on his westward course, encountered land at about 60° 40′ north latitude. Being a Welshman, he called the land "New Wales," a name which afterwards gave place to "New North Wales" for the northern part, and "New South Wales" for the southern; but all three designations, as applied to the Hudson bay coast, are now only of historic interest. Button wintered at Port Nelson, which he so named in memory of a shipmaster who, with many of the sailors, died there. When the ice broke up he went northwards past Cape Churchill and landed at a place about 60° north which he called "Hubbart's Hope."

The southern coast of Hudson bay, east from Port Nelson (York Factory), was visited and explored by Captains Luke Foxe of London and Thomas James of Bristol in 1631, and again visited by James in 1632. These two navigators met off the coast near the mouth of Winisk river on August 29-30, 1631. Each had given a name to the country to the southwest. Foxe called it "New Yorkshire" and James "The South Principality of Wales," probably on account of the previous name "New Wales" given by Button in 1612 to the land southwest of Port Nelson. These

two navigators sailed together to the eastward, to the entrance to James bay, and there separated, Foxe to go north and James to the southward, to winter. Foxe called the bay he had left "Wolstenholme's Ultimum Vale." James, after rounding the cape, determined its latitude (55° 5′) and called it "Henrietta Maria Cape," after the Queen, and also after his own ship.



Oat field at Ile à La Crosse.

In 1668 Captain Gillam entered Hudson bay with a pioneer fur-trading expedition under the patronage of some influential Londoners, at the head of whom was Prince Rupert, Duke of Cumberland, Count Palatine of the Rhine and cousin of Charles II, King of England. Thus was inaugurated the regime of the Hudson's Bay Company, but the Royal charter to Prince Rupert and his associates, constituting them "The Governor and Company of Adventurers of England trading into Hudson's Bay", was not granted until 1670.[2]

"The Hudson's Bay Company."

The company was organized to prosecute the fur trade, and not for colonizing purposes. The few explorations into and from the company's first posts on the bay were made solely in the interests of the fur trade. When in 1683 Governor Sargeant was urged to send men to penetrate into the country, the object was distinctly stated to be "to draw down the Indians by fair and gentle means to trade with us." This was the burden of many letters of instruction sent out to Hudson bay in those days, but the response was not very promising. The company's servants were not easily induced to imperil their lives, particularly as they complained of lack of encouragement. In 1688 Governor George Geyer, who himself, in 1773, had volunteered to do some exploring, was instructed to send the boy Henry Kelsey to Churchill river for an exploring trip "because we are informed he is a very active lad, delighting much in the Indians' company and being never better pleased than when he is travelling amongst them." Thus began the adventurous career of one who may be regarded as the pioneer explorer of the region under review.[3] In 1690 Kelsey "cheerfully undertook a journey up into the country of the Assiniboine Poets, with the Captain of that Nation." The following year he accompanied the Indians on a journey he computed at four hundred or five hundred miles, penetrating as far as the buffalo and grizzly bear countries. A diary of this trip was published, but it contained no references to the natural resources of the country. There followed a period of some activity in the matter of exploration by sea, the discovery of a northwest passage being aimed at. Between 1719 and 1737 the Hudson's Bay Company alone fitted out nine vessels to participate in this discovery, but these voyages added nothing to

the scanty knowledge then available as to the resources of the territory ruled over by the company.

Soon after the Hudson's Bay Company obtained its monopolistic charter, antagonism to it arose in England, and this hostility steadily developed, the legality of the charter being flatly challenged. One of the bitterest opponents of the company was Mr. Arthur Dobbs, a gentleman of means and scientific attainment, intensely interested in the subject of the northwest passage, who became embittered because he considered the Hudson's Bay Company had not furthered the exploration projects as he thought they should have done. In 1744 he published a volume on the countries adjoining Hudson bay, in which he arraigned the company for keeping the country back. He declared that the company would not allow their servants to make any improvements at the posts except it be to plant turnip gardens. He proceeded: —"There might be comfortable settlements made in most places, and very tolerable, even in the worst and coldest parts of that continent, which are the northeast and northwest sides of the bay; but in the southern and western sides of the bay, there might be made as comfortable settlements as any in Sweden, Livonia or the south side of the Baltic, and farther into the country, southwest, the climate is as good as the southern part of Poland and north part of Germany and Holland."

An Early Parliamentary Inquiry.

In 1748, ten years before the capitulation of Montreal to General Amherst, a motion was passed in the House of Commons "to enquire into the state and condition of the countries adjoining Hudson bay and the trade carried on there, and to consider how

those countries may be settled and improved, and the trade and fisheries there extended and increased, and also to enquire into the rights the Company of Adventurers trading into Hudson's bay pretend to have by charter to the property of lands and exclusive trade to those countries." The result was an investigation, which produced a considerable amount of evidence throwing the first official light upon the natural resources of Canada's great northland.

Up to this time the territory about Hudson bay had been commonly supposed "to be a mere waste and howling wilderness, wherein half-famished beasts of prey wage eternal war with a sparse population of half-starved savages; where the drought is more than Saharan, the cold more than Arctic, and that woe would betide the mad and unfortunate individual who might be so far diverted from the path of prudence as to endeavour to settle in those parts."[4]

Evidence heard before the committee revealed the fact that intelligent men who have lived in the country several years considered that it possessed decided attractions as a field of settlement, and held that nothing but the policy of the fur-trading company kept settlement back.[5]

Some of the evidence as to the resources of the country and as to the conditions of the very slim white population is still edifying. The attack upon the legality of the company's charter, however, came to nothing, and the revelations made as to the suitability of the country for settlement had no practical result, which is scarcely to be wondered at considering the conditions prevailing in both Europe and America—conditions which in the course of a few years were to result in momentous changes in the map of this continent.

No additional data as to the resources and geography of the great northland were produced until the years 1770 and 1771 when

Hearne Made His Historical Trip

of discovery. Many of the witnesses examined during the enquiry of 1748-49 had spoken of the statements of Indians regarding the rich copper mines existing on a great river many miles to the northwest of Churchill. The Indians who visited that post in 1768 so impressed the governor, Mr. Moses Norton, with their version of the richness of the copper deposits along the river they called the Neetha-San-San-Dazey (the "far-off metal river"), that being in London the following season he induced the Company to send out an exploratory expedition. The man selected for the command was Samuel Hearne,[6] a capable and experienced mariner, then serving as mate on the Company's brig "Charlotte." Hitherto all of the exploratory expeditions from Hudson bay towards the northwest had been in search of the northwest passage, and by sea, but now it was decided to undertake exploration by land.[7] Hearne really made three trips, two of which were unsuccessful. The first failed because of the lack of provisions, and the second because Hearne was plundered by his Indian companions and broke his sextant. On these trips he attempted to penetrate to the northwestward through the so-called Barren Grounds or Barren Lands, but on the third venture, leaving in December, 1770, he kept more to the westward and, being in the wooded country, was able to provide himself with provisions and to travel with much less discomfort. As he was accompanied by a number of Indian families as bearers and hunters, his progress was necessarily

slow and indirect, on account of the difficulty of crossing lakes and large rivers, and of providing food for so large a party. His general line of travel was at first a little north of west to Clowey lake, which was reached May 3, 1771, and thence a little west of north to the eastward of Great Slave lake, probably passing Artillery lake (his Catt lake?) and Clinton-Colden and Aylmer lakes (his Thoy-noy-kyed lake?) to the stream since called Coppermine river, which was reached probably near Sandstone rapid.[8]

During the eighteen years or so following Hearne's discovery of Coppermine river, considerable knowledge was acquired as to the resources of the more southern portions of the still unexploited north country by the activities of the Canadian fur traders, including the Northwest Company, in North Saskatchewan, Clearwater, Athabaska and Peace river regions,[9] and the resultant extension southward of the trading operations of the Hudson's Bay Company.

Mackenzie's Trips of Exploration

including the discovery of the great river of the north which still bears his name, were notable events in the history of the north country; momentous events, in fact, in view of the knowledge first obtained through them of the vast natural resources of the great Mackenzie basin.



Winter travel—Dinner time.

Mackenzie set out on his first voyage from Chipewyan, at the head of Lake Athabaska (a Northwest Company's post), June 3, 1789, and proceeded in canoes via Slave river, Great Slave lake, and Mackenzie river as far as Whale island in the estuary of that stream. On July 16, he started on the return trip by the same route, and reached Chipewyan on September 12. On his second trip, in 1792, Mackenzie proceeded from Chipewyan to the summit of the Rockies via Lake Athabaska, Peace river, and its affluents, making his way to the Pacific through the passes of the mountains, and down the streams on the western slope as best he could.

David Thomson, an energetic but little known traveller, made a track survey in 1799 of Lesser Slave river, and of the Athabaska from the mouth of the Pembina to Clearwater forks. In 1803 he filled in the gaps between the forks and Athabaska lake, and in 1810 ascended the river and crossed the Rockies by Athabaska pass.

SIR JOHN FRANKLIN.

With the first journey of Lieutenant (afterwards Captain Sir) John Franklin, R.N., in 1820, began a series of explorations which extended over a period of about thirty years, in connection with which the study of the natural history and geography of the far north country was carried on more systematically than had hitherto been possible. Franklin was fully equipped by the British Government for scientific work, and was accompanied by Doctor John Richardson, Lieutenant George Back and Lieutenant Robt. Hood—men of acknowledged skill and ability. The expedition left York Factory on September 9, 1819, and, travelling by way of Oxford House and Norway House, arrived on October 22 at Cumberland House where they went into winter quarters. In order to arrange in advance for the further progress of the expedition, Franklin, accompanied by Back, left Cumberland House on January 18, 1820, and, travelling by way of Carleton House, Ile à la Crosse and Methye portage, arrived at Chipewyan on March 26. Finally the party again set out on August 2, 1820, from old Fort Providence, on the north side of Great Slave lake, to ascend Yellowknife river, and on August 20 he reached Winter lake, near which he established his winter quarters. Here wooden houses, dignified with the name of Fort Enterprise, were erected. In June the following year the party descended Coppermine river, covering a distance of three hundred and thirty miles to the sea, and paddled along the coast eastwards, exploring the coast as far eastward as longitude 109° 25′ west and latitude 68° 19′ north, thus exploring Bathurst inlet and Coronation gulf. The story of the dreadful hardships endured by the party on the return trip, one-half of the whole number, including Lieutenant Hood, dying of starvation and exposure, forms one of

the most ghastly chapters in the history of Canadian exploration, and its publication did much to deepen the popular impression that the whole of the great northland was a hopelessly inhospitable region. As a matter of fact the disasters which overtook this expedition were due to its commissariat being inadequately outfitted. The Admiralty, who planned the expedition, knew practically nothing about the conditions of travel in the regions that they proposed having explored, and depended for aid upon the Hudson's Bay Company. That corporation did its best, but was unable to extend to Franklin any official aid after he left Great Slave lake or to supply him with proper provisions. The bitter fight between the two big fur-trading companies had reached a climax; every officer of the Hudson's Bay Company was needed in the Company's service, and supplies at the frontier posts were at the lowest ebb. So the expedition plunged into the unexplored wilderness without enough food and inadequately supplied with ammunition.

In spite of the disasters attending the return of this expedition, the British Government, determined upon completing the exploration of the Arctic coast line of the continent, satisfied itself that the route overland was the best for the explorers to follow, and Franklin, having been successful on this first trip in surveying a long stretch of coast to the east of Coppermine river, was appointed to the command of the second expedition to explore the coast to the west of that river. The exploring party spent the winter of 1825-26

At Fort Franklin

at the west end of Great Bear lake, and on June 22,

1826, set out in boats along Bear river and Mackenzie river for the coast. The principal members were Captain John Franklin, Lieutenant George Back (second in command); Doctor John Richardson, surgeon and naturalist; Thomas Drummond, assistant naturalist; E. N. Kendall and P. W. Dease, a chief trader of the Hudson's Bay Company, who was afterwards associated with Thomas Simpson in explorations west of the Mackenzie and east of the Coppermine. At the delta of the Mackenzie the party separated, one detachment under Doctor Richardson turning to the east and completing a survey of the coast as far as the mouth of the Coppermine. In the meantime Franklin and Back explored the Arctic coast to the westward of the Mackenzie for three hundred and seventy-four miles, passing beyond the northernmost spur of Rocky mountains and returned to Fort Franklin, reaching there September 21. Franklin remained there until February, 1827, when, leaving Back to follow him in the spring, he left for Cumberland House, where he joined Richardson on June 18, 1827.[10]

Some time before this expedition set forth, the crisis which had developed in the rivalry between the Hudson's Bay Company and the Northwest Company[11] had resulted in the union of the two companies under the name of the former and the reorganized company, when called upon by the Admiralty for assistance, was in a better position than the original one had ever been to assist in the work of exploration. Consequently Franklin's second expedition was properly provisioned and attended by experienced and reliable men. As a result it was unaccompanied by any of the tragic occurrences which marked the former trip.

Meanwhile explorations were being prosecuted

by sea among the Arctic islands and channels to the far north, and some of the expeditions were indirectly to contribute to the world's knowledge of the northern part of the Hudson's Bay Company's continental territory. Captain John Ross left England in the "Victory" in 1829 and with his ship's company was compelled to abandon the vessel in the ice in Regent inlet. They spent altogether four winters within the Arctic circle and were finally picked up in their boats in Lancaster sound by a whaler. The prolonged absence of this party caused great anxiety in England, and in 1833 a search expedition was organized at the cost of the Hudson's Bay Company and Captain Ross's friends with government assistance. At the head of the searching party was Captain (afterwards Sir) George Back, R.N., who had instructions to descend Thlew-ece-cho-dezeth or Great Fish river to the coast, exploring the river and adjacent country, as far as possible, as he proceeded. Some months after he had started, Back was notified of the return of the Ross expedition, but was ordered to proceed with his trip for exploratory purposes. Captain Back built as his winter quarters

OLD FORT RELIANCE

on a beautiful spot at the north east extremity of Great Slave lake. His explorations extended over parts of Great Slave, Artillery, Clinton-Colden and Aylmer lakes as well as the whole of Great Fish river, and from the Indians Back obtained some interesting information regarding the adjacent country.

Captain Back, in 1834, descended Great Fish river, since called Backs river, to its mouth. He also surveyed the coasts of its estuary as far as Cape Britannia on the one side and Point Richardson on

the other, leaving but a small space of coast line unexamined between his northern extreme and the limits of earlier explorations. The return journey began on August 16. Back reached the mouth of Great Fish river August 21, the head of it on September 17, and Fort Reliance on September 27.

The next journey of exploration in this region was that of Thomas Simpson and Peter Warren Dease,[12] officers of the Hudson's Bay Company. While the object of their expedition was to complete the survey of the Arctic coast so nearly completed by Franklin, Richardson and Back, they made some notes on the natural resources of the far northern country. Simpson left Fort Garry, the site of the present city of Winnipeg, on December 1, 1836, and, travelling on snowshoes, arrived at Chipewyan on June 1, and, descending Slave and Mackenzie rivers, explored the Arctic coast westward to Point Barrow. They then returned to the Mackenzie, ascended it and Great Bear river, and, crossing Great Bear lake, built a post near the mouth of Dease river, naming it Fort Confidence, and there spent the winter of 1837-38. They left here June 6, 1838, and, after ascending Dease river as far as was practicable, portaged to the Coppermine. They then descended that river to the sea and explored the coast to the eastward as far as Point Turnagain, the farthest point reached by Franklin in 1821. Being unable to proceed farther, they returned to Fort Confidence, where they arrived on September 14, and again wintered there.

An expedition which was to mark the beginning of a most notable epoch in the explorations of the Arctic regions sailed from England, in 1845. Sir John Franklin, with two ships, the Erebus and the Terror, with crews numbering one hundred and twenty-nine persons, left England on May 26, to complete the

survey of the north coast of America and to accomplish the northwest passage. The Erebus and the Terror were last seen by a whaling captain July 26, 1845, moored to an iceberg, waiting for an opening in the ice to cross to Lancaster sound.

As time passed without any word of the missing expedition being received, the interest and sympathy of the world were powerfully aroused, and not only England, but France and the United States also despatched

Search Expeditions

to the Arctic. From northwest Canada some historical expeditions made their way overland. In all thirty-five ships and five overland expeditions were engaged in this search. The entire northern coast line of America and the shores of the Arctic[13] were explored with minute care, and much scientific knowledge of value relating to magnetism, meteorology, the tides, geology, botany and zoology was accumulated. Several of the sea expeditions and all of the overland expeditions contributed to our store of knowledge as to the resources of far northern Canada.

For the purposes of this volume the most important of these expeditions, because the most productive of data regarding the natural resources of the region under review, was that dispatched overland from Athabaska district via Mackenzie river in 1848 and 1849. From the rapids of Slave river, Doctor John Richardson and Doctor Rae (both subsequently knighted) pushed on with all possible speed, leaving the heavier boats to follow with the winter supplies, and skirted the Arctic coast eastward to the mouth of the Coppermine river. Thence they

travelled overland to the mouth of the Dease river on Great Bear lake. Near this point, on the site of Fort Confidence, established by Dease and Simpson, Rae, whose detachment had ascended Great Bear river and crossed Great Bear lake for this purpose, had erected houses, and here the entire party passed the winter of 1848-49. As early in the spring of 1849 as the season allowed, the party divided on Arctic sea, and Richardson returned to England, while Rae made an attempt to reach Wollaston land. Failing in this, he returned to Fort Confidence, and ascended the Mackenzie to Fort Simpson. In the summer of 1854, under the auspices of the Hudson's Bay Company, Rae made a journey of exploration along the southern coasts of Wollaston and Victoria lands, still searching for the Franklin expedition. In 1853, when no trace of Franklin could be found elsewhere, Rae again turned his steps in the direction of Gulf of Boothia. First he sought a short cut to the south of Backs river by Chesterfield inlet and Quoich river, which he ascended in a boat for two and a half degrees of latitude (up to 66° north), but finding the river full of rapids and impracticable for his purpose, he returned and hastened north to Repulse bay.

The reports of these expeditions contain several references to the natural resources of the country, but they are not so valuable as would have been the case had time been less a consideration, or had the investigation of mineral deposits and other natural wealth of the country been the chief objective.

Some information as to the resources of the north country was obtained by the British Parliamentary Committee of 1857 already referred to (See p. 3), but most of the evidence had reference to the southern part of Hudson's Bay Company's territory now comprised within the settled parts of the provinces of

Manitoba, Saskatchewan and Alberta.

Canadian Parliamentary Investigations.

April 12, 1870, the Senate of Canada appointed a select committee on the subject of Rupert's land, Red river and the Northwest territory, with a view to collecting information respecting the condition, climate, soil, population, resources and natural products of the country, its trade, institutions, and capabilities and the means of access thereto, with power to send for persons and papers. The committee reported on April 25, 1870. This report with the report of the evidence was printed, in extenso, as an appendix to the Journals of the Senate (33 Victoria). None of the witnesses examined before the committee had ever been in the district north of the North Saskatchewan. One, Joseph Monkman, explained that he had been up the South Saskatchewan as far as Moose lake, and up the north branch of the same river as far as Carlton. He testified that although the country along the Saskatchewan looked promising from an agricultural standpoint, there were "no farms along the river." Most of the witnesses were asked if they had any information as to the "far northwest," and all who had heard anything definite regarding that region testified that their information was favourable.

Since the transfer of the northwest from the Hudson's Bay Company to the Dominion Government, a vast amount of reliable information regarding the great northland has been obtained by Canadian Government explorers, generally engineers reconnoitring in advance of railway construction, members of the staff of the Geological Survey of Canada, or expeditions despatched to various defined

areas by the Department of the Interior for the express purpose of investigating their natural resources and determining their suitability for agricultural or industrial developments. More or less extensive trips through sections of the great northland by adventurous sportsmen and naturalists have also contributed considerably to our knowledge of the country.

A very brief account of some of the more productive of these expeditions, with special reference to the routes followed, is necessary to enable the reader to appreciate intelligently the references to the information obtained to be made in the succeeding chapters.

Scientific Investigation of the Country.

In 1872, Professor John Macoun was sent from Edmonton by Mr. (now Sir) Sandford Fleming, who was then exploring for the Canadian Pacific Railway, to explore Peace river and see if there were a pass there. Professor Macoun's report attracted much attention to this district.

Professor Macoun had then already spent ten years study, theoretical and practical, of botany, natural history and physical geography. In the year 1875 he was appointed botanist to the expedition which, under the leadership of the Director of the Geological Survey, explored Peace river and Rocky mountains. Two years later he was asked by the Dominion Government to write a report on the Northwest territories and availed himself of all reliable information regarding the country. The summers of 1879-80-81 were spent by Professor Macoun in traversing the least known parts and investigating the fauna, flora, meteorology and

physical phenomena of the country.

During the years 1878-79 Doctor G. M. Dawson, of the Geological Survey, in conjunction with a Canadian Pacific Railway survey party, made an examination of the region between the mouth of Skeena river on the Pacific coast and Edmonton, including Pine river pass and its approaches, Smoky river and the fertile country north and south of Peace river. The vast extent of country covered left but little time for details, and caused the expedition to assume the character of a rapid reconnaissance survey.

In 1873, Charles Horetzky, C.E., was commissioned by Mr. Sandford Fleming to make a reconnaissance survey through Peace river country and Peace river pass to assist the government in reaching a decision as to the route of the Canadian Pacific Railway. Mr. Horetzky, who was accompanied by Doctor Macoun, botanist, proceeded via Edmonton, Lesser Slave lake, the confluence of Smoky and Peace rivers, Dunvegan, McLeod's lake, etc. Besides his official report, Mr. Horetzky wrote a popular account of this trip under the title "Canada on the Pacific," which contained much interesting information as to Peace river district.

In 1875, Doctor Selwyn, Director of the Geological Survey, mapped and reported upon the upper part of Peace river, as far down as the mouth of Smoky river, and in the same year Professor John Macoun, who accompanied him in the capacity of botanist, proceeded down the river to Lake Athabaska, and returned east by the Athabaska-Clearwater route, while Doctor Selwyn reascended Peace river, and returned by British Columbia.

Doctor Robert Bell, F.G.S., F.R.S.C., etc., in a period of active service in the Geological Survey

extending over more than forty years, contributed very largely to our knowledge of Northern Canada. He was medical officer, naturalist and geologist on the "Neptune," the "Alert" and the "Diana" expeditions to Hudson bay, and his reports of those voyages, as well as of his overland trips, are very valuable. Three of his exploratory trips, two in the eastern division, the other in the western part of the country under review, are especially interesting. In 1878 he made a track-survey and a geological examination of the boat-route from Lake Winnipeg to Hudson bay by way of Oxford and Knee lakes, and the rivers thence to York Factory. He also made topographical and geological surveys of the lower part of Nelson river, and of the upper part of the same stream, from Lake Winnipeg nearly to Split lake, leaving unfinished the central part. Between 1878 and 1891 he explored Nelson river, the lower part of Grass river, and parts of Churchill and Little Churchill rivers. In 1879, Doctor Bell, assisted by Mr. Cochrane, completed his survey of Nelson river and Churchill river basins; the country covered in that region included altogether Gull lake, Grass river, Sipiwesk lake, Jackfish river, Knee lake, God's lake, Island lake, Split lake and the coast of Hudson bay for a few miles on either side of Churchill. These explorations practically re-opened a section of country which must have been familiar to those engaged in transportation via the old route between Hudson bay, Red river and Saskatchewan river districts. Before reaching Norway House, although diligent enquiry was made by Doctor Bell, no reliable information could be obtained of the Churchill, or the central part of the Nelson, or the country lying between these two streams. And even at Norway House very little was known on the subject. This

arose from the fact that both these rivers had long before been abandoned as “voyaging” routes by the Hudson’s Bay Company, and also that no Indians lived at or near the parts to be examined.

In 1882, a track survey and geological examination of Athabaska river below the mouth of Lac La Biche river, was made by Doctor Bell.

In 1886, Doctor Bell conducted an exploration of portions of Attawapiskat and Albany rivers, and of the country between Lonely lake (Lac Seul) and James bay. Doctor Bell reached the Albany from Wabigoon via Lake Minnietakie, and crossed the watershed to the Attawapiskat from the highest of the chain of lakes on the Eabamet, which flows into the Albany about ninety miles in a straight line below the outlet of Lake St. Joseph. The Attawapiskat was followed to James bay.

A micrometer survey of the lower part of both Peace and Athabaska rivers was made by William Ogilvie, D.L.S., in 1884, and in 1888, Mr. Ogilvie, having completed some surveys in the Yukon, arrived at Fort McPherson via Peel river to make

An Exploration of Mackenzie river,

Great Slave lake and river, and Lake Athabaska. Mr. Ogilvie ascended this great waterway and prepared a report which is still much consulted. In 1891 Mr. Ogilvie, under the direction of the Surveyor-General, again made an exploratory survey in the same region. Mr. Ogilvie’s instructions were to make a thorough exploration of the region drained by Peace river and its tributaries, between the boundary of British Columbia and Rocky mountains and to collect any information that might be of value relating to that region. As it was desirable that he should, if

practicable, connect the end of his micrometer survey of Mackenzie river made in 1888 with that made on Great Slave river in the same year, which he was then unable to accomplish on account of high water, Mr. Ogilvie took with him the necessary instruments, but he found it impossible to complete this work. This time, he descended the great northwestern waterway from Athabaska to Fort Simpson, and, ascending the Liard and "East Branch" or Nelson river, as it has since been officially called, reached Port Nelson on September 15, ascending Nelson and Sikanni Chief rivers and portaging through the woods to St. John on Peace river. Another interesting report was the result of this really hazardous trip.

In 1886, Mr. A. P. Low of the Geological Survey, accompanied by Mr. J. M. Macoun, crossed Lake Winnipeg from Red river to Berens river and ascended the latter to a portage to the head waters of Severn river, making an exploration of the country from Lake Winnipeg to Hudson bay.

In 1887, Mr. R. G. McConnell, B.A., of the Geological Survey, descended to Mackenzie river from the Yukon via Liard river, and during that year and the following one explored a considerable part of Mackenzie basin including Slave river, Salt river, Hay river, part of the western end of Great Slave lake, etc. The result was embodied in a most interesting official report (Part D. Annual Report, Vol. IV., 1888-89, Geological Survey of Canada.) The country between Peace and Athabaska rivers north of Lesser Slave lake, comprising an area of about forty-four thousand square miles, remained entirely unknown until Mr. McConnell's exploration was undertaken.

In the years 1888, 1889, 1890 and 1891, Mr.

McConnell effected a most important exploration of the unexplored country between Peace river and Athabaska river and in the basin of the Athabaska. He investigated as thoroughly as he could the phenomena of the so-called tar-sand deposits and the

OIL SPRINGS OF ATHABASKA REGION,

about which the few hunters, traders and travellers who had hitherto penetrated so far had brought back such astonishing tales. His report, printed in the annual report of the Geological Survey of Canada for 1890-91 (New Series, Vol. V, Part I), excited much interest at the time throughout the scientific world, and is still regarded as the standard authority on the subject.

In the summer of 1889, a well-known English sportsman set out upon a trip to Great Slave lake district with the object of making some explorations. This was Mr. Warburton Pike, and his book "The Barren Ground of Northern Canada", describing his trip, gives a great deal of interesting information about that part of the "Barren Lands" just north of Great Slave lake and the region about the headwaters of Backs river. Mr. Pike, who combined the qualities of a good writer, a trained explorer and a keen sportsman, proceeded during the summer of 1889 via Great Slave lake and the canoe-portage route by Francois, de Mort, Nez Croche, du Rocher, Camsell, Mackay and de Gras lakes to the headwaters of Coppermine river. He spent the winter in camp just south of Mackay lake and at Fort Resolution, and the following summer proceeded via Great Slave lake, and a chain of lakes to the east of those he had traversed on his canoe-portage route the previous season, to Aylmer lake. Thence he proceeded down

Backs river to Beechey lake, south of Bathurst inlet. He came out via Clinton-Colden and Artillery lakes, and from Athabaska district made a trip up Peace river.

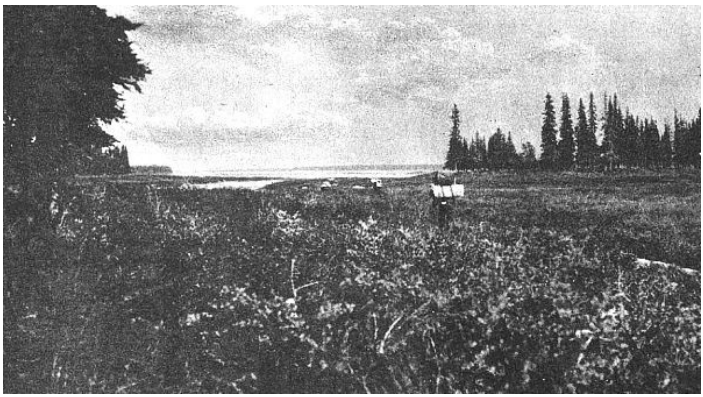
Mr. J. Burr Tyrrell, of the Geological Survey, explored the country bordering on the east shore of Lake Winnipeg in 1890 and 1891.

In 1892, Mr. Tyrrell, assisted by Mr. D. B. Dowling, made an exploration of the country between Athabaska and Churchill rivers and north of the latter waterway. The routes covered included a course from Prince Albert northward through Cree lake and down Beaver river to Churchill river, and north across the country by Cree lake to Black river, thence through Wollaston lake and up through Geikie and Foster rivers to the Churchill. In 1893 and 1894 Mr. Tyrrell conducted two important exploration parties. In 1893 the route taken was via Chipewyan, Lake Athabaska, Fond du Lac, Black lake, Chipman lake, Selwyn lake, Daly lake, Dubawnt river and lake, Aberdeen, Schultz and Baker lakes, Chesterfield inlet, Churchill, York Factory, Norway House and West Selkirk. In 1894 the route followed was via Cumberland House, Sturgeon-weir river, Churchill river, Reindeer river and lake, Cochrane river, Kasba lake, Kasba river, Ennadai lake, Kazan river, Kathkyed lake, Kazan river again, Ferguson lake and river to Hudson bay. Mr. Tyrrell and party came out via Split lake, Norway House and Selkirk.

The Vast Wilderness,

through which the lines of exploration upon these occasions passed, lies for the most part north of latitude 59°, and extends from the coast to Hudson bay, westward to Lake Athabaska, comprising an

area of not less than two hundred thousand square miles. The work of the party embraced a survey of the north shore of Lake Athabaska, Chipman, Cochrane, Telzoa or Dubawnt, Thlewiaza, Kazan and Ferguson rivers, in whole or in part, Chesterfield inlet, and the shore of Hudson bay from Chesterfield inlet to Churchill, as well as a line overland in winter, from Churchill to York Factory, and another from Churchill to Split lake.



Portage near Long Spruce rapids, Nelson river.

The distance travelled in 1893 was three thousand two hundred miles, one thousand six hundred and fifty of which had not been previously surveyed or reported on in any way. The whole distance of six hundred miles from Churchill to Lake Winnipeg was covered on snowshoes. During the trip of the following year Mr. Tyrrell travelled two thousand nine hundred miles, one thousand seven hundred and fifty by canoe and seven hundred and twenty-five on snowshoes, most of this distance being through unexplored country.

Jas. W. Tyrrell, C.E., D.L.S., who formed part of this expedition, subsequently published a popular account of the trip of three thousand two hundred

miles in a book entitled “Across the Sub-Arctics of Canada.”

During the summer of 1896 Mr. Tyrrell, travelling by canoe, made a survey of the northeastern portion of the old district of Saskatchewan and the adjacent parts of the then district of Keewatin, since annexed to Manitoba, the territory covered comprising an area of rather more than twenty-five thousand square miles, lying between north latitude 50° 40′ and 56°, and west longitude 97° 20′ and 122° 30′.

James Macintosh Bell, F.R.G.S., of the Geological Survey of Canada, made a geological reconnaissance of the north arm of Great Slave lake in 1899, wintered at Fort Resolution, and in 1900, accompanied by Mr. Charles Camsell, travelled to Great Bear lake, made a geological exploration of its northern shores, and returned by a chain of lakes to the north arm of Great Slave lake, proceeding to Edmonton the same winter.

In the summer of 1899, Mr. D. B. Dowling of the Geological Survey explored the upper part of Burntwood river from Three Point lake to its head near Reed lake, Kississing river, from the north end of Athapapuskow lake to its mouth on Churchill river, and the Churchill from above Sisipuk lake to the end of the long arm running from Nelson lake. During the summer of 1893 Mr. Dowling conducted an exploration in that part of southern Keewatin just to the east of the then eastern boundary of Manitoba, and north of the then northern boundary of Ontario. The area covered, now forming part of the province of Ontario, extends from English river and Lac Seul northwards to Berens river, the eastern branch of which forms approximately the northern limit of the area. To the east the exploration included the heads of streams flowing eastward to Cat lake, and on the

west White river, a southern branch of Berens river, with the western end of Red lake, confines its extent in that direction.

In 1900, J. W. Tyrrell, C.E., D.L.S., who had been assistant to his brother in 1893, conducted an important exploration of the country between Great Slave lake and Chesterfield inlet on Hudson bay. In all, one thousand seven hundred and twenty-nine miles of survey were accomplished, and in the performance of this four thousand six hundred miles were travelled

With Sleds and Canoes.

Mr. Tyrrell proceeded via Resolution, Great Slave lake, old Fort Reliance, Lockhart river, Pike's portage, Artillery lake, Clinton-Colden lake, Smart lake, Sifton lake, Hanbury river and Thelon river to a point near the confluence of Dubawnt river. Hence a portion of the party under the direction of C. C. Fairchild, C.E., was despatched to survey Aberdeen, Schultz and Baker lakes, while Mr. Tyrrell returned up the Thelon to devote his attention to the upper part of the river and the divide between the upper Thelon and Artillery lake, traversing, unattended, the one hundred and sixty miles between a small branch of the Thelon and Artillery lake. The party was reunited at Artillery lake, and returned to civilization via Resolution, Chipewyan and Edmonton.

In 1898, Mr. David T. Hanbury tried to reach the unexplored tract between Chesterfield inlet and Great Slave lake via the Norway-House—York-Factory—Churchill route. Finding that he arrived too late at the latter place, he decided to spend the summer on the Hudson bay coast and make preparations for an early start the following year. In

1899, he made an interesting trip from Churchill to Great Slave lake via Chesterfield inlet, Thelon and Ark-i-linik rivers, Clinton-Colden and Artillery lakes, and Lockhart river. As he was the first white man to explore Ark-i-linik or Thelon river, its most western affluent has since been called Hanbury river. In 1901, Mr. Hanbury travelled from Edmonton to Depot island in the northern part of Hudson bay, via Fort Resolution, Great Slave lake, Artillery lake, Hanbury, Thelon and Dubawnt rivers, Baker lake, Chesterfield inlet and Marble island. He spent most of the winter in an Esquimaux camp near Baker lake, and in February started on an adventurous trip back to civilization via Aberdeen lake and Thelon river, thence overland to Buchanan river, down that stream to Backs river, thence to the coast, westward along the coast to the mouth of the Coppermine, up the Coppermine to Kendall river, via Dismal lake, Dease river, Great Bear lake and Great Bear river to Fort Norman. Mr. Hanbury gives an interesting account of these trips in his book “Sport and Travel in the Northland of Canada.”

The United States Biological Survey, in the early spring of 1901, determined to send Mr. Edward A. Preble, Assistant of the Survey and one of its trained field naturalists, to obtain representative collections of the mammals, birds and plants of the great interior region west of Hudson bay drained mainly by the Mackenzie and described in the reports of the Survey as the most neglected large area in North America. As it was evident that only part of the region could be examined satisfactorily in a single season, it was determined to make first a reconnaissance of the region about Athabaska and Great Slave lakes. The route followed by Mr. Preble’s party was via Great Slave lake, including the north

arm, to Fort Rae; the chain of lakes and rivers by way of Lake St. Croix to MacTavish bay; Great Bear lake and Great Bear river to the Mackenzie. It had been the intention of Mr. Preble, who was accompanied by his brother and Mr. James MacKinley, formerly of the Hudson's Bay Company, to cross by one of the Indian routes to the upper Coppermine and to descend that stream, but various circumstances rendered this impossible and he was obliged to take the shorter and more westerly route.

In the spring of 1903, the results of his work in 1901 having been elaborated but not published, Mr. Preble was sent to complete his investigations in the Mackenzie region. This was especially desirable, since on the previous trip he had penetrated only as far as Great Slave lake. Upon his second trip the survey was carried from Great Bear lake to the Arctic coast line. The result of these trips was embodied in a very complete and altogether admirable report —"North American Fauna, No. 27."—published by the United States Biological Survey in 1908.

In 1905, Mr. Alfred H. Harrison, one of that large class of adventurous Englishmen who love to penetrate into the less known and totally unknown portions of the world for the very love of sport and perilous adventure, made a trip of exploration down Slave and Mackenzie rivers, and remained for nearly two years in the country

and Herschell island, and returned home in 1907 by the same route. Mr. Harrison, before he made this trip, had considerable knowledge of the Northland, for he had made a trip as far as Great Slave lake in 1902. Mr. Harrison is, moreover, the son of a former

officer of the Hudson's Bay Company, who in 1852 was stationed at the company's post at Fort Good Hope. Mr. Harrison, upon his return to England, wrote a book which he entitled "In Search of a Polar Continent" which contains a large amount of interesting information regarding the Mackenzie country.

During the seasons of 1903, 1904 and 1905, Mr. William McInnes of the Geological Survey made explorations in that portion of the southeastern section of this region drained by Winisk river and by the upper branches of Attawapiskat river. These explorations extended from 51° 10′ to 55° 10′ North latitude and from 86° to 90° West longitude. The result was embodied in a report printed in 1909 and numbered 1080.

Messrs. Wm. McInnes and Owen O'Sullivan of the Geological Survey were employed during the summer of 1906 to explore the region along the proposed route of the railway between the Saskatchewan and Churchill. Mr. McInnes explored the country between the Pas and Split lake; Mr. O'Sullivan, the country between Split lake and Churchill. Their reports were published in the summary report of the Geological Survey for 1906.

Mr. McInnes's route ran from Lake Winnipeg via Nelson river to Split lake and thence along Burntwood river and File river and lake to Reed lake, across Wekusko lake to a point between Grass and Burntwood rivers, back to Reed lake and thence along the Nelson. Mr. O'Sullivan's route was from Split lake via Assean lake, Outawi river and lake, Waskaiowaka lake, Little Churchill river, Recluse lake, Great Churchill river, Deer lake and river, and Great Churchill river again. The return trip was made via York Factory, Hayes river and Fox river.

In 1906 and 1907, W. Thibaudeau, C.E., acting under the instruction of Doctor Deville, Surveyor-General, made some explorations in Churchill district and along the route of the proposed Hudson Bay Railway from Churchill to The Pas on the Saskatchewan. On his trip over the route of the railway Mr. Thibaudeau proceeded from Churchill in a straight line to near Deer river. Crossing the river he followed a route between it and the Churchill, recrossing the Deer at a point a little more than a hundred miles from Churchill. Thence he travelled in a straight line to the Little Churchill, and followed the course of that river to Waskaiowaka lake. Thence he crossed to a point near Assean lake and continued his route via Split lake, Pipe lake, Grass river, Landing lake, Sipiwesk lake, Grass river, and Cormorant and Atikomeg lakes.

Mr. Joseph Keele of the Geological Survey of Canada made a reconnaissance across Mackenzie mountains on Pelly, Ross and Gravel rivers, in the mountain region lying between the Pelly and the lower reach of Mackenzie river in 1907 and 1908.

During the summer of 1908, Inspector E. A. Pelletier, of the Royal Northwest Mounted Police, with a corporal and two constables, patrolled the country between

Great Slave lake and Hudson bay.

They left Fort Resolution on Great Slave lake on July 1 and travelled via Pike portage, Artillery lake, Hanbury river and Thelon river, to Hudson bay at Chesterfield inlet, where they arrived on August 31. No natives or guides were employed from Great Slave lake to Hudson bay and this portion of the journey was made without any mishap whatever.

Inspector Pelletier estimated the distances travelled on this patrol as follows:—

Fort Saskatchewan to Athabaska (teams)
Athabaska to McMurray (scow)
McMurray to Graham's Landing (steamer)
Graham's Landing to Fort Smith (teams)
Fort Smith to Fort Resolution (canoes)
Fort Resolution to Fort Reliance (canoes)
Pike portage route between Great Slave lake and Artillery lake (portage and canoe)
Artillery lake to height of land (portage and canoe)
Height of land to Thelon river (portage and canoe)
Thelon river (canoe)
Beverly lake and river (canoe)
Aberdeen lake (canoe)
River between Aberdeen and Schultz lakes (canoe)
Schultz lake (canoe)
Schultz or Lower Thelon river (portage and canoe)
Baker lake (canoe)
River foot of Baker lake (canoe)
Chesterfield inlet, Hudson bay (canoe)

Total

Of the canoes used on this patrol, one was an eighteen foot length, forty-two inch beam, the other eighteen and one-half foot length, forty-three inch beam; both were eighteen inches deep, longitudinal strip cedar, varnished, fitted with oars for hard pulling against strong winds on the lakes. Inspector Pelletier had a good stock of paddles and fifty-five foot lateen sails. Each canoe weighed one hundred and twenty pounds portaging weight. The portage from Great Slave lake towards Artillery lake was found to be about six miles from the site of Fort

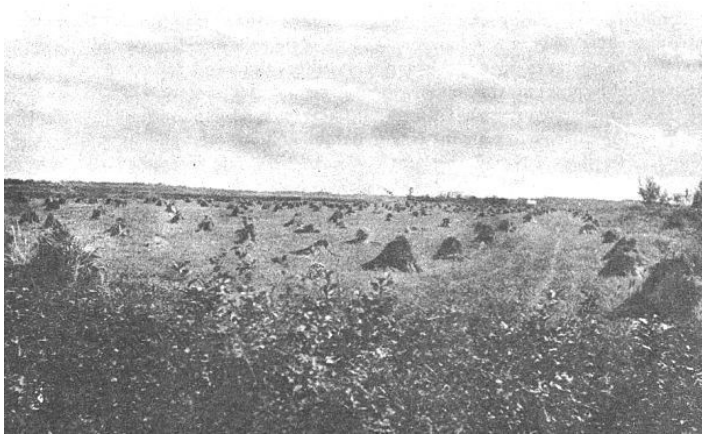
Reliance, of which historic establishment a stone chimney alone remains standing.

Some interesting topographical information regarding the region between Hudson bay and The Pas was obtained through the surveys made under the direction of John Armstrong, C.E., for the Department of Railways and Canals in 1908 and 1909, for the purpose of determining a projected location for a railway to Hudson bay from The Pas, the nearest point on the Saskatchewan then having railway connection. From The Pas to a point north of Pipestone lake a single route was laid down; thence two routes, one to Port Nelson, the other to Churchill, were surveyed. Mr. Armstrong, in his report (Sessional Paper No. 20 d.—1910), makes some interesting references to the natural resources of the district covered by the surveys.

All the expeditions which have been thus briefly passed in review made additions to the knowledge we possess of the natural resources of the great unsettled Northwest, but it will be observed that the acquisition of geographical knowledge only was the object for which most of these expeditions were equipped and sent forward. The trained explorers of the Geological Survey of Canada have given us a fair idea of the geological features and natural resources generally along the more accessible lines of travel, particularly in the southern and western parts of this vast unsettled and unsurveyed region, but it is only within the last few years that systematic surveys have been undertaken there to determine the adaptability of certain areas to agricultural development and settlement.

In 1908, Frank J. P. Crean, C.E., of the Railway Lands Branch of the Department of the Interior, was commissioned to explore and procure all the

information possible about that tract of country lying to the east of Beaver river and Green lake,



Farm at Mount Nebo on Green lake trail, sixty-five miles from Prince Albert.

SOUTH OF CHURCHILL RIVER,

and extending east to the old canoe route from Cumberland House via Frog portage to Stanley Mission. Mr. Crean was instructed by Mr. R. E. Young, Superintendent of the Railway Lands Branch, to pay particular attention to obtaining information about the character of the country away from the travelled routes, and to ascertain the value of the district to be traversed for farming, lumbering and mining purposes.

Mr. Crean left Prince Albert August 20, 1908, and returned there January 6, 1909. He proceeded by team to the south end of Green lake, and after reaching that point travelled chiefly by canoe, making side trips inland, where it seemed desirable to do so. After the ice formed he procured dog trains to continue the exploration. On this trip Mr. Crean

explored the district bounded on the west by a line from Prince Albert to Stanley mission; on the north by Churchill and Clearwater rivers; on the west by Green lake, Beaver river, the western arm of Ile à la Crosse lake, Buffalo lake, Methye river and Methye lake; and on the south by the surveyed territory along the north bank of the Saskatchewan. Mr. Crean gave the following statistics in his report:—"The gross area explored, and about which some information has been collected, is approximately sixteen million acres. The water covered area in this tract (area of lakes and rivers) may be set down at approximately three million acres—the remaining land area at thirteen million. I would estimate that an area of fully three million five hundred thousand acres is suitable for settlement as soon as surveyed and made accessible by roads, and an area of about eight million acres of swamp or land probably too wet at present for successful cultivation could be reclaimed at a moderate expenditure. All swamp will, however, eventually repay the cost of reclamation. The above figures are, of course, the result of an exploration extending over only a few months, and must be considered to be only approximate. The distance travelled was about three thousand miles, of which one thousand two hundred was made running behind dog trains."

In 1909, Mr. Crean was again sent out to carry on his exploration of the country north of the surveyed area in Saskatchewan and Alberta and extending west from the territory covered the previous year. He was instructed to cover as much of the country west to the Athabaska and

as time would permit. He left Prince Albert on June 17, 1909, completed his season's work at McMurray, and thence proceeded to Edmonton, reaching there December 11, 1909. From Green lake, Mr. Crean travelled principally by canoe, making numerous portages, some of considerable length. On some occasions he hired horses and used them as a means of transportation. The total area explored, or about which information was thus obtained, is approximately twenty-one million acres. Mr. Crean reports:—"Of this tract, not over two million acres is covered by water—lakes and rivers. A conservative estimate of the land available for settlement in its present state, when means of access are provided, would be about ten million acres. The greater portion of the remaining area, say nine million acres, could be drained, and, in my opinion, would well repay the expenditure. Throughout the tract there is ample fall which would allow of drainage being successfully carried out. A portion of the tract lies on the head waters of Churchill river, and all the streams contain numerous rapids and falls. On the west side of the height of land sloping towards the Athabaska and the Clearwater there are also excellent facilities for drainage. This tract is well supplied with timber, some of which may be suitable for export."

Mr. Crean, during this exploratory trip, visited the country between Green lake and Meadow lake, Birch lake and Loon lake to the westward; Waterhen lake and Island lake; Canoe lake and Burnt lake; White Fish river and lake, and Watchush lake; Gipsy lake, Gordon lake and McMurray; Gregoire lake. Pembina river. Cowpar lake, Winefred lake, Ipiatik lake, Heart lake and Lac La Biche, all to the westward of the area investigated in 1908.

Mr. Crean's report of his exploration in the season of 1908 was printed for public information, but owing to the great demand for copies the edition was soon exhausted and it was decided therefore, to issue the two reports in one new publication. The gross area covered by the two reports, and as to which some information was gathered, might be stated at approximately forty million acres.

Inspired with the wish to see for himself the country for the administration of which he was responsible, the Hon. Frank Oliver, then Minister of the Interior, in 1910 made the trip from Edmonton via Athabaska, Athabaska river, Lake Athabaska, Slave river, Great Slave lake, and Mackenzie river, to Fort McPherson, thence passing over to the Yukon by trail to Lapierre's House. Mr. Oliver left Edmonton June 2 and reached Fort Yukon on July 14. From Athabaska to Grand rapids (one hundred and sixty miles) and from McMurray to Chipewyan (two hundred miles) the Minister and his private secretary made the trip alone in a Peterborough canoe. The result of the Minister's observations, as communicated to the press, aroused considerable interest in the newest northwest throughout Canada.

The reports of explorers and travellers as to the character and resources of the great northwest have been supplemented by a considerable amount of information received from Hudson's Bay Company officials, and others engaged in the fur trade, missionaries, prospectors and pioneer settlers. Certain

resulted in the placing upon record of some of the most instructive of this class of information.

Much data of a most valuable character was obtained by two select committees of the Senate which sat during the sessions of 1887 and 1888, under the presidency of the late Honourable Senator Schultz, who was mainly instrumental in having the said committees appointed. The reports of these committees, with the evidence taken, were printed as appendices to the Journals of the Senate (1st Session, 6th Parlt., 50 Victoria, and 2nd Session, 6th Parlt., 51 Victoria).

During the parliamentary session of 1906-7, the Hon. Senator T. O. Davis, of Prince Albert, was instrumental in having a select committee of the Senate appointed to enquire as to the value of that portion of the Dominion lying north of the Saskatchewan watershed and east of Rocky mountains, comprising the northern parts of the provinces of Alberta and Saskatchewan and Mackenzie territory, and the extent of navigable waters, rivers, lakes, and sea-coast contained therein; also similarly to enquire and report from time to time as to the value of the portions of the Dominion on both sides of Hudson bay, including the territories of Keewatin and Ungava, and the extent of navigable waters, rivers, lakes and sea-coast contained therein. The committee, in accordance with the authority delegated to it, sent for persons, papers and records bearing upon the subjects submitted for its consideration, and examined a number of gentlemen possessing special knowledge, through personal experience or otherwise, of the regions named as the special subject of enquiry. The evidence thus obtained was, under instructions from the Senate, edited, condensed and arranged by the compiler of the present volume, and published, first in the journals of the Senate (3rd Session, 10th Parliament),

and subsequently in the book published under the direction of the Department of the Interior, entitled "Canada's Fertile Northland." It aroused much interest in the subject, not only in Canada, but throughout the civilized world.

Taking advantage of this, the Minister of the Interior gave instructions for the preparation of a summary or digest of the Schultz committee reports of 1887 and 1888, at that time out of print, the work being entrusted to the same compiler, under the direction of the late Mr. R. E. Young, Superintendent of Railway Lands and Chief Geographer. The result was the volume "The Great Mackenzie Basin", the first edition of which was published in 1908.

Altogether, from one source or another, during the three centuries which have elapsed since the British flag first appeared in Hudson bay, a vast amount of reliable information, covering many widely-separated districts of the territory under review, has been obtained; but hitherto much of the practical value of this useful data scattered through the pages of publications of various descriptions has been lost for

Lack of Systematic Compilation.

In bringing all this information together and compressing it within the limits of one volume, a difficulty presents itself in the tremendous extent of country concerned.

In arranging the matter of this volume, with a view to enabling the reader to follow more readily, the whole area under review has been divided into certain arbitrary geographical sub-divisions. In a region so vast, the differences of climate, soil and general physical character of the country in the

various districts are very considerable, and emphasize the necessity of treating certain geographical sub-divisions separately.

A glance at the map is necessary to enable the reader to understand the divisions of the country which it has been deemed advisable to make in projecting this volume, to permit of the intelligent treatment of the subject.

The region designated “The Keewatin Area” comprises that part of what was formerly the provisional district of Keewatin which lies east of the province of Saskatchewan, south of the 60th parallel of north latitude, west of James bay and southwest and west of Hudson bay. Its southern limits are defined by the former (up to 1912) northern boundary of Manitoba and the former (up to the same date) northwesterly boundary of Ontario.

During the first session of the 12th Parliament of Canada (1911-12) the whole of this territory was annexed to the two provinces lying immediately to the south of it, Ontario and Manitoba. The dividing line between the portion of the former district of Keewatin annexed to the province of Ontario, and that annexed to the province of Manitoba, is described in the legislation extending the boundaries of the two provinces as a line from the extreme north end of the eastern boundary of the province of Manitoba as it existed at the time of the extension of boundaries, “thence continuing due north along the same meridian to the intersection thereof with the centre of the road allowance on the twelfth base line of the system of Dominion Land Surveys; thence northeasterly in a right line to the most eastern point of Island lake, as shown in approximate latitude 53° 30′ and longitude 93° 40′ on the railway map of the Dominion of Canada, published, on the scale of

thirty-five miles to one inch, in the year one thousand nine hundred and eight, by the authority of the Minister of the Interior; thence northeasterly in a right line to the point where the eighty-ninth meridian of west longitude intersects the southern shore of Hudson bay; thence easterly and southerly following the shore of the said bay to the point where the northerly boundary of the province of Ontario as established under the said Act intersects the shore of James bay."

At the date of the final revision of these pages for the press, the division of the territory was too recent to permit of effective separate treatment of newest Ontario and newest Manitoba as separate territorial units, and any attempt to effect such separate treatment, it was felt, would only result in confusion.

The "Northern Saskatchewan Region" comprises the whole of the province of Saskatchewan, north of the surveyed area.

The "Northern Alberta Region" comprises the whole of the province of Alberta, north and east of the surveyed area.

The "Mackenzie River Region" includes all the territory in the great Mackenzie basin, north of the province of Alberta, extending northward to Beaufort sea, west to the boundary of Yukon territory, and eastward to the basin of Coppermine river, that of Yellowknife river, a line in prolongation of the latter stream across Great Slave lake and following the right bank of Slave river to the northern boundary of Alberta.

The area comprised within the designation "The Barren Lands" includes the immense territory extending eastwards from that last defined to Hudson bay, and including the bare, treeless, but wrongly called "Barren Lands."

With this brief and general outline of the various districts before him, the reader will more readily follow the attempt to present in a systematic and intelligible form all the data of practical value available regarding the varied natural resources of this vast territory.

[1] At the Semple murder trials at York in October, 1818, Sherwood, the Northwest Company's counsel, ironically described Red river valley (Manitoba) as the "land of milk and honey, where nothing, not even a blade of corn, will ripen."

[2] "The nations of Europe had adopted the principle that discovery gave title to the government by whose subjects or by whose authority it was made, against all other European governments, which title might be consummated by possession." (Chief Justice Marshall.)

[3] This was the same Henry Kelsey who showed conspicuous bravery at the capture of Fort Nelson by the French under d'Iberville in 1690, and who subsequently became a Deputy Governor in the Hudson's Bay service.—(E. J. C.).

[4] "The Last Great Monopoly."

[5] Joseph Robson, who had been employed as a stone mason and engineer in the construction of Fort Prince of Wales at Churchill between 1733 and 1748, and had been up Nelson river for a distance of forty or fifty miles, was one of the chief witnesses. Being asked as to the number of British subjects in the Company's settlements, he said that the first year he was at York Fort there were 36 persons there, and at Churchill 44 or 45; that he never saw any British subjects there, except the Company's servants, nor any other people desirous to "fix" there, or that the Company had ever offered encouragement to British subjects to "settle" there. He expressed the opinion that some of the country about Hudson bay might be settled and inhabited, if people would go up the rivers till they found a better climate, and there erect settlements. He declared that he did not doubt that he himself could find three or four hundred British subjects, who would willingly go there to live winter and summer, and, he added, he would go for one. He added that speaking from his own experience, the cold of the Hudson bay winter might be endured without any inconvenience, their clothing being

adapted to the climate. He had suffered more from cold in England, than ever he did at Hudson bay. It was true that flesh will freeze, but he never knew any person to lose his fingers from frostbite at Churchill or York.

[6] In 1773 Hearne established Cumberland House as a southern outpost of the Hudson's Bay Company. It was Hearne, the hero of this daring trip of exploration, who, as governor of Prince of Wales fort (Churchill), in 1782, ignominiously surrendered that stronghold to the French squadron under La Pérouse, without firing a shot.

[7] Governor Morton's instructions to Hearne set forth the object of the expedition in detail. They included the following:—

"The Indians who are now appointed your guides, are to conduct you to the border of the Athapapuscow (Great Slave lake) and Indians' country, where Captain Matonabbee (an Indian chief) is to meet you in the spring of one thousand seven hundred and seventy, in order to conduct you to a river represented by the Indians to abound with copper ore, animals of the fur kind, etc., and which is said to be so far to the northward that in the middle of the summer the sun does not set, and is supposed by the Indians to empty itself into some ocean. This river, which is called by the Northern Indians Neetha-San-San-Dazey, or Far Off Metal river, you are, if possible, to trace to the mouth, and there determine the latitude and longitude as near as you can; but more particularly so if you find it navigable; and that a settlement can be made there with any degree of safety, or benefit to the Company."

"Be careful to observe what mines are near the river; what water there is at the river's mouth; how far the woods are from the

sea-side; the course of the river; the nature of the soil and the productions of it; and make any other remarks that you may think will be either necessary or satisfactory. And if the said river be likely to be of any utility, take possession of it on behalf of the Hudson's Bay Company, by cutting your name on some of the rocks, as also the date of the year, month, etc."

[8] A synopsis of the account of Hearne's journey was published in pamphlet form in 1773 and re-published in 1778-80, the complete account being published in book form in 1790. (Beckles Wilson.)

[9] The history of the Peace and Athabaska country commences in 1778, when Peter Pond, subsequently a partner in the Northwest Company, pushing northwestward in search of new fur districts, reached the Athabaska by way of Methye portage and Clearwater river, and descending it, founded a fort known as “The Old Establishment,” about thirty miles above its mouth. In 1788 this post was abandoned, and a new one built on the south side of Lake Athabaska, on what is now known as “Old Fort Point.” Still later, this site was also deserted and a better one selected on the north shore, near the outlet of the lake. A general map of the Northwest was published by Peter Pond in 1785.

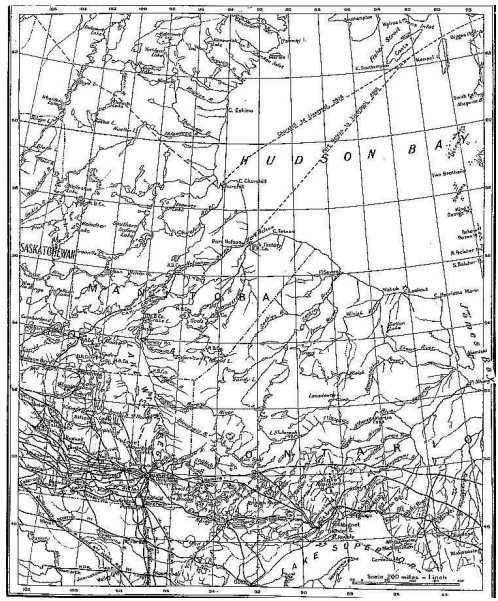
Peter Pond’s venture proved extremely remunerative, and he was followed by other traders who gradually spread themselves over the then unknown country to the north and west. (J. M. McConnell’s report.)

[10] In 1827 Franklin returned from the northwest via Lake Winnipeg, the great lakes and Ottawa river. In passing Ottawa, in August, he laid the cornerstone of the lowest tier of locks on Rideau canal.

[11] The English Government, in 1821, after the union of the Northwest Company with the Hudson's Bay Company, granted the reorganized company a license of exclusive trade over the country to the west of the watershed of Hudson bay, or Rupert's Land. The license was renewed in 1838.

[12] Dease was one of the Company's chief factors; Simpson, who was a cousin of Sir George Simpson, was an accurate astronomical observer.

[13] In all, 21,500 miles of coast line of which 5,780 miles were previously unknown, had been examined. ("Cruise of the 'Neptune'.")



THE KEEWATIN AREA

CHAPTER II.

THE KEEWATIN AREA.

(Newest Ontario and Northern Manitoba.)

Agriculture and Arable Land.

Early Agricultural Experiments and Their Success.—Evidence before the Parliamentary Committee of 1749.—Testimony of Official Explorers and Residents.—Many Areas Fit For Agriculture Described.—Wild Fruits Grow in Profusion.—Successful Gardens.—Much Country Capable of Improvement by Drainage.—Climate Inland

Warmer Than Further East.—Natural Hay Meadows.—
The Clay Belt.

The region west of James bay and southwest of Hudson bay, being the southern portion of the area known up to the time of the creation of the provinces of Alberta and Saskatchewan as the district of Keewatin, and comprising the territory recently (1912) annexed to the provinces of Ontario and Manitoba, was the first part of the still unexploited northwest with which white men came into touch.

Some years elapsed between its discovery by Henry Hudson and Sir Thomas Button in 1610 and 1612 and the establishment of the first posts therein by the Hudson's Bay Company at the mouths of Albany, Severn, Nelson and Churchill rivers. These posts were established and have since been maintained entirely for the purpose of the fur trade, and consequently no settlements have sprung up around them, and there has been no systematic attempt to exploit the agricultural possibilities of the adjacent areas. Nevertheless, it was some of the older servants of the big fur company who first drew attention to the fact that this region had agricultural possibilities, and it was from the posts on the bay that the first explorations of the interior were made. Of recent years, much information as to the agricultural possibilities of this area has been obtained by explorers of the Geological Survey of Canada, and through the explorations attendant upon the surveys for the location of the Hudson Bay Railway, which is projected to run in a northeasterly direction across this region from The Pas to Port Nelson.

The main object of those who secured the appointment of a select committee of the British House of Commons in 1749, to inquire into the

condition of the Hudson bay territory and the trade carried on there (See page 8), was to secure the cancellation of the Company's monopoly and to throw the country open to settlement. With this object in view much evidence was produced to show that the territory offered inducements to colonists, and, as inscribed in the pages of the official report, this gives us the earliest account of pioneer agriculture in this region, and an idea of the possibilities of the country from the old timers' points of view.

Mr. Richard White, one of the witnesses examined before the committee, said that he went to Albany Fort in the year 1726, as clerk to the Company, and remained there seven years, and that he had been ten years at Churchill, which was the northernmost fort. He testified that "the Governor at Albany had a garden in which peas, beans, turnips and salad grew as well and plentiful as in England, but he never knew of seed raised in that country to have been sown again. He saw a small quantity of barley growing near Moose river in August, which is about two months before the cold weather, which barley was in the ear, but not full, but as he has never been used to tillage, he is a very indifferent judge in those matters."

Mr. White stated that "he apprehended the countries adjoining to Hudson bay might be settled and improved, and that in the southern parts, oats, barley and peas would grow, but if persons were allowed to settle, he did not apprehend they could at first subsist by the cultivation of lands only he did not know why the Company did not grow their own corn, nor whether any proposal had been made to them for that purpose, for he really thought corn would grow there, which certainly would tend much

to the advantage of the Company, as well as to the security of persons residing there. Their common provisions were fish and fowl, and they had no bread but what came from England; that all grain kept there very well, except peas; that in a general way they had two years' provisions beforehand in their forts, especially of bread."

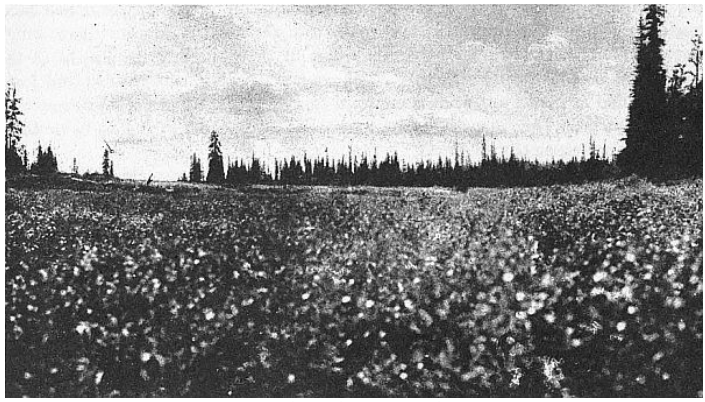
Being asked if the Indians could not cultivate corn for one-third of the price it costs in Europe, this witness said—"The Indians are in general a slothful people and cultivate no corn."

Soil Good and Climate Mild

Another of the witnesses examined before the committee, Mr. Matthew Sergeant, stated that while in the Company's service he had been twelve miles up the country at York Factory, thirty miles up the river from Albany Fort, and had travelled by land from Moose river to Albany Fort, one hundred miles along the coast. The soil was good and produced good turnips, the climate for four months in the year being mild.

The record of the evidence continues:—"The good soil is not quite two feet deep, when you come to a stratum of loam and sand. In some places the frost is never out of the ground, but you may dig through it. The turnips he has eaten there are as good as ever he ate in England, but he does not know whether seed raised there would produce the same. It is the general opinion at York Factory that the soil is proper for wheat, barley, rye or oats. He has seen very good peas and beans grow there, but he never saw any corn grow there, except some wild oats; and that his mess-mate did sow some corn there, which, though it grew a good height, never came to

perfection; but, in the opinion of the witness, oats would ripen at Albany, where he has seen a cherry-tree bearing black cherries. He has seen the Indians bring down currants, which, they said, grew in their country. They also brought down sugar, which was very black, and made from the tree of which their paddles are made; that the Indians informed the witness that there are large lakes behind the factory; that the witness had been in a lake ten miles long, without any fall going to it.



Prairie Land on lower Nelson river.

"It begins to thaw at Albany about April 8 or 10. There is a good soil there for six or eight inches, which may be gained within about a fortnight after the beginning of the thaw; that in two or three weeks more, as the weather happens, it thaws to the depth of two feet, commonly by the beginning of May. The frost sets in again about the beginning of October, and when the witness was there, October 4, it came in very hard. The witness believes there is time enough to grow wheat, for if summer grain were sown early in the southernmost parts, he thinks there would be time for it to ripen and to gather it in, but the frosts break sooner up in the country and come

in later. There are vast tracts of land fit for cultivation, and the witness has seen very good lettuce, spinach, dewberries, strawberries and black cherries. The Indians very rarely eat any bread, nor do they live long enough in one place to raise corn, nor have they any yams or potatoes, their provisions being fish and flesh, which they preserve by drying it, not having the art of salting. In case they were interested in the arts of tillage, he does not know whether they would stay in a place long enough to raise corn, for though they love bread dearly they would rather go hunting than cultivate land. The wild oats he mentioned before never came to seed, being little better than a species of grass. Grass grows there sufficient for the support of cattle, and they have made hay at Albany. If the Company were to grow corn, they apprehend the French would come and take it as they did their sheep in the last war, but they might protect their corn from the Indians. Witness does not think it to the benefit of the Company to grow corn, because they must have a house built at a distance from the factories, and men to watch it, to prevent the home Indians from stealing it. They must also have men to cultivate it, which would be very expensive. The witness cannot determine whether it would not be more so than having their corn from Europe, and he thinks the Company would sow it, if it were for their advantage."

Mr. John Hayter, another witness, said that he had been house carpenter to the Company six years at Moose river, three years at Churchill, and six months at Albany, and knew that no other trade was carried on there but that of furs. He had seen good barley grow at Moose river, and helped the person who grew it to dig his ground and sow it. It produced

about the quantity of half a bushel, which he saw rubbed out. The ear was large, and yielded as well, in the opinion of the witness, as the barley sown on common ground in England. Some of the seed was sown the next year, and it grew again but the witness did not see the produce of it. The person who grew this corn told him the reason why he discontinued sowing corn was that the Governor hindered him. Witness further said that he had made hay at Moose river.

Mr. Edward Thompson, who had been three years at Moose river in the Hudson's Bay Company's service as surgeon, being required to give an account of the commodities, soil and climate there, before the committee, said that the chief commodities were the furs of the beaver, the marten, the fox and the bear. He testified that he had seen better barley and oats grow at Moose river than ever he saw in the Orkneys, but the quantity sown was but very small. The seed would bear sowing again, but diminished in goodness. There was suitable enough ground for this corn, but never any encouragement given for sowing it, but quite the reverse, the Governor absolutely forbidding it, for no other reason, as the witness apprehended, but that if corn had been sown, a colony would soon have been erected there, and he could not say whether that would be for the advantage of the proprietors. The witness himself sowed about half a dozen corns of wheat, for a trial, in October, which lay in the ground all winter covered with snow and came to perfection in August. It was sown in a piece of good ground near the foot of a tree, which was in some measure a fence to it. The witness thought that beans, peas, barley and oats would grow there. He never tried it anywhere but at Moose river, but apprehended that corn would grow

in the inland countries at a hundred miles distance, even as far north as Port Nelson, for he had found the climate warmer the further one goes inland.

Enoch Alsop, who had been armourer to the Hudson's Bay Company at Moose river, informed the investigating Committee of 1749 that he had sown barley and oats there, the same seed three years successively, and that it grew very well. He sowed a handful or two of barley and oats at first, mixed with dust and ashes, which produced two or three quarts or a gallon of barley, and he thinks in the third year he had above half a bushel. Governor Stanton then

Forbade Him To Sow Any More

but gave no reason for such prohibition.

Robert Griffin, another of the witnesses, stated that he had been informed that the soil one hundred miles up the country would produce corn. He had seen oats grow to perfection at Albany. He had also seen peas, beans, turnips, salading (*sic*) and cabbage, and some few carrots. The beans were generally blighted, but the turnips, peas and cabbage, were "in great plenty and perfection." They had fresh seed sent over every year. The land was then cultivated for about a mile round Albany, being dug with spades upon the breaking of the frost, which generally happened from April 20 to 27.

In his evidence, Mr. Joseph Robson, perhaps the principal witness, explained that there was grass in abundance a yard high in the most northern parts of Hudson bay region he had seen. He did not believe corn would grow in the far north but grain would grow over large areas. He had eaten peas and beans which had been grown at York Factory, in latitude 57°, but he never knew any other corn tried there.

The quantity of peas and beans he spoke of was as much as six or eight people could eat, but there were a thousand acres of ground in latitude 57°, which, if cultivated, would produce the same, and there was a much larger tract to the southward. The peas and beans grew by common cultivation, without any force, but the produce was not so large as in England.

Being asked if it would not be a great advantage to the Company to grow corn at York Factory or their other settlements, Mr. Robson said it would doubtless be so, and it was reasonable to think they would do it, but there were many things not done which would be of great advantage besides that, and there must be some secret cause for it to which the witness was a stranger. It had been demonstrated that the soil about Hudson bay would bear roots, such as carrots, radishes and turnips. It also produced coleworts, and all of these roots and greens grew in as great perfection as they do in England; yet he did not think that there were two acres cultivated at both the factories where he had resided.

Being asked how long the frost was out of the ground at York Factory, Mr. Robson said it was hardly ever quite out of it, for he had dug three feet and a half deep, and then found a shell of ice under which the ground was all soft. The hole he dug was in low ground, about thirteen feet from high water mark. He never had an opportunity to dig up in the country, but the surface of the ground was free from the latter end of May to the latter end of August, and in the summer they had

Eighteen Hours Sunlight at Churchill.

By the accounts of the people coming down, the frost

breaks some months sooner up in the country.

Mr. Robson said he had seen oxen and horses belonging to the Company at Fort Prince of Wales (Churchill) which were brought from England and fed with hay and corn, the hay being got there and made into stacks.

Robson, who first went to Hudson bay in 1733, and finally left there in 1747, serving for some time as a mason, and later as "mason and surveyor," in the construction of Fort Prince of Wales at Churchill, published his book "An Account of Six Years' Residence in Hudson's Bay" in 1752. In this volume he mentions going out in the "Mary" frigate, and says, in writing of Churchill:—"We had brought over in the ship a bull, four heifers, ten oxen and a horse. There was an Orkney bull there before. Some of the heifers afterwards calved, and I think with care they would have increased and done well, though this place is in 59°, and the most northerly settlement in the bay."

On page forty-two of his book, Mr. Robson states: —"It is not to be imagined that the most northerly settlements in the bay should have as good a climate as the southerly settlement, there being so great a difference of latitude, as from 59° to 51° 30′. I was no farther up Churchill river than eight or nine miles but can say that the soil is very good, and that there are gooseberries and black and red currants growing near the sea upon points that appear almost barren. Those I have seen grow so low that the grass covers them. The marshes and low grounds are full of good grass, and there is a patch of ground near the fort on Eskimo point (near Churchill) which, though exposed to the north and northeast winds, produces good radishes, coleworts, turnips, small carrots, and lettuces, and other salading; blackberries also grow

upon the heath. Upon clearing away the snow in the spring, we generally found the under part of it congested to ice, three or four inches thick, lying hollow from the ground. Whether this was caused by the snow melting and thawing downwards, and then congesting from the coldness of the earth, and moistening the snow which was afterwards congested again, I am not able to determine. I am inclined to believe the latter, because the top of the snow was formed into a hard icy crust, and within was heavy, though soft. However, beneath this arch of ice we found green vegetables growing up an inch or two above the ground. Cattle here would live and do well, if the same care were taken of them as is generally taken in England. The horses I found among them had been kept several years, and were constantly employed in drawing stones and other materials for the use of the fort. And if they can subsist and be fit for service at Churchill river in 59° they would surely subsist and increase also at the bottom of the bay in 51° 30′, and in all the more southerly settlements.

"The soil at York Factory, which is in 75° 10′, is much better than at Churchill river. Most kinds of garden stuff

GROW HERE TO PERFECTION,

especially peas and beans. I have seen a small pea growing without any culture, and am of the opinion that barley would flourish here, and consequently in much greater perfection at Moose and Albany rivers, which are 51° 30′ and 52°. Gooseberries and red and black currants are found in the woods, growing upon such bushes as in England. Up the river are very good patches of grounds, and bottoms under banks,

so defended from the north and northwest winds that there is a fine thaw below when the top is freezing; here whole families might secure a comfortable subsistence, if they were as industrious as they are in their own country. Upon Hayes river, fifteen miles from the factory, is such a bank as I have just mentioned, near which I pitched my tent. After paling in some ground for a covey-warren, and for oxen, sheep, goats, etc., I should expect by no more labor than would be proper for my health to procure a desirable livelihood, not at all doubting of my being able to raise peas and beans, barley, and probably other kinds of grain."

On page sixty-three, Mr. Robson expresses the opinion "that the lands are capable of tillage, affording a good pasture for horses and cattle in the summer, and good hay for their subsistence in the winter. At Churchill, the most northerly factory, horses and cows have been kept in winter, though greatly exposed to the frost and cold. All sorts of garden stuff flourish at the factory, and where barley and oats have been sown, they come to perfection. At Moose Factory at the bottom of the bay, sown wheat has stood the winter frosts, and grown very well the following summer, though the cold is greater and continues longer than within land; black cherries planted here have also grown and borne fruit, as would other trees if propagated."

Reverting to the subject of climate, Mr. Robson states:—"I perceived that the garden ground at York Factory and Churchill river thawed much sooner and deeper in the space of one month than the waste that lies contiguous to it, and the same is to be observed in England. By the heat therefore which the earth here would acquire from a general and careful cultivation, the frost might be so soon overcome that

the people might expect regular returns of seed-time and harvest."

An Excellent Farming Country.

Ed. Umfreville, in his volume "Eleven Years in the Service of the Hudson's Bay Company and Four Years in the Canada Fur Trade", published in 1790, speaking of latitude 55°, says:—"The Hudson's Bay Company servants have tried Indian corn and barley by way of experiment which came to perfection. Potatoes, carrots, radishes, onions, etc., have been reared and found as good as those in Canada (Quebec). The natives collect vast quantities of wild cherries and bring them to the fort. Raspberries, strawberries, currants, cranberries, and an infinity of other kinds of which I do not know the names, are to be found everywhere. The grass grows to a great height which fattens our horses in a short time.

"The late Chief Factor Archibald, in his journal of Sir George Simpson's trip from York Factory to the Pacific in 1828, speaks of having had, on July 12, two days after leaving York, "a peep at the Rock, an old establishment with its gardens."

The Rev. John Semmens, who spent many years as a missionary in the north country, went to live on the banks of Burntwood river, at Nelson House, in the year 1874. He remained there two years, and for a number of years thereafter paid occasional visits to the locality and made journeys through the adjacent country. He writes:—"The most of my tripping was between Norway House and Nelson House, though I have been as far north as Indian lake, as far west as Nelson lake, and as far east as Split lake. The information I have to offer, therefore, concerns the lower reaches of the Burntwood after its junction

with Rat river at Nelson House. Much of the country specified is hilly, with frequent outcropping of granite rock, and some large tracts of muskeg or swamp land, but there are found large areas of open country, and valleys of tributary rivers, where the soil is rich and deep and where grazing and stock raising could be very successfully carried on. The sheltering forests, and the abundant water courses, the numerous beaver dams, and the rich native grasses would indeed make this locality ideal to sheep raisers and general ranchmen. The absence of anything like a market has hitherto kept this country from being reported of, but if a railway becomes an actual fact, Manitoba will add very much to her available resources, when extension comes, and settlers will find that in soil, in wood, in grasses, and in waters, this unknown land will afford comfortable homes for thousands. It will be seen by the map that about one hundred miles down the Nelson all the branches of that noble river unite in one. From that point we are accustomed to strike across country to Landing lake, Wintering lake, Pipestone lake and thence into Burntwood river. This short cut has along its course many thousands of acres, such as I have described, and for fishermen as well as ranchers must some day be a paradise.

"The cold at Nelson House is no more intense than that of a winter in northern Manitoba as at present constituted, but the frost sets in rather sooner, and tarries rather longer than it does at the north end of Lake Winnipeg. Roots and vegetables planted about May 24 do well and are gathered about September 15. The presence of so much water so regulates the temperature that there are few frosts either early or late to make growth uncertain, yet, in my experience, wheat is not a sure crop. All depends

on the season. Oats and barley will do well any time."—(J. A. J. McKenna's report on the Hudson Bay Route).

Split lake region.

The Reverend Doctor John McDougall, one of the pioneer missionaries of the west, has thus expressed himself regarding the region to the south of Split lake:—"The summer begins early, and the growth and vegetation are almost of a tropical character. This is attributable to the longer hours of sunshine that prevail, and to the proximity of streams of living waters everywhere in the district, each of which is conducive to plant nourishment. There is considerable rock throughout the section which indicates in the near future a season of development for the mineral prospector but there are also countless acres of good land which can be easily made to yield fruitful returns to the farmer, as has been the case southward in Manitoba and westward in Saskatchewan and Alberta. The soil is of clay sub-strata with sandy loam on the surface, and, although wooded to a considerable extent, is a far more enticing agricultural proposition than that which faced the early settlers on the bush farms of Ontario and other eastern provinces fifty years ago, and, with the advent of railways, a better market than the eastern settler had would be always available. The district in which are situated Norway House, Cross lake, Oxford House, Island lake, Nelson House and Split lake, covers a wide area, and at each of these places garden vegetables and grain for personal requirements have been successfully grown for a term of years. Summer frosts are practically unknown and the germination of vegetation, owing

to the long hours of sunshine, is exceedingly rapid." (McKenna Report.)

Doctor Robert Bell, in the report of his exploratory trip from Lake Winnipeg to Hudson bay in 1878 (See p. 17), states:—"Along the direct overland route from Churchill to York Factory the timber is reported to be generally small, and large prairie-like openings are said to occur, in which the ground is dry and covered with grass or other herbage. I saw very good potatoes and turnips growing in the gardens at Churchill. Previous to the advent of Mr. and Mrs. Spencer, the cultivation of potatoes had not been attempted, and the possibility of raising them at Churchill when suggested by Mrs. Spencer was ridiculed by the oldest inhabitants. However, in spite of predictions of certain failure, the ground was prepared, seed planted, and a good crop was harvested. The experiment has been repeated successfully for seven consecutive years, so that the question of the practicability of cultivating potatoes on the shores of Hudson bay in this latitude has been pretty well solved.

"Hay can be cut in abundance in the neighborhood of Churchill, and cattle thrive well, yet the same ignorance or obstinacy, as the above referred to, formerly prevented any attempt being made to breed stock on the spot, so that every fresh animal required had to be brought from some other place. Now, the small herd which is kept at the place is recruited by raising the animals calved at the fort itself. The open grassy land near the sea is practically of unlimited extent. Much of it is dry and undulating, affording abundance of pasture for the cattle. The butter made by Mrs. Spencer could hardly be excelled for quality and fineness in any country."

Lake St. Joseph section.

In the report (Part G., Geol. Sur. Report, 1886) of his exploratory trip in 1886 (See p. 18), Doctor Robert Bell, speaking of the country in Lake St. Joseph section, in the extreme southern side of the region under review, writes:—"The climate, in the immediate vicinity of the lake at all events, appears to be sufficiently good to admit of the growth of a variety of crops. At Osnaburgh House, near the east end, where the soil is of a sandy nature, the principal crop cultivated at present is potatoes, but early Indian corn, peas, beans, and a variety of roots and other vegetables, to say nothing of a profusion of flowers, were in a flourishing condition at the end of July. In former years, when cattle were kept at the post, barley was said to have been a regular crop. Hay grows very luxuriantly. I was creditably informed that pumpkins and muskmelons had frequently ripened at this establishment."

Doctor Bell, before the Senate committee of 1887, testified:—"Potatoes and all such vegetables would grow in Hudson bay district, but the immediate influence of the sea is unfavourable for gardens. Gardens close to the sea do not flourish as well as gardens inland. The frequent change from heat to cold and the fogs from the sea prejudicially affect them, and cause a sort of blight on vegetation close to the sea shore. But a few miles inland vegetation is more rank, and you can grow potatoes and the ordinary root crops. There are plenty of grasses there to keep cattle and sheep. There are many kinds of grasses there, also sedges, wild peas or vetches and lentils. They would make splendid feed for cattle."

Mr. Fawcett (Annual Report, Dep. Interior, 1885, pt. II, p. 37), speaking of his descent of the

Wenassago to Lac Seul, says:—"In a few places I noticed soil of vegetable mould and clay loam, which would be well suited for the growth of grain and vegetables should the climatic conditions be favourable. I also observed here that the best soil generally produced a growth of poplar, and wherever it appeared large and thrifty, good soil might be looked for, comparatively free from rock. On the rocky ridges, as usual, scrubby pine was the prevailing timber, while the flats and muskegs were invariably covered with spruce and tamarack. The good land noticed seemed to be in belts three or four miles wide and extending north and south for a considerable distance, as might be expected from the geological formation, the depressions and elevations succeeding each other in very regular order and much in the same direction."

On Big Black river, which flows into the east side of Lake Winnipeg, Mr. A. S. Cochrane, of the Geological Survey, who surveyed that stream in 1882, reports the soil as "excellent, being a light-gray friable clay. . . . . The land up to Pelican portage is first class, but above this there is a low and swampy country, which extends to 'Rapids-close-together'. A border of good land, on which some fair-sized timber grows, runs along both sides of the river."

Favourable lake and Severn lake.

Mr. Low, in the account of his trip in 1886, reports that along the shores of Favourable lake (which is from two to five miles in width) "there are considerable areas of good land, the best being on the peninsula and along the southern part of the lake, where the underlying rocks are hornblende and

chloritic schists; the northern part is more barren, the soil resting upon gneiss. The soil is a fine, rich sandy loam, quite suitable for growing good crops, and summer frosts seem to be the only drawback to successful agriculture. These are said to not occur at Trout lake, though situated further to the northeastward. At the end of the peninsula the foundations of several old houses were discovered, out of which trees twelve inches in diameter were growing. These ruins evidently mark the site of some old Hudson's Bay Company or more probably North West Company trading post. . . . .

"There is much good land about Sandy lake. Indeed the greater part of the land around these lakes would make good farms."

A short distance above Severn lake, according to Mr. Low, there is a considerable area of country "almost flat, with good timber and soil."

Mr. Low describes Trout lake (east of Severn lake) as being forty miles long by twenty miles wide. He states in his report that Mr. Tait, the officer in charge of the Hudson's Bay Company's post at that point, "says that good crops of peas, potatoes and other roots are raised here yearly, and are very rarely injured by summer frosts. This being the case, the country to the westward, between Severn and Sandy lakes, which is more favourably situated, having all the appearance of a better climate and a richer soil, must undoubtedly be well suited for agriculture, and will at some future time prove valuable land for settlement."

Mr. Low reports the soil around Fort Severn as a heavy clay and very swampy. Nothing but a few small turnips are with difficulty grown there. On August 8, strawberries, then beginning to ripen, were picked by Mr. Low on clearings around the post.

Mr. Low was examined at length before the Senate committee of 1907 (See p. 27), and stated in his evidence that the country between Norway House and Hudson bay is not very elevated. The highest points in it are probably somewhere in the neighbourhood of one thousand feet above sea level. For about half the distance to Hudson bay it is practically a rolling plain, and the rocks are ancient rocks of the Laurentian and Huronian ages. Beyond that there was an ancient deposit of limestone and sandstone, extending in a wide line around the northern part about half way across. These are large limestones, and they are lying almost flat. The country for about half way down from Norway House to Churchill slopes very gently towards the bay, so that the grade is not more than eight or ten feet to the mile, if it is that. The northeastern part is practically a plain.

There are considerable areas of low swampy lands. The surface going down into Hudson bay after reaching the Wolstenholme country is fairly swampy. The rivers have thrown up banks, and it is only at an occasional place that a break through those banks occurred to let out the drainage. In many places the river banks are from five to ten feet higher than the surrounding country, and in consequence the land beyond is drowned more or less, very often extending back for a distance as far as one can walk in a day.

Mr. Low considered that probably half the country due east from Norway House, say for one hundred miles, would be

Fit for Agriculture.

He would rank the agricultural possibilities there as

fair.

Of course there are very few settlements in there now, and the only one Mr. Low visited was a Hudson's Bay post at Trout lake, and they were growing peas and garden truck of all kinds, also potatoes and fairly decent looking crops. They were not bothered very badly with summer frosts, as Mr. Low could see from the crop of green peas. The climate seemed quite favourable for hardy crops. The soil areas that are fit for agriculture are fairly large; the rocky hills crop out only at intervals, and there is quite a large area there that Mr. Low thought would be fit for future settlement.

The low flat plain, southeast of Nelson river, appeared to be largely covered with muskeg and small spruce. He would suppose that there was more muskeg and spruce land than hay areas. The subsoil is clay largely. Down in the lower country near the bay there is a certain amount of sand on top. There was a fair amount of vegetable growth. Mr. Low remarked that he would not consider this low-lying area a good agricultural country at present, but with some drainage he thought a great deal of that country around James and Hudson bays is going to make a good agricultural country.

With regard to that territory north of Lake Winnipeg and east of Norway House and in the country southeast thereof, Mr. Low thought it would be a somewhat rocky country, but probably not more than one-third would be of that nature. Most of the land not rocky would be timber land. This would run up to about the eighteenth degree or probably more.

Mr. Low, speaking as to the climate of the region west of Hudson bay, explained that in the southern part, south of the Nelson, it is fairly good, he thought, for settlement. The summer frosts are rare,

and he thought with the opening up of the country it would probably improve. He considered that settlers in there would not have any more difficulty in summer than they would in the settled part of the northwest. The summer is probably equal to that of Saskatchewan. The length of the summer days is an advantage. They get more sunlight during the summer than do the people of older Ontario or other points farther south, and that is a distinct help to vegetation.



Portaging canoe at Long Spruce rapids, Nelson river.

In the summer of 1896, Mr. J. B. Tyrrell explored the country north of the mouth of Saskatchewan river. As a result of the exploration he states in his report:—"From Nelson river westward to longitude 100° 30′, and from the north end of Lake Winnipeg northward to beyond latitude 56°, the country is generally covered with a coating of stratified clay, varying in thickness from a few feet up to fifty, sixty, or even one hundred feet. This clay is of much the same character as that of Red river valley, having been, like it, deposited in the bed of the old post-glacial lake that once occupied the basin of Lake Winnipeg. The rivers have, as a rule, cut down

through this clay to the underlying rock, but away from the water-stretches rock exposures are not of any frequent occurrence. The

SOIL IS RICH AND FERTILE,

and the country will doubtless produce in abundance all the hardier roots and cereals grown in the province of Manitoba; and cattle, sheep, and horses could be successfully raised. If the country were made accessible by a railway passing through it to Hudson bay, it would certainly support a considerable agricultural population."

At page seven of his report (Part F. Geol. Sur. Rep., 1900, Vol. XII) Mr. Tyrrell states:—"Much of the land is well adapted for agriculture. At Norway House some fine barley had been sown and ripened in the garden, and all the ordinary vegetables grown in Manitoba have been raised for many years past. At Cross lake many of the Indians had good large gardens of potatoes and other vegetables, and McLeod and Mclvor, two fur traders, had excellent gardens in which were growing potatoes, turnips, carrots, parsnips, radishes, cabbages, cauliflowers, onions, lettuce, beans, peas, etc. At Nelson House in the extreme northern part of the district explored, many of the Indians regularly grow potatoes, and both the fur traders and the missionaries cultivate small patches of ground on which they raise abundant crops of all the vegetables mentioned as growing at Cross lake. It is probable that the hardier varieties of grain would also ripen here, but at present there is no object in growing grain of any kind for it could not be readily utilized."

In a foot note, Mr. Tyrrell states "Wheat ripens well at Norway House and Cross lake on the Nelson."

On page eight of his report Mr. Tyrrell says: —"During the summer of 1896 no frost occurred until August 29. At Nelson House we were informed that, during the preceding seven years at least, no frost that would injure garden produce had occurred at an earlier date."

At page thirty-four of his report Mr. Tyrrell states: —"Wuskwatim lake is a very pretty sheet of slightly murky water, six or seven miles long and three miles wide, surrounded by sloping clay-covered hills wooded with white spruce and poplar. Its surface is varied by a few islands composed of clay overlying a floor of gneiss. The two falls above mentioned, at and near its outlet, would furnish a large amount of

Power for Driving Mills

or machinery of any kind, while a supply of timber for building and fuel could be obtained from the surrounding country, and the soil would grow any of the ordinary roots or more hardy cereals, so that it is not improbable that before long when this fertile country is made accessible by the advent of a railroad from the south, one of the most prosperous towns in the district may grow up on the shore of this now secluded lake.

"Footprint lake, on the northern shore of which the Hudson's Bay Company have had a trading post for a number of years, and the Methodists have a small church and mission house, has somewhat the shape of a rude cross, seven miles long from east to west, and six miles from north to south. The latitude of the trading post was found to be 55° 48′ 26″ north. The lake is surrounded by banks of light grey friable clay from thirty to forty feet high, through which rise rounded hills of gneiss up to two hundred

feet or more in height. The clay extends over the lower portions of these hills, but some of the higher summits appear to rise above it, possibly having risen above the surface of Lake Agassiz where the surrounding clay was deposited on its floor. When the lake was visited in August last both the trader and the missionary had excellent gardens in which they were successfully growing potatoes, cabbages, cauliflowers, onions, radishes, lettuce, peas, beans, turnips, carrots and other vegetables, and many of the Indians had patches of potatoes sufficiently large to assist materially in the support of their families throughout the winter.

"I enquired from the Indians who were living around the lake, how far the fertile clay-covered country extended towards the north, and they told me that it extended as far as Indian lake on Churchill river, north of which the surface is either of sand or rock."

Mr. Tyrrell reports that many of the smaller fruits grow on the clay-covered country explored in great profusion. Among those that he reports as especially abundant were raspberries, gooseberries, red and black currants, strawberries, blueberries and headberries (*Rubus Chameomorus*).

Strawberries were growing "in great profusion" in the tract about Muhigan rapids on Muhigan river.

The country above Wuskwatim lake, according to Mr. Tyrrell, "seems to be a great clay plain, cut through by the sloping trough of the river, and trenched by wide lateral gulleys. The surface is generally covered with small poplar, with some spruce in the valleys, and there are no signs of rocky hills, or of rock, except here and there at the water's edge."

Mr. Tyrrell reports that McLaughlin river,

throughout its whole course from the long narrow lake to its mouth, flows through a level, clay-covered country, the rock merely rising here and there in knolls and ridges above the general level.

Mr. Tyrrell, reporting (Summary Rep. Geol. Survey, 1890-91) on his survey of the district about Lakes Winnipeg and Winnipegosis, mentions a cliff at Limestone bay, in the extreme northwest of Lake Winnipeg, rising in some places to a height of forty feet, composed at the bottom of a stiff, blue alluvial clay, and at the top of a mossy peat, and further on in the report proceeds to say:—"A deposit of clay similar to that on Mossy point extends all along the east shore of Lake Winnipeg, and the waves washing against the soft cliffs become charged with the mud from which the lake derives its name. This clay is also of great economic interest, for instead of the east shore of the lake being an uninhabitable rocky wilderness, as is generally supposed, it is largely covered with

A Rich Blue Alluvial Soil,

and the area of rock surface is relatively small. Much of this land is covered with forests of poplar and spruce, while on account of the retentive, impervious nature of the clay soil much of it is also boggy and wet, but when it is cleared and drained it will form rich agricultural land. At Badthroat river, Mr. Wood, the local Inspector of Fisheries, had cleared a beautiful farm out of the midst of the poplar forest, and he informs me that he grows successfully all the crops ordinarily raised in Ontario. Mr. McKay, the Indian Agent at Berens river, has also a clearing situated on the south side of the river in the midst of what was a dense forest of small spruce. He has

under cultivation a nice garden, and this year the potatoes were not cut down by frost till the middle of September."

During his examination before the Senate committee of 1907, Mr. Tyrrell described the whole stretch of country extending from Lake Winnipeg and Split lake on the east to Churchill and Athabaska on the west[14] as a "country essentially suited for agricultural purposes." He could not say what there was beyond the limits mentioned as he had not been there. This was a forest belt. The eastern side of this tract would be Nelson river. Not having been east of that river with the exception of twenty or thirty miles, he could not speak of the country beyond. Mr. Tyrrell declared:—"That belt of forest is for the most part excellent agricultural land." As far as the observations of Mr. Tyrrell went, he believed that that country, while a little harder to settle up, and not so attractive to settlers who are going in and looking for farms ready made and cleared for them and ready to put the wheat in, would be as fine an agricultural tract of land as there is in the Northwest. Everywhere in travelling through it, the evidence of rich vegetation was abundant, and everywhere where gardens or any kind of agriculture or horticulture had been attempted in this forest belt, it had been eminently successful. It is a forest country, a spruce covered country, and lies southwest of Hudson bay, west of Nelson river, north of Saskatchewan river, and extends to Mackenzie and Athabaska rivers. It would be about two hundred miles wide from north to south. Witness did not remember the length of it. It is land similar to that of Ontario, and will grow practically everything that will grow in that province, except possibly down in the southern peninsula. The summer is warm. The

winter does not count, because things do not grow in winter. There is a good rainfall. A small part of the district is park country, half wooded. It is a continuation northward of the Saskatchewan country.

Mr. Tyrrell said he had seen growing in that country all the garden products that they grow in Ontario—potatoes, carrots, turnips, cabbage, cauliflowers and all the ordinary garden produce. He saw excellent potatoes in the district around Nelson House. He could not say what time they were planted, because he was not there. The Indians constantly, when hunting, plant little patches of potatoes here and there in the spring and leave them all summer and dig them up when they go back to their hunting grounds in the fall, and use them for their winter supply. The witness had gone out and dug a pail of beautiful potatoes on several occasions out of these little Indian patches buried in the woods. They had never been hoed or cultivated in any way. They were not looked after from the time they were planted in the spring until they were dug in the fall. The potatoes seem to be able to grow sufficiently to keep down the weeds. As a protection against wild animals these potato patches are usually planted on islands. Witness had not actually seen wheat, barley nor oats grown in that country. He has fairly good evidence that they are grown there, but as far as he remembered he had not seen any himself. He had been told and believed that they grow there. There is no doubt whatever that the country described will support quite a large population. North of Lake Winnipeg there is another magnificent area of from five to ten thousand square miles of as fine country as there is in Manitoba or anywhere else. When Mr. Tyrrell came out of that district in 1896, after

spending a summer there, and said there was

A Rich Agricultural Country North of Lake Winnipeg

the Hudson's Bay Company's men and the people in the southern country pooh-poohed the idea. They said they had been up at the head of the lake and knew there was not a foot of good land there. But Mr. Tyrrell emphatically declared that there is a magnificent stretch of country there, which extends westward along the Churchill. These lands north of Lake Winnipeg are clay lands, an extension of the same basin as the Manitoba clays.

Mr. J. B. Tyrrell, in his evidence, pointed out that "the effect of the large body of water in Hudson bay and James bay on the temperature, summer and winter, of the surrounding country, was the equalizing of it very much, making the summers colder and the winters milder. There is a foggy climate around the bay. It is without much sunlight, so that it has not a chance to dry. The mean temperature of the summer within one hundred miles of the bay will not be so hot as it is back of that. The thermometer does not fall very low in winter at Churchill. At the same time any person will find it terribly cold on that coast, although the thermometer does not fall very low. There are a great many different matters in connection with temperature and climate that have to be taken into consideration. There is the amount of moisture in the air; whether the barometer is standing low or high; there are a great many of those things that have to be taken into consideration in any question of frost or of climate that arises. You may have frost with a north wind, while if that north wind were blowing

up over a wooded country, where all the leaves were giving out their vapour from the ground into the air, you would not have a sign of frost."

As to the climate of the great belt of arable land, that he had described to the Senate committee of 1907, Mr. Tyrrell said that at Nelson House the snow leaves the ground in May. There is little or no summer frost in that wooded country. He understood gardening commences the end of May, and the frost does not appear in the fall until about September 20. He had never known the potato crop to be lost through summer frost.

Asked as to the isothermal line, Mr. Tyrrell remarked that the isothermal is a line connecting points that have the same mean temperature for the year round. It has nothing whatever to do with vegetation. Things do not grow in the winter time. People have got to put the winter temperature absolutely out of the question. The summer temperature is the only temperature that counts for growth in the northern country where there is frost. In dealing with that, you have to take into consideration as between two places in different latitudes, the length of the day and the amount of sunlight, in order to get at the summer temperatures. Of course the sunlight has a great effect on the growth, and where the days have eighteen hours' sun a plant will grow faster than where the day has only fourteen hours.

Mr. Tyrrell submitted to the committee a memorandum from Mr. R. F. Stupart, Superintendent of the Dominion Meteorological Service, comparing the temperature conditions of the district between Lake Winnipeg and Split lake in the several months, May to September, with European countries, as follows: —

May—50°-40°, with north of Scotland and
southern Norway.
June—56°-54°, with Scotland.
July—63°, with south of England.
August—57·5°-55°, with Scotland.
September—50°-45°, with northern Norway
and Sweden.

Mr. D. B. Dowling, reporting (Part F. Annual Rep. Geol. Sur. Vol. VII) on his 1893 explorations (See p. 19) states:—"The agricultural possibilities of the valley of upper Berens river seem to be limited, and the areas suitable for cultivation are only to be found in isolated patches. These are principally in the neighbourhood of the larger lakes. The Indian reserves have been located with this end in view as they seem to cover about the best land seen. The soil is a light grey clay with a little vegetable mould, and the gardens made by the Indians produce potatoes of fair quality, the only vegetable grown. In the southern part of the district, better land is found and in greater extent than in Berens river valley. On Lac Seul, at the mission and trading post, there are

SEVERAL VERY GOOD GARDENS

in a flourishing condition, with all the ordinary vegetables growing very satisfactorily. The Indians appear to care little for any gardening except a very primitive attempt at raising potatoes. Land suitable for gardening was seen at Mattawa, and indeed the best and largest extent for this purpose is to be found between Lac Seul and Shallow lake."

Mr. Dowling, writing of the northern branch of Berens river, states:—"The land reserved for the Indians on the upper part of this branch of Berens river, is a small tract situated on the north side of a

long arm or narrows, running to the eastward, from a lake to which the name Pekangikum is given. The river enters at the eastern end of this area, coming from Sturgeon lake by a short stretch of river half a mile in length, in which there are two rapids. The Indian reserve appears fairly well timbered—principally with Banksian pine of slender growth and some spruce. The Indians have been able, in building their houses, to obtain timber of suitable size for the walls and rafters, and spruce of a diameter of fourteen inches is fairly plentiful. The shores of the lake are rocky, but strips of country inland appear, on which there is probably a fair quality of soil, though the surface is generally sandy. On one of the islands in the larger part of the lake, soil of good quality (clay) was seen, on which the Indians were growing potatoes. No doubt there is better land for this purpose on the reserve they have selected, but as they make their summer camp on a small island near the deeper part of the lake for the purpose of fishing—by which they mainly subsist—they naturally utilize the nearest land for their summer gardens."

Mr. Dowling, writing in his report of the country north of Lake Winnipeg and south of Burntwood river, says:—"As the area is situated so far north of the boundary of Manitoba, it might be presumed that much of it is unfitted for settlement, but it is discovered that over a large part there is good soil, and

The Evidence of Several Gardens

at various posts shows that for all the ordinary vegetables and coarser grains the climate is not too rigorous. Splendid gardens were found as far north as Nelson House, which is in the northern part of the

area here mapped. Proper drainage is needed, however, to bring much of the surface into a condition fit for agriculture. Along the river banks this is evident, for while the strip bordering the streams produces a great variety of grasses, shrubs and trees, a short distance back this is replaced by a swamp covered by moss and stunted spruce. This is more noticeable in the western part of Nelson valley, where the country is thickly covered by a coating of clay, and the surface is so uniformly level that its gradual slope to the east is not sufficient to drain it. The areas to which it would be possible to introduce a system of drainage, would at first be restricted to a narrow margin along the streams. The northwest corner of the district for present purposes may be classed as without a sufficient soil for agriculture. This may roughly be outlined as being composed of all the country lying to the west of a line from the outlet of Burntwood lake to that of Reed lake, and north of the escarpment which shows the northern limit of the Trenton limestone. In this the surface is rolling and hilly, the rocky ridges having a scanty coating of boulder clay and an occasional thicker deposit in the depressions. It will probably remain the home of the hunter and the trapper.

"To the south the country, underlain by limestone, has many of the characters of the northern part of old Manitoba. In the valley of the Saskatchewan there are large areas of rich soil formed principally by the river itself, which has brought down an enormous amount of silt from the upper part of its valley. The western part of the valley of Nelson river is covered by a thick lacustral deposit which reaches west to Burntwood lake and east to the channel of Nelson river. In this area good soil is found in almost every part and where drained

would no doubt make fair farming land."

Mr. Wm. McInnes describes the country about Winisk and Attawapiskat rivers, explored by him in 1903, 1904 and 1905, as consisting of three areas, the first a limestone area, along the bay shore, the second a boulder clay area, behind it, and the third in rear of it again, a high interior plateau. As to the latter area, he says:—"Although, considered as a whole, the central, elevated region cannot be spoken of as generally adapted for agriculture, there occur basins covered by heavy deposits of stratified sand and clay that seem to have been laid down in lakes held in between barriers formed by the walls of the retreating glacier and ridges of drift. An examination of some of these clays by Doctor Hoffman shows them to be highly calcareous and somewhat siliceous, a composition that with the admixture of the surface vegetable mould should produce an

Excellent Soil for General Agriculture.

The question of climate, which is, of course, of the utmost importance when considering the agricultural possibilities of a district, will be referred to more particularly in another place. It may be said here, however, that the climatic conditions are, if somewhat adverse, not by any means prohibitory to the general cultivation of suitably situated tracts.

"Muskeg, alternating with low ridges of gravel and boulders, covers wide tracts. It was noticed that the surface drainage became more perfect in that part of the region extending westerly towards Trout lake. . . . . .

"The tract referred to as the boulder clay area consists of a broad belt of country, about one hundred and fifty-nine miles in width, lying between

the Archaean highlands and the edge of the limestones of the basin of Hudson bay, overlapping the latter, however, so that the surface features of the two are generally quite similar. Gently undulating, and with a slight slope northerly and easterly, its general surface aspect is that of a great swamp, sparsely covered with stunted and deformed trees, that reach a growth approaching their normal only along the immediate banks of the rivers where drainage is afforded by frequent short gullies into the trenches that constitute the river valleys. The interior, to within a chain or two of the river-banks, owing to the impervious character of the till,

IS QUITE UNDRAINED,

and consequently covered by a thick deposit of sphagnum moss from two feet to ten feet deep, the surface layer still growing, and even the bottom only bleached a little, but not at all oxidized. The short cool summer season, and consequent low temperature of the water that saturates the moss, is probably the principal reason for the absence of any of the visible effects of decay. The rivers flowing through this region have no real valleys, that is to say, they occupy trenches but little wider than the immediate channels in which they flow, cut down through the stiff, tough till, which stands up in nearly vertical walls that rise from the freshet mark on either side. At low stages of the water a slanting beach, often paved with boulders, slopes gradually from the foot of the bank to the edge of the diminished channel. A more or less continuous layer of marine clay, rich in fossil shells, overlies the boulder clay, ensuring, wherever it is present, a soil of good quality. The absence of other than swamp

vegetation must be ascribed, then, to the almost total absence of drainage, and to the generally unfavorable climatic conditions.

"In the matter of the actual cultivation of these northern areas we have little to go upon. At the Hudson's Bay Company's posts at Fort Hope and Osnaburgh potatoes have been grown and small gardens maintained from the time of the establishment of the posts, and little difficulty has been experienced in maturing the common garden vegetables of Ontario, though occasionally the frosts of late summer have cut off all but the hardier kinds. As the posts were located with a view to their favourable situation for the purposes of the fur trade with the Indians, neither one is situated on ground well suited for cultivation, and much better results might reasonably be expected were trials made on more favorably situated tracts. An Indian cultivating a small garden plot at the head of the Pineimuta branch of Attawapiskat river succeeds in raising good crops of potatoes and turnips."

As to this part of the country drained by Winisk and Attawapiskat rivers, Mr. McInnes in his report says:—"The climate, as would be expected in these latitudes, and in a wilderness country approximately a thousand feet above sea-level, is somewhat severe. The summer temperature, though on occasional days rising as high as 85° Fahr., averages very much lower, and the nights are practically always cool. Frosty nights often continue into the early summer, and recur again in the autumn before most grain-crops would be ready for harvesting. Temperatures were taken with the thermometer during two seasons, and these, averaged, gave the following results for the months of July and August on lower Winisk river, and for July, August and part of

September on upper Winisk and upper Attawapiskat rivers:—

	6 a.m.	noon.	6 p.m.
Lower Winisk river	57°	69°	57°
Upper Winisk and Attawapiskat rivers	47.5°	61.6°	58°

"The only points in the region where any attempts at cultivation of the land are made are the two Hudson's Bay Company's posts at Osnaburgh, near the foot of Lake St. Joseph, and at Fort Hope, on Eabamet lake.

"At these posts small kitchen gardens and potato-fields are maintained with some success, though neither place is favourably situated for the purpose, the soil in both cases consisting of an almost pure sand. Timothy and clover grow luxuriantly, and all the common

GARDEN VEGETABLES THRIVE AT BOTH PLACES.

Indian corn, however, is not sufficiently filled out for table use when caught by the frost. Barley has been successfully grown at Osnaburgh, and the potato crop, wherever a suitable tract of land has been utilized, has been generally fairly good at both places.

"The first killing frost in 1903 occurred on the night of September 3, and in 1904 on the night of August 30."

Mr. McInnes (Geol. Survey Report for 1906, pp. 87 and following) describes the region explored by him in that year as follows:—

"It is bounded by north latitude 53° 50′ and 56°

10′, and by west longitude 99° 15′ and 101° 15′. Its general elevation above the sea is between seven hundred and nine hundred feet. . . . . For purposes of general description it may, in a broad way, be divided into three areas; the limestone area embracing all the tract underlaid by the horizontal or gently undulating, magnesian limestones or dolomites of northern Manitoba; the Archaean area, a somewhat broken and rugged country extending from the northern edge of the limestone escarpment northward and eastward until covered by the lacustrine sediments of the third or clay area. The latter, a gently rolling, clay-covered country, extends from the valley of Nelson river on the east to a contour, westerly, where the general elevation of the land is in the vicinity of nine hundred feet above the sea, or to approximately west longitude 99° 30′. The northern edge of the clay basin was not reached, but the Indians of Burntwood river region agree in saying that Churchill river valley forms its most northerly extension. The last of the three divisions is, generally, well suited for cultivation, but throughout the first two the areas suitable for agriculture are of limited extent. No part of the region is prairie though along some of the valleys, and here and there on the uplands, are found extensive hay marshes, with only occasional small clumps of willows, that, with drainage, would become virtually prairie lands. . . . . Northwest of the Hudson's Bay Company's post at Split lake the country is generally low, swampy and intersected by a network of small lakes; near Waskaiowaka lake, however, an extension northeasterly of the clay land of lower Burntwood valley forms a comparatively dry ridge."

A Garden in new Manitoba.

Speaking of the Hudson's Bay Company's trading post at Norway House, Mr. McInnes said:—"The chief factor in charge of the district cultivates a large garden, where, on June 10, peas, beans, beets and other vegetables were well started. Wheat had been successfully grown here as well as at Cross lake farther down the river, in latitude 54° 40′. There are many tracts of land along the river suitable for cultivation, though for long stretches the banks show only rounded surfaces of biotite gneiss, smooth and glaciated. The cultivable areas are confined to tracts overlain by lacustrine clays which alternate along the shores with glacial gravels and the bare rock surfaces devoid of any soil cover."

Mr. McInnes also reports:—"Below Cross lake no land is under cultivation until Split lake is reached, just north of latitude 56°, where the postmaster for the Hudson's Bay Company raises potatoes and the commoner garden vegetables."

Mr. McInnes reports that, ascending Burntwood river a few miles above Odei or Hart river, there is much land "apparently well adapted for cultivation. The clay is entirely free from boulders, and mixed near the surface with enough vegetable humus to produce a friable and seemingly productive soil. The gentle slopes give good natural drainage, and the open character of the forests makes it a country easily cleared. For the next nineteen miles the river valley and neighboring country present the same general aspect. Where the valleys of the main river and the Odei approach one another they are separated only by a dividing ridge a little over a mile across, and a hundred and fifty feet high. The ridge is clay covered to the flat summit, where knolls of

gneiss project. Beyond the valley of the Odei, to the north, is a rolling forested country with hills clay-covered to the tops, rising by gradual slopes to about a hundred feet above the intervening valleys, that are themselves from twenty to fifty feet above the river level. For the next twenty-eight miles the river, flowing in a rock-bound basin, has the character of a long, narrow lake from half a mile to over a mile in width. Covering the well-rounded ledges of gneiss that form the immediate shores is the same thick mantle of clay forming

A Country of Very Attractive Appearance.

Rising gradually from the river level to heights of from twenty to fifty feet, a flat or gently sloping plateau extends back from two to three miles to another rise, where the general level is increased to about a hundred feet. Recurring forest fires have not only denuded this section of its trees, but the stumps have for the most part been burned away, so that it is now covered only by an open growth of small white birch, poplar, willow and Banksian pine, with an undergrowth of vetches, grasses and small shrubs. Just above is Manasan falls where the river pitches over a ledge of gneiss with a vertical descent of thirty feet.

"Above Manasan falls," Mr. McInnes continues, "the river expands again to form a long, narrow lake for the next ten miles of its upward course. The same rolling clay plateau extends back from both shores of the lake, rising gradually to an undulating, higher tract, perhaps one hundred feet above the lake level. The forest growth is still very open, allowing a good surface carpet of grasses, vetches and other vegetation. Diversified here and there by small open

tracts where the grass-covered surface is free from trees, this country often presents quite a park-like aspect. Throughout all the clay-covered region the absence of erratics is striking; for miles no perched boulders nor transported materials of any kind; other than the lacustrine sediments, are seen, and even the country rock is deeply hidden under the heavy clay deposits that seem to be very homogeneous throughout, not laid down in thin layers as in the case of many clays of apparently similar origin in eastern Canada, but, if stratified at all, only in very heavy beds that seldom show their bedding planes. For the next fifteen miles to Wuskwatim lake, the river has a quicker descent and its course is broken by several small rapids. The surrounding country is slightly higher, rising in places about two hundred feet above the river, and more steeply from its shores. From the south shore a clay-covered bench a quarter of a mile wide rises to a comparatively steep slope to a height of one hundred and thirty feet, and extends back for miles at about that level, with a gently undulating surface, free from boulders or rock, excepting very rare exposures. As a matter of fact, but one small knoll of the underlying rock was actually seen, rising through the clay at a point about two miles back from the river. The Indians report that this plateau-like country extends right across to the valley of Grassy river with only gently swelling ridges and no high hills."

Mr. McInnes estimates the size of Wuskwatim lake as eight miles by four, with a long bay extending to the west from its southern end. He states that "on all sides of the lake are large tracts of

extending back for several miles at heights of from fifteen to fifty feet above water level, and beyond that continuing at a level of a little over one hundred feet. . . . . The grass-covered slopes that rise with very gentle gradients from the shores of the lake, make this a country of most attractive appearance and one that apparently would be well suited for cultivation. The Indian inhabitants of this section cultivate with success small garden patches of potatoes."

Country of the same general character, Mr. McInnes states, extends for thirty miles up the valley of the Burntwood above Wuskwatim lake.

On the shores of Footprint lake, in latitude 55° 45′, small fields of potatoes planted by the Indians were looking remarkably well, the vines being eleven inches in height and about ready to blossom when this locality was visited by Mr. McInnes, July 10, 1906. Above the lake broad flats extend back from the river on both sides, rising, from half a mile to a mile back, to fifty feet above the river. The greater part of the flats and practically all the high land has been burned over within twenty years, and is clothed now with an open growth of small mixed timber; the land is free from boulders and gravel and has a good carpet of native grasses, including such good meadow forms as the blue-joint (*Calamagrostis canadensis*, *Calamagrostis hyperborea*) and the wild rye (*Elymus dasystachum*). The open character of the forest permits a somewhat luxuriant growth of these grasses, mixed with vetches, strawberry vines, etc., and with currant, gooseberry and other small shrubs and bushes.

"The land lying to the southward of the most southerly bend of the river was found to rise with a comparatively steep slope to a height of sixty feet

above the river, and to extend back as a level clay-covered plain with about five inches of clay-loam soil well mixed with vegetable matter gradually merging downwards into pure clay. The plateau has a gently rolling surface, the bottoms of the hollows, where small areas of muskeg often occur, having a deviation forty feet lower than the slopes of the ridges, and the highest land reaching not more than one hundred feet above the river. For six miles back, the areas of muskeg that are not sphagnum swamps, but rather grassy marshes, are comparatively insignificant in extent, the higher land, wooded with Banksian pine, poplar and spruce and diversified by many open grassy glades, largely preponderating. Beyond this, however, a broad belt of wet, grassy marsh land extends southwesterly across to the heads of brooks running into Grass river below Wekusko lake, and forms practically the western limit of the clay-covered uplands, though in the river valleys and along the flanks of their bordering hills the clay land extends much farther west.

"Of the whole of this extensive plateau land, extending from the valley of the Nelson river westward to near Burntwood and Wekusko lakes (west longitude 90° 45′), northerly to beyond latitude 56°, and southerly to the limestone escarpment, an area of

ABOUT TEN THOUSAND SQUARE MILES,

it may be said to be characterized by a heavy clay soil entirely free from boulders. Lacustrine clays, composed of the rock flour once held in suspension by glacial streams and deposited by them as they reached the quiet waters of a great lake, are essentially the soils of this region. There is no

distinct surface soil clearly separable from the clay subsoil; the one merges gradually into the other, the clayey character of the soil being strongly apparent at the very surface where merely the shallow cover of decaying leaves and other vegetation is scraped away. Generally, for from five inches to over a foot down, the clay is deep brown in colour from the admixture of vegetable matter, and quite friable, and rootlets of even the smaller surface vegetation reach down far below this level, though on the tops of many of the ridges the light-buff coloured clay, without any appreciable coloration from vegetable matter, comes quite to the surface. The rolling character of the plateau generally provides fair drainage, but over considerable areas in its central portion, far from the valleys of the larger streams, there are large tracts that have not sufficient gradients for the proper flow of the surface water, and which could be made available for agricultural uses only by being artificially drained. The western limit of the good country is about longitude 99° 45′."



Portage on Moose river.

Mr. McInnes reports that the country lying to the south of Reed and Wekusko lakes, and stretching to Saskatchewan valley, contains very few tracts of land suitable for settlement. Practically only the river valleys, a few tracts adjoining some of the lakes, and parts of some of the slopes flanking the limestone ridges, can be considered as affording land suitable for cultivation. The upland is generally almost bare of soil, flat-lying limestones forming its actual surfaces, and the slopes, though covered to a good depth by clay, are for the most part too bouldery for tillage. Limited tracts occur here and there, suitable for individual holdings notably near some of the principal lakes. Of the agricultural possibilities of the country south of Reed and Wuskwatim lakes, Mr. McInnes writes:—"Experimentally but little is known of its capabilities, though we have instances here and there throughout the area, to beyond its northerly limit, of the cultivation of all sorts of garden vegetables, including, at The Pas,

Tomatoes and Indian Corn.

On September 6 of this year (1906), Indian corn well headed out was seen in Mr. Halcrow's garden at the Hudson's Bay Company's post, the ears large and full and quite fit for table use. The Indian, never a very enthusiastic agriculturist, succeeds everywhere in getting good crops of potatoes, and at the homestead of an old settler named George Cowan, on Cormorant lake, an exceptionally good yield of very large potatoes was being dug in September."

Mr. McInnes, during his explorations in 1906, gave particular attention to the question of climate,

which he rightly considered of vital importance in connection with this region. He kept a careful record of temperatures, and from the time it was begun, on June 19, until the night of September 29, when the thermometer fell to 26, there was no frost that affected even tender vegetation. On the night of August 10 the temperature fell to the freezing point, but did not get low enough to do damage, at least not in the valley of Grassy river, though some of the potato vines on the summit of the high ridge north of The Pas were slightly touched. Mr. McInnes said he was convinced that the district is not at all too cold for general agricultural operations. The longer daily duration of summer sunlight in these high latitudes, he points out in his report, must be taken into consideration, and, for purposes of comparison with more southerly localities, yearly averages of temperature are of no value. A region lying in a higher latitude, though showing a lower yearly average temperature, may, during the growing months, owing to its longer hours of sunshine, have quite as good an average as one farther south. Mr. McInnes's record showed that during July the temperature at 6 o'clock p.m. was equal to or higher than the noon temperature on fifteen days; during August on nine days; during September on eight days. The 6 p.m. averages for these months were lower than the noon averages by only 1°, 1½° and 2° respectively. For the purpose of comparison, Mr. McInnes procured from the Director of the Meteorological Service at Toronto an abstract of the same summer's temperatures at Minnedosa, Stony Mountain, Hillview and Brandon, and, comparing them with his record, he concluded that the country along the route of the proposed railway to the bay

Is Conspicuously Warmer

than the same latitude four hundred miles further east.

Mr. McInnes, examined before the select committee of the Senate in 1907, declared that the whole region from Split lake to a line about forty miles north of the Saskatchewan is a clay-covered country. After leaving Split lake, ascending the river, this clay-covered country shows absolutely no boulders and no gravel. Even the shores of the lakes, until you reach a height of about eight hundred feet, show no gravel bars at all. There is absolutely nothing to interfere with the cultivation of the soil there. It is a country that has been burnt over. The witness assumed that Burntwood river got its name that way. It has been subject to repeated burns. At the present time it is covered by a very open forest. Grasses grow fairly luxuriantly. There are two species of this, blue joint grass and a wild rye, that are the prevailing grasses. He understood from Professor Macoun, though he was not very familiar with the grasses himself, that these are very excellent meadow grasses, and make excellent fodder. Mr. McInnes left Norway House in the second week of June, and made the circuit and came out at The Pas on September 6, so it was in June, July and August he was there. He saw grass growing from eighteen inches to two feet high.

The witness computed the area of this country at about ten thousand square miles. He did not mean to say, he explained, that all of that ten thousand square miles is good land, but the basin characterized by this deposit of clay has an area of about ten thousand square miles. It is bounded on the north by Churchill river. The witness was at

about the centre of the basin. The Indians told him it extended north to the basin of Churchill river. Beyond that, northwards, mud and gravel took the place of clay. Starting at The Pas and proceeding towards Churchill, the witness first passed through about one hundred and forty miles of country underlaid by the flat limestone of northern Manitoba. He walked for miles over

Hills of Almost Bare Limestone

with hardly any soil. Beyond that—that is, about the contour he had spoken of where this clay was deposited, there is about one hundred and seventy miles to Split lake (Split lake is about two hundred and fifty miles from The Pas), possibly in a straight line about as the railway is projected, that is characterized by these clay deposits.

As to the flat country in Keewatin, beyond this clay area, it is a country of a different character. The witness proceeded from the Albany one hundred miles across country by the portage route to a large lake on Agnooski river and then another one hundred miles across to Winisk lake, and down Winisk river to the sea, and he crossed through the country between Agnooski and Winisk by three different routes, perhaps forty or fifty miles east and west from one route to the next, and the country is very much the same character. It is a country that is very much denuded. The country generally is characterized by hills of boulder and gravel and intermediate valleys very largely muskeg. Except in the immediate valleys of the larger rivers there is very little land that would be suitable for agriculture. From one hundred and fifty miles inland down to the sea, the country is of an entirely different character

again; that is to say, it is country that is originally overlain by from a very few feet at its edge to one hundred feet or more, a very tough impervious boulder clay, which holds up the water, and on which the drainage, up to the present time, is of a very imperfect character. The present drainage of that area is comparatively recent, and imperfect. An instance of its imperfection is seen in Winisk river. There is a lake near the head of the Winisk from which the main river flows, and from which the west branch flows north. They come together at a point (following the main stream) two hundred and fifty miles below, inclosing an island two hundred and fifty miles long. There are two other islands of this character

ALONG WINISK RIVER,

one eighty miles in length and the other about fifty.

The Winisk is a good large river. Mr. McInnes estimated the flow at some twenty-five thousand cubic feet per second. It runs in size somewhere between the Gatineau and the Ottawa, not quite so large as the Ottawa, but larger than the Gatineau. Over the whole of the country in the last one hundred and fifty miles down to Hudson bay, granting the proper climate and proper drainage, this green clay would make an excellent soil. In fact it is quite the same as the clay in the vicinity of Ottawa, practically clay of the same soil, and is very impervious. There are little streams running into the sides of the river, but they cut very sharp-walled trenches, as steep as boulder clay will stand, and that means an angle of say sixty degrees, eighty to ninety feet high. You get on top of these banks and you have a mossy place, sometimes six feet of moss. It is

never peat, never having turned into peat. It is simply a green moss which is pressed into layers of a couple of feet in thickness at the bottom of the six or ten feet, but never apparently oxydized or never carbonized at all, practically unchanged. The growth is going on still. It is merely the successive layers which are pressed down by subsequent layers on top of them, so that in places the thickness is quite ten feet. There are no grasses in that mossy district in the valley of the Winisk. A river of that size in places has some shores, perhaps a quarter of a mile, here and there, beyond the actual shore of the river, and it is grassy there. That is, there are occasional bottom lands, but there is no extent of them. Mr. McInnes did not think there is an agricultural country in that eastern district. It is entirely different from the country of which he had been previously speaking.

Upon Nelson river wheat has been grown successfully at Norway House, and also at Cross lake. The Hudson's Bay Company grow no grain at any of their Keewatin posts nowadays. In the old days they grew it and ground it in hand mills. Mr. McInnes saw potatoes that were grown about fifty miles north of The Pas. "They were quite showy potatoes, great large fellows like those you see exhibited in fairs—tremendously large, grown on practically new land, and they had a very large crop of them." There are no settlers in Nelson district. The Indians, however, grow potatoes at several points, even in the northern part of it, as far north as Nelson House, about latitude 55° 50′. On July 11, when Mr. McInnes arrived at Nelson House, the Indian potatoes had vines about eleven inches high, and were almost ready to flower. When he got out on September 6 to the Saskatchewan, at the Hudson's Bay post there, at The Pas, Indian corn was very well headed out, with

very large fine ears quite ready for table use, and there was no frost until September 29. He knew that because he stayed there until then.

With eighteen hours of the daylight, and no frost in the summer, vegetation is rapid. In a country where you can ripen Indian corn you can grow practically anything.

Mr. McInnes explained that he could not closely indicate the isothermal line on the part of the country he had explored the previous year, but he could say that the country averaged in the summer months from four to five degrees higher temperature than the same latitude farther west. He thought that

which would go past the north end of the country he had been speaking of, would come down as far as the north shore of Lake Superior, which would be a very long distance south. He had records kept during all summer of the temperatures through that western country, and he had a summary of the record kept in the preceding summers. He was rather surprised at the warmth of that western country in summer, and at the way heat kept up in the evenings. He kept the thermometer readings morning, noon and six o'clock in the evening, and found the six o'clock temperatures were almost as warm as the noon temperatures. That country has a very long day in summer. The day in those high latitudes is very much longer, and the growing time proportionately longer. In June they have about eighteen hours of daylight.

As to the district where he found the one hundred and seventy miles of agricultural land he had described, he reached there only about the middle of

June. There was no frost in the balance of June or in July, and no frost in August, excepting once, on, he thought, the 29th, when the thermometer dropped just to freezing point. There was not enough frost to touch vegetation at all in the valley of the river where he was. He noticed when he got out to the Saskatchewan there was rather a high ridge on which there were a lot of half-breed settlers. He got there on September 6, and noticed on top of the hills where they had potatoes that they had been touched just on the tops, but down in the villages the potatoes in the garden of the Hudson's Bay post had not been touched at all. He presumed that was the frost on August 29.

Owen O'Sullivan, C.E., of the Geological Survey of Canada, was one of the witnesses before the Senate committee of 1907. He explained that in 1904 he was engaged as assistant to Mr. Wilson in examining the west coast of James bay. They went up the river Kapiskau for one hundred and fifty miles and surveyed it, and found mostly swampy ground, right to about the headwaters of the Kapiskau, longitude 86°. His impression was that the whole coast from the southern extremity of James bay, at the mouth of the Hurricane, up to Cape Henrietta Maria, for an average of one hundred miles in depth, is mostly swampy ground. It is partly peat and wet spagnol (wet moss). There is a bluff of small spruce isolated here and there.

In 1905 he was sent to survey the coast between York Factory and Cape Henrietta Maria. The shore between these points was swampy as far inland as he could walk in two or three days.

Mr. O'Sullivan testified that during the summer of 1906 he started from Split lake, on the Nelson, and made for the headwaters of Little Churchill river,

going down the Little Churchill to the Big Churchill. The country between Split lake and Big lake is mostly swampy. The country about Big lake is a good loamy soil, with easy slopes surrounding the lakes. From Big lake to the Big Churchill the country is rocky and swampy, with a good deal of good loamy soil in places—a rich clay loam. The rock is mostly granite and gneiss. It is very hard to find out whether the land is suitable for agriculture on such an expedition. It is hard to know the extent of the soil, but Mr. O'Sullivan thought

THE CLIMATE WAS SUITABLE FOR AGRICULTURE.

There are lots of boulders all through the country, but it is possible to cultivate what there is of the land. There are places where the land extends to the size of a dozen townships, and then there would be three or four times that much without having in it enough arable land to make a good-sized township. In the vicinity of Churchill there is grass in the valleys of very good quality. It occurs about half-way down the Little Churchill.

Good potatoes are raised at Split lake. Mr. O'Sullivan had obtained a bag of potatoes grown there. They were rather small, but very palatable. That was in June, and they were grown the previous year. Split lake from the coast, by the Nelson, would be about one hundred and seventy-five miles. He went down Nelson river and north to Churchill. The general character of the country from James bay farther north is good, agriculturally. The country from Split lake rises to Wabishkok about two hundred feet. That is about thirty miles in a straight line. Besides potatoes, he had seen turnips, cabbage and lettuce growing, and all appeared to be very

good. The potato vines in September were touched with frost rather severely. The potatoes were taken up on August 23 and 25, 1906.

Mr. O'Sullivan stated that he had been up near the head of Lake Winnipeg, where the river leaves the lake. There is good agricultural land around there. He never had such good potatoes as at Cross lake. He did not see them growing, but had them in June and also in September. The June potatoes would be the previous crop, and the September ones possibly the new crop. They do not grow any grain there; they have no cattle, and there are no settlers in there. The Hudson's Bay factor raised the potatoes. He had just enough to keep his own family. He had them in three or four different quarters. Mr. O'Sullivan saw lettuce and turnips growing at Churchill.

Mr. J. W. McLaggan, of Strathcona, Alberta, in 1907, made an exploratory trip over a portion of the same country as Mr. McInnes, but going farther west. He left Prince Albert on August 2 and reached The Pas on August 15. On August 25 he crossed Clearwater lake. He describes the country he passed through as low and swampy, and

Wild Berries of All Kinds

as plentiful. The land north of Cormorant lake he found to be of good clay loam, and capable of being farmed successfully on a small scale after being cleared. A garden of potatoes, turnips, carrots and cabbages looked well, and on August 27

Showed No Evidence of Frost.

On upper Cowan river there are small hay meadows; the rest of the land is poor and hard to clear. Approaching Reed lake the soil is a clay loam which could be farmed if drained. The country about Herb lake and river is rocky, with patches of fair land, suitable for raising vegetable and garden produce. When the rapids of Grass river are passed the country becomes low, but in places there is good soil of clay loam with sand, and towards Setting lake there are good hay meadows. Although the country between Setting and Paint lakes is very rough and rocky, there is some good land. To the north of Paint lake there is a limited quantity of good land; about Methy lake Mr. McLaggan considers the land of little value for farming. Between Reed lake and Elbow lake there are some small spots of good land, but as a general thing the country is rough, rocky and swampy. The country between Elbow and Cranberry lakes is mainly muskeg. There are some patches of good land towards the lower end of Cranberry lake. There are some small hay meadows between Cranberry and Athapapuskow lakes, but the ground is generally rocky with some muskeg. There are some stretches of fairly good land along the lower part of Goose river but the country generally is rough and rocky. The country about the upper end of Goose lake was found to be boggy and of very little use.

ALONG GOOSE RIVER, BELOW THE LAKE,

there is quite a tract of fairly good land, and there is another on the Sturgeon, between the mouth of Goose river and Cumberland lake. The soil is a clay loam mixed with a little sand. It is covered with brush and small poplar and would be easy to clear.

Mr. McLaggan, after his trip, stated that the

growing season seemed to be satisfactory, “and where good land is found there should be no trouble to raise good crops of all hardy grains and vegetables, but the greatest drawback to farming would be the difficulty of making waggon roads from place to place, as the country between the spots of good land is rough and rocky.”

The climate seemed good to Mr. McLaggan. In the first week of September the foliage was green; there was no sign of severe frost, and butterflies, hornets and other insects were numerous and active. The first frost noted was on August 31, “but not enough to damage wheat.” The weather was fine in the morning and it rained in the afternoon. On September 13 he noted that the weather was fine but cold, with a heavy frost in the morning; that the leaves were falling, and that it began to look like autumn. Considerable rain followed, which, on October 4, gave place to snow, to be followed again by rain. The night of October 7 is noted as the first really cold one of the season, but the morning brought rain. There was snow again on October 8 with high wind and ice on the water along the shore of Goose lake. It was “fine and warm” on October 11, and “clear and cold” on October 13 when he reached The Pas on his return.

W. Thibaudeau, C.E., states in his report (See p. 23):—“At Churchill, potatoes, turnips and other vegetables have been successfully raised at the Hudson’s Bay Company’s fort. For many years cattle and horses have been successfully kept and bred at the Hudson’s Bay post; excellent butter was also made. Splendid pasture and hay meadows are found on both sides of the river above the harbour for a known distance of thirty-five miles. At the head of Button bay there is an area of two thousand acres

upon which

GOOD HAY CAN BE CUT,

which has been pronounced by Professor Macoun as affording excellent forage. Wild black and red currants and gooseberries are found in great quantities, and are equal, if not superior in flavour, to garden produce. Barrels of black currants can be picked around Fort Prince of Wales. Cranberries exist in great abundance everywhere. Other berries which are indigenous to the climate abound."

As to the region examined in his exploration trip from Churchill to The Pas, Mr. Thibaudeau states:—

"About thirty-five per cent. of the country travelled through is marshy and swampy; more or less hay is grown. Under marsh or swamps the soil is generally clay. I have no doubt that when the swamps and marshes are drained, and the moss is stripped, they will be susceptible to farming operations between Churchill and The Pas, and at a later period, after the northwest is settled, this land will become valuable."

Mr. John Armstrong, in his report of the preliminary survey conducted under his direction in 1908 and 1909 for the proposed railway to Hudson bay, mentions that as the greater portion of the survey work was completed during the winter months when the ground was frozen and covered with snow, it was impossible to obtain much information on the subject of agricultural land and minerals. He continues:—"It may be remarked here, however, that although these lands may require more or less improvement in the way of clearing and drainage, the fact that they are situated within a few hours' run of an ocean port may give to these lands a

value not hitherto thought of, and may cause a more rapid settlement than expected. At the inland Hudson's Bay Company's posts all kinds of grain and vegetables have been grown successfully for years. A study of the records of the Meteorological Office indicates that the climate is quite as favourable for farming operations as that of Prince Albert."



Typical country on Hudson Bay Railway Survey.

During the summer of 1910, an inspection of the timber along the line of the proposed Hudson Bay Railway from The Pas to Split lake was made by J. R. Dickson, B.S.A., M.S.F., Assistant Inspector of Dominion Forest Reserves, and his report was printed by the Forestry Branch of the Department of the Interior, as a Special Bulletin (No. 17) in 1911. Mr. Dickson's exploration covered a distance of some two hundred and thirty-five miles along the line of railway. The line of inspection followed was along the waterways on the northwest side of

THE PROPOSED LINE OF RAILWAY,

from which men were sent in at intervals of a few

miles in each direction so as to locate the timber. On the return journey the waterway route to the south of the line was taken and similar inspections made from it. The special object was to locate and estimate the areas of commercially valuable timber that could be made use of in the work of constructing the railways, and as a result a good idea of the character and location of the timber along the line has been obtained.

The route followed by the party was from The Pas to Moose lake, thence by portage to Mitishto river, down that stream and via Setting, Paint, Wintering, Landing and Sipiwesk lakes to Cross lake. From the last mentioned lake the party crossed to Minago river, and via that stream, Moose lake and the Saskatchewan returned to The Pas. The area covered was estimated by Mr. Dickson at eight thousand square miles. In addition to the information about the timber of this district given in this report there are many facts as to the topography of the country and its natural resources.

Mr. Dickson's party found that except for a varying percentage of rock outcrop usually in the form of low ridges covered by stunted jackpines, there is a great muskeg extending northeast along the whole course of Mitishto river, and appearing in fact to blanket the entire watershed in the region between Saskatchewan and Grass river systems.

Mr. Dickson's exploring party, in passing from Setting lake to Cross lake, by way of Paint, Wintering, Landing and Sipiwesk lakes, traversed part of the so-called "clay-belt" which, according to Mr. Dickson's report "contains upon the whole from fifty per cent. to seventy-five per cent. of arable land and probably has

A Good Agricultural Future."

The report as to the rocks and soils of the area explored says:—"The bedrock for one hundred miles northeast of The Pas is limestone—probably largely dolomite—and it frequently obtrudes through the muskegs or shallow soils which blanket it. These outcrops form low, narrow, flattened ridges, rising just above the general level of the muskeg, and nearly always running northeast and southwest. The line of contact between this limestone area and the Laurentian granite (upon which it rests conformably) runs northwest and southeast from a point ten miles east of Limestone bay on Lake Winnipeg across the southwest end of Hill lake on Minago river to Cameron falls on the Mitishto, thence passing in a westerly direction along the south shores of Reed, Wekusko and Cranberry lakes. Along this line, especially in the vicinity of Hill lake, there is a zone of deep clays of very promising agricultural value. In the area of granite farther north, the whole future, so far as agriculture or forestry is concerned, depends upon the general depth of the boulder clay. From the mere fact that it is a drift deposit, this depth constantly varies, but only a detailed soil survey of each township could show where and how much. There are large areas of almost pure rock outcrop and muskeg of little or no value even for timber production. But in general, over the great clay belt, the soil, which is almost uniformly

A Very Tenacious Boulder Clay

(nearly free of boulders, however), averages between four and twelve feet in depth, quite deep enough, therefore, for cultivation. It must be understood that

no hard and fast boundary line can be laid down as showing the confines of this clay belt. The change is often so gradual, and so many as yet unknown factors enter—as, for instance, soil depth and possibilities of drainage—that any estimate of the bounds, area and average arable content of this belt can, with our present very limited knowledge, be given only in general terms. I estimate the area of that portion included from north to south between Wintering and Cross lakes, and from east to west between Setting and Sipiwesk lakes at two thousand square miles.

"With regard to soil conditions, drainage is the great necessity everywhere. To render the soil fertile for cropping, the heavy stiff boulder clay must be opened up to the action of the air. Probably the use of a subsoil plough might obviate the necessity for underdrainage over large areas. But however secured, aëration is necessary to change the present cold, dead, impervious soil to a warm, porous, friable one, full of bacterial life, available plant food, and resulting fertility. The soil is exactly similar to that around Cochrane in New Ontario, which yields such large returns under right treatment."

Mr. Dickson says in his report:—"The climate and the soil conditions are the two basic factors which determine farming value. Where frequent or recent fires have not resulted in the formation of purely 'temporary' or 'fire types'—as e.g., young jackpine on heavy clay—a study of the existing flora answers many questions as to the climate and the soil. On well-drained spots as far north as Split lake the flora is almost identical with that of similar sites in Riding mountains of Manitoba, proving that during the growing season these localities lie under one and the same isotherm, or nearly so, And yet Riding

mountains are nearly four hundred miles southwest of Split lake. Two other factors which help vegetation in this northern clay belt are the low absolute elevation—only five hundred to seven hundred feet—and the large proportion of sunlight during the growing season, because of the long day. No doubt also the large proportion of the country covered by water has a tendency to prevent late spring and early fall frosts. In the absence of weather records, it is impossible to say whether the summer of 1910 was an average season or not, but certainly it was favourable for farming operations. There were showers every week and the growth of the native vegetation

Was Amazingly Rapid.

The total annual precipitation, including two or three feet of snow, would appear to be about the same as for western Ontario, to wit, thirty to forty inches. At Cross lake no damaging frosts occurred between June 8 and September 11, an interval of ninety-three days. But as a 'sixty-day' oat or barley in Ontario will mature in that region in forty-five or fifty days—a general rule which applies as well to fruits, roots and vegetables—there would appear to be no difficulty from a climatic standpoint in growing all the hardier products of the temperate zone. The size and the quality of the wild fruits between Setting and Split lakes were first-class. During the last week of July we enjoyed ripe raspberries, gooseberries, black and red currants, blueberries, saskatoons and strawberries (late ones). The first three mentioned were especially fine—the bushes loaded down with fruit as large and juicy as many tame varieties in Ontario. The average temperature of the growing season is about 60°

Fahrenheit. Certainly vegetables will grow to perfection anywhere between Cross lake and Nelson House. At the former we ate potatoes weighing a pound and a half each, dug on the last day of August, and when we left on September 10 the corn and tomatoes were still untouched by frost. I would respectfully point out the advisability of the Dominion Government placing several small experimental stations at suitable points within the limits of this clay belt to make careful test of its seasonal variations and cropping possibilities. When the railway is completed such information will be of the utmost value to intending settlers. The winters are quite as enjoyable as in Manitoba—probably more so. Mr. Clifford, one of the railway location engineers, who has spent two years between The Pas and Split lake, assured me that he

Liked The Winter Season There

much better than the summer. Whereas in many parts of the continent the summer of 1910 was a peculiarly dry one, in Keewatin it was just the opposite. Rain fell frequently, and high winds, especially nor'easters from Hudson bay, were almost constant and occasioned us some loss of time on the larger lakes."

Mr. William Beech, for many years back, and still, a resident of Churchill, in a communication to the press in 1911, wrote:—"The opinion generally entertained concerning the country around the bay and at Churchill is that it is a barren waste, covered with ice and snow for the greater part of the year, and devoid of any vegetation whatever. The opinion is an erroneous one. At the head of the bay there is an area of from two thousand to three thousand

acres where in the summer months good hay can be cut, and which Professor Macoun has pronounced as affording excellent forage. There are many other places also where the same condition exists, and where the country is covered with a rich thick growth of grass. It would surprise you, wouldn't it, if I should tell you that there are at least half a dozen different species of wild fruit which flourish in great abundance in the rocks and among the mosses throughout the country round the bay. Wild black and red currants, gooseberries, cranberries, crowfoot berries, and baked apple berries may be gathered by the bushel in season, and make the very best of preserves, so that we don't really have to depend on dried apples up there as many of you imagine. As for vegetables, I have seen radishes, lettuce, and turnips raised right at Churchill.

"Of course it is generally understood that the winter climate of the country round the bay is usually very severe. The lowest temperature I have experienced there, however, was 39° below zero on Nov. 29, 1906, with a strong wind blowing from the bay, which intensified the cold. It is exceedingly rare to have winds off the bay in the winter months. In winter the wind is generally from the west and northwest, while in summer it is generally from the east and northeast. I have always found the thermometer lower one hundred and fifty miles inland. It can never be called dark in the north, even in the depth of winter."

[14] It will be observed that part of this evidence treats of other districts than the one immediately under consideration; but it cannot conveniently be eliminated here without awkwardly dislocating Mr. Tyrrell's evidence.—(E. J. C.).

CHAPTER III.

THE KEEWATIN AREA.

(Newest Ontario and Northern Manitoba.)

Tree Growth and Timber Resources.

Considerable Areas of Good Timber.—The Range of the More Important Trees.—The Banskian Pine.—Forests of Trees in Many Places that Would Make Good Logs, and Much Pulp Wood.—Occasional Beautiful Forests of Aspen Poplar.—Magnificent Coniferous Forest Northwest of Lake Winnipeg.—Water Power on the Nelson.—Destruction Wrought by Forest Fires.—Ample Supply of Timber For Fuel.

There is considerable evidence showing that there are, in different sections of the territory immediately west and south of Hudson bay, considerable areas of useful timber.

Mr. Richard White, one of the witnesses examined before the Hudson Bay Investigation Committee in 1749 (See p. 8), stated that he saw fir-trees on the banks of Albany river thirty-five or forty

feet long, and fourteen or sixteen inches square at the bottom, and ten at the top, and here and there a small stick of birch; that there were a great many other small pines; but he did not know whether pitch or tar could be made from them, never having seen a trial.

Rev. John Semmens (See p. 36) writes:—"There is a good deal of timber in the valleys and on the islands and lakes of Burntwood river course, though it is sprucy and inclined to be small. I have cut timber as large as two feet in diameter at the butt and fifty feet in height, but this is exceptional. From ten to fifteen inches near the ground is a better estimate of the average size of the trees. The very name of this river suggests the historic fact that the natives of the country deliberately and habitually set the woods on fire, their object being to attract the deer which are known to be fond of the sweet grass which springs from the ashes of a fire swept surface. The result is that large tracts of country are denuded of their rich first growth of trees, and young forests are just coming into the middle stages of growth, while many of the hills stand bald and bare, giving silent evidence of the severity of successive visitations of the devouring flame. Yet the charred stumps and tangled roots here and there speak of a deep and fertile soil, as well as of possibilities of growth which few have associated with a so-called 'frozen north.' However, all the timber necessary for railroad purposes and for the use of settlers in building or for commercial cordwood can be found almost anywhere, the latter in illimitable quantities."

Doctor Robert Bell of the Geological Survey, in his report of his explorations in the

Valleys of Nelson and Churchill rivers

in 1879, states:—"Spruce and tamarac timber are found growing near the sea coast, in favorable situations as far as Seal river, beyond which their northeastern limit curves inland. The spruce, although not growing as a continuous forest quite as far north as Churchill, is still found of sufficient size in the neighborhood of this post to be used for building houses, boats, etc. The balsam poplar is rare and of small size at Churchill. White birch which was found on the main river, eighteen miles above the forks, is said to occur at about sixty or seventy miles west of the mouth of the river."

Doctor Bell proceeds in his report to describe the range of the most important trees over the area covered by his exploits as follows:—

"White Spruce—(the 'Pine' of Rupert's Land),—This is the most northern coniferous tree. On the east side of Hudson bay the last of it is seen on the coast a short distance north of Richmond gulf. On the west side it terminates about Seal river. Thence its limit runs northwesterly, and is reported to cross Mackenzie river about two hundred miles below Peel river.

"Tamarack,—(also called 'Juniper' and 'Red Spruce')—On the east side of the bay it accompanies the spruce almost to the extreme limit. It is abundant at York Factory. Along the lower part of Nelson river it is of fair size, but on the Churchill it becomes small towards the sea. Its northern limit runs northwestward to Mackenzie river which it is said to cross below Peel river.

"Balsam Fir:—(also called 'Single Spruce' and 'Silver Pine')—Abundant around the southern part of James bay and on good dry soil along Albany river. Mr. Cochrane reports it as common around Island lake, but scarcer on God's lake. It is rare and of small

size on Knee lake. In going down Nelson river, it is scarce below Sea River falls, and the last tree which I observed was at the outlet of Sipiwesk lake. On Grass river some good-sized trees were seen as far north as Standing Rock rapid.

"Balsam Poplar:—('Rough-barked Poplar', 'Cotton Tree', 'Balm of Gilead', etc.)—On the west side of Hudson bay, this is the most northern species of poplar. It is abundant around York Factory, and attains a fair size along the lower part of Nelson river. In descending the Great Churchill it becomes smaller and scarcer until the mouth of the river is reached, when it is rare.

"Aspen:—('Trembling-leaved Poplar')—This tree, which is so abundant and of such a thrifty growth around the southern part of James bay and on the border of the prairie regions of the Northwest territories, does not extend as far north as York Factory. In ascending Nelson river it was not met until within a few miles of lowest Limestone rapid. It extends northward nearly to the junction of Little Churchill with Great Churchill river.

"White Birch:—('Canoe Birch')—This species terminates on Hayes river, a few miles below Steel river. On the Nelson, the first tree was met with at seven miles before coming to lowest Limestone rapid, or at seventy from Point of Marsh. In descending the Little Churchill it disappeared about midway between Recluse lakes and the mouth, and in ascending the Great Churchill, it disappeared at eighteen miles above the forks. Along Burntwood river and the upper part of the Nelson it is large enough for building canoes, but becomes better for this purpose to the northwestward, and it is said to be of very good quality around Lake Athabaska."

Doctor Bell states in his 1886 report (See p. 18):

—“The timber all

has suffered greatly from forest fires at many different times, from about a century ago to the present year. Parts of the main shores and many of the islands, especially in the neighborhood of the Grand Traverse, have escaped the fires, and here full-sized timber may be seen. The second growth woods are of all ages, from seedlings of a year ago, up to trees nearly as large as those of the original forests. As elsewhere in these latitudes, where the old forests of spruce, tamarack, balsam, white birch, etc., have been burnt, they are succeeded by a growth of mixed aspens and white birch, with a sprinkling of spruce, or else by one consisting entirely of Banksian pine. In regard to relative abundance, the trees found around the lake may be mentioned in the following order:—white and black spruce, tamarack, aspen, white birch, Banksian pine, rough-barked poplar, balsam, white cedar, pigeon cherry, rowan and black ash. The ground or mountain maple (*Acer spicatum*), which is interesting as an indicator of climate, is common, and it was traced for a long distance down the Albany. Of the above kinds of timber, the white spruce and the tamarack are the most important commercially. The cedar is confined chiefly to the immediate shores of the lake, where it often forms a continuous but narrow border. About twenty spruce logs, for sawing into boards, were lying at Osnaburgh House at the time of our visit. They would average eighteen or twenty inches in diameter at the butts, the largest being about two feet. The six largest showed the following number of rings of growth:—one hundred and thirteen, ninety-seven, one hundred

and twenty-one, one hundred and sixteen, one hundred and seven, and one hundred and twenty, or an average of one hundred and twelve, these rings indicating, it is supposed, a corresponding number of years. A new tamarack flag-staff, which was about to be erected, measured about eighteen inches in diameter at the butt and showed two hundred and forty-four rings of growth."

Doctor Bell reports that on the dry ground along Boulder river the timber consists of black spruce, tamarack, balsam, aspen and white birch, but on the wet, level tracts, it was principally black spruce. All the rapids in Boulder river were overhung by thick groves of good-sized white cedar, and the same tree was met with in groups in some of the swamps at a distance from the river.

Doctor Bell, reporting on the country around Lake Lansdowne, says:—"Except where forest fires have run, large spruce and tamarack trees and some cedars were observed on the islands and on the mainland near the lake, and also along the river between it and Nolin island."

Doctor Bell writes in his report that

Along The Attawapiskat,

"except where the timber has been destroyed by fire, there is a good growth of spruce, tamarack, balsam, poplar and white birch, but it does not extend far back, the country generally being open sphagnum swamps with small scattered tamarack and black spruce trees."

Doctor Bell, at one of his examinations before the Senate committee of 1887, produced as an exhibit a branch of the Banksian pine (*Pinus Banksiana*), often called the jackpine and scrub pine. This is about the

only tree in North America which we can call strictly Canadian. Both its northern and southern limits are practically in Canada. It extends thousands of miles from the southeast in New Brunswick to the northwest, in a belt, throughout the Dominion.

In height this tree grows one hundred feet and upwards. Doctor Bell had seen them six feet in circumference. The largest trees that he had seen of this species were on the upper waters of the southern branches of Albany river. In general, trees attain their greatest perfection in the centre of their geographical distribution. Sometimes they degenerate into brush, at the outside edge of the territory in which they grow. As you go north, south, east or west, they may become smaller and smaller until they die out, but this is not the case with all kinds of trees.

The Banksian pine is not particularly valuable for lumber. It resembles the red pine; it has a coarse, distinct grain and can be used for many purposes. In England it would be used for the manufacture of fashionable bedroom furniture.

It is something like the pine of Florida and Georgia, which has been used for some years past in England in the manufacture of furniture. It would

Become An Article of Commerce

if means of communication with the northern forests were provided. The Banksian pine would make good ties, telegraph poles, and timber for general purposes, besides fuel. In groves it grows very straight, but it is more likely to be branchy than red pine. Doctor Bell had seen hundreds of them in groves, affording logs of from twenty to twenty-two inches in diameter—two or three logs to a tree. It

grows very rapidly. He had seen it, in his own experience, within fifteen years, growing to be useful trees; whole tracts had been covered with good timber.

Asked while giving evidence before the Senate committee of 1887 whether the shores of James bay and Hudson bay are wooded, Doctor Bell explained that on the west side to Seal river, a little beyond Churchill, commercial timber could be obtained from all the rivers flowing in from the south, and jackpine from some, and spruce and tamarack from all the rivers of James bay. This would be all of merchantable size, not extraordinarily large, but plenty of it. The spruce might be described as generally of a small size, but making up in quantity in the number of logs that might be obtained. The tamarack, though, is large.

In the course of his 1886 report (See p. 18) Mr. A. P. Low of the Geological Survey states:—"The trees around Favourable lake consist of white and black spruce, aspen and balsam poplar, white birch, balsam and tamarack, many of which exceed eighteen inches in diameter." On the shores of Sandy lake Mr. Low saw many trees of white spruce, poplar, birch and balsam exceeding eighteen inches in diameter. Between this lake and Severn lake there is a considerable area supporting a growth of black and white spruce, tamarack, poplar and birch, slightly smaller than those seen around the lakes.

As Severn river descends towards Favourable lake "the surrounding country gradually becomes smoother and the timber larger until within three miles of the lake, when the stream passes through low, swampy land, covered with thick, wet moss and a small growth of black spruce and tamarack."

Mr. Low reports the soil about Deer lake as being

"very thin and the timber correspondingly poor, except on a few low points where some white spruce, balsam and poplar exceed fifteen inches in diameter."

Mr. Low (at the time Director of the Geological Survey), in his evidence before the Senate committee of 1907, as to the resources of the more southern sections of Keewatin which he had explored, namely, between Norway House and Hudson bay, stated that the forest, as in a great many other parts of Canada, had been largely destroyed by fire, but around some of the large lakes and on the islands and other places,

A Fair Growth of Timber

is found in that region, with white and black spruce, pine, aspen, poplar and white birch of eighteen inches diameter. The trees are fairly clean, and a great many of them would probably make two or three logs, so that what remains of the timber there is fairly decent and good, except on the low swampy land where the growth is confined to black spruce and tamarack of no great size. Throughout the more southern region described by Mr. Low, there is a good deal of wood that could be used in the manufacture of pulp.

All of the rivers in the region have waterpowers.

Mr. J. B. Tyrrell, in the report of his explorations in the southern part of this region in 1896 (See p. 20), wrote:—"The surface is generally forested, though most of the valuable timber has been destroyed by fire. On Grass, Muhigan and Minago rivers, as well as on the shores and islands of some of the lakes, there are still some forests of excellent white spruce, but on the northern part of Burntwood

river white spruce is rather scarce, and at Nelson House timber for house logs has to be collected from scattered groves and brought several miles up or down the brooks or across the lake. Black spruce and canoe birch grow on the more level and imperfectly drained tracts, and Banskian pine may be seen here and there on the drier hillsides. Canoe birch grows to a good size beside the lakes and streams, but aspen (*Populus tremuloides*) is the commonest deciduous tree, as it grows on the drier uplands everywhere,

Occasionally Forming Beautiful Forests,

but more often, and especially towards the north, partly covering the surface with scattered groves of small trees. Among the smaller trees or shrubs, the rowan tree (*Pyrus Americana*) may be mentioned as growing freely and having an abundant crop of berries along the face of the limestone escarpment, especially around Wekusko and Reed lakes, and the wild cherry (*Prunus Virginiana*) grows beside most of the lakes.

"The forests surrounding Reed lake are mostly of poplar, but there are some good groves of fine large spruce up to twenty-five inches in diameter."

Mr. Tyrrell states that on the southeastern shore of Athapapuskow lake "considerable areas are covered with large white spruce." Almost all the country surrounding Cranberry lakes has been swept by fire, but many of the islands are still wooded with white spruce of fair size. At Wintering lake, "the surrounding shores rise gently from the water, and are densely wooded with a close forest of white spruce, growing on the rich clay soil."

Mr. Tyrrell describes finding the site of an old fur station near Setting lake "completely overgrown with

large spruce trees, quite indistinguishable from those of the surrounding forest." He adds:—"In many other instances the sites of the ancient fur-trading posts could be recognized as small, usually rectangular, poplar-covered areas, in the midst of or on the border of the adjoining forest."

Mr. Tyrrell reports the banks of the south branch of Gunisao river, which flows into the northeast side of Lake Winnipeg, as being "wooded with beautiful tall white spruce, apparently forming

but how far back from the river this forest extends was not determined. There is certainly here a large quantity of valuable timber, much more than was seen anywhere else in the country immediately east of Lake Winnipeg." Spruce up to twenty-four inches in diameter was noted.

In the report of his explorations in 1899 Mr. D. B. Dowling of the Geological Survey states:—"In the southern part of the district, north of Lake Winnipeg, spruce of both the white and black species is found of fair diameter, but in going north the size materially decreases. Over the major portion of the rocky country Banksian pine is the principal tree, which, though not large enough in general for timber, might in the future be of use for pulp wood.

"The hilly country to the south of Sisipuk lake and northwest of Loon lake is not well timbered but the lower land between the two and on the islands is fairly well covered by groves of small spruce."

Mr. Dowling, in his report of 1901 on Ekwan district (See p. 21), states:— "The timber along the coast gradually becomes smaller as we go northward and the tree-line recedes from the shore, leaving it

finally at the Opinnagow so that the country behind that cape is more or less an open plain. The shore, where the trees are at a distance from the beach, is generally an even mud slope, covered above high tide with grass, followed by a wide belt of stunted willows (gray) which look somewhat like the sagebush of the western plains. Behind this, a few isolated spruces of small stature appear before the tree line is reached. In sailing along this coast, it is impossible to know which way to steer so as to run parallel with the land, as nothing can be seen ahead by which to shape one's course."

As to the timber in the interior of Ekwan river district, Mr. Dowling reports:—"Along the streams there is a narrow fringe of timber, but in approaching the tree-limit this becomes very small. Back from the immediate slopes of the rivers the surface is nearly level, and moss-covered, with scattered groups of small spruce and tamarack. The greater part of the interior is reported to be muskeg (open bog). A small collection of about forty species of shore plants was made at the mouths of Ekwan and Albany rivers.

"Mr. Dowling found the surface of the terrace of Ekwan river to be covered with a thick coating of moss, and the timber on it is mostly small spruce and tamarack. Some of the trees might be from six to eight inches in diameter, but the average is much less. At the edges of the bank a fringe of larger trees occasionally appears, but it does not extend far from the stream."

Red Lake river and Red Lake.

In his report of his 1893 explorations Mr. Dowling says the timber on the banks of Red lake

river “is mostly poplar of a fair size with a sprinkling of birch and black spruce. The birch average twelve inches in diameter, but only a few of the spruce trees were found over eighteen inches.”

Mr. Dowling says the forest about Red lake “is somewhat varied, spruce and Banksian pine alternating as the dominant trees. On all the dry and sandy ground a thick growth of slender Banksian pine is found, and no trees of large size are apparently to be seen in such areas, but in the valleys and near the lakes black spruce is occasionally met with, forming small groves scattered through the forests of deciduous trees. Individual trees of larger size are common on the islands and points over which forest fires have not run, and such trees may attain in some instances a diameter of twenty inches, but the average is under eighteen inches. Birch and poplar are almost always present wherever the soil admits. On the richer and lower ground, between Red lake and Gull Rock lake, and farther down the river, the poplar trees are well grown and appear in groves in which nearly all trees average eighteen inches in diameter near the base. Farther to the westward on the higher ground, the soil being sandy, the Banksian pine is more abundant, and near the western end of Pipestone bay, some trees of red pine form a small grove, which appears to be the northern limit of the species in this basin.”

Mr. Dowling says the trees near Trout lake river are mostly poplar, with slender spruce on the lower land just behind. Occasionally Banksian pine is seen on the drier parts. Mr. Dowling mentions a tall forest of poplar and birch as bordering the western branch of White-mud river.

Speaking of the country explored by him about

Lac Seul, Mr. Dowling says:—"The country is well covered by timber but of small average growth. The sandy tracts are generally wooded by Banksian pine, but in the river-valleys and on the heavier land, poplar, birch and spruce are abundant. White and red pine are found in small groves south of Lac Seul and are of good average size for timber. On the lake are scattered trees of both varieties. The northern limit of red pine extends to Red lake, where a few trees were observed. Cedar of inferior growth occurs in isolated localities and extends northwest to the height-of-land, but none seem within Berens river basin."

Basins of the Winisk and the Attawapiskat.

According to Mr. McInnes's report of his survey of the region drained by the Winisk and the Attawapiskat in 1903, 1904 and 1905 (See p. 23): —"The average size of the trees growing within the country explored is not great. On exceptionally favourable tracts the spruces attain sizes quite large enough for commercial use as sawn lumber, and large areas would afford good pulpwood. Evidences of the constant recurrence of forest fires over the area are everywhere plainly seen. The brulé areas, varying from quite small patches to large tracts, are of every age; some are so old the forest has attained the full height of the old growth and the newer age of the trees can only be ascertained by a reference to their rings of growth, and others so recent that no vegetation covers the blackened surface. These fires are generally the result of the carelessness of Indian travellers, but may sometimes be traced to the igniting of a dry, standing tree-trunk by lightning. The oldest trees found in the whole area were

growing on a till-covered island, about fifty miles from the mouth of Winisk river. The complete isolation from the mainland by broad channels ensured its protection from fires having their origin outside its own borders. The spruces growing here were found by their rings of growth to be between two hundred and seventy and two hundred and eighty years old. The diameters and ages of trees, growing in a number of different localities throughout the region, were noted, and are given in the list below:—

				Diam. in in. 3 ft. from ground.	Ag by ring of grow
Tamarack,	Winisk river,	32 miles from mouth		9	10
Black spruce	"	32 "		12	12
"	"	32 "		12	15
"	"	32 "		8	7
"	"	50 "		10	27
"	"	65 "	near bank	8	13
"	"	65 "	"	6	11
"	"	65 "	10 chains back	3	10
Tamarack	"	65 "	"	3	8
Black spruce	"	below Wapikopa lake		10	13

"	"	Wapikopa lake	9	14
"	"	"	6	13
"	"	Nibinamik lake	9	7!
"	"	"	5	7!
"	"	above Nibinamik lake	15	13
Aspen poplar	"	"	15	13

Note:—It will be observed that this paragraph and other portions of thi testimony really refer to the Athabaska country treated of in the preceding chapter; but to save an awkward dislocation of Prof. Macou testimony, it has been kept intact. (E. J. C.)

As to the region explored by him in 1906 (See p. 23), Mr. McInnes reports:—"Though a wooded country throughout, there are but limited areas where the forest growth is of a size to be commercially of much value. There are no hard woods, the only deciduous trees that attain merchantable measurements being the canoe birch, the aspen and balsam poplars and the tamarack. Black spruce is the most abundant coniferous tree and grows to a size sufficient at least for pulpwood. Associated with tamarack, it covers all the more marshy tracts, giving way where the land becomes drier to white spruce, which is the timber tree of the region, and on the driest ridges to Banksian pine. Forest fires have been widespread and most destructive throughout the whole region sparing only the very wet muskeg areas and a few tracts isolated by surrounding water or marsh.

"White and black spruce, tamarack, aspen,

balsam and canoe birch form the forest surrounding Cross lake, the deciduous trees for the most part growing only in a fringe along the immediate shores.

Trees of Suitable Size for Sawing

into eight and ten inch boards are found on the islands, along the stream valleys and in places near the lake shores, but the general average size of the trees inland is smaller than this."

Mr. McInnes has the following to say of the timber he noticed in his ascent of Burntwood river: —"Above Odei river the forest is mainly spruce and tamarack of about sixty years growth, the larger trunks reaching diameters of from eight to ten inches, but the general average not more than six inches. In the valleys occasional white spruces and tamaracks attain diameters as great as eighteen inches. These are trees that have escaped when the surrounding forest was burned and are sufficient evidence that, but for the repeated fires, there would be large areas covered with good timber. In the fifteen mile stretch of the Burntwood below Waskwatim lake, the low flat along the river is covered by sixty years' timber growth, mainly of Banksian pine and spruce. The higher plateau is wooded principally with spruce from six to eight inches in diameter, with scattered Banksian pine, poplar and white birch succeeding an earlier burned forest. A mixed second growth forest, mainly aspen poplar, covers all the uplands round Waskwatim lake, while on the islands and on low flats bordering bays of the lake are found white spruce and poplar of diameters up to one foot. The country north of Footprint lake is described by Mr. McInnes as being covered for the most part with a mixed second

growth from ten to thirty years old, but with here and there clumps of white spruce, with tall and straight trunks a foot or more in diameter. As to the region just north of the Saskatchewan, Mr. McInnes says the areas of forest, where the trunks are large enough to be of commercial value, are limited. The principal tracts of large standing timber are situated to the north of Moose lake, to the west of Atikameg, in lower Grass river valley and on the ridge separating Cormorant and Yawningstone lakes. The last named tract contains white spruce of exceptionally large size with tall clear trunks. Smaller areas are found on islands and points in the various lakes, along the upper valley of Cowan river, and in clumps along all the stream valleys in the district. Smaller timber, mainly black spruce, that would be of value for pulpwood, is much more widely distributed over large areas."

Mr. McInnes made a computation of the age of the trees in the area he explored and found that the

Annual Growth is Slow.

They run from four to fourteen inches in diameter. They would furnish, he thinks, very strong and firm lumber, and the smaller trees, owing to their closely packed fibres and the comparative absence of open cellular matter, would be especially well adapted for the manufacture of pulpwood for paper making.

Mr. McInnes, in his evidence before the Senate committee of 1907, stated that the western part of Keewatin has evidently been a country of good timber generally, but unfortunately it has been almost all burned over, so that the only areas of good timber that he knew of were the area north of Moose lake, the area west of Clearwater lake, and the area

between Cormorant and Yawningstone lakes. He made cross-sections in that country several times, and he found white spruce, and the largest tree he found was thirty inches in diameter. He would say most of these trees make about three fourteen-foot logs because they were growing thickly, and it was a regular white spruce timber limit. There were a great many from ten inches up to twenty-three inches. That is an area about six miles long by two or three wide, and going through that there are areas of swamp. He cross-sectioned through it, and would come to a quarter of a mile of good trees, and then perhaps a mile of swamp land with black spruce, and half a mile of good trees right across. North of that point there are only a few isolated areas of timber that had escaped the fire. On the islands and lakes there were pretty good timbers, and on some little peninsulas that are nearly cut off; otherwise it had all been burnt.

About Waterpowers.

Specially referring to waterpowers, Mr. McInnes, in the report of his explorations in 1906 (See p. 23), says:—"Between Lake Winnipeg and Split lake, a distance of about two hundred and twenty-five miles, the Nelson river has a descent of approximately two hundred and seventy-five feet. The current between the numerous lake expansions is generally swift, and upwards of a dozen falls and rapids occur, some of the former offering magnificent sites for water powers. The aggregate power that could be generated along the river is enormous, as the amount of water passing over the various falls is very great. The volume of the river can be appreciated by a consideration of the extent of its drainage area,

which embraces all the country westward to the mountains between the watershed of the Churchill and Athabaska on the north, and the Missouri on the south, and eastward to the head waters of Albany river, and within fifty miles of Lake Superior."

Mr. Owen O'Sullivan, in his 1906 report (See p. 23), states that the shores of Assean lake, which is about twelve miles long and a mile wide, are "well wooded with black spruce, tamarack, and white birch." The forest growth at Waskaiowaka lake is chiefly black spruce and white birch of from four to fourteen inches in diameter. Mr. O'Sullivan describes a hill of drift "covered mostly with black spruce averaging eight inches in diameter" as rising for two hundred feet above the level of the water on the east side of the expansion of the Little Churchill below Waskaiowaka lake. As far down as the junction of Switching river the country on both sides of the Little Churchill produces black spruce, white birch and tamarack of small size. From a point eighty miles down the Little Churchill northward, the country, which was overrun by a fire that occurred some forty years ago, is now partly covered with bunches of second-growth black spruce, tamarack and white birch. Bunches of spruce and tamarack that escaped the fires were frequently met close to the water's edge.

In his evidence before the Senate committee of 1907, Mr. O'Sullivan stated that in his trip in 1906, the only timber he saw was at Split lake—spruce, poplar and white birch, from four to eighteen inches in diameter. The country between there and Big lake is swampy and bears black spruce with small spruce averaging four to six inches in diameter, which would make good pulpwood. Then around Wabishkok there are birch and white spruce, and so

on. They are a little larger, as large as six to eighteen inches in some places, occurring in isolated groves. The black spruce would average in the nice terraces and level clay slopes from the lake about eighteen inches. They grow that size and more. North of that, between there and the tree limit or the open barren ground, the country was

RUN OVER BY FIRE

about forty years ago, and probably there was another fire which occurred about five years ago, so there are no trees. Going down the Little Churchill there are no trees to be seen on the heights, except in the valleys of the river, where groves of spruce and poplar which escaped the fire are standing. These spruce and poplars which are in the valleys are sometimes twenty inches in diameter. The cottonwood grows to about fourteen inches. It is tall and very healthy looking. The spruce trees grow pretty long, and quite a number of sawlogs could be taken out of each tree. The soil is pretty good, but the area is small. After leaving Big lake, all the way down there is no timber at all. In the valleys of all the streams there is timber, consisting of bunches of spruce and tamarack. At the Big Churchill the clay hills are mostly covered with moss. It has been burned over, and there are good large spruce in the valleys of Little Churchill river away up to about eighteen or twenty inches in diameter, but they are very few. They are all very healthy looking trees.

In 1902, Mr. Alfred W. G. Wilson, of the Geological Survey, made a reconnaissance traverse across the southern part of the unexplored area lying to the north of Lac Seul and east of Trout lake, visiting Slate, Marsh, Gull, Smoothbrook, Cat and St.

Joseph lakes. He states in his report:—"The forest growth is found chiefly around the lakes and streams. The sands, sandy gravels, or clays, usually of glacial origin, are generally forested, the trees varying with the character of the soil. There are large areas of nearly bare rock, where only a few stunted conifers or poplars grow in the crevices. Where the soil is sparse, and the country low-lying but yet fairly well drained, there is an open forest, chiefly black spruce, and the ground is covered with a dense mat of moss interlaced with fibrous roots. The soil covered, and the swampy areas, are usually thickly overgrown with small shrubs, mostly alder. In general the timber is rather small, in most parts of the district at present too small even for pulpwood or ties. Occasionally along streams the trees are larger, especially north of the east end of Lac Seul. Another area of good timber, chiefly black spruce and tamarack, occurs along Root river between Lac Seul and Lake St. Joseph."

Mr. J. W. McLaggan, in the account of his trip in 1907 (See p. 58), describes the country between The Pas and Clearwater lake as covered with small, mixed timber. On the north side of Cormorant lake, and along the creek which connects it with Lake Yawningstone, and on the south side of the latter lake, he saw from three to five million feet of good milling spruce timber. Along Cowan river the country is described as low and flat, with small quantities of good spruce timber in spots until within a few miles of Black Duck lake when bunches of good spruce, estimated at ten million feet, come into view. After crossing Black Duck lake the country continues low and marshy, with scattered bunches of spruce and tamarack of a size suitable for ties or pulpwood. As Mr. McLaggan approached Reed lake

he passed through low and swampy country covered with scrubby timber. To the south of Reed lake about a million feet of medium sized spruce were sighted. The country back was found to have been burned over and now growing poplar, which, in a few years, will make good pulpwood. On the north side of Herb lake there are spruce and poplar fit for railway ties and pulpwood, and along the river to the rapids there are small bunches of jackpine and tamarack and of merchantable spruce, but back from the lake and river the country appeared all burned. Mr. McLaggan expresses the opinion that there must have been a good timber area bordering these waters, and that, if fire can be kept out,

Reforestation Will Soon Be Effected.

Along the shores of and on the islands in Setting lake there is, Mr. McLaggan estimates, about ten million feet of young, sound, clear spruce timber, averaging from twelve to fourteen inches in diameter. Between Setting and Paint lakes are two falls of thirty feet, where splendid power can be developed; the banks of the river become higher and there are small bunches of spruce and poplar, but back from the river has been burned over. On the south side of Paint lake there is a fairly good bunch of spruce, suitable for railway ties or pulpwood. Back from the lake the country has been burned over but is growing up again with poplar and other trees. On Methye lake Mr. McLaggan found the timber to be mainly jackpine and tamarack of small size, a limited portion of which would be fit for railway ties. Traversing File river, with the exception of a bunch of spruce of about half a million feet, averaging twelve to fourteen inches in diameter, there was seen

nothing but small, scrubby mixed timber of but little value. The country back from the river has been burned over. Between Reed lake and Elbow lake he saw about two million feet of good spruce and poplar, averaging from twelve to fourteen inches in diameter. Towards the lower end of Cranberry lake there are bunches of good spruce. It is estimated that there are a million feet in all. The country continues rough and rocky, with patches of good land and some muskeg. In the country between Cranberry and Athapapuskow lakes there is a poor growth of scrubby timber. Some small bunches of spruce were seen along Athapapuskow lake near the portage, and by Goose river, but the country has all burned over, leaving only small clumps of spruce. Speaking generally of the timber in the area explored, Mr. McLaggan reported:—"The fires seem to have burned over nearly all the country and I was not able to walk far enough into the interior to find any land not burned, and from information gathered from Indians and trappers, would conclude that this burned land reached from Grass to Burntwood river, with the exception of small pieces along the lakes and rivers. There is a growth of young timber coming up, since the fire, which may be of value in time."

W. Thibaudeau, C.E. (See p. 23), states in his report that although there is no merchantable timber in the vicinity of Churchill, there is abundance of fine building stone and limestone to be found everywhere, and there is also an ample supply of timber for fuel purposes for many years along both banks of Churchill river and around Button bay. He continues:—"Between October 24, 1906, and November 9, 1906, I made an exploration of the country between North river and Churchill river for a distance south of Button bay, of about twenty miles.

On the

East Side of Button Bay

I found a strip of good timber, consisting of spruce and tamarack six to ten inches in diameter, about half a mile wide and extending three to four miles in length on the east side, between the southern ridge of Churchill peninsula and the bay, and about three miles south of Churchill. At the head of Button bay (and parallel with it), there are a number of parallel ridges extending to North river. These ridges are timbered with spruce and tamarack four to ten inches in diameter. Close to North river there is a good spruce timber ten to thirty inches in diameter in small scattered bunches, covering a distance of about four miles. At the southern end of the south ridge of the western peninsula at Churchill, there is a strip of good spruce timber, six to twelve inches in diameter, extending about two miles by four miles; also on the east side of the same ridge about one and one-third miles south of Mosquito point, there is a strip of good timber for a distance of about four miles.

"Between December 7, 1906, and December 17, 1906, I made an exploration of the country between Churchill and Owl rivers. Four miles from Churchill river in a southerly direction I crossed a ridge, running in a northeast and southwest direction at about one and one-half miles from Hudson bay, extending opposite to Mosquito point. From the point of crossing to the bay, on the sunny side, the ridge is well timbered with spruce six to twelve inches in diameter. Twenty-five miles from the starting point, I crossed another sandy ridge with scrubby timber. Two miles west of this point there is

a barren hill known as White mountain, three hundred feet in height by one mile in length. At the eastern woods there are a few square miles of spruce and tamarack averaging six to eight inches in diameter. Close to White Whale lake I crossed another gravel ridge having no timber. On each side of Salmon creek there are scrubs, willows and small spruce, with grassy meadows. At Broad river to the left of the place of crossing, for about four miles there is a strip of timber one-third of a mile in width, eight to fourteen inches in diameter, consisting of stunted black spruce."

The section about Waskaiowaka lake is fairly level and dry, with some scrub timber. The banks are steep and covered with very thick mossy peat, probably ten feet thick. The timber consists of black spruce and white birch from five to sixteen inches in diameter. From the Hudson's Bay Company's post on Split lake to the mouth of Grass river, the country on the east side of the lake is undulating, and part of the banks and islands is fairly timbered with spruce. Part of the shore of Landing lake and the islands are well timbered with spruce six to ten inches in diameter. Travelling from Landing lake to the head of Sipiwesk lake, the country was found dry and well timbered with spruce from eight to fourteen inches in diameter. The islands of Sipiwesk lake are well timbered with spruce, some being thirty inches in diameter. On Reed lake, the islands are well timbered with spruce six to fourteen inches in diameter. From Reed lake to Station 616 the country is level, forty per cent. being swampy. There is some spruce and tamarack timber four to eight inches in diameter. On the north side of Cormorant lake, there is a strip of timber, four miles wide by ten miles long.



Log jam on Limestone river.

THIS TIMBER WAS THE BEST SEEN

while exploring around that country.

Mr. Thibaudeau describes the country from Split lake and extending to The Pas, ten miles in width on each side of the proposed route of the Hudson bay railway, as “a pulpwood belt”. He says in his report: —“On this area, assuming one-sixth to be covered by pulp wood, the balance being river, lakes, ponds, swamps, etc., and assuming ten cords per acre of an average of six inches in diameter, there would be five million seven hundred and fifty-six thousand six hundred and sixty cords. This is a very low, but safe estimate.”

Mr. Thibaudeau makes the following reference to the water powers in the region explored by him: —“Deer river at its mouth has a minimum flow of seven thousand cubic feet per minute. A dam, eighteen feet high, can be built at reasonable cost and would generate one thousand six hundred horse-power. Two dams of the same height could be built within ten miles of the river mouth, which is twenty-

five miles from Churchill. North river, which is three hundred and fifty feet wide during December, had a flow of not less than two hundred and fifty thousand cubic feet per minute. With a fifteen-foot dam, it would generate about five thousand horse-power. On Churchill river, within sixty to eighty miles from Churchill, large waterpower could be developed and transmitted to Churchill. Nelson river, Burntwood river and Grass river have a number of falls which could be utilized for the development of power for use in pulp mills or other industries."

That portion of Mr. J. R. Dickson's report (See p. 60) referring to the timber of the district between

THE PAS AND CROSS LAKE

explored by him in 1910 is especially valuable. He states:—"In the region we traversed, only five species, namely,—spruce, poplar, tamarack, birch and jackpine have any possible commercial value, and of these, speaking generally, only one, spruce, is large enough for sawmill purposes or railway tie material. The poplar, birch and pine are invariably too short, spindly, limby and crooked for any use save fuel or pulpwood, and what mature tamarack there was is now standing dead from insect attack. We did not find over two hundred green tamarack above ten inches in diameter all summer. This remnant is on the northeast end of Bear island in Sipiwesk lake. Black spruce is easily the predominant species in all that region, and, except on very occasional well-drained tracts of spruce-flat type, where it reaches ten to fourteen inches in diameter at breast height, it is a small spindly tree, only four to eight inches diameter breast height at maturity, useless even for second class ties. This is the

condition in which the jackpine also occurs. The white spruce, therefore, is the only species large enough to furnish construction timber, sawlogs, or even railway ties, and the supply is very limited. In the first place, this species occurs only on the best drained spots, such as river and lake margins or on the small islands; in the second, the fires of the past one hundred years have destroyed nearly all the old stand. To sum up then, only a mere fraction of one per cent. of the area we surveyed now carries merchantable timber—a fringe along lower Mitishto and upper Minago rivers, and on a few of the islands and peninsulas in the larger lakes—as shown on the map. There is probably enough timber available to build the rough construction work of the Hudson Bay Railway.

"From the mere size of the country and the density of the oncoming second growth stands, the possible supply of firewood is enormous. Because of its remoteness from settlement, however, it has no present commercial value. Owing to the killing by bark beetles of practically all the larger tamarack (or possibly killed by larch sawfly previous to beetle attack, though we found no trace of the sawfly), there is almost no green pile timber of any value in the whole region. Hence, unless by importation, the only choice left is between dead tamarack and the largest of the close-grained black spruce. The latter would remain sound in soil contact for about ten or twelve years, which would satisfactorily cover the first initial experimental stage in the operation of the new road.

"Just at the present time, within the area we inspected, the timber is too young and small upon the whole to be cut at a profit even for pulpwood. But in the absence of fires for twenty years the now

eighty-year-old stands of four to eight-inch timber can be profitably cut for this purpose, and it is probable that within the next quarter of a century part of the

Enormous Energy Now Running Free

in the falls and rapids of Nelson and Grass rivers will be harnessed to drive pulp and paper mills. The age of the reproduction is in nearly every case a measure of the time which has elapsed since the last destructive fire occurred. As a general rule, to which, however, there are endless local exceptions and variations—the young growth is approximately either forty or eighty years of age, the former being now one to four inches in diameter, and the latter four to eight inches, but none yet large enough for making railway ties. It will, however, soon be suitable for pulpwood. Scattered trees from older stands occur in this second growth, but not in sufficient number to repay the cost of lumbering. The rate of growth in the very dense stands that are usual in that latitude is decidedly slow except where the soil and drainage conditions happen to be just right. Black spruce on semi-muskeg, a site of average quality for that species, is only four to five inches in diameter breast height at one hundred years. White spruce is rather fastidious regarding moisture conditions and only appears on fairly well-drained spots, attaining there a size of eight to twelve inches diameter within a century. Poplar in that time reaches eight to ten inches. As for jackpine, occasional trees reach twelve to sixteen inches, but only after long immunity from fires, and such trees are too limby for use. I saw no jackpine stand where the trees would average even six inches in diameter.

If the general drainage conditions could in some way be improved so as to partially replace the unprofitable black spruce with the white species,

would be immeasurably greater."

Mr. William Beech of Churchill, in his communication to the press referred to in the preceding chapter (See p. 63), writes of the timber resources of Hudson bay region:—"Another valuable asset of the district is the timber which everywhere dots the regions around the bay. The most northerly species is the spruce, which extends north of Churchill about forty miles, as far as Seal river, and which attains the height of about thirty feet and an average diameter of from twelve to fifteen inches. The balance of the timber is pulpwood and this exists in unlimited quantities. When you consider that the best of water power is available all along the rivers for the manufacture of this product, it will be seen that this is but another of the valuable resources of the district."

As to the water powers available, Mr. Beech writes:—"There are a great number of magnificent water power sites, within very easy access of the surveyed route of the railway, all of which can be easily developed to furnish almost unlimited electrical energy. Hydro-electric energy could be developed at any one of these sites within a distance of thirty miles from the road, which would make transmission to points along it, or possibly operation of it actually, by electricity. It certainly assures cheap power for any manufacturing or milling centre which may develop. All these power locations must inevitably become very valuable. A few years ago, no

one, with the exception of one or two far-seeing and experienced individuals, believed in the power propositions on Winnipeg river where so much development is now taking place. To-day what are they worth? They cannot be bought at any price. I believe the same will be true of the sites contiguous to the Hudson Bay Railway."

CHAPTER IV.

THE KEEWATIN AREA.

(Newest Ontario and Northern Manitoba.)

Economic Minerals.

The Rocks in Many Cases Highly Magnetic.—Norite Rock Similar to That at Sudbury About Trout Lake.—Peat in the District North of Lake Winnipeg.—A Large District Underlain By Keewatin and Huronian Rocks Which "Has Large Possibilities."—Gypsum.—Building Granites.—Quartz Veins on Grassy River Below Reed Lake.—A Possibility of Nickel Occurring.

The evidence contained in the report of the British parliamentary investigation of 1749 shows that from the establishment of the first trading posts along the shores of Hudson bay, the attention of the officials and servants of the Hudson's Bay Company was attracted by the statements of the natives as to the existence in the country of deposits of economic minerals. The earliest authorities of the trading company appear, however, not only to have

abstained from investigating the mineral resources of the region, but to have discouraged their employees from prospecting, desiring them to concentrate all their efforts upon the fur trade. Many of the witnesses before the committee repeated in their evidence statements obtained from the Indians as to the existence of deposits of lead, and particularly of copper, in the north, doubtless referring to the then unknown Coppermine district.

The only evidence heard before the committee, unquestionably bearing upon the mineral resources of the territory immediately under review in this chapter, was given by Alexander Browne, who had been six years in the company's service as surgeon at the bay, and who stated that he had seen large quantities of red earth, which was obtained about thirty-six miles to the southward of Churchill river; that he had tried some of it in a crucible, and found it to contain a heavy metallic substance like cinnabar, and a fluid like quicksilver. This trial was only to satisfy his curiosity, having received no orders to make it; but the

GOVERNOR WAS PRESENT AT THE EXPERIMENT,

and upon the witness presenting his surprise to him that the company did not endeavour to improve these discoveries, the Governor answered that he was likewise surprised that they did not.

Rev. John Semmens (See p. 36), writing of his observations while on service as a missionary in the Burntwood district, says:—"It was not my business to seek for minerals, but having been a miner in earlier years, I had my eyes open, and found many indications of deposits which, in my opinion, at no distant day will contribute largely to the commercial

development of the north. I shall be surprised if one of these lodes is not found at or near the southern outlet of Beaver Dam lake. And there will be many others."

Doctor Robert Bell, of the Geological Survey, describes the rocks of the eastern part of Lake St. Joseph as "corresponding with some of those of the Huronian series. On the northern side, three miles from Osnaburgh House, there is a grey mica schist." On the Albany, two and a half miles below Shabushquaia river, "Huronian rocks make their appearance. They consist of light-greenish, rather finely crystalline hornblende schist; black, with some light-coloured schist, together with fifteen or twenty feet of fine-grained banded magnetic iron ore, with slaty partings. A specimen of this ore was analysed by Mr. Kenrick of the Geological Survey, and found to contain 42·09 per cent. of metallic iron, and to be free from titanic acid. Along with the magnetite is a band of iron pyrites, a few inches thick, with traces of copper." A dark green hornblende schist occurs at two miles before coming to Shabushquaia river. It holds patches of calc-spar and quartz running with the cleavage. Specks of copper pyrites were found in small quartz veins in the schist at the foot of the falls at the eighth portage below Lake St. Joseph on the Albany. At the eleventh portage Doctor Bell examined a number of veins of quartz holding epidote and hornblende, but no ores could be detected.

Doctor Bell, before the Senate committee of 1887, referring to his first voyage to Hudson bay, explained that lignite had been found inland in the country south and west of James bay. It belongs to a more recent geological formation than the lignite in the vicinity of Edmonton.

Mr. A. P. Low, in his report of his examination of the country between Lake Winnipeg and Hudson bay, says “The rocks in several places

ARE HIGHLY MAGNETIC,

and probably contain large quantities of iron ore, both disseminated in small crystals through the rock, and in large masses.” When being examined before the Senate committee in 1907, Mr. Low, then Director of the Geological Survey of Canada, drew attention to the fact that the map of Keewatin showed a large number of lakes, like Gas lake, Island lake, Favourable lake, Severn lake, Trout lake, etc., and remarked that wherever these patches of water are seen it indicates softer rocks than the other parts. These rocks are usually Huronian, and in many places they carry good indications of minerals, copper pyrites and different sulphides of that kind. At Trout lake there is a large area of what is called norite rock. These are the rocks in which the nickel deposits of Sudbury occur, and there is great probability of a small deposit being found up there.

There have been no indications of coal discovered in Keewatin, but Mr. Low explained that on hurried trips such as he had made it was impossible to examine mineral deposits very much, and one is liable to lose many of them. The general character of the southern part of Keewatin as regards mineral resources is good.

In the bank of Nelson river, opposite the mouth of Pine creek, Mr. J. B. Tyrrell reports a dark grey, rather fine-grained diorite or uralitic diabase, probably forming part of a large dyke cutting the gneiss. “Near the north end of Little Playgreen lake is a light reddish-grey massive biotite-granite cut by

veins, a foot or more in width, of red pegmatite containing crystalline masses of molybdenite, with occasional crystals of pyrite and magnetite."

Mr. Tyrrell reports copper and arsenical pyrites in a diabase dyke exposed in an island in Pipestone lake two miles and a quarter from the mouth of the river.

He reports the cliffs on the lower part of Burntwood river as being "occasionally overlain by a small thickness of peat." He reports other deposits of peat in the district north of Lake Winnipeg.

Before the Senate committee of 1907, Mr. Tyrrell explained that the primary object in all his explorations was the mineral development of the country, and any other information that he collected was incidental. He stated that there is a district from Cumberland House northeastward towards Nelson river which is underlain by what are known as

KEEWATIN AND HURONIAN ROCKS,

the same kind as those in which minerals are found in northern Ontario at the present time. The very existence of those rocks was barely known. There had been practically no exploration of them, no prospecting, so that no one could say as to whether they were to be a barren portion of those rocks which are rich elsewhere, or whether they were to be like the Huronian and Keewatin rocks elsewhere, rich in mineral of some of the kinds so much desired. Comparing them with the rocks in other places, they have large possibilities. From that point there is an area of sandstone in the vicinity of Cree lake which may contain copper, but nothing much was known of it. It is about the age and character of the rocks that are rich in copper around Lake Superior, but no mineral wealth has yet been found in it.

Mr. D. B. Dowling, in his report on the survey of Burntwood-Nelson-Lake Winnipeg district in 1899, predicts that the several large areas of Huronian rocks which he outlines will at some future time be thoroughly prospected, and, as has been the case in nearly all such areas, ores of the useful and precious metals are likely to be found. “As it is at present, a very hasty visit has shown that many quartz veins and intrusive dykes cut these rocks, and indications of the precious metals are not wanting. In the Pipestone area on Nelson river, mispickel and copper pyrites are recorded by Mr. Tyrrell, as well as a promising showing of mica on the south side of Indian Reserve island, on Cross lake.”

In Severn district, in the southern part of the old district of Keewatin (now part of Ontario), there is a large region lying to the southwest of Cape Henrietta Maria, that had never been geographically explored before 1901. In the year named, Mr. Dowling was entrusted to do this work, and was instructed to make an instrumental survey of Ekwan river, the largest stream in this region. A micrometer survey of the river was made to the mouth of the Washagami branch, a distance of one hundred and fifty miles. The general valley was found to be a narrow cut through clay, with cut banks on either side for most of the distance to the first branch. As directed by his instructions, Mr. Dowling

Looked for Gypsum

between Moose Factory and Albany, and found some loose pieces of it in the vicinity of Nomansland.

“It is quite likely that this mineral occurs in situ in the vicinity,” Mr. Dowling states in his report.

In another part of his report Mr. Dowling states:

—“Silurian limestone is found on Trout river, draining Mill lake, as well as in the bed of this lake just north of the trap rocks. The rocks at the narrows of the lake, described in the maps, as ‘high and romantic’ are cliffs one hundred and fifty feet in height of trap, capping horizontal beds of probably Animikie age. The trap overflow covers the uneven surface of these rocks, in much the same manner as Nipigon bay in Lake Superior. The underlying rocks are dark slates impregnated with iron ore, and interbanded with beds of jasper. Some of the beds seem to contain a high percentage of magnetite and hematite. On the east shore a section of about ninety feet of these jasper and iron-bearing slates is exposed above the lake, but on the west side they have been brought down to below the water level by a series of north and south faults and the exposures there are of trap alone. These rocks form an east and west ridge reaching to the lakes on the Washagami and eastward to a large lake on a branch of Trout river, which, as before stated, drains Sutton Mill lake and runs to the north.”

Mr. Dowling reported iron ore in the vicinity of Sutton Mill lake, west of James bay, and south of Hudson bay. On the east coast of James bay and Hudson bay abundant evidence of iron ore had been discovered; in fact, two large islands, Taylor and Gillis islands, are said to be almost pure iron ore.

Mr. D. B. Dowling, in his report of 1902 (Part F.F. Geol. Sur. Report) says:—“Small deposits of peat are to be found in various places, but the most important, from an economic point of view, is the area north of Lake Winnipeg described by Mr. Tyrrell. Along the valley of Burntwood river, where it is cut through the thick clay deposit, the general surface of the terrace is quite level. The drainage

near the river is general, but back from the edge of the valley, on the more level parts, there is very often a wide expanse of swamp covered by a stunted growth of spruce and carpeted by heavy layers of moss. These swamps may at some future time supply peat for fuel."

According to the report of Mr. Wm. McInnes, who explored in 1906 (See p. 23) the basins of Reed and Wekusko lakes and Grass river, there are areas of intrusive granite, some of which, below Reed lake, are of even texture and bright red colour and would furnish very beautiful stones for monumental work and ornamental building. Palæozoic limestones cover all the country between the Saskatchewan and an east and west line cutting the southern ends of Reed and Wekusko lakes. The rocks are, as far as examined, magnesian and are probably all dolomites. They occur in flat-lying or gently undulating beds, varying in thickness from six feet or more to quite thin and shaly, the latter occurring near the base and the heavy beds forming the mass of the formation. Many of the heavy beds are even-grained and uniformly bedded so that they can be readily taken out in blocks of even thickness and of any required size. Many of the low cliffs near the lakes are so situated as to be admirably adapted for quarrying. Quartz veins are plentiful throughout the Keewatin belts, but, with the exception of arsenical and iron pyrites and traces of copper (near File lake), no valuable minerals were found in them, though their character, particularly where exposed on Grassy river below Reed lake, was

Considered Promising Enough

for the occurrence of the minerals that are so often

associated with these rocks. The prevailing rocks exposed along Nelson river are biotite gneisses. Only at two places on the shores are other rocks seen, at Pipestone lake and on the southern shores of Cross lake, where a belt of Keewatin rocks crosses, and for some miles follows the river valley. The exposures at Cross lake are promising looking for the occurrence of gold, resembling closely, as they do, the gold bearing strata of the district east of Lake of the Woods. They are cut by intruded masses of the same crushed granite with blue opalescent quartz, known locally in the eastern region as *Protogene*.

Mr. William McInnes, in his evidence before the Senate committee of 1907, stated that in the region just west of Hudson bay there are only two or three belts of what is known as the Keewatin rocks. These are the rocks which in western Ontario hold gold. The witness found no minerals in commercial quantities. He found traces of copper on File lake. At Cross lake there is an area of these Keewatin rocks cut by intrusive granite of the same character as the protogene of western Ontario, which are almost always gold-bearing, but nothing has been found there. The limestones would make excellent building material. There are some intrusive granites on Grassy river which are of fine texture and beautiful red colour, which would make very fine monumental stone trimmings for buildings, etc., and would quarry very well. That would be along the projected line of the railway.

Nickel may be Found.

An occurrence, which seemed to Mr. McInnes to be of particular interest, was his discovery on upper Winisk river of a large area of so-called norite rock.

That is the rock in which the nickel of Sudbury occurs. It is quite a characteristic rock. Mr. McInnes examined samples under the microscope, and they are not to be distinguished from the Sudbury rock. That led him to hope that there was a possibility of nickel occurring there too, but he did not find any, although he examined as well as he could. But he had not much time, and was too far away. There are two or three areas of these Keewatin rocks occurring unfolded in the Laurentian, but Mr. McInnes found no minerals in economic quantities in them at all. Near Eabamet river, a tributary of the Albany, he saw crystals of mica in the granite, two and a half inches in diameter. Of course that is not large enough to amount to much, but it shows a possibility that there might be something better there.

Mr. A. W. G. Wilson says of the district north of Lac Seul explored by him (See p. 74):—"There seems to be little prospect of finding valuable economic minerals in the region in paying quantities. In almost all the bands of basic schists small, less often large, veins of quartz occur. At the surface these veins and the associated schists present the usual rusty appearance due to the decomposition of the pyrite. The granites are occasionally cut by pegmatitic dikes. Near the head of Cross lake, a rock, apparently of this character, carries a small amount of molybdenite in crystals varying in size up to an inch and a half across; it is uncertain whether the mineral is of economic importance, but the small size and the poor character of the specimen seen, and the difficulties of transportation point to the deposit being economically unworkable. The extent of the vein is not known. Near the inlet into Slate lake, about three-quarters of a mile from its northeast end, on the eastern shore, is the only place where

magnetic minerals were found sufficiently segregated to produce a noticeable local variation of the compass. Here, stringers of a metallic mineral, probably magnetite, were found. Though this metal is sometimes a constituent of the basic rocks, the more common occurrence of iron ore is in the form of ilmenite. No hematite was noted in the district."

In his report (See p. 60) Mr. J. R. Dickson speaks of the mineral deposits of the area explored by his party south of Cross lake as follows:—"Judging by such necessarily superficial observations as the members of the party were able to make, the region we covered is not well supplied with economic minerals.

Traces of Copper

were found at Wekusko lake, and samples of iron ore at Sipiwesk lake, and careful prospecting might perhaps disclose deposits of commercial value, but everywhere else so far as observed, the obtruding bedrock was either pure granite or limestone. The latter, however, is mostly dolomite, the variety used as a flux in the reducing of iron ores, and future ore discoveries may give rise to such demand. This dolomite also will prove a valuable building stone for prairie towns, when made available by the Hudson Bay Railway."

According to Mr. McLaggan (See p. 58) the section of country about Reed lake is very rocky. Dark coloured granite, streaked with white quartz, extends along the lower end of the lake and for six miles along the river. Four miles farther Mr. McLaggan found indications of iron and saw a good water power. Above Herb lake he saw another splendid water power, very easy to develop, and

along the river below rapids in five places from which fair power could be generated. At the lower end of Herb lake and along the river, granite mixed with white quartz was seen, and at the falls in the river, about twenty miles below the lake, good slate was found. On this lake Mr. McLaggan noted indications of iron. In places along and back from Grass river, on either side, quartz was seen. The country has been burned over, leaving only a few bunches of spruce, and the surface of the rock has been well exposed, so that prospecting would be easy. Mr. McLaggan thinks that this part of the country may prove rich in mineral.

On September 10, Mr. McLaggan reached Paint lake. Quartz was still in sight, but not so frequent in occurrence. There are a number of islands in the lake with rocky shores and small, mixed timber. Below Elbow lake the river banks are high, the country becomes rougher, and fire has bared the rocks of soil. White quartz crops out in considerable quantities. Along the banks of Cumberland lake there are considerable quantities of limestone, which may "become very valuable in time."

Speaking of the region explored, as a whole, Mr. McLaggan considered that as a mineral country it offers a wide field for prospectors. "In the country travelled over there are indications of gold, silver, iron and limestone, and Indians and white men from the north tell wonderful stories of a place called Indian lake, north of Nelson House, and of an island on Burntwood river where various minerals and oil are said to exist."

In his report on the preliminary surveys for the Hudson Bay Railway, John Armstrong, C.E., states: —"Our definite knowledge of minerals is limited to limestone and marble. The limestone occurs in the

southern portion of the line a short distance from The Pas, in unlimited quantities favourable for quarrying, and will probably prove the future source of supply for the greater part of the provinces of Saskatchewan and Manitoba. Marble of a very high grade occurs on Marble island in Hudson bay, and is also found of a fair quality at Churchill. Iron ores, gold, silver, galena, mica and other minerals have been discovered by the Geological Survey at various localities on the bay, all of which are fully described in the reports of that department. Various specimens of the precious metals have been shown to our engineers, but their origin was preserved in so much mystery that they could not be treated as evidence of the existence of the metal in that territory, and might have been used with equal effect to demonstrate the richness of a deposit in Colorado or Johannesburg."

CHAPTER V.

THE KEEWATIN AREA.

(Newest Ontario and Northern Manitoba.)

Game, Fur-bearing Animals and Fish.

Flocks of Wild Fowl that Obscure the Sky.—Six Species of Seal in Hudson Bay.—Stocked with Animals of Various Kinds.—White Fish Abound in Most of the Lakes and Streams.—Saw Eleven Moose in One Day.—The Commercial Value of the Sturgeon Fisheries.—Future Summer Playgrounds.—Barren Lands Caribou at Churchill.

The immense resources of this territory in the matter of fur, fin and feather, are traditional, but the testimony of residents and explorers as to distribution, present conditions, etc., are interesting and important.

Doctor Robert Bell, in his 1886 report (See p. 17), says the Indians around Lake St. Joseph "live principally upon fish in summer and rabbits in winter, but these resources are supplemented by geese and ducks in the spring and autumn, and occasionally by larger game, such as caribou and bears at any season. The fishes of the lake comprise whitefish, grey trout, sturgeon, pike, pickerel, yellow-barred perch, grey and red suckers, besides some smaller species.

"At seven miles before joining the Attawapiskat, Boulder river falls into a lake three miles long, which the Indians call Sturgeon lake, from the abundance of this fish to be found in it. While in the act of setting our gill net, the evening we camped on its shores, a sturgeon, measuring upwards of five feet in length, was caught in it."

Doctor Bell reports that several lakes abounding in fish are said to occur on the course of Henley river, which flows into the Albany ten miles below the Forks.

Doctor Bell, in his evidence before the Senate committee of 1887, said he had seen wild fowl in the region about Hudson bay in large numbers, and if one were close enough up to them, and surprised them in a marsh, they would rise in such clouds that

THEY OBSCURED THE SKY

for a few moments until they got away. They would not darken the land in their flight, but they would

prevent one seeing the sky or the sun for a few seconds. On the shores of Hudson bay and straits are found nearly all the sea birds that live in the northern part of this continent, and some of those of Europe. Some species are abundant; surf ducks, scoters, eider ducks, etc. The eider duck is valuable on account of its down. Of geese, the grey goose and the blue and the white wavies are very abundant in the spring and autumn on the shore of Hudson bay—and especially towards the southern parts of James bay. Swans are common. They breed on the islands, and some on the shores of Hudson bay, and their skins are an article of trade. In former years swans' down was used for trimming ladies' garments, and swans' skins formed an item of export for the Hudson's Bay Company. White bears are found in the northern part of Hudson bay, and there are plenty of black bears around the southern part.

There are valuable fisheries, too. There are codfish in Hudson bay. The variety the witness had seen is called the 'rock cod,' which is not of so good a quality as the common variety of the Atlantic, but he understood that it is the same species.

The variety of fish known as sea trout is found in the mouths of the rivers running into Hudson bay and James bay. They do not go far up the stream; they are never found beyond the first fall in a river. There are sea trout in both Hudson bay and James bay, at the mouths of the rivers. They are the same variety as that found on the Atlantic coast. They have the same habits. There is also the speckled trout. The marine animals—fishes and mammals of Hudson bay—have precisely the same habits as similar species have on the Atlantic coast.

The fur seal is not found here, but the seals of Hudson bay are valuable for their oil. They are

tolerably abundant. There are

Six Species of Seal in the Bay.

There is the bearded seal, for instance, which grows to the length of thirteen feet, the ringed seal, the Greenland seal in Hudson strait, the grey seal, and the harbour seal, which is quite common in those waters, also the spotted or fresh-water seal. The latter run up the rivers after salmon and whitefish. It is a large spotted species with an almost white or light grey coat, with distinct black spots thickly scattered over its body. This seal ascends the rivers for long distances inland, sometimes as much as two hundred miles. They live on fish, and they sometimes remain in the lakes in the interior. The skins of these seals are valuable, making very good coats.

As to James bay, the best fish there is a variety of whitefish, apparently identical with the large whitefish of Lake Superior, only the fish grow larger in the cold waters in the north. The whitefish live equally well, if not better, in salt water. They run up the rivers also. They belong to the salmon family. Then there are trout of different kinds, and at the northern part of James bay there is Hearne's salmon. They are small salmon, but of very fine quality. The flesh is equal to that of the common salmon, perhaps better. It is firm and red and well flavoured. Hearne's salmon seldom exceeds ten pounds in weight. It is also found all around Hudson bay, and on both sides of Hudson strait.

The porpoise, or more properly speaking, the small white whale, is abundant in James bay.

Doctor Bell expressed the opinion that the fisheries of Hudson bay will, no doubt, be very valuable.

Mr. A. P. Low, before the Senate committee of 1907, stated that the fish in the inland waters of Keewatin are like those in the other northern parts of Canada, and fairly abundant especially in the larger lakes. The chief fish are the whitefish and the lake trout. In Hudson bay the whitefish and the ordinary river trout have sea-going habits, and the Indians take quite a number along the shores in nets, more especially in James bay.

Mr. Low reported sturgeon as being plentiful in Favourable lake.

Mr. J. B. Tyrrell in his report speaks as follows of the game and fish in that area in the southwest of this region (See p. 19) explored by him in 1896: —"The country is stocked with animals of various kinds. Moose are abundant in some of the more thickly wooded tracts. Black bears are somewhat numerous, and beaver, otters, martens, mink, muskrats and red foxes are killed by the Indians in considerable numbers in the aggregate every year.

Whitefish Abound

in most of the lakes and streams, while the lake trout seemed to be moderately plentiful in the clear lakes near the head of Grass river. Of the other fish, the sturgeon and pickerel (*Stizostethium vitreum*) are the most important. The region was known among the early fur traders as the Muskrat country. Trout and whitefish are said to abound in Reed lake."



Moose crossing Limestone river.

Near the forks of the Muhigan large game was very plentiful, and Mr. Tyrrell saw eleven moose in one day.

As to his survey of the Ekwan district in 1901, Mr. D. B. Dowling reports:—"The principal fur-bearing animals of this region are foxes, otters and beavers. Of the larger mammals few appear to be taken by the Indians. In the interior the game birds are all very scarce, the fall hunt for ducks and geese being confined to the shores of the bay. The rivers afford a small supply of whitefish. The streams running to the north into Hudson bay in this region are, at certain seasons, well stocked with speckled trout. Sutton Mill lake is well supplied with a slender variety of lake trout, and at the narrows, speckled trout were also caught."

Mr. Dowling mentions that at the foot of the first fall met with ascending Trout lake river from Little Shallow lake, the Indians form large camps in the autumn to catch whitefish as they are ascending the river to the spawning grounds.

The Best Food Fishes.

Mr. McInnes, in the report of his explorations about Winisk and Attawapiskat rivers (See p. 23), says:—"Whitefish and sturgeon are the best food fishes, and occur in most of the lakes. Both are taken in nets, and the latter also by spearing from scaffolds built out over rapids in the river. Doré and pike are also generally distributed over the whole area, and form an important source of food supply, though the sucker among the fishes, like the rabbit among the mammals, holds the most important place, as it can be caught everywhere, not only in the larger lakes but also in the smaller ponds and streams. Brook trout were actually caught only in Winisk river near its mouth, and in the streams running into Albany river, but were seen in the rapids below Weibikwei; the Indians assert that they occur also in the lake itself. Lake trout were caught in large numbers in Trout lake at the head of Severn river, but are not found in either the Winisk or Attawapiskat waters.

"The moose (*Alces americanus*) has been found as far north as the southern shore of Weibikwei lake, in north latitude 52° 50′, though tracks were actually seen during our exploration only as far north as Attawapiskat river. Even here it is not nearly so plentiful as farther south in the belt of country lying near the Canadian Pacific Railway and extending for about one hundred and fifty miles north of it. Caribou (*Rangifer caribou*) range all over the district. No red deer are found anywhere throughout the region. The fur-bearing animals, though not so plentiful as they once were, are still fairly abundant throughout the district; the otter and the beaver from long-continued trapping are less numerous, perhaps, than any other species."

Bears, Mr. McInnes says, are taken in good numbers, and foxes, including the red, silver, black

and cross varieties are numerous. Otters and pine martens are taken in good numbers and beavers occur more sparingly. Minks and muskrats are plentiful. That the raccoon occasionally strays as far north as north latitude 52° is shown by the fact of one being taken by an Indian woman on upper Attawapiskat river in 1903.

Mr. McInnes describes Atikameg (locally known as Clearwater), Cormorant and Reed lakes as "very beautiful sheets of clear water, well stocked with fish, including lake trout and whitefish."

Mr. McInnes, in his evidence before the Senate committee of 1907, expressed the opinion that if the region lying west of Hudson bay were opened up by railways there would be a considerable business in exploiting the fisheries, because the sturgeon is valuable. They would get the sturgeon on the lower Nelson and part of the Churchill. Big lease-holding companies put steamers on the various lake expansions on the Nelson, so that they reached down to within a few miles of Split lake, and marketed sturgeon in that way. They put tramways on all the portages. They ran that way for a couple of summers, but the distance was too great and it did not pay. The larger lakes have good whitefish and sturgeon. The head of the Adawadskit was particularly full of sturgeon. Going out Mr. McInnes's party was short of pork and stopped one day to get supplies. In one night's fishing the Indians caught so many sturgeon that they had enough to carry them for one hundred and fifty miles to the Hudson's Bay Company's post. One of the sturgeon

WAS THREE FEET LONG.

At the mouth of the Winisk the Indians were

catching speckled trout and whitefish in very large numbers. In fact the Indians of all that interior country live on fish. They smoke and dry them to a limited extent, and late in the autumn catch them before the larger lakes are frozen over, when the temperature is low enough to freeze the fish. They catch enough to put by for the winter. Some are sent to Chicago frozen.

In his report (See p. 60) of the survey made by his party in 1910 of the area south of Cross lake, Mr. J. R. Dickson states:—"The deeper lakes all abound in whitefish of the finest size and quality. In Paint lake during the mayfly season (July up there) their dorsal fins could be seen cutting the water everywhere. Pickerel, and of course jackfish and suckers are likewise very abundant. We had no sturgeon net, but we saw quite a number jumping in Sipiwesk lake. Altogether the fishing industry should be a decidedly profitable one after the railway goes through. Much of that region is suited only, and admirably, to producing a permanent revenue from this source. The beaver have been almost exterminated, but mink, fisher, muskrat and other fur-bearers are still fairly numerous. As to large game, moose and caribou are plentiful, but we saw no elk or bear. More stringent game laws will shortly be necessary with the opening of the country to white hunters. Nearly all those northern lakes are thickly studded with beautiful islands—quite a similar Laurentian country to Muskoka, but on a more extensive scale. Some future day these large island-studded lakes will become popular summer playgrounds for the people of the prairies, for the July and August weather is delightful. As yet of course, they are almost inaccessible."

Mr. McLaggan, who explored the country in

1907, describes the waters between The Pas and Clearwater lake as abounding in trout, whitefish, jackfish and pike. Reed lake is studded with many islands and replete with large trout, whitefish, pike and pickerel. Grass river, where it broadens into the long stretch known as Setting lake, is described by Mr. McLaggan as one of the most beautiful sheets of water he has ever seen and quite comparable to the St. Lawrence where it passes through the Thousand islands. He looks forward to it becoming a great summer resort. Goose river is very shallow and so teems with whitefish that they seem to cover the bottom and can be killed with sticks. Generally, along his route, Mr. McLaggan "found game in great plenty and immense waters teeming with fish." W. Thibaudeau, C.E., states in his report (See p. 23): —"In September, October and part of November large shoals of white whales (I counted thirty-five in one shoal) could be seen going up river at Churchill at every tide. Salmon, trout and whitefish are taken in the river and harbor all the year, but are more abundant in the spring.

Within a Few Miles of Churchill,

in the fall and winter, large herds of barren lands caribou were encountered. These herds supply fresh meat of an excellent quality for the residents of Churchill. Polar bears are occasionally shot in the vicinity of Churchill. Along the western peninsula Eskimo congregate in the spring for the purpose of seal hunting, these animals frequenting these shores in the spring in large numbers. Among the fur bearing animals are found black fox, silver fox, red and white fox, marten, and wolves both black and gray. Swans, geese, ptarmigan and many species of

duck in large numbers, and some spruce grouse are found along the shores of Churchill harbour and river.

Referring specially to his exploration of that part of the country between Churchill and Owl river in December, 1906, Mr. Thibaudeau states:—"For one whole day we passed through an immense herd of barren lands caribou. There must have been thousands of them."

Reporting on the fish and game along the route of his exploration trip from Churchill to The Pas, Mr. Thibaudeau says:—"From timber line on Hudson bay to The Pas are found moose and caribou in fair quantities. Rabbits are scarce throughout the country explored. Saw a few spruce grouse; ptarmigan are found plentifully, but not further south than Grass river. Whitefish abound in all the lakes from Churchill to The Pas; also in some lakes are found trout, pike and suckers. Indians and travellers rely upon this source of supply for dog feed."

Mr. William Beech, of Churchill, in his communication to the press already quoted, writes: —"Fur-bearing animals exist in large quantities, and in many varieties, throughout the woods and along the shores and rivers. I have seen enormous white polar bears three hundred yards from my house as early as August 9, and at times they are very aggressive. Wolves are numerous, and very bold at times, so bold in fact that I have frequently heard them running round upon the roof above my head. White, red and black foxes, and a few of the rare silver variety are to be found at all seasons, and are

Valuable for the Fur They Bear.

Caribou roam in herds, and are very good eating,

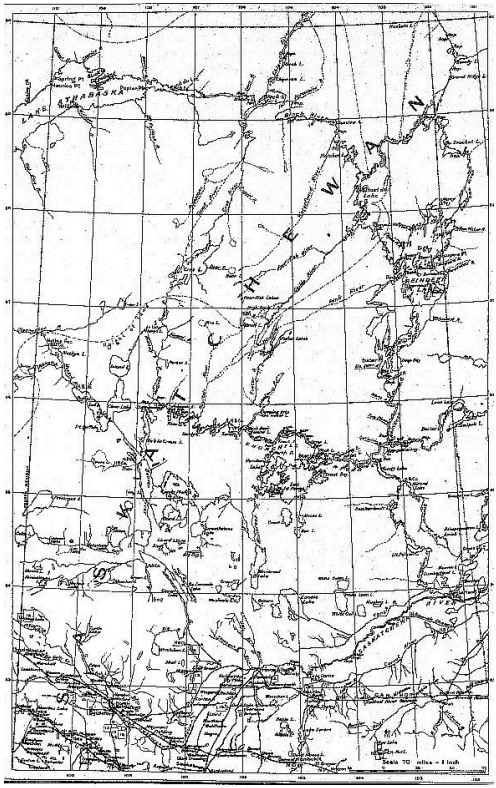
while seals, ducks, ptarmigan, geese and swans abound throughout the districts round about. Curlew, snipe, and loons also provide good shooting. Of fur-bearing animals besides foxes there are beaver, otter, mink, ermine, and wolverine, innumerable.

"Great sport is afforded to those who are so inclined in harpooning whales. I have counted as many as twenty in one school, going up the river at almost every tide, and an impressive sight it is. In summer at Churchill the Hudson's Bay Company capture many white whales, from ten to fifteen feet in length and weighing from one thousand to two thousand pounds, by the use of extra strong nets. The flesh is cut up and kept to feed the dogs in winter, while the blubber is boiled down at the factory and the hides are sent to England.

"It will surprise you, perhaps, when I tell you that we fish on dry land at Churchill. That is a fact, nevertheless. The natives of Churchill, both Indians and Eskimos, and also the white men, set their nets on dry land. They set their nets, which are about fifteen feet long, with three upright posts placed vertically on the shore. When they have set them they simply wait for the tide to come in, and when it has come in they simply wait until it has gone out, and there are their fish all ready to be taken out without any trouble. The catch consists chiefly of whitefish, salmon trout, and pickerel, all of good quality.

"When the Hudson bay route is completed, one of the best fishing trades in the world will be opened up. There are five lakes, in all, in the district, all full of fish, and the farthest teaming which is necessary would be about forty miles. On lake Winnipeg at the present time, fish are hauled a distance of one

hundred and forty miles, and they are teamed into Edmonton from Lesser Slave lake, a distance of one hundred and seventy-five miles and made to pay. The salmon of the north averages from four to ten pounds in weight, and is of good quality; the whitefish is not so large as that of Lake Winnipeg, but it is of fine flavor, and very firm. The caplin, a small fish resembling the sardine, is found in such quantities at some seasons of the year that they are left in thousands upon the shore when the tide goes out. Fishing usually commences at the latter part of June and finishes at the end of August."



NORTHERN SASKATCHEWAN

CHAPTER VI.

NORTHERN SASKATCHEWAN.

Agriculture and Arable Land.

An Early Scientific Explorer's Enthusiastic Description of Part of the Country.—"Capable of Any Extent of

Cultivation."—An Old Hudson's Bay Company's Official Who Considered it "A Splendid Country to Settle in."—Mr. Crean Reports That "It is no Experiment" to Raise Wheat in North Saskatchewan.—Missionary Farmers and Their Accomplishments.—Capable of Supporting "A Dense, Thriving Population."—"A Splendid Ranching Country."—Heaviest Rains Just When they are Needed.

To obtain a correct idea of the resources of that part of the province of Saskatchewan north of North Saskatchewan river, one has to consider that great extent of territory as consisting of two very distinct areas, one to the south, the other to the north of Churchill river. While the area to the south of the Churchill is a well-wooded, park-like country, with great agricultural possibilities, the soil of the region north of that river, so far as explorations up to this time have shown, is mainly sandy and sterile.

Thanks to its being crossed by the old fur traders' portage routes from Cumberland House, Fort à la Corne and Fort Carlton, on the Saskatchewan, to Frog portage on the upper Churchill and Methye portage on the Clearwater, the southern part of the region immediately under review has been known and written about for many years, but there is very little indeed in the ancient writings worthy of notice in this chapter. The first white travellers over the long and toilsome water routes of this beautiful country of swift-running rivers and isle-studded lakes were the enterprising fur traders from Montreal, who in course of time combined to form the Northwest Company. Their interests were all centred in the fur trade, and while travelling through the country, business, time and the exigencies of the commissariat combined to

Prevent Them from Exploring

the country with a view to investigating its natural resources, even if they had any inclination to do so, which is doubtful. At any rate such of these pioneer travellers through this country as ventured to write about their travels devoted their literary efforts to describing their adventures en route, their camps, the methods and habits of the voyageurs and Indians, the Indian camping places, and the rivers, lakes and overland trails traversed. Generally very minute details were given in these old books of travel as to the geographical features of the country, distances, bearings, the direction and currents of the rivers, the size, shapes and relative situation of the lakes, etc., but one reads over page after page, and book after book, without finding a single reference to the soil, or to the possibilities of the country from an agricultural point of view. In the course of time the opening up to the fur trade of the farther northwest on the banks of Athabaska and Mackenzie rivers resulted in a greatly increased amount of travel over the old canoe routes, but it did not attract attention to the natural wealth of this region, and until recent years the attractions this country offers to the agricultural settler have remained unrecognized.

Sir Alexander Mackenzie, in his book (1801), states that “no part of this country has ever been cultivated by natives or Europeans, except a small garden at Ile à la Crosse, which well repaid the labour bestowed upon it.”

Examined before the British parliamentary committee of 1857, Richard King, M.D., surgeon and naturalist to the expedition in 1833 in search of Sir J. Ross, was asked:—“Are you under the impression that there is any portion of the territory which you then saw that would be available for the purpose of settlement?” He replied:—“Yes, I found a very large

country, as it appeared to me at that date. I hold in my hand one of Arrowsmith's very best and recent maps, he being the great authority upon that country, and the square piece of country which I always looked upon as a very fertile valley is there distinctly shown. It is bounded on the south by Cumberland House, on the Saskatchewan. It is an enormous tract of country. Cumberland territory is, according to Sir J. Richardson, I find, several thousand square miles. Then it is bounded by Athabaska lake on the north. I am not now exactly giving it north and south. I may state that I passed through a great portion of that country, but of course what I am saying as to the larger portion that I am now speaking of, is not only from my own personal observation upon it, but from an inquiry upon the spot, seeing the nature and extent of that country. This large portion which I have described as within this area I looked upon as the

MOST FERTILE PORTION WHICH I SAW.

"On this map it is very clear. You will see the country entirely surrounded by water."

Asked if he meant to express an opinion that the whole of that territory was suitable, as regards soil and climate, for the purpose of cultivation, Doctor King replied that he was told by the traders there generally that it was precisely the same land as that which he passed through, namely, a rich soil, interspersed with well-wooded country, there being growth of every kind, and the whole vegetable kingdom alive.

Doctor King impressed upon the committee the fact that in going through that country his position was that of a naturalist; he "came away certainly

with the impression that it was a very magnificent country in many parts of it; of course there were barren portions, but upon the whole, up to Athabaska lake, it appeared to me to be capable of any extent of cultivation."

Doctor King said that some time previous to his visit to that locality there had been some agricultural activity at the Hudson's Bay Company's post at Cumberland House due to the enterprise of Governor Williams. Doctor King found capacious barns, and implements in fields which had evidently been placed under culture. On approaching Cumberland House, he had found a little new colony of thirty persons established, a Canadian, an Englishman, and half-breeds. They had their fields divided out into farms, and other things. It was described to him that they had formed a little colony at Cumberland House but had been

Ordered from the Immediate Vicinity

by the Hudson's Bay Company. The settlers told Doctor King that "at the time they were ordered off, the Company would not allow them to go on cultivating; that it was against the Company, and that therefore the thing was to be broken up, etc., etc."

As to the little new settlement, Doctor King stated that it appeared to him, in going over the colonists' farms, that they were very highly cultivated. There was corn, wheat, and barley growing. He bought a calf from them; he gave seven shillings for it. A fat bullock sold for twelve shillings.



Haying near Green lake.

Doctor King testified that when he went on to Cumberland House, he found that the settlers were really borne out in what they had stated, for he found that the barns and implements were in the fields, and that the cows, oxen, and horses had all gone wild. He enquired the reason of it and was told that Governor Williams had a penchant for farming and that the Company had ordered him off somewhere else.

Hon. William Christie, formerly Inspecting Chief Factor of the Hudson's Bay Company, before the Senate committee of 1888, explained that there was a vast extent of splendid country from Prince Albert on the whole north side of the Saskatchewan, going away up until the traveller came near Fort Pitt, keeping a little to the north. Then, when he would come to the route of Green lake, there was two days' journey through a magnificent country, beautifully timbered, well watered and supplied with abundance of fish. As he once travelled through it, he remarked to one of his men,—

"What a Splendid Country To Settle In."

Green lake, witness explained, is north of Carlton, about eighty miles. One crosses at Carlton and for two days can travel through a prairie country with bluffs here and there, and lakes; it is a splendid country. Then he would travel for two days through a forest to Green lake.

Professor John Macoun, in the Dominion Government Canadian Pacific Railway Report of 1877-8, says:—"I was at Ile à la Crosse (almost due north of Battleford) on September 22, 1875, and saw potatoes still green as they were in July. I was told by Mr. Cummins that these potatoes hardly ever were killed by frost in September. Here there was a flour mill driven by horse-power and I am told that all kinds of grain ripen successfully."

Professor Macoun in his book "Manitoba and the Great Northwest," published in 1882, made the following reference to the northern portion of Saskatchewan as an agricultural country:—"About fifty miles north of Carlton the 'Star Mission,' in connection with the Church of England, is situated. This Mission was established in 1874, and placed in charge of the Rev. Mr. Hinds, who, besides being a minister, was a practical farmer. He at once commenced to teach the old men farming and the children English, and in less than one year had a number of small farms commenced, and the children well advanced in the knowledge of English. Since then he has been very successful, and in 1879 Mr. O'Keeffe, D.L.S., writes of the Mission: 'At Sandy lake the Indians under the supervision of the Rev. Mr. Hinds, Church of England Missionary, were cultivating successfully fine fields of grain and raising vegetables.' Of the country in this vicinity the

same writer says: 'No finer country could be desired than the section above described. The water is pure and abundant, and the land extremely rich. Pea vine, vetches, grasses, and, in fact, all herbaceous plants were luxuriant.' "

In the report of his explorations during the years 1893 and 1894, Mr. J. Burr Tyrrell gives the following general description of this area:—"The country between Saskatchewan and Churchill rivers is very different from that north of the latter stream. From Prince Albert, situated on the banks of the North Saskatchewan, at an elevation of one thousand four hundred feet above the sea, the surface rises with a gentle slope northward to a heavy stony moraine ridge, the highest point of which, on Green lake trail, was found to have an elevation of about two thousand two hundred and twenty feet. From this high ridge the country slopes gradually northward, at first with a gentle rolling, and afterwards with a more even surface, to the chain of lakes and extensive swamps that lie along the edge of the district directly underlain by Archaean rocks. This country has very much the general appearance of that portion of northwestern Manitoba to the west of lakes Manitoba and Winnipegosis, including Duck and Riding mountains, previously described by the writer."

Between Churchill and Saskatchewan rivers two lines were examined by Mr. Tyrrell, one from Prince Albert northwestward by Green lake to Ile à la Crosse, and the other from Stanley Mission southwestward by Montreal lake to Prince Albert.

Writing of some of the more noticeable geographical features of this area Mr. Tyrrell says: —"Churchill river from its northern source at Methye portage, following its windings, has a length of four

hundred and eighty miles to the mouth of Reindeer river. It is a long series of very irregular lakes filled with clear blue water, connected by short and usually rapid reaches. Some of the rapids are produced by rocky barriers, while others are over boulders and between banks of till, such as is underlying much of the surrounding country.

"The largest tributaries flowing into the Churchill from the south are Beaver, Sandy and Rapid rivers.



Flowers at Ile à La Crosse.

"Beaver river rises on the Cretaceous plateau, not far from Lac la Biche, and, flowing, first eastward for two hundred and fifty miles, and then northward for a hundred miles, empties into the south end of Ile à la Crosse lake. Its course northward was alone surveyed. Here it is a rapid stream from one hundred to two hundred feet wide, flowing between low clay banks, beautifully wooded with spruce and poplar. Much of the land along the course appeared to be well adapted for agricultural purposes, and the rank vegetation gave

PROMISE OF ABUNDANT HARVESTS."

The Venerable Archdeacon J. McKay, one of the best known Church of England Missionaries of the Canadian west, was examined before the Senate committee of 1907. He stated that he was born on the eastern shore of James bay, near Rupert's House. His father was a Hudson's Bay Company's officer. Witness had his education in Manitoba in the early days. He had been more in the old country than in eastern Canada. He lived at Moose Factory until he was eighteen.

Archdeacon McKay explained that he had been forty-five years in the west, in charge of missions of the Church of England, and was ten years at a place on Churchill river, a little north of Lac la Ronge. The nearest point to Lac la Ronge on the map is where the Anglican mission is situated, about ten miles north of Lac la Ronge, on Churchill river. This is about due north from Prince Albert, and in a straight line it would be considerably over two hundred miles from Prince Albert. He had been for some time superintendent of the Anglican missions. For the two years preceding his examination he had been at Lac la Ronge. He had been as far north in this country as Lake Cariboo. In fact he had been away to the north end of Reindeer lake. It is very poor country up there, and the trees are not very large. From the Churchill he had been down to Hudson bay, and he had been as far west as Ile à la Crosse lake and on to Methye lake, which is not many miles south of Clearwater river and in an east-southeasterly direction from McMurray.

The land between Lac la Ronge and Prince Albert in some places is very good. It is all forest practically until to about thirty miles from Prince Albert, or

perhaps twenty or thirty. Then the open country begins where it is not heavily timbered. To the west of Lac la Ronge the country is very much the same. It is not rocky, some muskeg and some pretty good land, but all timbered—in some places heavy timber. There is spruce and poplar. The spruce is good enough for lumber, and of course it would do for pulpwood. The witness had travelled the country about Lac la Ronge pretty thoroughly, and if it were cleared of timber it would, in his opinion, be generally

Fair Agricultural Land.

The rocky country is north of that.

So far as agriculture at Lac la Ronge is concerned, Archdeacon McKay said he had raised good wheat at his former mission on Churchill river for seven years in succession without having it frosted. The climate is good. It is a rocky country, and there is not a great deal of good land; but so far as the climate is concerned it is all right for raising anything that can be raised in Saskatchewan generally. Potatoes grow splendidly.



Potatoes at Anglican Mission, Lac la Ronge.

He could not describe what the grasses are, but they are grasses that grow mostly in moist land, something like slough hay, grasses that grow on the margins of lakes, and along the rivers. There was not much stock there, but he had stock when he lived on the mission on Churchill river, fifteen head of cattle and two horses. That is a little north of Lac la Ronge, and is practically the same country. As to the Lake Ile à la Crosse country, he considered it fairly good. It is not rocky and there is plenty of timber and plenty of hay as a rule—some prairie hay and some swamp hay, and the soil is fairly good—better than Lac la Ronge. It gets better as you go west. It is certainly better about Ile à la Crosse than at Lac la Ronge, and there is no rock country about Ile à la Crosse. The hay is long. It is very much the same as the natural hay in Manitoba. The only whites in the country he had described north of the Saskatchewan were the Hudson's Bay Company's officials and

traders. There is no agricultural settlement at Lac la Ronge. There are only Indians there, and they have not gone into anything in the direction of agriculture more than raising a few potatoes.

Archdeacon McKay stated that it is a peculiarity of that part of the country around Lac la Ronge that the frosts are very late. On a small island in the lake Archdeacon McKay has seen potatoes in the beginning of October with the

Vines Untouched by Frosts

at that late season. That was of course on account of the large body of water that equalized the temperature. On the mainland that would probably not be the case, but two years ago he was at Lac la Ronge when Mr. Chisholm, the Indian Inspector, came out to make treaty payments towards the end of August, probably August 20, and the potato vines were not touched at all either on the mainland or on the islands. The snowfall is not very heavy. It is generally a little heavier than in Prince Albert section of the country, but not always so. Three feet on the level would be considered deep snow. As a rule the first frosts come some time in September. In 1906 the potatoes were touched with frost about September 15, but not seriously. In the spring one can put in grain from May 5 as a rule. He used to sow wheat May 5 generally, and plant potatoes from May 20 on. The lowest temperature in winter, judging from his own sensations, was about the same as Prince Albert. In the summer time it is quite as hot at Lac la Ronge as at Prince Albert. It is farther north and the days are longer.

The weather at Lac la Ronge is moderately dry. Generally there is sufficient rainfall for the crops. In

the summer of 1906 there was quite a long spell of dry weather, which affected the wild fruits. It was an exceptional spell of dry weather, but generally there is a good rainfall. The rainy season would be quite equal to Manitoba.

Richard S. Cook, Esq., Mayor of the city of Prince Albert, Saskatchewan, was examined before the Senate committee of 1907. He stated that he had at the date of his examination by the committee been engaged in farming at Prince Albert for fifteen years. He had a large stock and dairy farm, operated it successfully, and had made it pay every year. Mr. Cook stated that he had travelled considerably over the country about Prince Albert, particularly to the north and northwest of that city. He had gone north from Battleford and down Beaver river. Little is known of that country. It has always been travelled by canoe. Stanley Mission was the farthest north he had been, two hundred and fifty miles north of Prince Albert, and about the same distance north of Battleford. The country in that northern district is fit to be an empire in itself, and a wealthy one. People knew little of it yet, but it was going to prove an excellent country for agriculture. It was such an immense country it was hard to grasp the possibilities of it. One might travel over it for years and know very little about it. There is very little open country there, except where the fire has gone, but about seventy-five per cent. of the soil in that country is good, capable of being cleared up and becoming good agricultural land. The area must be at the least about two hundred and fifty miles by two hundred and fifty miles. In travelling about the country, he had examined the region about Fort Pitt, Beaver lake, Moose lake and Cold lake. For a considerable distance immediately back from

Saskatchewan river the soil is light; not a very good country. The country immediately behind Fort Pitt, however,

Is Fit for Raising Grain.



Oat field at Anglican Mission, Lac la Ronge.

The further north one goes in that country the better it is. The altitude is gradually getting less, and on Chipewyan reserve, south of Cold lake, there is as fine land as he had ever seen in his life. The grass is four and one half feet long, and people had been known to grow one hundred tons of hay the first season. Mr. Cook doubted whether wheat would grow the first year.

Around Cold lake the fires had been very destructive. There had been timber there, and where it had been burnt over the grass was good. The soil was all right and the pea vine growing, and good

rich grass, so that he thought the country down the Beaver would be a fairly good agricultural country. This district is one hundred and fifty miles north of the Saskatchewan. It would be northwest of Battleford about one hundred and fifty miles. At Stanley and Churchill, two hundred and fifty miles north of Prince Albert, they were raising all kinds of stuff. There was a sheaf of wheat in the Board of Trade in Prince Albert which was brought from there, and it was certainly a very fine specimen. Mr. Cook thought that in the area he had visited in the north there was a country that would be settled up and sustain a large population. The fires had been very destructive in parts of the Stanley country. The soil throughout at one time was a good soil, but where the fires were very heavy and hot it burnt the top of the soil. He would judge that seventy-three per cent. of that country would have good agricultural soil as soon as it was cleaned out.

Settlements had been started twenty miles north of Prince Albert, and some years ago an American went in there and he now has a beautiful farm. The witness brought in a collection of vegetables from that country, and he never saw a better lot of farmers' produce in his life. This original American pioneer was growing Turner raspberries, and anyone will tell you that where you can grow Turner raspberries, fall wheat will grow, and where fall wheat will grow the climate is fit for anything. The settler in question got the Turner raspberries from Mr. Cook in Prince Albert. It takes a certain climate to grow that raspberry, and they claim the same climate will grow fall wheat. It is not the wild raspberry of the country, but a variety sent out from the experimental farm in Ottawa. Wild raspberries grow all through that country. That one man starting

out demonstrated that the climate was all right, and others followed suit, and there are now one hundred and fifty or two hundred settlers in that country, which was considered a few years ago as no good. The same remarks apply to the country clean out to Candle lake. That country is fairly clear and open, and there is some hazel brush, and where hazel brush will grow the land is considered good, and where poplar will grow it is also considered good soil.

Mayor Cook expressed the opinion that

Lack of Means of Communication

was all that kept the tide of settlement from flowing into that northern country. He went on to explain that the people out on the Saskatchewan and north of it anticipate being able to ship by the Hudson bay route. They are all expecting it. They consider that there is not a question of doubt but that it will be successful. They expect an open route via Hudson bay for half of July, all of August, September, October, November and part of December. Witness was speaking from the information received from people who spent their lives on Hudson bay. Many of the Hudson's Bay Company's officials came in to Prince Albert district to settle, after they had been superannuated. From information obtained from these old Hudson's Bay Company's men, his honest opinion was that it was a perfectly feasible route for the months he had given:—half of July, all of August, September, October, November and a part of December.

Mr. Cook, concluding, remarked: "When you are shipping out your cattle, you are sending them by the short route, and the shrinkage will be light. One

feed, and probably none at all, would last to Churchill. The short route would also make it possible to ship out at least one-third of the crop before the frost sets in, which would be a great relief to the settlers."

W. F. Bredin, Esq., member of the Legislative Assembly of Alberta, for the Division of Athabaska, and residing at Lesser Slave lake, was examined before the Senate committee of 1907 and stated that at the date of his examination he had resided ten years in the country north of Edmonton. He had been from Edmonton north to Fort Wrigley, and he had been on Peace river from Fort St. John, thirty miles inside the British Columbia line, to about five hundred miles down the Peace—from that point. Ten years previous to his examination he went down the Athabaska to the Mackenzie in boats.

Mr. Bredin referred briefly to a trip he made east from Athabaska district during the summer of 1906, when he travelled from McMurray up Clearwater river and thence across to Prince Albert. The land on Clearwater river for one hundred miles, in the bottoms, is very good. It appeared to him, from the river, however, to be very sandy back on the high rocks. He should think there would be a good deal of rock and muskeg. From where he left Clearwater river in to Prince Albert, on the North Saskatchewan, the country was more or less of a sandy nature. There were beautiful lakes all the way, filled with good whitefish and trout. The whole northern country is that way.

In his evidence before the Senate committee of 1907, Mr. H. A. Conroy remarked:—"There is some good country along the Clearwater—very nice country from an agricultural point of view."

The Crean Reports.

A great amount of invaluable information as to the natural resources of the region south of Churchill and Clearwater rivers is contained in the report by Frank J. P. Crean, C.E., of his explorations (See p. 25) in 1908 and 1909. It is interesting to note that this work of exploration was the first ever undertaken in a systematic way to ascertain the agricultural possibilities of Canada's northland.

The late Mr. R. E. Young, Superintendent of the Railway Lands Branch of the Department of the Interior, under whose direction, and at whose instance, these explorations were conducted, in forwarding Mr. Crean's first report, wrote:—"Mr. Crean's report gives a great deal of useful information about the district, and the results of his observations appear to shew that mixed farming may confidently be expected to prove successful over a large area. When the country is made accessible by roads a considerable settlement of agriculturists may, I think, be looked for. The country is also shewn by his report to be rich in natural resources."

In forwarding Mr. Crean's second report to the minister, Mr. Young wrote:—"The exploration in the year 1909 shows results even more satisfactory as to the possibilities of the country for settlement than the exploration of the previous year. A very considerable proportion of the area explored is shewn by Mr. Crean's observations to be well adapted for mixed farming and to have natural resources of timber, hay, fish and game which will be of much value to incoming settlers. Results of actual operations in cattle raising are of a most encouraging nature. At and in the vicinity of Meadow lake over one hundred miles north of

Battleford, there are herds of cattle aggregating over three hundred, and over fifty horses, all of which are described as in a thriving condition. At Cowpar and Winefred lakes towards the western part of the track explored and in Clearwater valley to the north, conditions seem also most promising for stock-raising. It may be of interest to note here that recent reports of investigations in Siberia, Mongolia and northern Manchuria by the Bureau of Plant Industry of the Department of Agriculture of the United States, give accounts of the discovery of three varieties of yellow-flowered alfalfa which are found growing and thriving in a wild state under conditions of climate much more severe, both as to cold in winter and snowfall, than are to be found in any part of northwestern Canada as far north as there are any claims made as to possibilities of settlement. It may therefore be considered reasonably probable that whatever advantages alfalfa has over our native grasses as fodder are assured for all habitable parts of our north country."

As to the district about Lac la Ronge, Mr. Crean says in his report of 1908:—"Besides the mineral wealth supposed to be available there is also considerable land to be found capable of being tilled.

It is No Experiment

to endeavor to raise wheat in this section. It has already been done. Stanley, or as it is sometimes called Stanley Mission, is worthy of special description. It appears that Stanley is one of the best known spots in the north. The village or settlement is situated on a most picturesque point jutting into Churchill river. The country surrounding it is rolling, and this adds considerably to the beauty of the

locality. From an agricultural standpoint the land is good. The soil is a rich loam and the subsoil is sandy clay. The loam, however, attains a great depth. I put one hole down almost four feet and had not then struck a subsoil. This, however, was exceptional. Stanley's fame rests altogether on the energy and initiative of Reverend Mr. Hunt, a Church of England clergyman, and the founder of a Church of England Mission there about 1851. Mr. Hunt, as far as I could ascertain, not only built the celebrated and beautiful church, but also planted some wheat and barley. This he found would grow successfully, and he established a small mill to grind the wheat. At first he used a hand mill, which is still standing at the Mission House. Later on, however, he built a small water power mill and for a number of years this was in operation, used not only by the Mission but also by the Hudson's Bay Company."

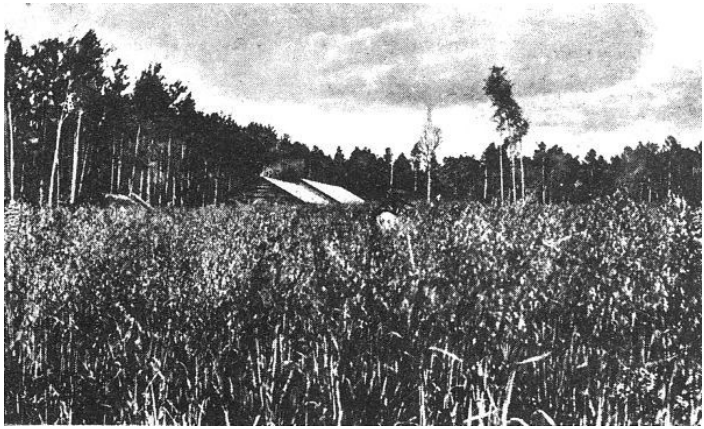
What a Missionary is Doing.

On the north shore of the bay at the southwest end of the lake, the Church of England Mission have a large school not yet completed, and also an open air saw mill. The Reverend Mr. Brown is in charge of the Mission and is endeavouring to establish a farm in order to teach the natives to work. He has some cattle, pigs, and poultry. Reverend Mr. Brown has a good garden, nothing in it suffering from frost. At Little Hills, just at the mouth of Montreal river, wheat has been grown successfully and Mr. Brown intends putting in a crop this year. I might here be permitted to say that the Reverend Mr. Brown, who is materially assisted by his wife in his Mission work, is deserving of the most unstinted praise for his zeal and industry in the building up of the Mission. Under

somewhat disadvantageous circumstances he fills the several positions of minister of the gospel, farm instructor and mechanic to his flock, cheerfully and with good effect. The Hudson's Bay Company had a good garden last year, but most of the ground here is stony. Revillon Frères have a post here and they, too, raise all the vegetables they require.

Mr. Crean reports that on Deer lake (Montreal lake section) "just east of the narrows a white man lives and he has a first class garden. Around Deer lake the land is good and I see no difficulty in its development. The soil at Deer lake is a good light loam inclined to be sandy, with a blue clay subsoil. Muskegs occur, but they are generally small. There is ample hay everywhere. I fancy this country might profitably be surveyed and opened for settlement. I did not travel to the east of Montreal lake, but from information obtained there is not any great difference in the country from the west side."

Mr. Crean goes on to say that there has been no attempt at agriculture in Snake lake and Sandy river section. "The height of land dividing the water sheds of Ile à la Crosse and Sandy river is not very high but is clearly marked by a clay ridge. This ridge has been burnt off in recent years and is covered with fallen timber and brulé. A poplar growth is springing up now. This part of the section should make good agricultural country. There is, however, a vast area of swamp in this section; I cannot say if it could be drained. Sandy river flows through vast hay meadows. These are not too wet and are by no means swamps. Of course most of the meadows would be improved by clearing of scrub bush."



Oat field at La Plonge.

Mr. Crean reports having seen wheat and oats growing at the Roman Catholic mission at the junction of Beaver and La Plonge rivers on September 4, 1908. Mr. Crean says in his report: —"The wheat was a first attempt, but will be tried on a much larger scale this year. The small patch sown last year must have been put in late in the spring. It appeared well matured but frosted; this I fancy was due to its being planted close to the river. The priest has cleared a good sized patch, perhaps about ten acres, which he intends sowing in wheat. The oats were splendid and grew to a great height. The vegetables were especially good. The variety astonished me. Almost every vegetable was represented and appeared to thrive. Potatoes, cabbage, cauliflower, lima beans, green peas, carrots, turnips, onions, lettuce, beets, parsnips, and tomatoes all growing splendidly.

I Never Saw a Better Garden,

and indeed I don't remember seeing as good in the

west. This garden is indicative of what can be done. The land around the mission is all good and easily cleared as it is covered with poplar.

Mr. Crean reports that in 1908 the priests at Ile à la Crosse had about three acres in use as a garden. The Hudson's Bay Company's post had about thirty-five acres ploughed and five acres in oats, which sell at that point at a dollar per bushel. "The Hudson's Bay Company grows potatoes for sale, but the native, being almost entirely a flesh eater, looks on vegetables with contempt."

Mr. Crean stated that there were some good gardens at Canoe lake. One Chipewyan grew some barley but cut it too soon. At the southwest of Canoe lake the country rises considerably, and the soil is good. There is no settlement but the country is adapted to farming.



Potatoes at Buffalo river.

"At Buffalo river there is quite a large settlement of Chipewyans. They grow quite a little barley and some oats. The Chipewyans and some half-breeds seem not to care for flour when left alone and so they grow barley in preference to any other grain. It

is easier to cook, being just thrown in soup. The land on the northerly side of Buffalo lake is good but there are no people living there. The Chipewyans at Buffalo river told me that they never heard of the crop of barley being a failure for the past fifty years."

At Methye lake, according to Mr. Crean's report, there is a Roman Catholic Mission near the east end, and a priest, Father Pinard, is in charge. He has a small garden and had a little patch of barley. Both did well. At the Hudson's Bay Company's post, ten miles away, on the west side of the lake, there is a garden of about an acre. It looked splendidly on September 17. The potato tops were not touched by frost. The swamp through which Methye river flows, though very wet, produces

A Large Quantity of Hay.

The winter supply of feed for the cattle on Methye portage in its palmy days was grown at Methye Post and at Buffalo lake at the mouth of Methye river (hence called Bull's House), but now there is no necessity for raising grain or fodder, the Hudson's Bay Company having abandoned this route to the Mackenzie about the time of the Riel Rebellion in 1885. Mr. Crean says:—"From conversation with the natives, the priest and the Hudson's Bay Company's manager, I feel sure that the climate here would be quite favourable to wheat raising. I am informed by the residents that this section is not affected by early frosts, and the gardens which I saw certainly bear out their statements.

"Pigs will, I firmly believe, thrive well in the north, and sheep will at any rate not suffer from the raids of the coyote.

"Although the north may never seriously compete

with the more southerly latitudes in the wheat market, still, by judicious mixed farming, it will eventually be equally productive and

Support a Dense, Thriving Population.

Mr. Crean thus described Clearwater river and valley:—"The Clearwater is a stream varying from one hundred to three hundred feet wide. It is fairly rapid, and generally about four feet deep. At several points along the river there is a considerable fall where a substantial amount of power might be developed. The valley is from half a mile to three miles wide, and generally contains magnificent soil. In the upper region the timber is large and almost completely covers the valley. On the slopes of the valley, which are from two hundred to six hundred feet long and rather steep, the timber still continues, poplar and some spruce, but once the bench land is reached there are some large openings, and hay meadows to be found. When the railway reaches McMurray, there is no doubt that a large agricultural settlement will take possession of this beautiful valley."

Mr. Crean writes in his report:—"The valley of Clearwater river would, in my opinion, be a magnificent cattle range, and should be a farming country. There are large open prairies, and the grass is splendid. Vetch and pea-vine grow everywhere. I was greatly impressed with Clearwater valley; it is quite similar to North Saskatchewan valley. The soil is a good loam with a sandy clay subsoil. I had ample opportunity to observe it carefully as the whole place in the vicinity of the portage is pitted with prospect holes. The loam would be about a foot deep on an average."

As to natural pasturage and hay in the area explored by him in 1908, Mr. Crean states:—"Along Big river in the southern portion of the tract is

A Splendid Ranching Country.

Hay abounds, and water and shelter is easily obtained. The country is principally open, dotted with bluffs of poplar, and hay is to be had everywhere. The grass cures here and the rolling hills would be blown clear of snow which would afford a winter range for stock almost equal to the Porcupine hills in southern Alberta. Farther north, however, the country is too flat until Methye portage is reached. The valley of Clearwater river below Methye portage would furnish a cattle range that to my thinking would be hard to beat. I am informed that there is even a better cattle range in the valley of Pembina river, southwest of Methye portage, but I did not see it. Generally speaking, in my opinion mixed farming would be the industry best adapted to the entire tract explored. Everywhere I travelled there was an abundance of hay and along the main routes hay was stacked in quantities in many places but always with an eye to proximity to the trail. Sometimes the meadows would be small but always numerous. At Green lake there were particularly fine meadows, and I am told to the west of it is even better."

Mr. Crean, in the report covering Green lake, Ile à la Crosse, Methye portage, Snake lake and Lac la Ronge sections, writes:—"It may be said that the whole tract though not exactly fitted for agricultural settlement throughout in its present state, is still capable of producing large quantities of cereals and farm produce and supporting a large population. The over abundance of water and lack of natural

drainage, causing large swamps and muskegs, might in my opinion be easily remedied by clearing out some of the rapids on Churchill river and providing outlets for the surplus water where natural outlets are lacking."

Mr. Crean has the following general remarks to make as to the soil of the district covered by his explorations in 1908:—"The soil throughout the district varies so much that a general report of it would be inadequate. In the southeasterly portion the soil is good, being a light loam, with a blue clay subsoil; towards the west the soil is light loam with sandy clay subsoil. North of Montreal lake the soil is still good but large stones occur more frequently till at Lac la Ronge rock outcrop is met with. There are of course fertile spots where the soil attains a considerable depth, but no large compact areas of land occur in the northeastern part of the tract explored, except at Stanley, where perhaps three thousand acres of arable lands may be found in one block. To the west of Lac la Ronge though rock outcrop continues; fertile spots occur more frequently, till at Trout lake there is no sign of rock. The soil around Trout lake is light and rather sandy. Muskegs occur frequently until Snake lake is reached. Sandy river flows through a large hay meadow, bounded on the west by a muskeg or peat bog, extending westerly to Ile à la Crosse lake. This hay meadow varies in width from one quarter of a mile to three miles. Abundance of good hay might be cut along this river. This whole country between Snake lake and Ile à la Crosse lake,

Needs Drainage

and there are few high spots in it except along the

shore of the lakes or rivers. On the west side of Ile à la Crosse settlement there is practically no land fit at present for cultivation, the country being all low and almost a muskeg. I explored this side pretty thoroughly for a distance of about sixty miles and found it to be practically all the same, and almost the same level as the lake. Along what is termed Deep river, connecting Ile à la Crosse lake and Little Buffalo lake, the banks are higher and the land good, but this is only a fringe along the river, seldom extending more than half a mile inland. These muskegs could, of course, be easily drained. The soil around Buffalo lake is light, but appears to be fertile. It is generally a light loam rather inclined to be sandy, with a sandy subsoil. In some places the soil is much heavier and is very fertile. Methye river flows through an immense swamp, which extends for miles on each side, no ridges being even in sight. At Methye lake the soil is very much better, being a heavy loam varying from eighteen inches to almost any depth. Once the height of land at Methye portage is crossed on the portage, the whole country towards the west takes on a far better aspect, and the soil appears to be as good as could be desired."

With special reference to climatic conditions, Mr. Crean, in the report of his explorations in 1908, says: —"The climate seems well adapted for raising any cereal. In fact, wherever wheat has been tried it has grown successfully. At Methye portage, which is considerably north (Latitude 56° 35′ 11″), oats and barley have been grown. Wheat was not tried, but I feel sure it would grow successfully, notwithstanding the relatively high altitude. Methye portage has an altitude of about one thousand six hundred and seventy-seven feet as compared with one thousand three hundred and ninety-eight feet at Prince Albert.

It is very much above the general level of the country to the south and east."

Low Altitude and Long Summer Day.

Mr. Crean quotes Professor John Macoun's remark that "in considering the possibilities of agricultural development of all this modern country, one fact to be kept steadily in mind is the advantage of the low altitude and the long day, which are fixed conditions and will always remain the same," and gives a table verified by Doctor W. F. King, Chief Astronomer of the Department of the Interior, to compare the hours of sunshine on specified days during the summer at Ottawa, Prince Albert, and Methye portage. On May 1 the length of the day between sunrise and sunset at Ottawa (45 north latitude) is 14 hours, 4 minutes; at Prince Albert (53 north latitude) 14 hours, 46 minutes; at Methye portage (56.36 north latitude) 15 hours, 12 minutes. June 20, the hours of sunshine are as follows:—Ottawa, 15 hours, 26 minutes; Prince Albert, 16 hours, 42 minutes; Methye portage 17 hours, 30 minutes. For August 20 the figures are:—Ottawa, 13 hours, 42 minutes; Prince Albert, 14 hours, 17 minutes; Methye portage, 14 hours, 36 minutes.

Mr. Crean states that in 1908 "The first frost registered by my thermometer was on October 2, when the thermometer fell to 24 degrees Fahr. I was at Methye portage on September 17, and the potato tops were not frozen in the least. The garden was also quite untouched. Nor had I seen any frozen vegetables on the way up. . . . . The lakes began to freeze on October 20, but remained open for perhaps two weeks, the weather turning quite mild again. There was not sufficient snow to travel with dogs

until November 20, and the snow was not deep until December 15. The rainfall in this district is ample, though not excessive, and its uniformity from year to year is a valuable feature. As far as I could learn the heaviest rains occur in the early summer

JUST WHEN RAIN IS MOST NEEDED

for agricultural operations. The snow fall is not generally heavy, seldom exceeding eighteen inches, and, as with the rainfall, is uniform."



Green Lake settlement.

As to agriculture, actual and possible, in Green lake district, Mr. Crean reports:—"At and around the Hudson's Bay Company's post on the north end of Green lake there is a considerable settlement of half-breeds. A Roman Catholic mission is established here. Revillon Frères have also a post. The priest has a good garden having all kinds of vegetables, and also a small fruit garden growing currants, gooseberries, raspberries and strawberries. These all thrive and mature. Green lake is important as a

stopping place for freighters in winter and consequently large quantities of hay are stacked. Some oats and barley are grown but no real effort has been made to farm. Father Teston of the mission says that he has grown oats and barley for fifteen years in succession and so far has not had a failure. I interviewed a native named Morin, who said that he had grown potatoes, oats and barley in small quantities for thirty-five years and could not recall having ever had a failure. He has never kept a record of when he sowed or when he harvested, neither has the Reverend Father. Morin owns thirty-five head of cattle and twelve head of horses. He has sown wheat on six or seven occasions and it always ripened. In his opinion there is no doubt that wheat could be raised anywhere in the locality. The ice in Green lake goes out early and it is generally very late before it freezes. The summers are always warm and there is ample rain. The gardens, which I saw here, were certainly fine although they were not cared for as they should have been. Weeds were allowed to grow in profusion."

In his report of his explorations in 1909 along the west side of Green lake, Mr. Crean wrote:—"The crops were not very far advanced when I was there, nor indeed did any resident sow grain to any extent. There was a small field of oats, a small field of barley and the usual gardens. The gardens, as is customary in the fur country, are neglected; but yet the vegetables seem to grow in profusion. Lettuce and radishes in fourteen days grow from the seed to a size fit for table use. On Sunday, July 14, I saw some radishes one and one-half inches in diameter, fourteen days' growth."

Meadow lake district.



Oat field at Meadow lake.

Mr. Crean reports most favourably on Meadow lake district, west of Green lake. He says:—"This section of the country is practically prairie and contains, in my opinion, some of the very finest farm land in Canada. The soil is exceedingly rich, there being in some portions twenty-four inches black loam, with clay subsoil. The open prairie country is perhaps twelve miles wide, and extends from Meadow lake almost to the fourth meridian. At the Indian Farm Instructor's house there was a plot of about five acres of the finest of banner oats. I could not obtain any data as to when these oats had been planted, but saw it on August 1, when it looked very well with good promise of ripening in plenty of time before the frosts. A settler named Evans is situated on the northern boundary of the Indian Reserve. In his garden I saw beans, tomatoes, peas, cauliflower, onions, carrots and parsnips, all doing very well. Mr. Evans came into this country last winter, at least just before the spring, broke this land, harrowing it as well as possible, and planted a garden on the sod on June 12. At Meadow lake there are two or three large herds of cattle which are thriving well. The grass at Meadow lake grows perfectly, and is of the

very finest quality for feed. The snow may be deep here, but hay is so easily procured that I am of the opinion that it would balance the scarcity of winter range. There was considerable disagreement amongst the people living in this country as to whether the grass really ripened. I satisfied myself later on (in October) that it really does ripen. The few settlers agree that two loads of hay will winter one animal, that is, two loads for each head of stock, whether yearling or full grown. Hay grows in such profusion that two loads to the animal could easily be obtained for even a large herd of cattle. There is little doubt that cattle fed and finished make better beef than range cattle, and the opportunity of procuring finishing food (ensilage) is always present in the northern latitudes. Hay here is by no means slough grass, but it is the

FINEST OF NORTHERN UPLAND HAY."

Professor John Macoun speaks in the highest terms of the nutriment contained in this kind of hay. That there is ample of it is a certainty. An old settler in this country is Cyprian Morin, who is a fine specimen of the old half-breed or native; born at Methye portage in 1834, he is now as active as a man of thirty. Morin's mother died four years ago at the age of one hundred and nine years. She was at that time quite capable of doing a good deal of work; in fact, I am told, attended to all the baking. Morin who runs a trading post and has raised barley and garden vegetables every year for twenty years, has also eighty head of cattle and some thirty five horses; he has never tried wheat. He says that the grass must ripen in this country (and it does), as the horses remain fat all winter. About eight miles to the west

of Morin, a man named Fiddler has located, who has one hundred and fifty head of cattle and sixteen horses. Last winter his losses were extremely heavy. He told me that he lost seventy head of cattle, but said that it was because the cattle had not recovered from their travelling over the trail from Battleford. William LaRonde who also lives in this locality, his place being situated on Meadow lake, has fifty head of cattle, all doing well. Reverend Father Cochin has lately opened a mission here, and has a rather nice little church, which is not yet finished. He has a good garden this year."

With reference generally, to the whole area of country explored by him in 1909, Mr. Crean stated in his report:—"In estimating the area of land available in its present state for agriculture, I do not wish it to be understood that it is one large tract, but that ten million acres of land in large and small tracts out of the total is capable of producing crops, which will enable settlers to make a comfortable livelihood. The land is almost entirely covered by a growth of small poplar. There are some open places and a good deal of swamp. I will, however, refer to this when dealing in detail with the tract. The climatic conditions prevailing throughout offer no obstacle to farming, and wherever experiments in agriculture have been attempted they have always been successful."

Whitefish Lake District.

Mr. Crean has this to say of Whitefish lake district (southwest of Methye lake), which he explored in 1909:—"This section lies almost upon the height of land between Arctic ocean and Hudson bay. The land is drier and of a better quality than that to be found at or around Buffalo lake; still, as is often the case in

this north country, one finds muskegs, almost impassable, either on top of, or very often half way up a considerable hill. There are a great number of muskegs between Methye portage and Whitefish lake, the country being flat and in need of draining. Whitefish lake is two hundred and forty feet higher than Methye lake, that portage which leads from it to Gypsy lake (eight miles in length) crossing the actual height of land. From Gypsy lake the water empties into the Clearwater, thence to the Athabaska and Arctic ocean. The natives at Whitefish lake grow turnips, carrots, parsnips and potatoes, but lack seed of any other kind. The potatoes are completely worn out and change of seed is certainly necessary. Going southwest from Whitefish lake towards Pembina river, the land improves, some very fine semi-open country being encountered. The Indians at Whitefish lake, who travel a great deal, use horses rather than canoes. The horses which I saw were not noticeable either for their condition or their breeding, the former being extremely poor, and the latter being absent,—Indian cayuses of the common type."

Waterhen lake district.

As to Waterhen lake district north of and across Beaver river from Meadow lake district, Mr. Crean, in his 1909 report, states:—"The country surrounding Waterhen lake is for the most part good, especially that portion which lies to the west of the lake, where there is some very fine land. Hay grows everywhere, and though the country can generally be considered wooded there are large openings. The land around Island river and Island lake (Lac des Isles) is included in this tract. From Island lake to Beaver river there is a portage of twelve miles, which

passes through the finest semi-open country. Pea vine and vetch are found in abundance. This good land extends to the fourth meridian, perhaps beyond, but I did not go any farther. No crops are grown. Indians there depend entirely on game, fish and fur for a somewhat precarious living. Waterhen river passes through a very large hay swamp shortly after flowing out of Waterhen lake. As it approaches Beaver river, however, the land becomes more of a muskeg, and although there are ridges containing arable land, the whole country may be taken to be sorely in need of drainage."

Mr. Crean did not go into the region north of Clearwater river, but he made enquiries regarding it, and has the following to say about it in his report: —"The country to the north of the Clearwater has not been explored even by fur-traders or Indians. Occasionally one meets a half-breed who has travelled through it, and the rumour current amongst the fur-traders is that the country contains nothing but small lakes, jackpine and rock outcrop. Still, the Indians who trap in this country kill nothing but beaver, which, it is well known, live upon poplar; therefore I concluded the country must be a poplar country and of some promise agriculturally."

North of the Churchill.

Most of the information we possess as to the most northern portion of the region under review, namely the country north of Churchill river, is contained in the report by Mr. J. B. Tyrrell of the exploration conducted by him in 1892. This report covers an area of about sixty thousand square miles, bounded on the south by Churchill and Clearwater rivers; on the west by the lower portion of Athabaska river; on

the north by Athabaska lake, Stone river, with its expansions, Black and Hatchet lakes, Wollaston lake and Cochrane or Ice river; on the east by the lower part of Cochrane river, Reindeer lake and Reindeer river. It lies between north latitudes 55° 20′ and 59° 37′, and east longtitude 101° and 111° 30′.

Mr. Tyrrell, in his report, gives some interesting information as to the great lakes and the rivers which are such conspicuous topographical features of this area.

Reindeer lake, from which Reindeer river flows, has an area of about two thousand two hundred square miles, and an elevation above the sea of one thousand one hundred and fifty feet. Its water is very pure and clear.

Wollaston lake is a large body of beautifully clear transparent water lying in a general north-and-south direction, with a greatest length of about fifty-five miles and an approximate area of eight hundred square miles. Though smaller than Reindeer lake, it is very similar to it in general character. Very many rocky islands rise abruptly out of its clear blue water. Wollaston lake is the dividing line between the waters flowing to Churchill river and those flowing to the Mackenzie, for it is not only drained by Cochrane river, toward the Churchill, but Stone river flows from its northwestern side, towards Lake Athabaska.

Lake Athabaska lies in a general east-northeasterly and west-southwesterly direction, its southwestern end being in northern Alberta. This lake has a greatest length of one hundred and ninety-five miles, a greatest width of thirty-five miles, a shore-line of four hundred and twenty-five miles and a total area of two thousand eight hundred and fifty square miles. Its depth has not yet been determined.

Cree lake is a large elongated body of pure transparent water lying in a general northeast and southwest direction, with a greatest length of forty-nine miles and a width as yet undetermined. Cree river discharges its waters towards Lake Athabaska.

Geikie river is, as far as is known, the principal tributary of Wollaston lake. It rises in some small lakes near the source of Foster river, and flows northeastward through a thickly drift-covered country. For long stretches it is straight and without current, giving the appearance of a wide, quiet river, or a chain of long narrow lakes.

The principal tributaries of the Churchill river on the north are Mudjatik, Haultain, Foster and Reindeer rivers. Mudjatik river is a swift, winding stream about eighty miles in length, generally flowing in a shallow channel through a sandy plain, in the bottom of a wide depression between ridges of granite. It is obstructed by comparatively few rapids, and these are for the most part over ridges of boulders.

Mr. Tyrrell, and his assistant, Mr. Dowling, considered the whole of the far northern part of this region as

Absolutely Unsuitable For Agriculture.

It is mentioned, in the report, that, under the trees at White Spruce rapid, on Geikie river, pembina berries, raspberries, etc., were growing in profusion in July, but no areas of arable land were found. All references to the soil are unfavourable, these for instance:—“There is no soil of any value for agricultural purposes along Mudjatik river.”

“The country surrounding Cree river is sandy and very barren.”

CHAPTER VII.

NORTHERN SASKATCHEWAN.

Tree Growth and Timber Resources.

A Rare Bit of Sylvan Beauty.—Ash-Leaved Maples Successfully Grown From Seed.—Notes by The Way on Available Water Powers.—Much Country Covered with Small Timber Not Generally of Commercial Value.—Some Areas of Good Timber Which Will be Invaluable To the Settlers.

The wide belt of territory north of the Saskatchewan as far northward as Churchill and Clearwater rivers, is pre-eminently a wooded country, its resources in the way of timber being very valuable, and its forest-clothed mounds, river valleys and lake basins imparting to it a beautiful park-like appearance in marked contrast to the more monotonous scenery of the great prairie country south of the Saskatchewan. There is little doubt that the scenic beauties of the region, by attracting travellers, will, when there is railway communication, contribute materially to the development of the natural resources of this extremely promising portion of the, as yet, unexploited northwest. Included in this territory is the famous scenery of Methye portage, which for upwards of a century has excited the admiration of explorers and travellers as perhaps the most superb natural panorama of forest scenery in North America. Of the many books and diaries of men who have had

the privilege of enjoying this view, there is not one which omits to pay tribute to its beauty.

Alexander Mackenzie, in the account of his trip of 1789, describes the height of land overlooking the Clearwater from Methye portage as commanding "a most extensive, romantic and ravishing prospect. From here the eye looks down on the course of the little river, by some called Swan river, by others Clearwater or Pelican river, beautifully meandering for upwards of thirty miles. The valley, which is at once refreshed and adorned by it, is about three miles in breadth and is confined by two lofty ridges of equal height, displaying a most beautiful intermixture of wood and lawn, and stretching on till the blue mist obscures the prospect. Some parts of the inclining heights are covered with stately forests, relieved by promontories of the finest verdure, where the elk and buffalo find pasture. These are contrasted by spots where fire has destroyed the woods and left a dreary void behind it. . . . . ."

Mackenzie, further, declares this "enchanting scenery" to be a "wonderful display of uncultivated nature."

Most Delightful Natural Scenery.

Harmon, writing in 1800, gives us the following as his impression of this view:—"About a mile from this end of the portage is a hill, which towers majestically to the height of a thousand feet above the plain below, and which commands a most extensive and delightful prospect. Two lofty and extensive ridges enclose a valley about three miles in width, which stretches far as the eye can reach. Little river, which is also, by different persons, denominated Swan, Clearwater, or Pelican river,

winds in a most delightful manner along this charming valley. The majestic forests, which wave upon these ridges, the delightful verdure of the intervening lawn, and the beautiful stream which wanders along through it, giving a pleasing variety to the scene, until these objects become blended with the horizon, form, on the whole, the most delightful natural scenery that I ever beheld."

Sir John Franklin, in his account of his expeditions, writing of the view from the heights above the Clearwater at Methye portage, describes it as "the most picturesque and romantic prospect we had yet seen in this country. Two ranges of high hills run parallel to each other for several miles until the faint blue haze hides their particular characters, when they slightly change their course and are lost to the view."

Captain (later Sir) George Back makes enthusiastic references to this beautiful view, for instance the following:—"A thousand feet below, the sylvan landscape lay spread before us, to the extent of thirty-six miles, in all the wild luxuriance of its summer clothing. Even the most jaded of the party, as he broke from the gloom of the wood on this enchanting scene, seemed to forget his weariness, and halted involuntarily with his burden

TO GAZE FOR A MOMENT,

with a sort of wondering admiration, on a spectacle so novel and magnificent. . . . . There is something appalling in the vastness of a solitude like this."

Sir George Simpson, in his narrative, speaks of "that noble view of Clearwater river which has been drawn with so much truth and beauty by Sir George

Back."

Bishop Tache, in the accounts of his travels, writes of the Clearwater:—"This delightful little stream, rising to the east of Methye portage has, up to the present time, and in spite of the difficulties of navigation, enjoyed almost the exclusive privilege of supplying a route to Athabaska-Mackenzie. On descending the heights of Methye portage one takes boat on this little river which, in order to keep the traveller in the midst of the beauties it presents to his view, places obstructions in the way, necessitating the portages of White Mud, the Pines, Bigstone, the Horse and the Cascades."

The early travellers were also impressed with the fine trees in this section of the northwest, and occasionally mention extra fine groves which attracted their attention. For instance, Simpson speaks of "firs of great size" on a projecting point in Methye lake, and, referring to one of his camps in Clearwater valley, says:—"One of the pines, under shelter of which we took up our night's lodgings, measured three yards in girth at five feet from the ground."

As in other parts of Canada, forest fires have wrought dreadful havoc in parts of this belt, but there still remains considerable areas of good timber.

The Venerable Archdeacon McKay, in his examination before the Senate committee of 1907, stated that as to the country around Lac la Ronge there is timber all through it, wherever it has not been destroyed by fires. He explained that he put up a sawmill operated by water power at Lac la Ronge in 1906. The logs that are sawn there are the kind of timber found in that part of the country. They average seventeen logs to the thousand feet. They would be logs fourteen or fifteen feet long. The

diameter would be about two feet across at the butt —good, large logs, clean timber, very much the same timber as at Prince Albert. This good timber is scattered all over the country, sometimes for miles. It depends on the nature of the country.

Asked how far this timber area would outskirt to the east, west and north, the Archdeacon replied he would say that kind of country extended all the way through right down to Lac la Ronge, and down all the way to the border of the province. Although he had not been through it, he had travelled backwards and forwards on it a good deal, visited Indian camps and so on, and it is very much the same kind of timber all through. In some places it is muskeg, and in some places heavy timber. Reindeer lake is not north of the tree limit. There are trees there, but they are small. They do not grow so large as farther south. It is a good way north of Reindeer lake before the barren grounds are reached. The Archdeacon had never been farther north than Reindeer lake.

Timber about Lac la Ronge.

Mr. Tyrrell describes the country immediately north of the Saskatchewan as a thickly wooded belt, "which contains a large quantity of timber, chiefly white spruce, trees up to eighteen inches in diameter. It is a wooded country with trees from twelve to eighteen inches in diameter, tall with clean trunks—good, nice timber. Of course, the timber does not grow as large on high, dry, sandy ridges as it grows in the valleys. Most of the timber is in good soil in the valley bottoms, but there is more or less land all over. The poplar and birch affects the higher land, and the spruce and hemlock the valleys."

Mr. Dowling states that the sides of Green lake

are “densely wooded with poplar and spruce.”

Pioneer Arboriculture.

Speaking of his visit to Ile à la Crosse lake, Mr. Dowling states in his report:—“Some ash-leaved maples had been planted in the garden of the Hudson’s Bay Company’s post, which are now from ten to fifteen feet high, quite healthy and bearing abundant seed.”

According to Mr. Dowling’s report “The timber in the rocky country bordered by the southern shore of Lac la Ronge is not large or abundant. Southward there is some improvement, and large individual spruce trees occur occasionally. The ‘lob sticks’ at Big Stone, Hudson’s Bay Company’s post, are fine examples of these. On Montreal river, small Banksian pine cover the eastern slope of the sandy plateau. No large timber, spruce or pine, is seen till near the lake, where at the southern end some groves of large spruce occur. On the watershed south of Montreal and Deer lakes the largest timber is seen. Here the formation of the country is evidently morainic, but southward the country slopes gently towards Saskatchewan river.”

Some Merchantable Timber Areas.

Mr. Crean reports that a considerable quantity of merchantable spruce timber is to be found in Methye lake section. There is some remarkably fine spruce along the banks of Whitefish river, and it extends in not very dense forest across to Methye lake, a distance of about eight miles.

Summarizing the results of his explorations in

1908, Mr. Crean reports.—"Although numerous prairie openings occur, this tract may be spoken of as practically covered with small timber not generally of any commercial value. The poplar is the principal growth, and, following the rule so well known throughout the western prairie country, indicates good land. Some spruce is found and large quantities of small second growth jackpine. There is some tamarack. There is, of course, no white or red pine. The poplar in some places would make fine pulpwood or barrel staves. Generally speaking it is of no commercial value. There are several small groves of good spruce along Churchill river, and at Methye portage there is a large quantity of good spruce. Along Whitefish river the timber is large and of good quality. On both the east and west side of Green lake some good timber is found but it is scattered. Generally there is ample timber for settlers' use, but not enough to supply any lumber industry.

"Throughout this district there are many points where a large amount of water power could be developed, and there are numerous small power sites. The district might be utilized so as to create great industrial centres. The great advantage of the numerous water powers is the fact that sufficient power can be obtained at many points to supply the needs of a fair sized community. On almost every stream there are sites where small powers could be easily developed and grist mills, saw mills, lighting and pumping plants could be operated at the minimum of expense. I did not gauge or measure the possibilities of any of the water powers, but made rough estimates of a few prominent ones. On Beaver river at what is termed Grand rapids probably

TEN THOUSAND HORSE POWER COULD BE

DEVELOPED.

Rapid river, which enters the Churchill about seven miles below Stanley, falls seventy feet in one cascade. This should afford a large amount of power. Churchill river between Ile à la Crosse lake and Knee lake, a distance of about twenty-five miles, has a fall of eighty feet. This fall is practically all in three rapids, all of which have sharp descents. At one rapid there is a cascade eight feet high. All the tributaries on the north side of the Churchill afford ample opportunity of development of power. Mudjatik river is a series of water-falls."

Mr. Crean, in his report of 1909, says: —"Waterhen river is very rapid, and along it are several small falls and steep descents. These would be ample to develop power for a small community, but not enough for any commercial proposition. On Clearwater river occurs one of the best commercial water powers which I have seen. It could be easily and inexpensively developed."

All reports agree in saying that there are numerous water powers susceptible of development throughout the area under review, but there is not much detailed information given on this point.



Prairie along Clearwater river.

Mr. Crean reports that along Whitefish river there is a considerable quantity of good tamarack, but explains that although this timber would be extremely useful to any settler going into the country, he did not think there was sufficient for any commercial project. There is a considerable quantity of timber north of Waterhen lake and river. There are several scattered clumps of fine spruce in this locality which are passed on the string of small portages when one is travelling from Waterhen lake to Island river. The diameter would average perhaps twelve inches, but running up to twenty-four inches.

The Native Timber Trees.

Mr. Crean incorporates in his report the following description, with comparative values, of the most common kinds of timber found in the north:—

"(1). White Spruce (*Picea canadensis* (Mill) B., S. & P.)

The wood is light, soft, not very strong, straight

grained, light yellow, with hardly distinguishable sapwood. This is the best tree for lumber purposes in the northern forest, and is also one of the best for pulpwood. It usually grows on higher ground than the black spruce.

"(2) Black Spruce (*Picea mariana* (Mill), B., S. & P.)

The wood resembles closely that of the white spruce, and as lumber or pulpwood no distinction is made between them. The wood has a slight red tinge and has paler sapwood. The black spruce grows usually in muskegs and low places and owing to the coldness of the soil does not grow fast, and is usually small, not usually over six or eight inches in diameter.

"(3). Jackpine (*Pinus Banksiana*, Am.)

The wood is light, soft, not very strong, close grained and dark, nearly brown in colour, with light thick sapwood. This tree is used mostly for railway ties and fuel, but is manufactured into lumber to some extent. It is not equal in colour or smoothness to the wood of the spruce. It is used for pulp, but has not so fine a fibre or colour as the spruce.

"(4). Tamarack (*Larix americana*, Michx.)

The wood is light brown, heavy, hard, strong, rather coarse grained and very durable. It is used for railway ties, posts and dimension timbers. It is not sawn into lumber, being more useful for other purposes, and is not used for pulp.

"(5). Poplar, Aspen or White Poplar (*Populus tremuloides*, Michx.)

The wood is light brown with almost white sapwood. It is smooth and easily worked. It is used for pulp and is cut into lumber for inside finish. As it is a widely extended and quick growing tree it is used largely for fuel. Next to the spruce it is the most

valuable tree for pulp. It is manufactured largely into finer grades of paper by the soda process.

"(6). Balsam or Black Poplar (*Populus balsamifera*).

The wood is light brown, with thick sapwood. It is rather coarse and not strong. It is chiefly used for fuel, though sometimes cut into boards where other lumber is not available. It is not so valuable as the aspen poplar.

"(7). Birch (*Betula papyrifera*, Marsh).

The wood is light, strong, tough, hard, very close grained, light brown, tinged with red, with thick, nearly white sapwood. It is used for spools, lasts and turned work generally. Birch fibre is short and brittle, and not easily bleached, and is not suitable for pulp."

Reindeer lake and river.

The district north of Churchill and Clearwater rivers, authorities agree, is only thinly wooded, the growth becoming smaller towards the northern limit. According to Mr. Tyrrell, the banks of Churchill river from Methye portage to the north of Reindeer river are low and thickly wooded with spruce and poplar. White spruce (*Picea Alba*) forms some groves of fair size in the bottom lands along Reindeer river near Churchill river, but farther north it is rarely seen except in some particularly favorable localities. One small isolated grove of white spruce was found in a high sandy island in Hatchet lake, standing out conspicuously in the midst of the surrounding forest of small black spruce. Poplar (*Populus tremuloides*) and Birch (*Betula papyrifera*) are the only remaining trees of any importance. They are chiefly found in the vicinity of Churchill river, though small scattered

trees were seen on the banks of Stone river. The rocky shores and islands of Reindeer lake are generally thinly covered with a sparse growth of small, black spruce. The irregular shores of Wollaston lake are chiefly composed of thinly wooded, rocky hills. Geikie river flows between low, sparsely-wooded banks. The banks of Mudjatik river are thinly wooded with Banksian pine and spruce. As to Cree river, surrounding country is sandy and very barren supporting but a scanty growth of black spruce and Banksian pine, with very little underbrush. Some fine, large, white spruce were noticed at spots on Geikie river.

Near Lake Athabaska.

Mr. Tyrrell mentions that along the northeast shore of Lake Athabaska, “Some good white spruce, up to fourteen inches in diameter, is growing on the points.”

Mr. Tyrrell, before the Senate committee of 1907, in speaking of the forests of the country north of the Churchill, explained that far in the north there is the tract of country that has no trees on it; then a belt of country from one to two hundred miles in width, with small Banksian pine, spruce, larch, poplar and some white birch. He would not consider any of those woods valuable for timber purposes, except locally. They would serve for pulpwood, but the growth is not thick. Still over considerable areas there might, of course, be a large quantity of timber for pulpwood. In that belt the trees would average probably six inches. Occasionally you would find some a good deal larger. The poplar grows on the drier lands. It is not an indication of good land in an extremely northern country. It indicates a dry, sandy

soil, but further south it indicates excellent soil.

CHAPTER VIII.

NORTHERN SASKATCHEWAN.

Economic Minerals.

A Large Amount of Iron Ore in the Northeastern Corner of the Region, on the North East Side of Lake Athabaska.—Indications Favourable for the Discovery of Coal.—Nickel and Traces of Cobalt on Reindeer lake.—Medicinal Waters.—Bituminous Springs and Pit Coal on Cree river.—Tar Sands Near Buffalo lake.

In the report of his explorations in 1892 and 1893, Mr. J. B. Tyrrell notes the occurrence of several areas of Huronian quartzite along the northeast side of Lake Athabaska. In one case, he states:—"At a distance of a mile and a half from this island (four miles and a half east of Beaver Lodge island) in a direction north 66° east, a conspicuous red hill rises one hundred and twenty-five feet above the water, its abrupt red cliff standing out boldly towards the southwest. On its northeastern side, at its base, it is composed of thinly fissile quartzose schist, very much reddened, striking north 30° west, and dipping south 60° west, at an angle of 10°. Farther up the side of the hill the rock is a quartzite, interbedded with layers of hematite, which in some places forms the larger part of the mass. The summit of the hill, several hundred yards in length, is composed of a highly hematitic quartzite, mingled

with a large quantity of limonite, especially on the higher points. In places the rock is a conglomerate, with quartz pebbles, and a matrix of limonite. Other similar red hills can be seen in the distance on the strike of the rocks, and the total amount of iron here and in the vicinity is doubtless very large."

Mr. J. B. Tyrrell, before the Senate committee of 1907, stated that from a line at Cumberland House, on Saskatchewan river, northwestward to Churchill river, and westward along Churchill river, the country to the south is underlaid by the more recent clay rocks of the plains, and the mineral wealth that is to be looked for there is

Coal and Iron.

He had considerable confidence in both those most useful products being found in that country. Coal is found on Saskatchewan river at Edmonton, and on Pembina river, west of Edmonton, and there are several more outcroppings of coal down Saskatchewan river as far as Prince Albert. Most of the country north of Saskatchewan river had not been explored for coal. It is a country of gentle slopes covered with grass and wood, and the coal outcropping in such a country is certain to be covered. There is no possibility of seeing it as a natural outcrop. It has to be looked for, but it has not been looked for in that country sufficiently to find it, so he was perfectly confident that the same seams that outcrop on the Saskatchewan, in the west at all events, would be traced much further north.

Writing in his report of his survey of the west shore of Reindeer lake, Mr. Dowling states:—"From Priest's point (proceeding southward), the lake gradually narrows from a minimum width of four

miles, to a narrow inlet less than a mile wide at the outlet, and the course of this part lies very nearly southwest and northeast following in a general way the strike of the rocks. A band of dark mica-schists is crossed, reaching from near Priest's point to twenty miles southwest, and along the course followed through the islands many small dykes of a quartzose fine-grained granite were found, in which iron pyrites is freely developed. The beds of fine-grained gneiss on Camping island, ten miles south from Priest's point, are also found with many veins of pyrites and on the hill in the centre of the island many of the beds are very much rusted and decomposed. The pyrites are found to contain a small percentage of

NICKEL AND TRACES OF COBALT.

At the north side of a small creek on the west shore, southwest from Camping island, the Indians report a soft soapstone or serpentinous rock from which they make pipes, but a visit to the locality did not result in finding this rock, which was then said to be obtained in small pieces from the shore and generally under the water. The rock there was, however, a light green sericite-schist, and it is possible that unfoliated or less cleavable portions of this might be soft enough for the purpose named. The stratigraphical relations of this band with the surrounding gneisses, could not in the time at the disposal of the party be made out, so that it is problematical whether this may be a small area of highly altered Huronian beds or not. The next rock occurring to the south is a dark garnetiferous gneiss, followed by reddish granitic gneiss to the outlet of the lake."

Mr. Dowling mentions that in descending Reindeer river his attention was attracted by the red colouring of a hill near the river, below the mouth of Stump river. He states:—"On a nearer view, this red colouring is found to be due to the debris of a decomposed band occupying the crest of the ridge. The rock has been very highly charged with iron oxides and pyrites. The strike of the beds is south 10° east, with dip eastward at angles varying from 60° to 80°. Several large seams of red granite cut into the hill and break up the beds somewhat.

"A section of the hill shows a light, coarse gneiss near the bottom, with a dark mica-schist, followed by a bed of light, rusty coloured gneiss having a thickness of about five feet. This in some places seems to have been very rich in pyrites and is weathered out to a reddish ochre. The outcrop is just below the crest of the ridge, and from it the ochre falling down, stains the whole face of the hill. Above, on the summit, the rock is mostly a dark-red gneiss."

Archbishop Clut, examined before the Senate committee of 1888, stated that he had seen sulphur springs on Clearwater river. Asked if he had ever heard of the existence of valuable minerals in any part of the country northeast of Lake Athabaska, Bishop Clut explained that he had seen a man named McCarthy, at Fond du Lac, Lake Athabaska, who told him that he had discovered gold, but as he was not an educated man, the bishop did not know whether he was mistaken or not. The man said he would not show it to anybody, but that he was almost sure that he had found a gold mine. Nobody had brought to him specimens of gold, silver or anything of that kind from that region.

Bituminous Springs and Pit Coal.

Chief Factor A. McDonald chronicles in his journal having passed bituminous springs on Cree river, south of Lake Athabaska, just above the junction of the Pierre au Calumet or Pipestone river (McLeod's "Peace River"). He also reports having passed, the same day, "Large strata of pit coal all along either side of the river."

Mr. Alfred Von Hamerstein informed the Senate committee of 1907 that "on Clearwater river there are first class medicinal springs. The natives have been using the water right along, and it acts very well on the bowels. It is like the well known Hunyadi mineral water. It is a very nice, picturesque country, and the natives go up there and doctor themselves."

In the course of his examination before the Senate committee of 1907, Mayor Cook, of Prince Albert, explained that nobody in the region north of the Saskatchewan bothers about the coal. Coal had been discovered at Lac La Ronge—there was no doubt about that. Good samples had been brought in, but nobody bothered with it yet because wood was so plentiful.

W. F. Bredin, M.L.A., stated before the Senate committee of 1907, that on his way from McMurray to Prince Albert, he found that the tar sands appeared on Buffalo lake, which is on the Churchill system of water, and that, in his opinion, showed that the tar sands are both on the Mackenzie water system and on the Churchill system, on both sides of the divide there.

Mr. Crean in his 1908 report says:—"At the narrows between Little Buffalo lake and Buffalo lake, there is a tar sand outcrop. The Indians use it to pitch their canoes."

Mr. Crean also says:—"Lac la Ronge district is claimed to have great possibilities as a mineral

district. The Laurentian range of rock crops out here and is easily traced to the northwest. Whether this outcrop really contains mineral of economic value is still unsettled. Numerous claims have been staked at Nickel island in Lac la Ronge and on the mainland close by, also on Churchill river above Stanley. I had not time to prospect the country, but from casual observation I should think that it would repay a closer investigation. The vein on Nickel island is very distinct and about eighteen inches wide on the outcrop. Several small companies have been formed and development work in a limited way is progressing."

So far there has been very little systematic prospecting for economic minerals in the portion of the province of Saskatchewan north of the river of that name, but the people of Prince Albert and Battleford and the pioneers settled in the wilderness north of those towns, have for years believed that coal, iron and other minerals will be found in the vicinity; trappers, traders and Indians often return from the wilderness with stories of mineral discoveries.

CHAPTER IX.

NORTHERN SASKATCHEWAN.

Game, Fur-Bearing Animals and Fish.

"So Fine a Country for the Chase That It May Be Regarded as an Extensive Preserve."—The Wood Buffalo Used To

Roam Over It, but Do Not Now.—Moose and Caribou Plentiful.—The Indians Kill the Moose for Their Hides.—Fish of Various Kinds in Abundance.—Sturgeon That Weigh a Hundred Pounds.—One Indian Killed Eighteen Moose During One Season.

As fish has always been the staple food of the inhabitants of that part of the province of Saskatchewan north of the river of that name, and the fur trade their only industry, it goes without saying that the country abounds in fish and game. A very few quotations from travellers and explorers is all that is required to give an idea of the species of fish and animals to be found in this region, and of their occurrence.

In his account of his passage through the Clearwater country, Simpson writes:—"This is a fine country for the chase, and so little frequented in winter, that it may be regarded as an extensive preserve. We saw three moose deer on the top of one of the hills, and their tracks and those of the wood buffalo were numerous in every direction. The valley of the river is entirely sheltered from the inclement north and northwest winds, but its exposure to the east usually rendered the snow deep and soft, as we found to our cost. . . . . Just before breakfasting we saw, on the northern hills, a large moose, and a band of five wood buffalos sunning their fat sides—a sight sufficient to make the mouths of the pemmican eaters water, but they were beyond our reach, and, taking the alarm, quickly disappeared. The declivities of the hills seemed, as we passed along, completely chequered with the tracks of these and smaller animals."

Mr. H. J. Moberly, chief trader of the Hudson's Bay Company at Rapid river, (Lac la Ronge) Cumberland district, forwarded the Senate committee of 1887 evidence in writing regarding

animal life in the far northwest. He explained that he knew Saskatchewan (north) river and valley from the mouth of the Saskatchewan on Lake Winnipeg up to its source in Rocky mountains. He also knew Athabaska river and valley from its source down to its mouth in Athabaska lake, and was well acquainted with all the country between those two rivers, from Rocky mountains down to Carlton, and from there, taking a line via Green lake, Beaver river, Ile à la Crosse lake, Deep river, Buffalo lake, Methye river and lake, Methye portage and down the Clearwater to its junction with Athabaska river, as an eastern line and Rocky mountains as a westward. He knew well all the country between Athabaska and Peace rivers, from their mouths to their sources.

As to wood buffalo, at the time Mr. Moberly wrote, there was a band, probably about two hundred, between the Saskatchewan and the Athabaska. (There are none there now). They kept on the mountains between Lac la Biche and McMurray. Another band, probably three hundred strong, was between Athabaska and Peace rivers on Thickwood and Birch mountains. A third band, probably seven hundred strong, was scattered through the mountains between Liard and Peace rivers, and from Salt river to the foot of Rocky mountains.

Moose Run All Over the Wooded Country

north of the prairies and east of Rocky mountains.

The distribution of other game and fur animals in far northwestern Canada was given by Mr. Moberly as follows:—Reindeer (cariboo), large—all over the wood countries from Saskatchewan, to the barren grounds of the north; reindeer, small—all over the barren grounds in the north, and come south in

winter as far as Lac de Brochet, Athabaska lake and Peace river, close to Rocky mountains; red deer—Athabaska and Peace river valleys; black tail deer, jumping deer and chevreux—same country as the red deer; black and brown bears—all over the wooded country and Rocky mountains; grizzly bears—Rocky mountains, valleys of the Peace, Athabaska, Liard, and Fraser, but seldom farther than two hundred and fifty miles from the foot of the Rockies; beaver—Athabaska, Peace river and in fact all over the wooded country.

In his report of his exploration of the country between Churchill river and Lake Athabaska in 1892, Mr. J. B. Tyrrell writes:—"The moose (*Alces Americanus*), roams through the more thickly wooded parts of the country as far north as Stone river, which is probably near the northern limit of its range. Seven individuals in all were seen during the course of the summer. The woodland caribou (*Rangifer caribou*) is said to occur in the more southern portion of the district, near Churchill river, but none were seen. The barren ground caribou (*Rangifer Grœnlandicus*) comes south in winter to the south end of Reindeer lake and the upper portion of Mudjatik and Foster rivers. It travels north in spring to the Barren Lands, but a very few animals are occasionally left behind, one having been shot in July near the north end of Cree lake. The Canada lynx (*Lynx Canadensis*) is moderately abundant in some seasons in the more southern part of the district. The gray wolf (*Canis lupus occidentalis*) roams over the country, but is not plentiful. The coyote (*Canis lisatrans*) is found occasionally as far north as the height of land, one having been shot by the writer on one of the small lakes near the source of Foster river. It is, however, certainly not common

in the district. Red, black and cross foxes (*Vulpes vulgaris*), wolverine (*Guloluscus*), marten (*Mustela Americana*), weasel (*Putorius vulgaris*), mink (*P. vison*) and skunk (*Mephitis mephitica*) are all found in greater or less abundance in the rolling wooded country underlain by Archaean rocks. The otter (*Lutra Canadensis*) was found on all the streams north to Stone river. The black bear (*Ursus Americanus*) roams over the whole country. A few beavers (*Castor fiber*) may still be met with in many of the streams. A considerable colony was found in the untravelled country near the source of Geikie river, but our canoemen brought back word of this (to the Indians) important discovery, and doubtless the beaver were killed during the following winter. The muskrat (*Fiber zibethicus*) was seen swimming in all the streams. The rabbit or American hare (*Lepus Americanus*) is found everywhere in the denser woods, but it did not seem to be anywhere abundant.

Fish in Abundance.

"Fish seem to be everywhere abundant in the lakes and streams, but the number of species is very limited. The lake trout, (*Cristivomer namaycush*) is, however, the largest of any of the finny tribes. One was caught near the mouth of Stone river weighing twenty-five pounds. The whitefish (*Coregonus clupeiformis*) is found everywhere throughout the district, but more especially in the shallower lakes. The blue fish or Back's grayling, (*Thymallus signifer*) was caught in Stone river at the foot of the heavy falls below Black lake. Pike, (*Esox lucius*), pickerel, (*Stozostethium vitreum*), methy, (*Lota lacustris*) and two or three species of suckers, (*Catastomus teres* and *Myxostoma macrolepidota*) were found in almost all

the water stretches.

Mayor Cook, of Prince Albert, when examined before the Senate committee of 1907, explained that at that time he held the appointment of inspector of fisheries. He testified that once, some years previously, on Beaver river, he had seen thirty-two thousand whitefish caught in two nights, which would average about two or two and one-half pounds each. They put up the winter supply of fish in three or four nights. These fish were caught by half-breeds and Indians. The fish were coming down after spawning, and those catching them set the nets right across the river. This happened in close season, "but they did not bother about that; it was the fish they were after." There are whitefish, trout, jackfish and some sturgeon in Torch and Saskatchewan rivers. Reindeer lake and the small lakes all around it are full of fish. They fish up there until December 1. Sometimes the lakes are open until December 15, and break up again about May 15 to 20. It depends upon the size of the lake. If it is a very large lake it will take a little longer. Witness had seen the lakes open on December 15. Those lakes are teeming with fish,—whitefish, sturgeon and trout. The trout run as high as fifty pounds.

The sturgeon run from ten to one hundred pounds. Witness had never seen one over one hundred pounds. He had seen one whitefish that weighed seventeen and one-half pounds, and trout that weighed fifty. He had them for the exhibition in Ottawa, but the train was blocked and did not get through. The biggest jackfish he had ever seen weighed forty-five pounds. They have some little bits of things but they range up to that. In other places they have big fish from ten to forty-five pounds in weight.

According to Mr. Crean, Methye lake is a fine body of fresh water and is well stocked with fish. “Wild fowl of every kind abound here. Moose and caribou are plentiful. The result of Nature’s bounteousness, is that the native, content with Nature’s provision, grows nothing. He kills the moose for its hide.”

In his report on the area explored by him, in 1908, Mr. Crean stated:—“The staple food of the native north of the Saskatchewan is fish, and with this commodity he is amply supplied. Whitefish are found in all the lakes and rivers. Green lake is stocked to repletion with as fine whitefish as will be found anywhere. Ile à la Crosse lake is also amply supplied. Canoe lake, Marten lake and all the immense water area comprised of the numerous lakes in this district are well stocked with this valuable food.

“Game of all kinds abound, the principal species being the moose, the caribou, the deer, the black bear, the cinnamon bear, the lynx, the wolf (timber), the fox, the wolverine, the otter, the beaver, the mink, the marten, the muskrat, the rabbit, and the squirrel. Among the principal birds found are swans, geese, ducks, partridges, ptarmigans, gulls, jays, (whiskey jacks), kingfishers, crows, robins and loons.

Moose are Still Plentiful

but are being killed in large numbers by the natives and the wolves. The same remark would apply to caribou of the woodland variety. The barren land caribou or reindeer come down as far as Cree lake (one hundred miles north of the Churchill) in numbers, and a few stray farther south. I shot one in the muskeg just north of Lac Ile à la Crosse.”



Landscape in Clearwater valley.

Mr. Crean states that an Indian living on Snake lake at the mouth of Sandy river killed eighteen moose during the autumn of 1908.

“Game, particularly moose,” according to Mr. Crean, “is plentiful in the Meadow lake district, and easily obtained. Beaver are plentiful in one or two districts, particularly along Clearwater valley and the rivers tributary to the Clearwater from the north. They are, of course, very easily killed, and consequently form a large portion of the fur in the north. When other fur is scarce, the Indian devotes his attention in particular to the killing of beaver. Muskrat were extremely numerous and were taken in very large numbers. Early in the fall, however, before the fur could possibly be of any use they were being killed in great numbers.”



THE ATHABASKA COUNTRY

CHAPTER X.

NORTHERN ALBERTA.

Agriculture and Arable Land in the Eastern Section or "Athabaska Country."

A Section of the West Where Officials of the Hudson's Bay Company Were Directed to Cultivate Gardens.—Some

Points Where Wheat has been grown, Including the Sample which took First Prize at the Philadelphia Centennial Exhibition.—Crude Indian Gardens at Cowpar lake.—Livestock Grazing out in December and January.

A glance at the latest "Railway Map of the Dominion of Canada," published by the Department of the Interior, will show that the surveyed, and consequently fully-explored, part of the province of Alberta extends considerably farther north than do the lines which mark the northernmost limit of the surveyed territory in Saskatchewan.

The areas of arable land in Northern Alberta are admittedly so extensive and important, and there has been such a large accumulation of evidence as to the latent agricultural wealth of the actual agricultural experiments in this most promising region, that, with the object of enabling the reader the more readily to follow the text, and to assist him in locating the geographical points mentioned, it has been deemed advisable to divide the material referring to arable lands and agriculture in this territory into two separate chapters, corresponding with two divisions of the area immediately under review. The country readily lends itself to such a division; in fact, invites it.

The region west of the 114th meridian has long been known and designated as "Peace river country," and possesses characteristics, and to some extent, a history quite its own. The remaining or eastern half of the territory, at least as far north as the lower reach of Peace river, is the main basin of the Athabaska and, as such, will be treated as a distinct area in the present chapter, the one immediately following to be devoted to the subject of the arable lands and agricultural possibilities of Peace river country.

Athabaska river, which is the most southerly of the three great tributaries of the Mackenzie, rises in Rocky mountains near Mount Brown, at an altitude of about five thousand seven hundred feet, and pursues a northeasterly and northerly course for nearly six hundred miles to Athabaska lake, falling in this distance some five thousand feet, and being interrupted by several series of rapids. In the first three hundred miles of its course it falls about four thousand feet, and receives in succession Baptiste river from the west, the Macleod and Pembina from the south, and the Lesser Slave, draining the large lake of that name, from the west. Below its confluence with the last named stream, the Athabaska turns southeastward for some fifty miles and then resumes its northerly course. In the course of the next one hundred and fifty miles it receives, in succession, La Biche river from the east; Quito or Calling river from the west; Big Mouth brook from the east; Pelican river from the west; and House river from the east. Just below the mouth of the last river the Athabaska strikes a range of low hills, and in forcing a passage through them is deflected eastward, and for a distance of about seventy-five miles contains many rapids, falling in this distance some four hundred feet. At the lower end of this stretch it receives the waters of Clearwater river, its principal tributary below Lesser Slave river. The Clearwater rises on the height of land between the Churchill and the Athabaska, and pursuing a nearly straight easterly course for some one hundred and fifty miles, mingles its limpid waters with the sediment-laden flood of the latter stream. In the lower part of its course the Clearwater occupies a deep valley and is very rapid. Thirty or forty miles above its mouth it is joined by the Pembina, a stream

of about equal volume. Below the mouth of the Clearwater the Athabaska pursues a nearly direct course northward, receiving Red, Moose, and Bar rivers from the west, and enters Athabaska lake through a number of channels including alluvial islands.

Lake Athabaska was known to the pioneer fur-traders and explorers as "Lake of the Hills," and it is so described by Mackenzie and others.

The country drained by the Athabaska is

MAINLY A ROLLING PLAIN

and with the exception of a few areas of semi-prairie land, is well wooded, with a forest composed mainly of spruce, fir, pine, tamarack, poplar, birch and willow. A large part of its surface is occupied by mossy swamps, called muskegs, and hundreds of ponds and lakes, of which Lesser Slave, seventy miles in length, is by far the largest, occupy its shallow valleys. Immense areas have been swept by fire, sometimes repeatedly, and in some places the original forest covering has been destroyed and small prairies have succeeded.

The first information we obtained as to the agricultural possibilities of Athabaska basin came from explorers and travellers passing through the most northern portion of it on their way to Peace river, Great Slave lake and the Mackenzie via the old canoe route by Methye portage and the Clearwater. In more recent years, particularly since the inauguration of steamboat communication along the long navigable stretches of the Athabaska and Mackenzie, the favourite route to the far northwest has been down the Athabaska from Athabaska, and, as is only natural, our knowledge of the resources of

the country has increased greatly.

Sir Alexander Mackenzie, as far back as 1787, saw at a trading station of Peter Pond, on Elk or Athabaska river, "as fine a kitchen garden as he ever saw in Canada."

It might be explained here, that in the spring of 1778, a number of the Saskatchewan traders put their goods into a common stock, and placed Mr. Peter Pond in charge of them, directing him to proceed to the Athabaska and trade with the Indians. He took the present Hudson's Bay Company's route, by Cumberland House, Frog portage, Ile à la Crosse, and on to Methye portage and down Clearwater river to the forks of the Athabaska. Here he built a house, and in the spring of 1779 planted garden seeds.

As a general thing, at the early trading posts, agriculture of any kind, even the making of gardens, was neglected, and, rightly or wrongly, the officials of the Hudson's Bay Company got the credit of discouraging such ventures. If this had ever actually been the settled policy of the company, it was officially abandoned some time previous to the year 1826, for, writing in the year mentioned at Chipewyan (north latitude 58° 40′) of improvements in the country, the

Result of Judicious Arrangements

then recently effected by the directors of the Hudson's Bay Company, Sir John Franklin writes: —"They (the directors) have also directed, where the soil will allow, a portion of the ground to be cultivated for the growth of culinary vegetables at each of their establishments, and I witnessed the good effect of this order, even at this advanced post, where the ground is rocky; the tables of the officers

being supplied daily, and those of the men frequently, with potatoes and barley. Such luxuries were very rarely found beyond Cumberland House on the route that we travelled during my former journey."

Sir John Franklin also mentioned a phenomenon which has a considerable bearing upon the agricultural possibilities of this country, namely the quick change from winter to summer and the rapid growth of vegetation. He wrote of the advent of spring at Chipewyan in 1827:—

"There can scarcely be a higher gratification than that which is enjoyed in this country in witnessing the rapid change which takes place in the course of a few days in the spring. Scarcely does the snow disappear from the ground before the trees are clothed with thick foliage, the shrubs open their leaves, and put forth their variegated flowers, and the

WHOLE PROSPECT BECOMES ANIMATING."

Sir John also mentioned that the first flight of swans northward was noticed at Chipewyan on April 15, the first geese on April 20, the first robins on May 7, and the first house martins on May 12. Barley was sown at Chipewyan on May 15, potatoes on May 21 and garden seeds on May 22, and it was expected that all would be ready for use by the close of the following September.

Sir George Simpson's party were regaled with "new, but very small potatoes," on August 11, 1828.

Sir J. Richardson, before the British parliamentary select committee of 1857, asked to state to the committee any general opinion which he had formed of the capabilities of any considerable

portion of the country which he had traversed, for the purpose of settlement and colonization, replied: —"With regard to the production of cereals, wheat may be grown up to the 58th parallel of latitude (same latitude as Fort Vermilion) in favourable places, but only in parts."

The report of the Dominion Government's survey parties sent out in advance of the Canadian Pacific contain important references to agriculture in the country. In the report for 1877-78 (p. 332) appears the following reference to Chipewyan (latitude 58·7°):—"Professor Macoun there obtained in 1876, fine samples of wheat and barley—the former sixty-eight pounds to the bushel and the latter fifty-eight pounds. At the French mission, two miles above the fort, oats, wheat and barley were all cut by August 26." In 1880 report it is stated (p. 102), "Reverend Gordon said in 1880 that wheat and barley raised at Chipewyan received a medal at the Philadelphia Centennial Exhibition of 1876."

In the report of 1877-78 (p. 326) there is this reference to McMurray (latitude 56·7°):—"Professor Macoun on September 8, 1875, found tomatoes, cucumbers, wheat and barley, under cultivation together with all vegetables found in kitchen gardens in Ontario. He spent ten days there and obtained specimens of wheat and barley which

Have Astonished Everyone

to whom they were exhibited; many of the ears contained one hundred grains and the weight of both wheat and barley was nearly ten pounds above the ordinary weight per bushel. These grains had been raised on soil comparatively poor—very poor for the district—and lying only a few feet above the level of

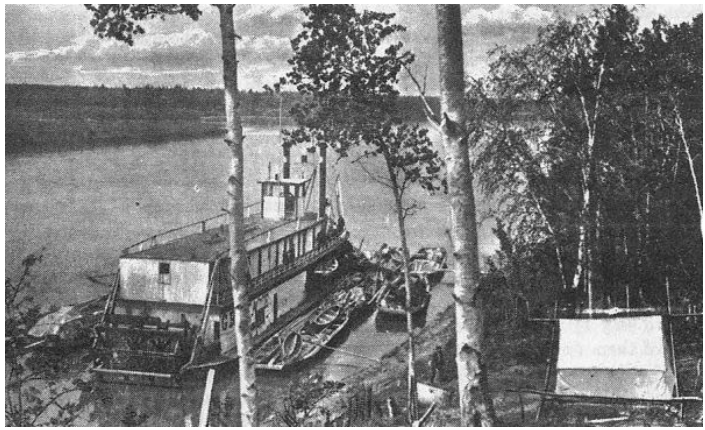
Lake Athabaska."

In a report of his then recent trip through this country written by William Oglivie, D.L.S., in 1884, he writes:—"A great deal of the soil along the bank of the Athabaska was of very fair quality. At McMurray, where there are a couple of small prairies or meadows, the soil is good, and the root crops and garden produce raised there are generally very good. The Hudson's Bay Company have a garden at McMurray of upwards of an acre in extent, and the Episcopal mission one of smaller area, but the soil is very sandy. The Roman Catholic mission have a garden also, most of which they obtained by draining a bog into the lake. In the season of 1883 (which was a pretty favourable one in that district, being free from summer frosts) the Hudson's Bay Company raised about four hundred bushels of potatoes, the Episcopal mission thirty bushels on a small patch, and the Roman Catholic mission about five hundred bushels. Many of the retired Hudson's Bay Company's servants also have small patches which they cultivate, potatoes and fish being the principal articles of food used during the winter."

Doctor Robert Bell, before the Senate committee of 1887, testified that they grew cucumbers and melons as far north as Lac la Biche. He had seen them there himself, and he was not sure but that they grew pumpkins, too. He pointed out that where cucumbers and melons grow pumpkins will grow also. It is hard, Doctor Bell pointed out in the course of his evidence upon this occasion, to induce the Indians to grow anything. Even potatoes, which they all know to be a safe crop, they will not grow unless encouraged by supplying them. If supplied with seed in the autumn they will not preserve any over the winter. They would not take the trouble to dig a pit

or build a cellar in which to preserve the seed, but in the spring, when the time comes for planting, if anyone were to give them the seed they would plant it. Artichokes would be very suitable to introduce amongst the Indians, because they are very hardy and productive; the seed remains in the ground and the Indians could not destroy it all.

Mr. Alfred von Hamerstein, who has lived in Athabaska district since 1897, trading and prospecting, was examined before the select committee of the Senate of Canada in 1907.



S. S. Grahame at McMurray.

The agricultural resources of the Athabaska district, as far as this witness could understand, were indicated by the farming that was then actually being conducted

With Fairly Good Success

at Athabaska. At Baptiste lake there was, when the witness first went there, no agriculture attempted. He was the first man to introduce farming there. He

kept a trading store, and the natives insisted on having different kinds of seeds. Amongst others he got some flower seeds, and some lovely flowers were raised. The people raise some crops there now. It is a very good ranching country—first-class. Several people went up there with cattle. A man named Mailloux took one hundred and twenty head of cattle, and they were in good shape. The kind of grass there is a red top, a very big grass. The country has all been burnt over and the timber has fallen, so the grass cannot be cut with a mowing machine, but in some places they have cleared away the fallen timber and can use machinery now. Vetches and wild pea vines grow all over that country, but there is no bunch grass to be found; it is mostly red top. How far north it grows witness could not say. He had traced it up in very large quantities on Slave river. About a hundred or two hundred yards from the river there is a big slough, and this grass grows all along there very luxuriantly. There is no place along the northern shores of Lake Athabaska where grass can be grown. It is mostly rock and muskeg.

At McMurray, according to Mr. von Hamerstein, the land is good, and between the junction of the Clearwater and the Athabaska there is a flat of land about three miles long, and from a quarter of a mile to a mile and a half or two miles wide, which is very fine soil; but the rest of it is all hills covered by an inch and a half of moss, under the moss being the limestone rock. They raise good garden stuff at McMurray. A party there had good crops for three years.

Where there is soil to be found it is very good, mostly old river beds or where eddies have accumulated soil; but the rest is sand and muskeg. East of McMurray there are several lakes, the centre

of what is described as fine hay country. The natives there have from sixty to eighty horses, and there are reported to be

Good Grazing Patches

round the lakes. It is probably a better ranching country than an agricultural one. To the northwest of this district are some muskeg lakes, where the natives have quite a few horses and cut considerable hay.

From Fort Smith, going in a southerly direction to a place called Salt river they have a very fine large prairie, and it extends right through to Peace point. The people there are not given to farming. It is against their interests, because they could make a living much more easily by hunting. People often ask why they do not farm, but it must be remembered that in order to raise a crop of potatoes they would have to stay by it the whole season; and there is more variety in hunting. But some of them do farm and raise a few cattle. The country is difficult of access; they do not get any new stock, and it has become badly inbred. As a result he had seen cattle there having the head of a bull and the body of a calf. There are not very many cattle in there; only certain natives have them, and a man with four or five head of cattle is a very rich man. Some patches of land are very good.

Mr. Elihu Stewart, who had travelled over the northwest while Superintendent of Forestry, stated before the Senate committee of 1907 that along the Athabaska the country is composed of a succession of rolling hills, and there is a good deal of light soil. The valleys are very good, and Mr. Stewart understood that the country through by Lake

Waubascow, all the way to Lesser Slave lake, is through a good district of country. Through this district there is good land—perhaps not all the way through. Along the Athabaska the country is light, second-class land, but Mr. Stewart found at Calling river, some sixty miles below Athabaska, a man

Raising Wheat There.

He says he raises as good wheat as can be grown, but Mr. Stewart would not consider from the appearance along the banks that there were the same alluvial deposits that are found farther north.

Mr. H. A. Conroy of the Indian Department informed the Senate committee in 1907 that the Indians and half-breeds told him that the country between Great Slave river and Hay river is covered with buffalo grass, excepting a little timber that grows in a fringe around Great Slave lake. He had information from Indians living in that country that it is an open country covered with prairie grass.

Mr. J. Burr Tyrrell, in his evidence before the Senate committee of 1907, remarked as to the country immediately north of Lake Athabaska that it could not be considered as being within the arable area. The arable belt, however, as one goes west from Hudson bay to Athabaska river, widens enormously. He spoke generally of the vast country west of Athabaska river to Peace river country, and said there is certainly a large tract of agricultural land there. However, one or another may differ about the value of any particular part of that country. In the country, going west into Peace river region, there is certainly a large area of good land that Mr. Tyrrell would not attempt to confine inside of such a belt as he had been speaking of.

W. F. Bredin, M.L.A., in his evidence before the Senate committee of 1907, said that descending Athabaska river from McMurray, where Clearwater river goes into the Athabaska, the elevation of the plateau above the river is very much less than it is on the upper river. It looks like a great alluvial plain, from the river all along from McMurray to Lake Athabaska, two hundred miles. That country is more or less timbered, and the soil is excellent. Going down Slave river to Great Slave lake, for a distance of three hundred miles, on the east of Slave river, it is all rocks; while west of the river the country is all alluvial, and the soil is generally very good, right down to Great Slave lake.

At Chipewyan on Athabaska lake the Roman Catholic priests have a farm which was originally a muskeg, right amongst the Laurentian rocks, and they grow wheat there that was awarded a

MEDAL AT THE CENTENNIAL EXPOSITION.

The muskeg between the Athabaska and the Peace can all be drained and cultivated. These muskegs are from a foot to three feet deep until you strike hardpan. The moss keeps the heat of the sun out. In fact there is ice in some of those muskegs all the year round, covered with moss.

Mr. Frank Crean, in his 1909 report, gives the following information regarding the country west of Methye and Buffalo lakes and south of Clearwater river:—"Along Pembina river there are fine hay meadows which should enable anybody who desired to keep cattle to procure ample feed for the winter. To the west of Cowpar lake there is a large prairie which would certainly afford magnificent summer range, though I am informed that in winter the snow

is too deep for cattle to range out." Northwest of Cowpar lake Mr. Crean saw some horses grazing in December. Their owner had made no arrangement to winter them, and Mr. Crean was told that the horses thrived.

Cowpar lake lies just south of latitude 56°. It is a small lake, and of itself of no great importance. The surrounding country, however, is exceptionally good farming land, and to the east and south at about ten miles distance is found the commencement of a large prairie about forty miles long and varying from twelve to fifteen miles in width. This prairie is in its present state fitted for agriculture. The Indians from Cowpar lake go there in the spring and plant gardens, leaving them until the fall when they bring the produce to their homes at Cowpar lake.

Mr. Crean continues:—"Pembina river flows through the south end of this prairie, and several small lakes touch it. The prairie is watered by small creeks draining into these lakes, and altogether it is

AN IDEAL SPOT FOR THE PIONEER,

as hay, water, wood and fish are to be found in abundance throughout its extent. The land adjoining Cowpar lake on the east and south is all arable, being open and rolling. To the northeast, towards Whitefish lake, the land is also good. It is easy to predict that Cowpar lake will some day be a centre of a considerable settlement, although at present the only occupants are about four families of Chipewyans."

Winefred lake, according to Mr. Crean, is a large body of water amply stocked with fine whitefish, and Indians both from the south and north come to Winefred lake to catch fish in the fall. The country

surrounding the lake is mostly swampy hay land, but might, he thought, be easily drained. A good deal of muskeg is found in this vicinity, indeed, more than anywhere else that Mr. Crean travelled on the watershed of the Athabaska.

About Heart lake the land is all good though somewhat rolling and inclined to be broken. There is no more obstacle to farming around this lake than there is anywhere else between it and Edmonton. The country is identical with that passed through en route to Edmonton. In fact the country is almost prairie, some bluffs of poplar being the only pretence of woods.

With reference to the northern portion of the area explored by him in 1909, Mr. Crean states:—"In the matter of attempts at agriculture the fact that there is no demand for agricultural produce in the north prevents people who live there from carrying on even experimental work. Wheat has been grown successfully at McMurray, which was about the most northerly point touched by me. Here, too, all the ordinary vegetables grown in the more southerly portions of the province are grown with the greatest success." Mixed farming would appear to be an industry which most readily adapts itself to northern conditions. Wheat can be grown in almost any part of the north which I have explored. It is undeniable that northern latitudes increase the likelihood of summer frosts. If, however, live stock is kept, the larger yield of grain to the acre, even if slightly frosted, will pay quite as well converted into beef or pork as a smaller yield of the better quality grain in more southern latitudes."

The officers of the Royal Northwest Mounted Police have contributed considerable valuable information regarding the northern section of the

country under review in this chapter.

In his 1909 report, Inspector D. M. Howard, of the Royal Northwest Mounted Police, referring to the northern section, wrote:—"In the northern part of the district, Chipewyan and Smith Landing, very little grain is grown. The Roman Catholic mission at Fort Smith have put in a small crop of about fifteen acres under oats and barley this year as an experiment. There are about thirty-five head of cattle all told in Chipewyan sub-district, but the stock is not very good, being too much inbred. The Hudson's Bay Company brought in ten head of horses this year from Edmonton and the Roman Catholic mission brought four from Vermilion; this, with the three police horses, makes a total of about forty head."

During the winter of 1909 Sergt. R. W. Macleod, of the Royal Northwest Mounted Police, made a patrol across country from Fort Vermilion to the mouth of Hay river on Great Slave lake. In his report (p. 178, Annual Report of the Royal Northwest Mounted Police for 1909), he states that from Fort Vermilion for about sixty miles the country is prairie with small poplar bluffs scattered over it, and the next twenty-five miles is mostly pine bush with here and there a small prairie, then on into Hay river at Horse track is prairie with poplar bluffs and willow scrub, a total distance of one hundred and ten miles from Fort Vermilion. In 1905 the government had a road cut out, corduroyed, and graded the entire distance suitable for a wagon road. Previous to that time an Indian pack trail was the only way to travel. The Hudson's Bay Company and Revillon Brothers each built a sales shop and residence at the end of the wagon road on the south bank of Hay river, and have been doing business there in the winter only, for fur. There are no white people in the country

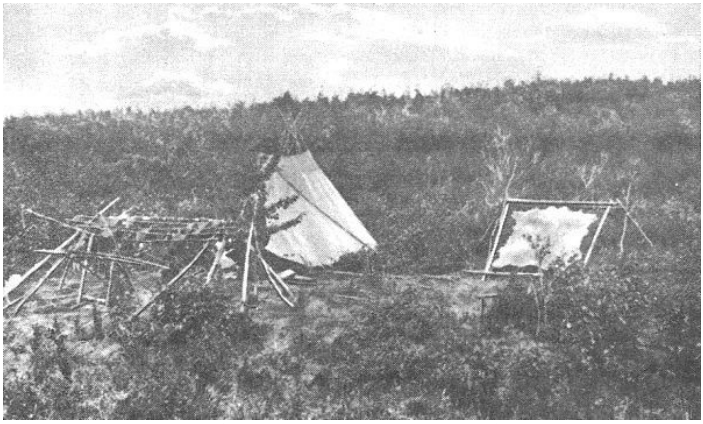
closer than Fort Vermilion. The country between Hay river and Fort Vermilion is nearly

ALL APPARENTLY SUITABLE FOR FARMING,

with a splendid supply of wood and water. Hay river is about one hundred yards wide at the Horse trace (local name) and is fed by numerous muskegs to the north of Dunvegan on Peace river, and the southeast slope of the divide between Peace and Liard rivers.

When Sergeant Macleod and his patrol were at Alexandra falls on January 29, they found that three small bands of Indian horses were wintering out on the portage, which is a prairie with poplar bluffs.

Corporal Mellor (of the Royal Northwest Mounted Police) in September of the same year, made a patrol with horses into the buffalo country southwest of Smith Landing. In his report the Corporal states that from Salt river "we proceeded northwest through about eight miles of small poplar, and then across a large stretch of prairie country. This is not prairie country in the generally accepted term, but simply ground of a marshy nature, perfectly flat, and covered with a luxuriant growth of grass. This would doubtless afford splendid land were it not that the water thereon is intensely salty and quite unfit for use. These prairies are of large extent stretching from Peace river, in the south, I am told, to Buffalo river, in the north, a distance of over one hundred miles. They are dotted all over with thick clumps of willows, the only trees growing thereon."



Indian Camp near Fort Smith.

In the last annual report of Superintendent G. E. Sanders, D.S.O., commanding "N" Division at Athabaska, and dated October 1, 1911, that officer describes the area from Athabaska river to Great Slave lake and west to the Rockies as an agricultural country. He states:—"The general state of the district from an agricultural and business point of view is one of great development and progress. The stream of settlement into the country round about Athabaska and to upper Peace river and Grande prairie has continued to a much larger extent during the year. With the influx of settlement traders have followed and a general

AIR OF PROSPERITY PREVAILS,

with very optimistic hopes for the future. The homestead entries at Athabaska for the first three months of this year exceeded the entire number for 1909, and for the past months the entries are upwards of one hundred and seventy-five in excess of those received during the whole of 1910. The

homestead entries at Lesser Slave lake and Grande prairie have increased at an even greater rate. At the latter place, the first day the Land Office opened there, seventy-five entries were received."

"It was generally expected that the railway would reach Athabaska in November, but the contractors have met with so many set-backs, due to the weather, shortage of labour and, lately, sickness amongst their horses, that it is extremely doubtful when the work will be completed.

"As a consequence of the coming of the railway the town of Athabaska has experienced quite a boom in real estate, and the prices for lots in the townsite and for land adjoining have become very high, lots that sold for three hundred dollars last year are now exchanging hands at three thousand dollars, and land within a mile has been sold for one hundred and seventy-five dollars per acre. A great deal of building is going on and every one predicts an important future for the place on account of its many natural advantages, and its situation making it the distribution point for the vast country to the north."

In an interview, Hon. F. Oliver, ex-Minister of the Interior, stated, after his long trip in 1910 (See p. 27) that along the rivers passed through proceeding from Edmonton to the delta of the Mackenzie where the banks are high the soil and climate conditions are perfectly good for agriculture. So far as McMurray, conditions are entirely good for agriculture, judging from what he saw himself and from what people told him.

The minister explained this statement by pointing out that the difference in latitude is neutralized by the great drop in altitude and the

Influence of the Warm Chinook Wind.



Indian Family arriving at McMurray for Treaty.

McMurray, while two hundred miles farther north than Edmonton, is but eight hundred and fifty feet above sea level, while Edmonton had an altitude of two thousand two hundred feet.

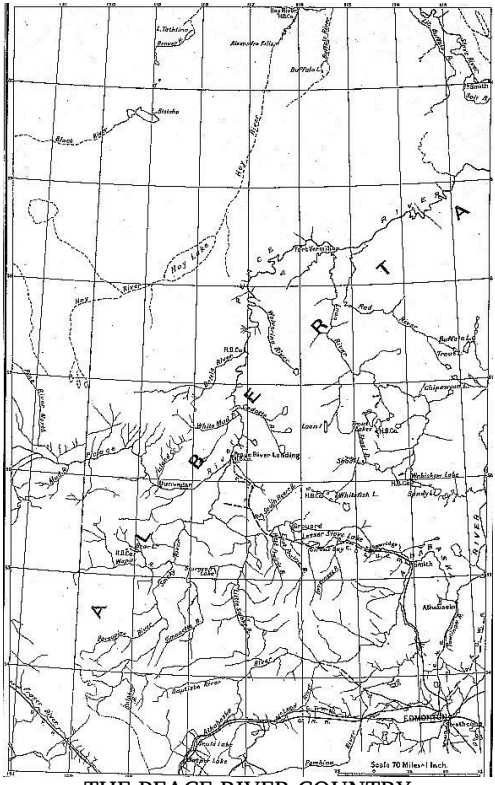
Mr. Oliver here made reference to conditions which are to-day recognized by men of science.

According to Mr. E. A. Preble, of the U.S. Biological Survey (See p. 22), “The climatic conditions of the various parts of Athabaska valley vary considerably, according to location. The more open portions of the upper part of the valley, though lying at a considerable altitude, enjoy the ‘Chinook’ winds, which so temper the climate that it compares favourably with more easterly regions lying much farther south. Lack of detailed data precludes the possibility of comparing absolutely the climatic conditions of the upper and the lower Athabaska; but the effects of the ‘Chinook’ winds are felt to some extent throughout the course of the river.”

According to the same authority—“The climate of Athabaska lake is not radically different from that of other parts of the Mackenzie region which are practically removed from the influence of the warm

Pacific winds. Though it lies at a low altitude, the proximity of the lake to the “Barren Ground,” from which winds are frequent, keeps its average temperature rather low. An occasional warm west wind slightly tempers the winter climate. The Peace and the Athabaska break up at their mouths about May 1, but the neighbouring part of the lake usually does not open until about the middle of May, and the eastern part probably not before June. The lake usually closes at Chipewyan some time in November.”

Mr. H. A. Conroy informed the Senate committee of 1907 that he had travelled through Athabaska-Peace river country once when for twenty-one days in January he did not need his coat in the middle of the day. The cattle were all out in the pasture fields. He had been going in there every year for eight years, and had been there for five winters. Mr. Conroy stated that he never saw a very deep snowfall in that country. He felt pretty sure that the ‘Chinook’ winds go through to Athabaska lake. He remarked that in that country in the winter he did not suffer as much from cold as he had suffered in Ottawa, and he slept out every night, sometimes under a tent and sometimes in the open. He travelled once with a dog train and afterwards with ponies, and got along very well with them.



THE PEACE RIVER COUNTRY

CHAPTER XI.

NORTHERN ALBERTA.

Agriculture and Arable Land in the Western Section or "Peace River Region."

Where Wheat Has Been Grown with Remarkable Success for Many Years.—Scientific Explorers Early Recognized this as a Wheat Growing Country.—A Head of Cabbage Fifty-three and a half inches in Circumference.—Livestock Lives Out of Doors in Winter.—According to a Church of England Missionary, Peace river Enjoys the Finest Climate in the World.

The more westerly (or Peace river) section of northern Alberta is attracting much attention on account of its remarkable agricultural possibilities; and the numerous settlements which have, during the past few years, been established, have practically demonstrated that the glowing accounts which have from time to time reached the outside world as to the fertility of Peace river country, have not been exaggerated.

Peace river, which has lent its name to the country along its banks, whether in British Columbia or in northern Alberta, is formed by the junction of Finlay and Parsnip rivers, two transmontane streams, and is the largest and longest of the tributaries of the Mackenzie. It rises in and drains a large district west of Rocky mountains, and then continuing eastwards, intersects the axis of that range and drains the country lying along its eastern slopes, through four degrees of latitude. Its length, from the confluence of Finlay and Parnsip rivers, to the point at which it unites with the waters flowing from Lake Athabaska to form Slave river, is seven hundred and fifty-seven miles, but measuring from Summit lake, the source of its principal branch, it is approximately nine hundred and five miles.

From the confluence of the Finlay and the Parsnip, the Peace flows in a general easterly direction for some three hundred miles to its junction with the Smoky, falling in this distance a little less than eight hundred feet. The country through which

it flows may be considered as a plateau in which it has excavated

A Rather Deep Valley.

A number of streams, Pine river from the south being one of the largest, discharge their waters into it. Back from the river the country is mainly level or rolling, and is thinly wooded. Smoky river is the largest tributary of the Peace. Its principal branches rise on the eastern slope of Rocky mountains, and it drains a large extent of thinly wooded and prairie country. Below the mouth of the Smoky, the Peace turns and pursues a winding though general northerly course nearly to Fort Vermilion. It is bordered at first by steep sandstone cliffs, but its valley gradually becomes wider and shallower. Extensive plains comparatively level and clothed with grass or a sparse growth of poplars, border it on both sides. North of Fort Vermilion this character of country is said to extend to the valleys on Hay and Buffalo rivers. The country between Peace river and Great Slave lake, however, is very imperfectly known.

One of the first records we have of successful agriculture in Peace river country is in the famous diary of Daniel Williams Harmon of the Northwest Company's service, who spent several years there. He speaks favourably of the situation of Dunvegan (north latitude 56°, west longtitude 119°), where he found himself located in October, 1808. He goes on to say in his diary:—"Our principal food will be the flesh of the buffalo, moose, red deer, and bear. We have a tolerably good kitchen garden, and we are in no fear that we shall want the means of a comfortable subsistence."

In an entry in his diary dated May 6, the

following spring, Harmon states:—“We have planted our potatoes, and sowed most of our garden seeds.” Under date June 2, the same year, we find the entry:—“The seeds which we sowed in the garden, have sprung up, and grow remarkably well. The present prospect is, that strawberries, red raspberries, shadberries, cherries, etc., will be abundant this season.”

July 21 Harmon writes:—“We have cut down our barley and I

Think it is the Finest

that I have ever seen in any country. The soil on the points of land along this river is excellent.”

Under the date of September 1, the same year, Harmon noted the commencement of the annual migration of wild fowl southward, and on Friday, October 6th, he wrote in his diary:—“As the weather begins to be cold, we have taken our vegetables out of the ground, which we find to have been very productive.”

In his diary for the following year, Harmon records a summer frost on June 23, writing:—“The last night was so cold, that the tops of our potatoes were frozen.” The frost in question does not seem to have damaged the crops, for on Wednesday the 3rd of the following October this observant diarist wrote:—“We have taken our potatoes out of the ground, and find that nine bushels, which we planted May 10 last, have produced a little more than one hundred and fifty bushels. The other vegetables in our garden have yielded an increase, much in the same proportion, which is sufficient proof that the soil of the points of land along the river is good. Indeed, I am of the opinion, that wheat, rye, barley, oats, peas, etc., would grow well in the plains around us.”

It is very evident that all of the officials of the fur trading companies who were on duty in Peace river country did not devote the same intelligent attention to agriculture that Harmon and his colleagues did.

When Charles Horetzky, C.E., was at Dunvegan in 1873 (See p. 17) there was no bread used, and the only vegetables served at meals were some "very diminutive potatoes." Mr. Horetzky comments as follows on this subject:—"Owing to the fact that the Company's agents are liable to be suddenly removed from one post to another, those people are, not unnaturally, averse to the expenditure of time and labour necessary for farming experiments; hence the absence of farm produce at these posts. But the natural advantages of excellent soil of unlimited extent, and the proverbially early disappearance of the snow in spring, would lead one to believe that good crops of barley, potatoes, and fall wheat might be successfully raised in this part of the Northwest."

One of the strongest arguments advanced by Mr. Horetzky in his advocacy of Peace river pass route for the Canadian Pacific Railway was that a line built via this route would open up

A Vast Fertile Region

situated to the south of Peace river—"a region probably comprising an area equal in extent to Manitoba, well wooded with abundance of fresh water, of excellent soil, and in all probability possessing unlimited quantities of good coal. The climate is most salubrious, and, by all accounts, as mild as, if not milder than, that of Red river. On the extensive plains bordering upon Peace river, both north and south of it, snow rarely exceeds two feet in depth, and never packs."

The travellers and traders who have been in Peace river country are as enthusiastic about its picturesque appearance as about its apparent fertility.

Mr. Horetzky reached Peace river a few miles above the mouth of the Smoky September 30, 1873, and thus describes the scene:—"We feasted our eyes on the glorious landscape now mapped out before us. A strong westerly gale was blowing, but the air was so warm and balmy, that to recline on the beautiful grassy sward, full face to the blast, was positively delicious. For several miles, to the southwest, the noble river, flowing eight hundred feet below us, on its silent course to Arctic ocean, could be distinctly traced as it meandered through its mighty valley. Several large and wooded islands dotted its surface here and there, causing eddies and whirlpools, which in their turn made long and faint streaks of foam, barely visible in the distance. From our position, and embracing an angle of fully one hundred and thirty degrees, or, in other words, from the northwest round to south, a boundless and nearly level expanse of country could be taken in at a glance, the only breaks being the great valleys of Peace and Smoky rivers, than which nothing we had ever seen could be more beautiful, the former especially, in its magnitude and depth, surpassing all we had anticipated."

The pioneer missionaries attached to the Church of England and Roman Catholic missions appear to have done more towards demonstrating the agricultural possibilities of Peace river country, and the whole Mackenzie basin, than the fur traders.

In the "Mission Field" of January 2, 1882 (a London monthly publication of the Society for the Propagation of the Gospel), the Right Reverend

Bompas, Bishop of the Church of England in Athabaska and Mackenzie districts (his diocese comprising the centre Arctic watershed of British America), published the following:—"The excellence of the land in Peace river country for farming purposes is well known; the

SOIL IS RICH AND PRODUCTIVE,

and the climate most salubrious. A mission station is established at Fort Vermilion under the charge of the Reverend Arthur Garrioch, and a church is fast approaching completion. Other mission stations have been started at different parts of the river, and in 1878 a mission farm was begun which the bishop hopes will in time obviate the necessity of procuring all the supplies of flour, etc., from Red river, the expense of which, from heavy freights, is so great that every bag of flour by the time it reaches the missionaries north of Athabaska costs upwards of £5."

It was as superintendent of the mission farms that the head of the Lawrence family, the originators of farming on an extensive scale and by scientific methods in Peace river country, was attracted there.

Besides the satisfactory pioneer attempts at tilling the soil of Peace river country, the raising of live stock was many years ago demonstrated to be successful. As early as 1823 there was an infant ranching industry there, Sir George Simpson's party having noted a small band of half a dozen horses when approaching Dunvegan.

In the reports of the government explorers a great deal of interesting information will be found as to the soil, climate, and agricultural possibilities of Peace river country.

Professor John Macoun was the first scientific explorer to draw attention to the agricultural possibilities of Peace river country, after making a thorough examination of the natural flora, the soil, climatic conditions, etc. Mr. Macoun had accompanied the first Canadian Pacific Railway survey expedition, and had subsequently been botanist to the geological survey party appointed to investigate this very country. There was much information as to the agricultural possibilities of the country in Professor Macoun's official reports, and he summarized his conclusions in his book "Manitoba and the Great Northwest," published in 1882. He defines a tract lying between the upper reaches of Athabaska river and the fifty-seventh parallel of latitude, in Peace river basin, which he considers "may be classed as fertile," and estimates its area as about thirty-one thousand five hundred and fifty square miles. Speaking of this tract, he states:—"Its average elevation may be stated as little over two thousand feet, and this is maintained with considerable uniformity, for though the general surface slopes slightly from the north and south toward Peace river, the region as a whole may be considered as a plateau through which the great gorge-like valley of the Peace has been excavated.

"The northern banks of Peace river valley are also very generally open grassed, and parts of the valley of the Smoky and other rivers have a similar character. The total area of

PRAIRIE LAND, WEST OF SMOKY RIVER,

may be about three thousand square miles. The remainder of the surface is generally occupied by second-growth forest, occasionally dense, but more

often open and composed of aspen, birch, and cottonwood, with a greater or less proportion of coniferous trees. Some patches of the original forest, however, remain, particularly in the river valleys, and are composed of much larger trees, chiefly coniferous, among which the black spruce is most abundant. Handsome groves of old and large cottonwoods are also to be found in some of the valleys. Where the soil becomes locally sandy and poor, and more particularly in some of the more elevated parts of the ridges before described, a thick growth of scrub pine and black spruce, in which the individual trees are small, is found, and in swampy regions the taramack is not wanting, but grows generally intermixed with the black spruce.

"Though the prairies are most immediately available from an agricultural point of view, the regions now covered with second growth and forest, where the soil itself, if not inferior, will eventually be equally valuable. The largest tract of poor land is that bordering the valley of the Athabaska on the north."

Professor Macoun was examined before the Senate committee of 1888 and gave a considerable amount of information, all valuable at the time, and much of it still so, as to the character of Peace river country from Macleod in latitude 55°, to Lake Athabaska, up the Athabaska to the Clearwater, and up the Clearwater to its head.

Starting from the Parsnip and through Rocky mountains, the good country for agriculture commences, according to Professor Macoun, at Rocky mountains portage at Hudson Hope (in British Columbia) or The Hope of Hudson, as Capt. Butler puts it. From that point down the country is suitable for agricultural purposes, the whole distance; on the

prairie, not on the slopes of the river, but on the prairie above. The north bank of the river, that is the one facing south, has hardly any wood, but is covered with berries, and witness found the cactus growing there. The other side of the river, facing the north, was covered largely with spruce down to the river's edge, the whole upward slope. It was only the banks of the river that were wooded; above, all was prairie, with poplar and willow in clumps. It was of the same character as the North Saskatchewan, but with much taller grass.

Said Professor Macoun:—"While at Fort Vermilion, on Peace river, in latitude 58° 24′, I was informed by old Mr. Shaw, who had charge of that post for fifteen years, that

Indian Corn Would Ripen

well every year there, and at Battle river corn ripened three years in succession, and that frost never injured anything on this part of the river. The whole country at Fort Vermilion is a plain, not elevated at its highest point more than a hundred feet over the river, but the greater part of it is less than fifty feet. The soil is wonderfully like that of the second prairie steppe, in the prairie region, as the surface is composed of black loam, mixed apparently with limestone gravel. From Fort Vermilion, Caribou mountains are visible about forty miles off. These may have the effect of keeping off the cold winds from Great Slave lake, and hence the country is permanently warm. Both days and nights have been warm down on this part of the river, whereas on the upper parts, where high banks are, the cold was even felt at night in August.

"The grain at Fort Vermilion was sown on May 8

and 20, and was cut on August 6. Wheat growing among the barley and by the fences was almost ripe August 12, when I was there. At Rocky mountain portage (British Columbia), where Peace river issues from Rocky mountains, latitude 56 degrees, we found a first rate garden with vegetables far advanced, July 21; new potatoes, onions, and carrots were part of our bill of fare. That was in 1875. Five days later, at Fort St. John (B.C.) vegetation was even further advanced, and all kinds of garden stuff were in the greatest perfection. Nigger Dan's barley was colouring on July 26, and would be cut the first week in August. His potatoes were large, and enough for fourteen men were dug on August 2.

"I may mention that strawberries were fully ripe on July 6, at Hudson Hope (B.C.). At Dunvegan, barley was almost fit to cut August 4. Cabbage in the priest's garden were closing, and all his garden vegetables far advanced.

"At Battle river pease were getting ripe August 8. At Fort Vermilion potatoes were very large and many heads of barley contained sixty grains, others many more. I never saw such fine barley before. Barley was sown on May 8 and cut on August 6—that is at latitude 58° 24′. At Red river (a small fort, fifty or sixty miles below Fort Vermilion), they have no ploughs, and the ground was broken up with a spade or hoe. The garden stuff

WAS WONDERFULLY LUXURIANT,

pease, Windsor beans and potatoes being far advanced; cucumbers started and raised in the open air, a very large crop, and a number of them were ripe on August 14.

"At Chipewyan mission, two miles from the fort,

there were wheat, oats and barley, a good crop as regards grain. Windsor beans were ripe and pulled up on August 17. Wheat and barley were in stock August 26, and specimens of these, which I brought to Ottawa, are here on the table.

"At Red river fort a Frenchman named St. Cyr had a garden, and he told me he had a particular thing growing in the garden that he did not know anything about. I went out to look at it, and there was a splendid patch of cucumbers, many of them ripe. That was in August. I said: 'These are cucumbers; how did you start them?' He said: 'I got the seed from England and put it in the ground, and that is what has come from it.'

"I passed down the Athabaska (from Chipewyan) to the Mission, and I found growing on soil that would be of no value here whatever, sand and muck, an old swamp where they had planted wheat on May 5, and I found it in the stook on August 26, and brought away from it the grain that was awarded the bronze medal at Philadelphia in 1876. It was forwarded to me, but I said that it did not belong to me, but to the missionaries at Athabaska. I exhibited this very lot of grain in Manitoba before Consul Taylor and many other gentlemen, and the matter of the number of grains in the fascicle was then discussed and made public. They took a quantity of the wheat from me and shelled it, and Mr. Gouin, Inspector of Inland Revenue, weighed it, and it showed a weight of sixty-eight pounds to the bushel. [15]

"The wild pea or vetch grows all through Peace river valley, but was particularly noticed on the plateau above Fort St. John (in British Columbia) in latitude 56°. Here it was actually measured by myself and was found to attain a height of eight feet, while

the weeds, such as the purple fire weed of the east (*Epilobium angustifolium*) attained a height of seven feet. These are given in illustration of the wonderful luxuriance of the commoner plants on that high plateau. The vegetation throughout the whole Peace river valley is of the most luxuriant character, and it seems

More Like That of the Tropics

than a country drawing near the Arctic Circle."

Professor Macoun explained that in Peace river country, the snow passes off so easily that as soon as it is off the ground and a few inches of the soil thawed, the ground is ready for seeding, because the soil is friable and the snow of little depth. The character of the month of September is almost identical with that of the very best Septembers in Ottawa—a smoky atmosphere with occasional white frosts in the morning, but generally a calm atmosphere. In October the frosts get more severe towards the last of the month. About the 25th at Chipewyan ice begins to form and the rivers and lakes soon close.

Professor Macoun furnished the committee with some data from notes kept by Daniel Williams of Fort St. John, commonly known as "Nigger Dan." These notes showed that from 1872 to 1875 the date for planting potatoes varied from April 25 to May 10, and for sowing barley and oats from April 22 to May 7. After September 22, in 1874, Williams dug over one hundred bushels of potatoes.

William Ogilvie, D.L.S. (See p. 18) in his report of 1884, wrote:—"Opposite Fort Vermilion, on the north of the river, there is an extensive tract of prairie and poplar bluff country, which extends from

the Peace to the watershed between Peace and Mackenzie rivers, southwestward along the Peace for about forty miles or more, and northeastward along the river a few miles, until it merges into the country already described. This is said to be a first class country in every way, well wooded and watered, with a rich, deep, black loamy clay soil; and if the life of flowers and berries be any indication of freedom from frost, this district is favoured in this respect, as the berries ripen here when they are killed in the surrounding parts.

"The country southwestward from the end of this tract to Battle river is described as woods and swamps, alternating with patches of prairie and open woods, and from Battle river to the prairie near Dunvegan, generally drier and with more prairie.

"It appears, therefore, that from Dunvegan, on the north side of Peace river, down the river to Peace point, and thence to Salt river on the Great Slave, there is a tract of country about six hundred miles in length and forty miles wide, of which a large percentage is fit for immediate settlement, and a great deal more could be very easily closed.

"Of the country southeast of the Peace, between it and the Athabaska, very little is known. It was described by all whom I met, who had seen any portion of it, as a rolling surface, the ridges heavily wooded with fair timber, and many of the basins containing swamps and lakes of considerable size. Out of one of the latter, Lake Wapisca, Loon river flows into the Peace, and another stream called by the same name into the Athabaska, at Grand rapids. Some of the ridges rise into high hills, and in some of these, rock exposures are said to be visible.

"At Dunvegan, notwithstanding the severity of the frosts, the crops were very good, both in quality

and quantity. When I was there, the Roman Catholic missionaries

HAD THRESHED THEIR GRAIN,

samples of which I brought back. The yield was as follows:—Fifty pounds of wheat were sown on April 16 and reaped on August 20, and twenty-seven bushels threshed of good clean grain; fifteen pounds of Egyptian barley sown on April 18 and reaped August 20, and fifteen bushels threshed, weighing fully sixty pounds to the bushel. The Hudson's Bay Company and the Church of England mission had not threshed, and could not give their returns, but they were well satisfied with their crops of all kinds. The Reverend Mr. Brick, of the Church of England mission, was already using bread, when I was there, made from wheat of the present year's growth."

Mr. Ogilvie in his 1891 report wrote as follows:—

"For a distance of six or seven miles back from Peace river valley there is much prairie and meadowland, with some woods and swamps scattered over it. The soil is an excellent black clay loam as rich as any I ever saw, and the growth of hay and grass bears testimony to this fact. The dip of the valley from this plain is very sharp and the banks very steep, falling about eight hundred feet in a mile.

"At Fort St. John the Hudson's Bay Company have a small patch on which they raise potatoes and garden stuff along with barley and oats. The grain always ripens and the vegetables are as good as one would wish to use. Mr. Gunn, the officer in charge here, has been in Peace river district since 1883, and in the interval he has wandered around the adjacent country a good deal.

"The Hudson's Bay Company have several bands

of horses in the vicinity of Fort St. John, only a few of which have ever been broken. These animals live on the prairie on the north side of the river, winter and summer, and

VERY SELDOM ARE THERE ANY LOSSES,

except by wolves, or when the Indians are starving they may quietly dispose of one or two and report them lost.

"At Dunvegan, the Company has grown wheat, barley, oats, potatoes, and garden stuff generally for many years with astonishing success. When I was there in 1883-84, I saw grain and vegetables fully equal in quality and quantity to any I have ever seen anywhere, the garden vegetables being especially fine. Last year everything was harvested and stored when I got there, but what I saw of the produce was excellent. I saw two sunflowers which measured fourteen inches across the disc. With the corolla attached, these flowers would have been nearly two feet in diameter. The seeds of each weighed fourteen ounces and measured nearly a quart. A head of cabbage was shown from which I stripped off all the loose leaves leaving it fit for cooking and then measured and weighed it. It measured fifty-three and one-half inches in circumference, and weighed twenty-eight and one-half lbs. This was an exceptionally large head, of course, but the general run of both cabbage and cauliflower was large and would be considered so anywhere. Mr. Round, the officer in charge of the post, told me he two years ago made a departure from the old fashioned method of growing these plants, and instead of developing them in hot beds, he simply planted the seed once for all in drills in the garden, and when they arrived

at the proper stage, pulled out the superfluous ones. He found this method just as satisfactory and much less troublesome. The other garden vegetables were just as large and good as one would wish to see them. Mr. Round informed me he planted fifteen bushels of potatoes last summer, and after using them freely for the sustenance of his family (five members) and the servants, in all eight or ten, from the time they were fit for use, until they were harvested, he harvested upwards of two hundred bushels. He sowed about four bushels of wheat, and though the dry season much affected the result he would have about sixty bushels. This grain is used in various ways, some of it being ground into flour by the aid of small hand mills. He sowed four bushels of oats, and though part of the crop was destroyed by a hail storm, one hundred bushels were threshed. In 1890 he planted twenty-five bushels of potatoes, and though they were freely used from the time they were fit for use until harvested, seven hundred and twelve bushels were harvested. The Anglican and Roman Catholic missions here also successfully raise both grain and vegetables, the latter depending for much of their subsistence on the results of their agricultural labours.

"This post has been in existence for the greater part of a century, and more or less farming has always been done at it during that time."

Mr. Ogilvie embodied in his report a number of extracts from the Dunvegan post journal which are interesting as conveying an idea of the

Climate and the Growth of Vegetation.

Some of these extracts are worth requoting here:—

"1829. Ice began to move in the river April 12.

Sowed barley April 17; planted potatoes April 30; cut barley August 10; cut wheat August 25; harvested potatoes September 24; first snow October 21; first drift ice October 24.

"1830. Ice broke up April 28; sowed thirty quarts of wheat May 3; sowed garden seeds May 4; planted potatoes May 5; cut wheat September 14; commenced digging potatoes September 27; first drift ice October 29; ice set fast November 25.

"1886. Ice started to break up April 13; sowed barley May 12; planted turnips May 13; planted potatoes May 17; began harvesting operations August 20; cut buckwheat September 2; harvested potatoes September 23; stored nine hundred and eighty-four bushels; slight snow October 12; first ice drifting November 10; ice set fast November 30.

"1887. Ice started April 27; sowed oats April 29; sowed other seed May 2; commenced planting potatoes May 5; sowed garden seeds May 9; sowed peas May 11; finished planting potatoes May 28; planted fifty bushels; severe frost June 7, injuring young vegetables, etc., severe frost again on June 25, cutting down everything to the ground, potatoes and all; July 29 new potatoes for the first time; first snow fell on September 16; commenced taking up potatoes September 20; harvested six hundred and eighteen bushels; took up turnips and carrots September 5; first drift ice in river October 24, but it cleared out again and returned November 12; set fast November 29.

"1888. Ice moved May 1; began sowing barley May 9; began planting potatoes May 10; sowed oats and wheat May 15; sowed garden seeds May 16; sowed turnips May 28; slight frost August 1, injured garden stuff; cut barley September 5; cut oats September 7; started taking up potatoes September

27; finished October 3, five hundred and twenty-nine bushels; took up turnips October 5; first snow October 15; first ice in river October 27; ice set fast November 27."

Mr. Ogilvie continues, in his report:—

"I would now call particular attention to the mention of frost in June, 1887, and to the fact that it cut down vegetables to the ground. Alone there is nothing very wonderful about the statement, as it is just what we would expect frost to do; but in conjunction with using new potatoes for the first time on July 29, just one month after the frost, and the further fact that

SIX HUNDRED AND EIGHTEEN BUSHELS WERE HARVESTED,

it is most astonishing. Mr. Round, the officer who made the entry, was a witness of the event, and he is a gentleman whose sanity I would as soon doubt as his word. I questioned him about it and he assured me emphatically of its correctness. He can offer no explanations, if it is not that a fog generally settles on the river valley after a frost and shields plants from the direct rays of the sun a good part of the day; but even that does not account for this case, as he assures me the potatoes were cut down, black, to the ground.

"The Reverend J. G. Brick, Anglican missionary, who spent some time at Dunvegan, combining farming with mission work, in 1886 started what might be called a branch farm at Old Wives lake, about thirty-six miles from Dunvegan, on the cart trail, between the latter place and Smoky river crossing, on the plateau above the immediate valley of the river. Reference will be made to this later.

"In 1889, he established himself in the valley of the river on the north side, about five miles above the mouth of Smoky river. Here he has established a mission and a school for the education of the young, on which he bases all his hopes for the improvement of the natives. He keeps this school open during the winter months, and as an inducement to attend, he gives all the children who live at a distance their dinner.

"This gentleman took in with him a large outfit of farm implements and stock. He has a small grist mill and threshing mill, with which he threshes and grinds his grain. By grinding his wheat twice it makes a fair article of flour, but his facilities for bolting it are not quite up to the times, consequently his flour is not quite so white as our high grade flour, but it makes good bread, nevertheless.

"He is well satisfied with his success agriculturally. He furnished me with the following information relative to his doings in 1891:—

"Began ploughing April 11; sowed first wheat April 15; ice broke up April 20; river cleared April 26; commenced harvesting August 20; cut wheat August 27; about nineteen acres under grain, total yield six hundred and ninety-eight bushels.

Wheat Two Hundred and Fifty Bushels on Six Acres;

oats two hundred bushels, barley two hundred and twenty-six bushels. After all the grain was removed he raked the field and got twenty-two bushels of grain from the rakings. He sowed two varieties of wheat, Ladoga, and wheat he got in Manitoba, which he thinks is Red Fife, but is not sure; both are beautiful specimens of grain. He has some two-rowed

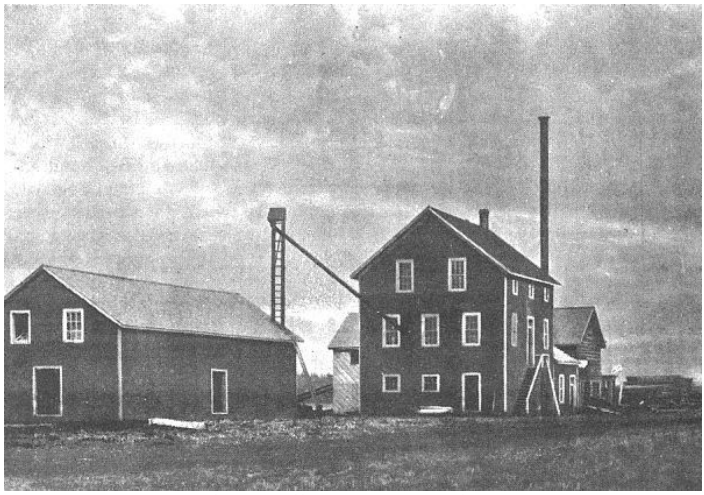
barley which he procured while in England in 1888, when he obtained one pound. The yield in 1891 was six hundred pounds of as fine, clean, bright and plump grain as could be seen elsewhere.

"His Ladoga wheat was sown April 21 and harvested August 24, but he allowed it to over-ripen, and thinks he lost at least four or five bushels while harvesting. He sowed ninety pounds and threshed one thousand five hundred. He obtained a sample of black Norway oats from Webb and Company, England, which he sowed on five-eighths of an acre of ground, last year. When harvesting it was all drawn off the field in one wagon load, and when threshed it turned out sixty-four bushels of first-class grain. Last year he tried Indian corn; it did not ripen, but yielded excellent green corn; cucumbers were grown successfully, but did not ripen. Yet I saw as good pumpkins fully developed both here and at Dunvegan as one would wish for.

"Mr. Brick has about forty head of cattle, and several horses; last fall on my arrival there he had about forty pigs, but killed some during my stay, and only intended to winter about twenty-five. He employs a good deal of local labour, and pays for it with food to a very large extent; in fact it is the only way it could be paid for in the country. The hay for wintering the cattle and horses is cut on the plateau about seven miles from the farm. He generally allows his cattle to run out until Christmas, the grass on the meadows being enough for them to feed on it after the early snows have fallen. The horses not kept in for use are wintered out. The Hudson's Bay Company at Dunvegan have about one hundred and fifty wild horses, and the Roman Catholic mission and the Indians also have many which always winter out on the plains north of the Post, which affords them both

food and shelter, as the country between Dunvegan and Smoky river, crossing on the north side, is particularly park-like prairie to a distance of twelve to twenty miles back from the river. The woods afford them shelter and on the prairies the rich grasses grow. There are also large areas

WHERE EXCELLENT HAY GROWS.



Flour Mill at Fort Vermilion.

No other attention is, or has been, given to these animals than to occasionally send a man out to hunt them up and count them. This is not so difficult a task as it would seem, as they run in bands; each band consists of mares and a stallion, who will give fight to the death for his mares. Each band is known by the name of its stallion, and as each keeps pretty well in the one locality, it is not so difficult to keep track of them as it would appear. I saw several bands on my way from Dunvegan and all were very fat, notwithstanding that the cold winter weather had set

in a month before, and the snow had been a foot deep for ten or twelve days. 'Chinook' winds occasionally visit this part of the country and carry the snow off; here also they blow from the southwest. The approach of one is known some little time before it arrives by the roar it makes. Many people in the country call them the 'high-winds' they blow so strongly. They often visit Lesser Slave lake."

Mr. R. G. McConnell of the Geological Survey, in the report of his visit to the country, wrote in 1888: —"Vegetables of various kinds are grown yearly without difficulty, at Fort Vermilion, Lesser Slave lake, Whitefish lake and Trout lake, while potatoes are grown by the Indians even on the summit of Birch mountain, at a height of two thousand three hundred feet above the sea. Wheat and other cereals have been fairly successful at Lesser Slave lake and at Fort Vermilion, the only places where they have been tried. The prairie country round Fort Vermilion equals in fertility the famous Edmonton district and appears to enjoy an equally good climate, its higher latitude being compensated for by its more western situation and by its lower elevation. This district is about one thousand feet above the sea. In the interior, narrow strips of aspen-covered, but excellent land, are usually found along the main rivers, and surrounding many of the lakes, and numerous areas, often

EQUAL IN SIZE TO EASTERN COUNTIES,

might be selected, which appear well adapted for cultivation, but the numerous swamps, muskegs and marshes which separate these areas detract greatly from their value. The western, and especially the northwestern, portion of this district contains the

most promising agricultural lands."

Mr. McConnell, before the Senate committee of 1907, explained that his exploratory work in Peace river country had been mostly along the streams. He had, however, been over quite a bit of the tableland. He had nearly always gone back from the river quite a bit, twenty or thirty and forty miles in places. From Lesser Slave lake he started on foot with a couple of men packing, and went through all the country between Lesser Slave lake and Big Knife lake, a distance of about one hundred and fifty miles. His mission was specially to look for minerals, but, of course, he was supposed to keep his eyes open for anything. As to the extent of land suitable for cultivation in Peace river country, Mr. McConnell said there are aspen ridges all through that country which may be good, but they are separated by muskegs everywhere, except on the table prairie. These muskegs occur with solid ground in between them, and in those places aspens grow, and where those poplars are found the land is nearly always good. But the poplars do not grow to any size. The aspen is not on the prairie; it is on the wooded country, in between the muskegs. Besides there are occasional patches of prairie at Fort Vermilion, following Peace river down, and also Grande prairie. There is no large continuous prairie thirty miles from Edmonton towards the north. There are occasional patches of prairie tableland with only small areas of bottom land. The tableland decreases in height as going northward. Farther down the Vermilion the prairie begins again. At Fort Vermilion the country is not so much subject to frost as in the higher land. Wheat has been grown there a great number of years. In the valley of the river the low land on each side is fertile. There is no great quantity of it on

either bank. There are just these flats. Taking the aggregate it is a large quantity because it is a tremendously long river. The valley is probably a mile wide on both sides of the river.

Grande prairie, in upper Peace country, which is

About Seventy-five Miles Across,

is probably the largest area of open country, and there is a prairie following Peace river about twenty-five miles. That disappears going down Peace river, and the country is wooded and partly muskeg as far as Fort Vermilion. Then there is another small prairie area. Taking the upper stretches of the country, northward forty miles from the river, the country is partly muskeg. Travelling across it with horses, one would run into a muskeg every couple of miles, and there are ridges only a few feet higher than the muskegs, and they are nearly always covered with poplar, and those ridges seem to be fairly good agricultural land. But they are always separated by these muskeg lands. This muskeg is very deep. Mr. McConnell had had horses go down in it. Along all the streams there is a certain amount of good land. There are a great many streams in that country, and in the aggregate the amount of water is large.

As to Grande prairie, or north Peace river country, the soil is very good there. There is a subsoil. It is a good wheat country, and in June and July it is looked upon as the best wheat country in the world. He had noticed the pea vine growing in that section, and so far as he could judge from going over it, the country is a good agricultural one, except for frosts. There happened to be some frosts both times he was there, but apart from that the country is certainly good. There is swamp grass growing

about the margins of the small lakes. It was after the middle of the month of August that he experienced frost there. He did not know much about the growing of vegetables in Peace river country.

Mr. McConnell considered that at that date the value of Peace river country as a whole as far as wheat-growing was concerned, was entirely problematical. If one went there in June or July he would come to the conclusion that it is the finest country in the whole wide world, but he himself had been there twice in August and found a heavy frost on each occasion. Things changed very rapidly about the end of August. He did not know if there would be frost about the same time around Edmonton, but the two years he happened to be in Peace river district there would be about fifteen degrees of frost at night. That was in the elevated, cattle country, which is considered higher than the surface of Peace river. There were no crops there at that time. The soil in that district is splendid. It is precisely the same as the country around Edmonton. It might be good for the growing of hay, or in fact anything. There is no question that the soil is good, and in June and July it is a

Most Attractive Country.

He went down Loon river, and found much of the country in there partly muskeg; in fact, the greater part of it is muskeg; but there are patches of country covered with aspen, which is probably good for agriculture. He went all the way down Loon river and Red river, which flows into Peace river, and another unnamed stream, and found it was a prairie country down there. There is a grist mill at Vermilion, and a large quantity of wheat is sent

there. The wheat is all grown in that vicinity. That country is too good a country to be wasted. The valleys are protected from the wind, and the theory is that it is less liable to frost on account of the wind being kept away. There is a magnificent growth of grass on the plateau, and there is hay in the marshes. It is very much the same country as that around Edmonton. It is a good place for raising cattle, but they probably would have to feed them in the winter time, as they do at Edmonton. Sheep ought to do well. They appeared to have a fair rainfall. He thought that as far as the country is concerned it is very much the same as Edmonton. It is well watered.

Mr. McConnell concluded that a farmer might succeed there even if he could not grow wheat, if he could get a market. That was the only thing that would prevent him from succeeding, he thought.

Much evidence as to the agricultural possibilities and climate of the Peace country was taken by the Senate committee of 1888 (See p. 28).

Hon. William Christie, formerly Inspecting Chief Factor of the Hudson's Bay Company, in his examination before the committee, expressed himself sanguine about the agricultural possibilities of Peace river country, which he considered "is one of the finest countries that you would wish to see. Upper Peace river country is as fine a country as I ever saw." He did not think Peace river country subject to droughts at all, but the winter snow disappeared much more rapidly than it did in Manitoba. The vegetation in Peace river country is very luxuriant; the grass is more like that of Manitoba than that of Saskatchewan. He thought the wheat crop would be as certain in upper Peace river district as in the Saskatchewan district. Farther down, at Lac la Biche, they never have wheat frozen; that may be affected

by the temperature of the lake water. On upper Peace river they are less subject to frost. He had always understood that wheat grew well at Dunvegan.

At Fort Vermilion there was a splendid country. He once rode with Governor Dallas sixty miles through a most magnificent country. The soil was a beautiful dark loam, as they could see by the mole hills, and they were struck with the charming appearance of the country. There were more bluffs than were found on the Saskatchewan, and it was a beautiful country all the way up to Dunvegan. Where the country was open, the grass was higher than on the Saskatchewan. It was not very long—about the same as in Manitoba. As to the testing of the capacity of the country for agriculture, he explained that a good deal had depended upon the characters of the officers in charge of the various forts whether the capacity of the country in the vicinity for agriculture was tested. In the journals of long ago he found that they used to raise splendid wheat crops at Dunvegan, and cattle. Another officer, without any taste for agriculture, going in there might find it very difficult to live. If he had no taste for gardening or agriculture, nothing would be raised. A great deal depended on the officer of the post whether he lived well or not. If he was active and energetic he would always live very well.

Witness agreed with the remark that there is enough good land in Peace river country

To Make a New Province.

G. M. Dawson, M.D., LL.D., at the time Assistant Director of the Geological Survey of Canada, was examined by the committee and explained that he

had personal acquaintance with the Athabaska from Athabaska to Baptiste river; with Peace river valley from Smoky river to the headwaters; and with the country between the above designated portions of rivers.

Quoting from a report he had prepared in 1879-80, on the extent of arable and pastoral lands in the region of Peace and Athabaska rivers, Doctor Dawson showed that Peace river basin comprised an area of about thirty-one thousand five hundred and fifty square miles. Its average elevation may be stated as a little over two thousand feet, and this is maintained with considerable uniformity, for though the general surface slopes slightly from the north and south towards Peace river, the region as a whole may be considered as a plateau, through which the great gorge-like valley of the Peace has been excavated. This valley has in general a depth of six hundred to eight hundred feet below that part of the plateau bordering it, with a width of two or three miles from rim to rim. Its tributary streams, at first nearly on the plateau level, flow in valleys of continually increasing depth as they approach that of Peace river. Those from the southeastern portion of the region rise either in Rocky mountains or near the Athabaska, the tributaries received by the latter stream, in this part of its course, from the north and northwest being—with the exception of the Baptiste —quite inconsiderable.

The ridges and hills by which this region is occasionally diversified, appear in all cases to be composed either of the generally soft rocks of the cretaceous, or of arenaceous clays containing erratics and representing the boulder clays of the glacial period. These elevations are generally slight, and with exceedingly slight, and gradual slopes, the

scarped banks of the streams constituting much more important irregularities. These ridges, however, often resemble detached portions of a higher plateau, and spread widely enough to occupy in the aggregate a considerable area, of which the soil is not so uniform in character as elsewhere. With these exceptions, the soil of the district may be described as a fine silt, resembling the

WHITE SILTS OF THE NECHACCO BASIN,

and not dissimilar from the loess-like material constituting the subsoil of Red river valley in Manitoba. This silt at a short distance below the surface, is greyish or brownish in colour, but becomes mixed superficially with a proportion of vegetable matter to a varying depth. It has evidently been deposited by a comparatively tranquil body of water not loaded with ice, probably toward the close of the glacial period, and has either never been laid down on the ridges and undulations above referred to, or has been since removed from them by processes of waste. As evidenced by the natural vegetation its fertility is great.

West of Smoky river, both to the south and north of Peace river, there are extensive areas of prairie country, either entirely open, and covered with a more or less luxuriant growth of grass, or dotted with patches of coppice and groves of trees. The northern banks of Peace river valley are also very generally open and grassed, and parts of the valley of the Smoky and other rivers have a similar character. The total area of prairie land west of the Smoky may be about three thousand square miles.

Though the prairies are most immediately available, from an agricultural point of view, the

regions now covered with second growth and forest, where the soil itself is not inferior, will eventually be equally valuable. The largest tract of poor land is that bordering the valley of the Athabaska on the north. This rises to an elevation considerably greater than most of the region to the north and west, and appears, during the submergence to which the superficial deposits are due, to have been exposed to stronger currents which have prevented the deposition of fine silt, causing it to be replaced by a coarser silt which passes in places into actual sand, and alternates with ridges of boulder clay. This region is often swampy, and, for a width of twenty to twenty-five miles on the trail from Sturgeon lake to Athabaska, is quite unsuited for agriculture, though still in many places capable of yielding good summer grazing when the forest has been completely removed by fire. To the northward, more particularly to the east of Smoky river, peaty and mossy swamps occupy part of the surface, and these may be regarded as permanently unsuited to agriculture.

There is also a sandy tract, though of small width, along the lower part of Wapiti river near its junction with the Smoky. Deducting as far as possible all the areas known to be inferior or useless, with about twenty per cent. for the portions of the region under consideration of which less is known, the total area of land, with soil suited to agriculture, may be estimated as

AT LEAST TWENTY-THREE THOUSAND fiVE HUNDRED SQUARE MILES.

In the absence of complete maps, such an estimate cannot be otherwise than very rough, but may serve to give some idea of the fact.

Doctor Dawson expressed the opinion that “the truly wonderful luxuriance of the natural vegetation in Peace valley prairies indicated, not alone the fertility of the soil, but the occurrences of a sufficient rainfall.”

He went on to explain that the summer season of 1879 was an unusual one, characterized by excessively heavy rainfall, with cold raw weather in the early summer months. These conditions did not extend to the west of Rocky mountains, but appeared to have been felt over the entire area of the plains to Red river valley. As a result of this, the crops generally throughout the Northwest were later than usual, and the mean temperature of even the latter part of the summer appears to be rather abnormally low. Notwithstanding this, on Doctor Dawson’s arrival at Dunvegan, on August 16, small patches of wheat and barley in the garden of the fort presented a remarkably fine appearance and were beginning to turn yellow. On his return to the fort on August 31, these were being harvested, their complete ripening having been delayed by overcast and chilly weather which prevailed between these dates. At the first-mentioned date potatoes were quite ripe, with the balls formed on the stalks, and the garden contained also fine cabbage, beets, carrots, onions, lettuce and turnips. Dwarf beans, cucumbers and squashes were also flourishing and, though these plants are particularly tender, showed no signs of frost. The two last-named, having been sown in the open ground, did not appear likely to perfect their fruit. A few stalks of Indian corn were also growing, though it is improbable that this cereal would ripen in this district. When this garden was again visited, on the last day of August, the beans, cucumbers, and squashes had been cut down by frost, but not

completely killed. The potato tops were also slightly nipped.

Rev. Mr. Tessier, who had been at Dunvegan as a missionary for some years, had always been

ABLE TO RIPEN SMALL, BLACK BUTTER BEANS,

but in some seasons not without difficulty, owing to frosts. He had also tried a few grains of oats, which he procured accidentally, and obtained a return of astonishing abundance. About the date just referred to, the potato plants of Smoky river post (The Forks) were badly cut down by frost, the tubers being, however, quite ripe, fine and large.



View on Halfway river.

Doctor Dawson pointed out that Mr. Horetzky had been told that the plains were often nearly bare up to the month of December, though the winter usually sets in with the month of November. Sir Alexander Mackenzie remarked the same absence of snow in the early winter months of 1792. It was entirely gone on April 5, 1793, and gnats and

mosquitoes were troublesome on April 20. Horses almost invariably wintered out well without requiring to be fed. Hay should be provided for cattle, to ensure perfect safety, for a period of three or four months, though in some seasons it was necessary to feed the animals for a few weeks only. The Indians of 'Cree Settlement' on Sturgeon lake wintered their horses without any difficulty round the borders of a neighbouring lake, the shores of which were partly open. From Hudson Hope, the horses were sent southward to Moberly lake to winter, and according to Mr. Selwyn, did well there. Lesser Slave lake, with its wonderful natural meadows, has long been known as an excellent place for wintering stock, and was referred to as such by Sir J. Richardson.

From such comparison as could be made, according to Doctor Dawson, it would be premature to allow that the climate of Peace river was inferior to that of the region about Edmonton on the Saskatchewan. It was true, he admitted, that in both Saskatchewan and Peace river districts the season was none too long for the cultivation of wheat, but if the crop could be counted on as a sure one—and experience even then seemed to indicate that it might—the occurrence of early and late frosts might be

Regarded With Comparative Indifference.

The season was at least equally short throughout the whole fertile belt from Peace river to Manitoba, though early and late frosts were not so common in the low valley of Red river.

The almost simultaneous advance of spring along the whole line of this fertile belt, Doctor Dawson

pointed out, was indicated by the dates of the flowering of the various plants, a point referred to by him in some detail elsewhere. It was further unquestionable that the winter was less severe, and not subject to the same extremes in Peace river and upper Saskatchewan regions as in Manitoba.

Scientists, Doctor Dawson remarked, had already found reason to believe that the early and late frosts, and not the absence of a sufficient aggregate amount of heat, constituted the limiting condition of wheat culture in the Northwest, but that neither Saskatchewan nor Peace river countries lay upon the actual verge of the profitable cultivation of wheat appeared to be proved by the fact that oats succeeded on the Saskatchewan, and also—in so far as one or two seasons could be accepted as evidence—on Peace river; while it was well known that this cereal is less tolerant of summer frost than wheat.

This, Doctor Dawson remarked, is further proved by the fact that at Fort Vermilion and Athabaska lake, one hundred and eighty and three hundred miles, respectively, northeast of Dunvegan, Professor Macoun had found wheat and barley ripening well, but in this instance the fact was complicated by the circumstance of the decreasing altitude of the country, which introduced a new condition.

Doctor Dawson's Striking Illustration.

To give some idea of the value of a tract of generally fertile country, such as that described, Doctor Dawson remarked: "Let us assume, as above, that the area of actually cultivable land is twenty-three thousand five hundred square miles, or fifteen million one hundred and forty thousand acres. Let us suppose for simplicity of calculation, that the whole

area were sown in wheat, the yield, at the rate of twenty bushels to the acre, would be three hundred million, eight hundred thousand bushels."

The Reverend J. Gough Brick, for many years in charge of the Church of England mission at Dunvegan on upper Peace river, submitted some interesting evidence in writing to the committee. He stated that on his mission farm he had ploughed on April 8, and sown wheat on April 12, and that wheat was cut about August 20. Wheat was generally sown from April 12 to May 1, and harvested at the end of August. The barley was sown from May 10 to May 20, and harvested at the end of August. The time for sowing and reaping oats was the same as wheat. Potatoes were planted about May 16 and dug in September. Turnips planted at same date were gathered October 10. The Hudson's Bay Company had done a little farming, in connection with other posts, at Dunvegan, Fort St. John, Hudson Hope and Fort Vermilion, for very many years. Witness supposed that at Dunvegan they had raised wheat, barley and potatoes for seventy-five to one hundred years, and seldom had the crops turned out a total failure. In 1884, he went up on to the height of the prairie country, some thirty-six miles from Dunvegan, and broke up about three acres for an experiment. In 1885 the crop on the land, only once ploughed, was fairly good. In 1886 there was a magnificent crop of wheat, barley, peas, potatoes, turnips and all other vegetables. In 1887, he was sorry to say, the crop there was a total failure. A frost on July 26 killed out everything.

The ordinary prairie grasses, with wild vetches and pea-vine, were found in abundance, growing more or less all over the country. The soil was a black loam, a large percentage he considered fit for

grain, the rest for pasturage. They had no insect pests in upper Peace country. The Indians were raising a considerable quantity of potatoes. A few were raising a little barley and wheat.

Mr. Brick informed the committee that he considered the climate of Peace river country as

THE FINEST IN THE WORLD.

The usual snowfall in Peace river is from eighteen inches to three feet. Ice begins to run in Peace river about November 5, but some seasons remain open until December 20. It generally breaks up about April 10 to 15. The prevailing wind is from the southwest, and during the winter the Chinook winds prevail in upper Peace river country. The three growing months are very dry until about the middle of July; then some seasons they get considerable rain. There were summer frosts some seasons; but still they were not so destructive in Peace river country as farther south. These frosts were purely local, and witness thought that were the country settled they would be less likely to occur. The early part of the summer is generally dry, while the weather in September and October is very pleasant indeed.

Some interesting information was communicated to the committee by Mr. Frank Oliver, then editor of the Edmonton Bulletin and member of the old Northwest Council. Mr. Oliver explained that most of his information was acquired from Mr. Murdock McLeod formerly of the Hudson's Bay Company's service. Peace river country, according to this witness, was especially noted for its abundant supply of berries of excellent quality. Although berries of all kinds mentioned were plentiful in the upper Saskatchewan, Indians used formerly to travel to

Peace river, some two hundred and fifty miles, to avail themselves of the supply there. Successive years of experiment had demonstrated the practicability of the growth of wheat, barley, oats and potatoes, at Dunvegan, Fort Vermilion and Chipewyan, the two latter in latitude 58½°.

There has been considerable exploitation of the agricultural possibilities of Peace country since 1888, and we now have data which tend to show that the faith of the pioneer farmers of the country was not misplaced. Much interesting information, as to more recent agricultural enterprise in the country drained by the Peace, was obtained from witnesses examined before the select committee of the Senate of Canada in 1907.

Fred Lawrence, F.R.G.S., Justice of the Peace, etc., of Fort Vermilion, gave some detailed and interesting evidence. Mr. Lawrence explained that his father went out to Peace river from Montreal in 1879, in the employ of the Church of England missions, becoming at once interested in the problem of making the missions and Indian schools in Peace river, and the whole of the northern country, self-sustaining. The settlement of Fort Vermilion is in latitude 58·30°, almost as far north as the northern part of Labrador. The place in 1907 (it has since increased considerably) consisted of about five hundred people, white people, and English-speaking half-breeds. The total production of wheat there in 1906 would be twenty-five thousand bushels, the average being

ABOUT TWENTY-ONE BUSHELS TO THE ACRE.

Of oats and barley about ten thousand bushels, mostly barley, was raised. The wheat was ground

and used to make bread for the people out there. The first market was at Fort Vermilion and the surrounding points, and whatever surplus there was was shipped down Peace river into Mackenzie river district.



Sheridan Lawrence's Farm at Fort Vermilion.

Mr. Lawrence stated that in 1906 he had cut spring wheat, fully matured, in eighty-six days. The time of cutting was the end of July. Wheat grown at Fort Vermilion is harder than grain of the same variety grown in Ontario. He explained that the river bottom proper only consists of points or flats in the bottom of the bed of the river, which "bottom" is practically about two miles in width, whereas, what is properly called Peace river valley, is in reality a broad tract of country. When you once get on to the height of land, this so-called "valley" covers three hundred miles in width, and extends from Rocky mountains on to Lake Athabaska. Peace river makes great bends, and on alternate sides of the river you find wide flats, where there is probably the richest soil there is in that northern country, made up of alluvial deposits all of black soil. There are places on the lower part of these points which get flooded, perhaps once in seven or eight years. Nearly all the points, however, are above the high water mark, and when these flats are cultivated the soil yields the

heaviest of crops. On these flats cultivation of the soil was first undertaken in that part of the country, and it was supposed by many that they comprised the only part of Peace river country that was suitable for cultivation. People supposed that when they undertook the cultivation of grain on the height of land they would get into the muskeg and swamp that adjoined the river in many places, and grain could not be raised; but this has been proved to be a fallacy. The tableland is sometimes called "bench land," and this bench land in some places is very wide. There are places in it, as at the south of Fort Vermilion, and to the north and west, where there is one hundred miles of this land on each side of the river.

This land is not all suitable for cultivation. It has its swamps and its muskeg, and its

LOW PATCHES OF LAND,

that are found in almost any country where there is a large growth of scrub timber; but the larger part of this land, as Mr. Lawrence had found by travelling over the country away from the river, is suitable for settlement.

Mr. Lawrence drew the attention of the committee to the fact that some years ago, Doctor Dawson, after going through Peace river country, reported that a large part of it was covered with muskeg and would be permanently unsuited for agriculture. In 1903 he took a trip from Fort Vermilion through Lesser Slave lake, through an unknown country two hundred and fifty miles. Later than that he travelled away from Peace river about fifty or sixty miles, and saw something that gave him an idea of these muskegs. The muskegs had covered

some large patches of that country, and the moss was about three feet in thickness. There had been large tracts of this moss burnt out. Forest fires had been running through there, and Mr. Lawrence supposed that the fire burnt thousands of acres that had formerly been muskeg, as shown by these large patches of moss, sometimes a few feet across and sometimes larger, which were left standing, where the muskeg had been. On this burnt area he saw grass from four to five feet in height. There were thousands of acres of it covered with the red-top grass, which is the standard grass of the west. The reason these muskegs had been there for so many years was that the moss formed a great sponge and retained the moisture. But when all that land is drained and the moss removed, it will certainly raise good crops of grass, and where grass can be grown, grain can be raised.

Mr. Lawrence stated that he would say that about one-tenth of the district to the north is covered with moss. To the south of Grande prairie there is a large proportion covered with moss, and Doctor Dawson may have intended to refer particularly to that district. Mr. Lawrence produced photographs of the grain raised on the soil that was formerly covered by timber—low land and timber. He explained that he had farmed at Vermilion for over twenty years, and had

Never Had a Failure in Wheat

during that time, although he had as low as five and one-half bushels to the acre. There was one very dry season which reduced the average, but there was always a certain amount of grain raised there that was good for seed and grinding purposes. There has

never been a complete failure from frost or any other cause. They have no rust on the wheat up there. He had raised as much as sixty-six bushels of wheat to the acre. That was the biggest yield, and accomplished without any fertilizer whatever. The heads of wheat at Fort Vermilion often would grow to the length of six inches, and at times he had counted sixty-five kernels in one head of wheat. Barley sown after the middle of May is usually ripe in the last week of July. The continuous daylight with about eighteen hours of sunlight accounts for the rapid growth of all vegetables in these parts.

During the month of July, Mr. Lawrence stated, they have at Fort Vermilion an occasional frost that sometimes cuts the potato vines down, but never puts them back seriously—just enough to show the effect of the frost on some of the top leaves. The potato vines, however, often show no sign of frost until they are ripe, and the potatoes obtain their full size and are matured. They had never had July frost severe enough to ruin the potato crops. These frosts are very slight. In 1906 he planted his garden during the week following May 24, and he planted tomatoes, cucumbers, peas and other vegetables. In the fall, during harvesting, his family had squash pie that was made from squash ripened in their own garden. The squash were raised just the same as the peas and other vegetables and took their chances, no hotbed and no special care, and he also raised cucumbers and tomatoes. The tomatoes did not ripen, but before they had a chance to freeze they were taken up. He thought that with care such as is given to these things in Manitoba and other parts of the Northwest, planting these tender vegetables early in hotbeds, and giving them care, the same success could be had in raising tomatoes, squash or other

things of that kind as is had in Manitoba and other districts. At Peace River Landing tomatoes were ripened in 1906 in the open garden. Other garden vegetables, such as cabbages, and so on, grow very well. He had raised cabbages at Fort Vermilion eighteen and one-half pounds in weight, and swede turnips are raised in the open field. Out of a three-acre patch

HE HAD SELECTED TURNIPS,

and a great many of them weighed from eighteen to twenty-five pounds. They were of the purple-top variety. They had no special attention or care, and they were good sound turnips.

Another of the witnesses examined before the same committee of the Senate was Mr. W. F. Bredin, member of the Alberta legislative assembly for the district. Mr. Bredin, in his evidence, stated that as regards Peace river valley, he would judge that from the mountains to Peace point, a distance of between seven and eight hundred miles, following the winding of the river, there is an average of seventy-five miles in width on each side of Peace river that is equal to the soil on any similar length of the Saskatchewan. That would make Peace river country about one hundred and fifty miles in width, and extending from the mountains to Peace point, a distance of seven or eight hundred miles, which is all equally good for agricultural purposes with the Saskatchewan valley. That would extend considerably beyond the bottom lands of the river, including also the table land back of the river. A great deal of it is clean prairie, on the north especially. There is more of it covered with scrub and small timber than there is clean prairie, but the

soil is equally good where the timber grows. Mr. Bredin stated that he had a ranch at Grande prairie for six years, and raised oats and vegetables every year there. He had cattle there for five winters, and the average length of feeding them during those five years was six weeks of each winter. That is south of Peace river, but within this belt of one hundred and fifty miles. In that Spirit river country he knew there were some white settlers, as well as half-breeds, who were making their living by

Raising Stock and Farming.

That seven hundred or eight hundred miles of good country, of which he spoke, would extend right to the foot of the Rockies. As to the question of the uniformity of the quality of the soil, he had only been down to what they call Wolverine point, near Fort Vermilion. He would say the country is uniformly good from Rocky mountains to that point. At Wolverine point the valley is much lower and perhaps the soil may be blacker, and the black soil may be deeper on the lower stretches of the Peace. All of that country would be good for stock. Both slough and upland hay is abundant. The pea vine and all the small fruits that grow anywhere else in the northwest grow up there, and all the wild flowers that he knew of in the northwest grow there. This area in Peace river country would compare on the whole with any part of Canada.

In reply to a question, Mr. Bredin stated that after his ten years' experience of the country north of Edmonton he would consider that to be quite as good a place for a man to settle in as the Saskatchewan valley was twenty-five years previously. During the debate on the capital question in the Alberta

legislative assembly at Edmonton, Mr. Bredin remarked, he had made an estimate of the good land north of Edmonton in Alberta, and it figured up more than the good land south of that city. If you were to add all the good land north of the Alberta boundary to Alberta, you would have about twice as much good land in the province north of Edmonton as there is south of that city.

One Hundred Million Acres of Good Land.

Mr. Bredin submitted what he said he considered a careful estimate of all the good land north of Edmonton, east of Rocky mountains. He stated: —"My estimate of the area of the agricultural lands that will be available in northern Alberta—say north of the 55th parallel of latitude—and in the unorganized district of Mackenzie, is not less than one hundred millions of acres."

Mr. Bredin informed the committee that one spring, when he left Fort St. John on the upper Peace, the grain there was up six or seven inches. He must have been at least a month going to Edmonton, and when he got there the grain there was just in the same stage of growth as the grain had been when he left Fort St. John; so the season must be earlier at the latter place. They very often sowed seed at Fort St. John in March, and invariably no later than April. In 1906 they began cutting the wheat at Peace River Landing on the last day of July, and the wheat was ready to cut five or six days earlier than that. As a matter of fact, Mr. Brick, the member for Peace river district in the Alberta legislature, started to cut on the last day of July, and he told Mr. Bredin that the grain was ready to cut a week earlier. Mr. Brick cultivated there, that year, three hundred acres of

land in wheat, oats and barley.



Vegetable Garden 15 miles west of Fort St. John.

Stockmen west of Peace River Landing would have to feed their cattle, taking one year with another, an average of seven weeks, and east of that probably more.

Mr. Elihu Stewart, of the city of Ottawa, at the time Superintendent of Forestry for the Dominion Government, since retired from the public service to engage in private business, was one of the most important witnesses examined before the committee. He explained that his knowledge of the country beyond the Saskatchewan has principally been derived from two trips that he made, one in 1902 to Peace river, and one during the season of 1906 down the Athabaska, down Slave river, and down the Mackenzie to the delta, and thence across to the Yukon, and back by the way of Dawson. Mr. Stewart produced before the committee samples of some of the grains that are grown at the end of Lesser Slave lake. One was a sample of hulled barley, grown for the use of the mission schools; another, wheat from

Lesser Slave lake; a third, another quality of wheat from the Roman Catholic mission at the end of Lesser Slave lake, grown that year (1902). These exhibits were principally from the farm at the end of Lesser Slave lake. The Roman Catholic mission there has

A Very Large Farm and Stock,

and grain is grown there by others as well. Mr. Stewart said he had noticed in discussions on Peace river that there was not enough distinction made between the valley of Peace river and the tableland above. There is a high level country, and all at once it drops down some six hundred feet to a valley. He thought the difference between the height of the banks and the water at Peace River Landing is something like six hundred feet. In that valley there is no question at all about the wheat ripening. He produced some specimens of grain grown in the valley near Peace River Landing, also some tobacco grown there. The width of Peace river valley is very narrow, not over two miles at the crossing. The soil is good, perhaps a little heavy, with the exception of a few miles which is light and covered with jackpine. The rest is good agricultural land. There would not be a great quantity of it in the valley of the river at that part. The altitude is pretty high, but down the river towards Fort Vermilion it lowers, and probably the elevation of the upland there would not be greater than the level of the water at Peace River Landing. The grain-growing capabilities of that plateau all depend on the elevation. Peace river district is an immense country extending some six hundred miles from the mountains to the lake. Down at Fort Vermilion crossing they raise large quantities of wheat. Of course, at a very high altitude the same

result cannot be expected, but wheat he saw on the plateau above Peace river was uninjured on September 20. But there was frost that night. He did not know whether it was enough to kill the grain. However, if they had no frost up to September 20, there should be

NO TROUBLE RIPENING GRAIN THERE,

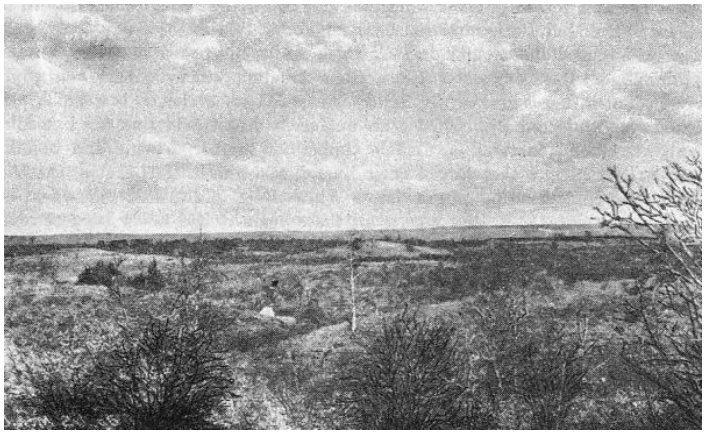
because it ought to be fit for harvesting before the end of August. The wheat in question was sown by an Indian and put in very late. Wheat grown at Fort Vermilion took the first prize as the best wheat shown at the Centennial Exhibition at Philadelphia, in 1876.

Mr. Henry A. Conroy, Inspector for the Indian Department under Treaty No. 8, gave some very interesting evidence as to the agricultural resources of Peace river country before the committee. Mr. Conroy stated that he had been annually travelling through this northern country for about eight or nine years. He starts in along Athabaska river, from Athabaska, which is about one hundred miles from Edmonton and goes up the river to the junction of Little Slave river, thence visiting all the Indian reserves in the treaty district.

When Peace river district is reached via the route taken by Mr. Conroy, the altitude is very high. It is certainly over one thousand feet from the top of the bank down to the bottom of the river—tremendous banks. The country, as he understood it, is very fine. Bunch grass grows all along the north side extending through to Hay river. He had information as to this country from Indians and half-breeds, and they say bunch grass grows all along the way. Shortly after striking the Peace, Dunvegan is reached. The country

north of Dunvegan; all along the river is, in the opinion of Mr. Conroy, fit for agriculture on both sides and for any distance back. Of course one would have to go up to the top of the banks to get the land. Fine buffalo grass grows in the district north of Dunvegan up to Peace River Landing. As to the country running across from Dunvegan to Fort St. John, it would not take a man very long to cross it if he had a road.

A Startling Comparison.



View of the Pouce Coupé Prairie.

Mr. Conroy stated emphatically that he was of opinion there is a large area of valuable agricultural land on Peace river. Taking the whole country there as far as he knew, there is as much agricultural land to be settled as there is settled at present west of Winnipeg.

Mr. Conroy uttered a word of warning against some of the settlers (old-timers). He remarked: —"Old-timers in there do not want anybody to come in, and they tell people the country is no good. They

have the whole country to themselves. One man grows two thousand or three thousand bushels of wheat every year and gets for it from one dollar to one dollar and seventy-five cents a bushel from the Hudson's Bay Company, and he does not want anybody else to come in and compete with him."

Continuing his evidence, Mr. Conroy explained that from Fort Vermilion northeasterly the limit of the agricultural country is reached, but below that it could be made an agricultural country. There were no settlers there at all then (1907). At Fort Vermilion there had been a settlement for many years. Mr. Conroy said he had been there many times, and knew all the settlers in that section. Some of the finest wheat he ever saw, he saw growing in that settlement. He saw it only after it was harvested; it was threshed. They had a roller mill there, an up-to-date mill. The Hudson's Bay Company manufactured flour at Fort Vermilion to send north.

While at Peace River Landing with the Indian Treaty Expedition in 1899, Mr. Charles Mair ("Through the Mackenzie Basin," p. 89) made enquiries as to the fertile areas of the upper Peace from the Indians, half-breed hunters, and the few prosperous farmers and stockmen of the district. The nearest farmer and rancher to Dunvegan, at that date, Mr. C. Brymner, who had lived for ten years on Spirit river, told Mr. Mair that during seven of these, though frost had touched his grain, particularly in June, it had done little serious harm. Mr. Brymner informed Mr. Mair that it was a fine hay country, even the ridge hay being good. Mr. Brymner, himself, had at the time over a hundred head of cattle, which, thanks to the Chinook winds, fed out late in the autumn and early in the spring. Mr. Mair states that southeast of Fort St. John there is a considerable area

known as Pouce Coupé prairie, which was well spoken of. The "Grande prairie," to the southwest of Peace River Landing, which connects with Spirit river country and is drained by Smoky river and its branches, is a much more extensive open country. This is an extensive district suitable for immediate cultivation, and containing valuable timber for lumber, fencing and building.

Mr. Mair states that Rev. Father Busson told him in 1899 that at the Dunvegan and St. Augustine mission farms White Russian and Red Fife wheat had been raised since 1881, and during all these years it had never been seriously injured whilst the yield had reached as high as thirty-five bushels to the acre. Seeding began about the middle of April and harvesting about the middle of August.

Present Conditions and Settlement.

In his annual report (see annual report Royal Northwest Mounted Police, 1908), dated Athabaska, October 8, 1909, Inspector D. M. Howard of "N" Division of the Royal Northwest Mounted Police gives much interesting information regarding conditions at that recent date in Peace river region. It will be observed that some of the Inspector's references are to districts immediately north and east of that directly under review in this chapter, but they are none the less instructive here on account of the similarity of climate and other conditions.

Those portions of the report referring directly to the districts treated of in this volume are extremely interesting. The principal settlements in the district at that date were stated to be as follows:—

"Lesser Slave lake, known as Grouard, so called after the Roman Catholic bishop of the diocese, a

well known pioneer of the country, is situated six miles from the west end of Lesser Slave lake and has a population of twenty-five whites, and one hundred and twenty-five half-breeds, who make their living by hunting, fishing, and freighting in the winter time. Most of them have a few head of cattle and horses, and small gardens where they raise vegetables for their own use. The Roman Catholic mission has a school, hospital and convent. The Church of England also has a mission school for the Indian and half-breed children.

"Salt Prairie and Heart River (settlement) has a population of twenty whites and one hundred and seventy-five half-breeds.

"Prairie River (settlement) is considered one of the best settlements in the district, the land being very good. It has a population of eighty-five whites (Canadians, Americans and Swedes) and twenty-three half-breeds.

"Sturgeon Lake (settlement) has a population of nine whites and two hundred and ninety half-breeds and Indians.

"In Peace River Landing district there are six actual settlements:—Peace River Landing, Shaftesbury, Silver Springs, Cold Springs, Bear Lake and Little Prairie."

The inspector proceeds to give some particulars about these pioneer settlements.

Silver Springs (settlement) is situated about five miles from the farm of T. A. Brick, on a high bench at the head of a spring named by the settlers, Silver Springs.

Bear Lake (settlement) is used only as a winter camp, and for haying in the summer. The lake from which it is named is about twelve miles long by eight wide. It is very shallow and muddy, although the

land about it is very good and will make a good grain country, but as yet no one has done anything in that line. There are no fish in this lake.

Little Prairie (settlement) is about twenty-two miles out from Peace River Landing on the way to Lesser Slave lake. This prairie is about ten miles long and one wide, but can be extended in all directions by clearing the bush. The land is very good, and the little grain sown has done very well this year. Two white men and a number of half-breeds are the only settlers at present.

Peace River Landing (settlement) is what is known as round the crossing of Peace river, extending about ten miles up on the north side of the river, taking in the Roman Catholic mission, known as Smoky River mission on account of its being opposite Smoky river where it joins the Peace; this part is all surveyed with free grant lots to both whites and half-breeds who had settled there before the treaty known as No. 8 was made with the Indians.

Shaftesbury is the name given to the upper part of Peace River Landing settlement, round the English Church mission, extending some sixteen miles up the river, and comprising the balance of Peace River Landing settlement.

The Post Office for this District

is situated at Peace River Landing, and serves for all these settlements.

Cold Springs (settlement) is located on high land about thirty miles from Peace River Landing, near Old Wives Lake Indian reserve; several settlers have taken up land there this year, and grain of all kinds has done well.

Peace River Landing settlement, including Shaftesbury, Bear Lake and Silver Springs settlements, has a population of about two hundred and forty; twenty-nine French-Canadians, thirty Canadians and English, forty Indians and one hundred and fifty half-breeds. Little Heart River has a population of forty half-breeds and two whites (Americans).

As to industries and transportation, Inspector Howard stated in his report:—"Steam sawmills are in operation at the following points in the district:—Athabaska, Lesser Slave lake, Peace River Landing, Prairie River, Fort Vermilion, Chipewyan and Fort Smith; one is also to be in operation at Saskatoon lake in the Grande prairie country this winter. The mill at this point does a good business, as a number of new houses have gone up in the village this year, and a considerable quantity of lumber is used annually in the building of the scows for the river transport; few of these scows are brought back up the river, but are broken up down below, and the lumber used for building purposes, scows being built new at this point every year. Grist mills are also in operation at Lesser Slave lake, Peace River Landing and Fort Vermilion. At Sawridge two lime kilns are in operation and a good quality of lime can be obtained at a reasonable price.

"The Northern Transportation Company has built a new steamer at this point (Athabaska) this summer for use on the run between here and Moose portage. This steamer is smaller than the 'Northland Sun' and of lighter draught and will enable the company to run much later than in former years. The river gets very low in the autumn before the freeze-up.

"Until the country has a railway affording the settlers entrance to the markets, the grain acreage

will not increase beyond sufficient to supply the settlers' own wants, and to meet local demands, but the advent of a railway will change all this."[16]

Present Day Agriculture.

Inspector Howard gave the following information as to agriculture in his district:—

"The general state of the district is satisfactory, and most of the settlers, having had good crops, seem well pleased with their prospects in this new country. In some parts of Peace river country a few suffered loss from hail, and want of rain in other parts has affected the crops of a few injuriously, but on the whole the crops were a very fair average. In most cases threshing is not over, but in one case where the crop has been threshed a Mr. L. H. Adair, of Baptiste lake, about twelve miles west of Athabaska, really in the Athabaska country, threshed five thousand bushels of oats from one hundred and twenty acres of land. Nearly all the new settlers coming into the country this year have settled at Grande prairie, in Peace river country, where the land is very good. Most of these settlers were from Eastern Canada and the United States, and in nearly all cases were supplied with a fair amount of capital, stock and farm implements. Nearly all of them have put in gardens, and have vegetables enough for their use in the winter, and from reports I have received from the detachments, in no cases should there be any shortage amongst the new settlers during the coming winter.

"Mixed farming is chiefly carried on in this district, oats and barley being the chief grain grown. There is practically no market for wheat at present owing to the want of railway communication.

Potatoes and all other kinds of vegetables are successfully grown, most of the farmers having small vegetable gardens for their own consumption, but practically none are grown for market.

"In Peace River district, Red Fife wheat was sown last spring from seed supplied by the government. The wheat principally sown in this district in former years was Ladoga, an early ripening grain, but the Red Fife appears to have done just as well this year. The amount of grain raised this year in Peace River Landing district is about:—Wheat, five thousand bushels; oats, four thousand bushels; barley, one thousand two hundred bushels. Threshing was not finished at the time this report was made, so the above is only an estimate.

"There are about three hundred head of horses of all kinds and three hundred and fifty head of cattle owned by settlers in Peace River settlement, practically

EVERY FARMER OWNING A FEW HEAD

of each. In Lesser Slave lake district there are approximately six hundred and one horses, seven hundred and fourteen cattle and one hundred and forty-five pigs; in addition to these there are the following registered stock: three stallions, five bulls, thirteen cows, four boars and six sows.

"The crops through Peace River Landing and Lesser Slave lake subdistricts have been a fair average. The grazing lands about Lesser Slave lake, Grande prairie, Peace River Landing, Fort Vermilion and other sections are very good, and hay is very plentiful and a supply for the winter can easily be put up.

"The acreage under crop in Lesser Slave lake sub-

district is about seven hundred and thirteen acres of oats, three hundred and one acres of barley, twenty-three acres of spring wheat, nineteen acres of fall wheat, twelve acres of fall rye. One acre of sugar beets and mangolds were grown this year as an experiment and turned out very successfully.

"The crop all round was good; only one farmer suffered any loss, about twelve acres of his barley being damaged by hail.

"Next year there will be a much increased acreage under crop, a lot of breaking having been done this summer and autumn."

A Pleasant Country to Live in.

Not only does the climate of the Peace country appear to be satisfactory from the view point of the farmer, but it is also described by travellers as exceptionally pleasant to live in. Mr. Warburton Pike, in his book (See p. 19) refers enthusiastically to the beautiful autumn of the Peace country. He writes:—"We reached Fort Vermilion late in September, in the full glory of the autumn; the sharp morning frosts had coloured the poplar leaves with the brightest golden tints, and the blue haze of an Indian summer hung over prairie and wood. Away on Great Slave lake a half-breed had told me of the beauties of Fort Vermilion as a farming country, and had explained that all the good things of the world grew there freely, so that I was prepared for the sight of wheat and barley fields, which had this year produced a more abundant harvest than usual; potatoes and other vegetables were growing luxuriously; cattle and horses were fattening on the rich prairie grass, and it seemed that there was little to be gained by leaving such a fertile spot in the face

of the winter that would soon be upon us."

Speaking of his trip up the upper Peace between the date mentioned and the end of November, Mr. Pike wrote:—"I do not remember to have ever seen in any other part of Canada such a fine autumn as we enjoyed between Vermilion and the Rockies. There was hardly a day's rain the whole time, and, although a sharp white frost usually made a cold camp, the days were bright and at times almost too hot for tracking."

That the climate of Peace river country is exceptionally healthy is declared by all the white people who have lived there, and their declaration appears to be borne out by the fact that a considerable portion of the inhabitants have attained a very old age. Mr. Charles Mair in his book "Through the Mackenzie Basin" mentions that when the Indian Treaty expedition was at Lesser Slave lake in 1899 his attention was drawn to the number of people of extreme old age among the inhabitants. He especially mentioned the case of an aged half-breed woman, Catherine Bisson, who was born on New Year's day in the year 1793. She was blind at the time Mr. Mair saw her, and scarcely able to walk, but was able to talk, and even cracked jokes with those about her. In a footnote Mr. Mair states that this very old woman died in the spring of 1908 at the remarkable age of one hundred and fifteen years.

[15] It will be observed that this paragraph and other portions of this testimony really refer to the Athabaska country treated of in the preceding chapter, but to save an awkward dislocation of Professor Macoun's testimony it has been kept intact. (E. J. C.)

[16] The railway is now being constructed, and there has been a remarkable development in this section since Inspector Howard penned this report.

CHAPTER XII.

NORTHERN ALBERTA.

Tree Growth and Timber Resources.

An Abundance of Timber in the Vicinity of Chipewyan.—Much of the Country Has Been Swept by Fires.—Most of the Timber is Along the Rivers.—Millions of Cords of Pulp Wood.—Spruce and Black Bark Poplar the Principal Varieties.—The Water Power Possibilities Described as Tremendous.

The timber resources of northern Alberta, according to the evidence in hand, are very considerable, a matter of not a little importance in a new country. We will deal first with the eastern, or Athabaska division of this section.

In his evidence before the Senate committee of 1888, Professor John Macoun, Botanist to the Geological Survey, said:—"There is an abundance of timber in the vicinity of Chipewyan on Lake Athabaska. There are as fine spruce in the Athabaska delta as are to be found in any part of the northwest. I have measured trees on the Embarass river that were two feet and a half in diameter and were very tall. On Peace river, likewise, especially on islands, there are many large groves of spruce and poplar, which attain extraordinary dimensions."

Mr. Alfred von Hamerstein informed the Senate committee in 1907 that from McMurray up in a westerly direction, for about twenty miles, there is very good timber. He had seen trees that would make one thousand feet of lumber. From Athabaska to House river there is timber standing yet. There had been some fires raging, but they had not burned it yet. The timber consists of some patches of spruce of a fairly good size, and the rest is poplar. From House river to McMurray there is no timber left. It is all burned out. There are patches here and there along the river, a couple of trees left standing, and there is some very fine timber in that. There is some timber which Mr. von Hamerstein used for his oil well boring work, and he had taken out strips sixty-four feet long, out of which he had cut his walking beams. There are only patches of this timber; the rest had been burned. A little further east there is some fine timber at Chipewyan. From the mouth of Peace river to about Fort Vermilion there is some good timber. Timber of the same quality ranges north for a considerable distance. There will be a range of timber four or five miles long, and then muskeg. From the Vermilion down there is no timber left; it is all burned up. There is no young timber growing up

to speak of—at least Mr. von Hamerstein did not see any, except in a few places where a little young timber is starting to grow. Indeed it is mostly poplar, with patches here and there of spruce, but mostly poplar.



Saw Mill near Fort Smith.

Mr. H. A. Conroy of the Indian Department, in his evidence before the Senate committee of 1907, stated that he had been east of Lake Athabaska as far as Fort à la Corne. All along the rivers there is good timber, particularly on Great Slave river. On the lower levels of the Athabaska, through to Athabaska lake, there is heavy timber all the way along. Mr. Conroy did not know what was behind the timber belt, but believed it was pretty muskeggy. That was what the Indians told him. He had been up the river by boat every year for eight years. Taking the country as a whole, there is quite

A Lot of Marketable Timber.

All the rivers and lakes could produce good timber.

There are millions of cords of spruce for pulpwood.

Mr. Conroy, in a report to the Superintendent of Forestry, January 17, 1910, wrote:—"That part of Athabaska river north from McMurray to Smith landing is fringed with a heavy growth of spruce and black bark poplar. The spruce is quite large, and from an economical standpoint will be of great value in the future. A considerable part of this country is also excellent for agricultural purposes. From McMurray southwest to Athabaska there is quite a quantity of valuable spruce and poplar which has been saved by the watchfulness of the guardian, William Biggs, who makes his trips up and down that section of the river. He is one of the most useful men in the north.

During the summer of 1910 Mr. W. Hayes, a capitalist and manufacturer of Duluth, Minnesota, made an exploratory trip through the Athabaska country with A. Violette. Mr. Hayes stated in an interview on his return to Edmonton that there was timber enough in Athabaska district to supply western Canada for the next half century. Agricultural prospects, he declared, could not be better, while copper, iron and gold had been found, and also petroleum, asphalt, limestone and oil. Fishing could be developed into quite an industry.

Interviewed in Edmonton after his long trip in 1910 (See p. 27) the Hon. Frank Oliver, Minister of the Interior, stated:—"All the way from Edmonton to Fort Macpherson the country, along the rivers at least, is level and forested. There is no prairie. On the upper part of Athabaska river the banks are from one hundred to two hundred feet in length, and the country is well wooded. There is a considerable amount of spruce of good size, but the timber is chiefly poplar. The country has at one time been

altogether under spruce, but fires have wrought havoc in it. The explanation of these fires is that all freight for the north country goes down Athabaska river and the men who steer the scows down walk back along the banks. They are careless with their camp fires and the result is a continual danger of further destruction by fire."

Valuable Water Powers.

With such knowledge as we now possess it is safe to say that within a few years the water powers of the section of country under review will constitute one of its most important natural assets.

Mr. William Ogilvie, in a letter published in the Ottawa Journal, February 19, 1910, writing of the water power susceptible of development on Slave river, stated:—"When making my survey in 1888, I deduced the total fall in the river in this stretch by observing the angles of depression or elevation of each survey station from the preceding one, and with the distance from each station to station deducing the rise and fall; in this way I found the total fall to be two hundred and forty-seven feet. The instrument I had to use was not of a high order of precision for this purpose; nevertheless, I feel safe in saying the fall is between two hundred and thirty and two hundred and sixty feet. All the drainage basins of Peace and Athabaska rivers, and Lake Athabaska, are in one here, and with this fall in so short a distance the power possibilities, when required, will be tremendous."

Mr. Ogilvie, upon another occasion, speaking of Athabaska river, said:—"The current averages well over four miles an hour, but the rate varies much with the height of water. At Grand rapids falls, the

fall is about sixty feet in one quarter of a mile. They are a fine sight and will, when required, develop a lot of power; I would say in the average season fully as much as Chaudiere falls at Ottawa (say eighty thousand horse-power)."

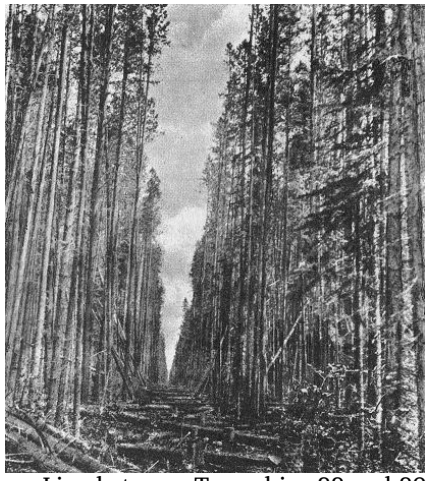
Peace River Section.

As to the timber resources of the western or Peace river division of the section under review, Doctor G. M. Dawson, before the Senate committee of 1888, after describing the prairie country, showed that the remainder of the surface was generally occupied by second-growth forest, occasionally dense, but more often composed of aspen, birch and cottonwood, with a greater or less proportion of coniferous trees. Some patches of the original forest, he said, remained, however, particularly in the river valleys, and were composed of much larger trees, chiefly coniferous, among which the spruce was most abundant. Handsome groves of old and large cottonwoods were also to be found in some of the valleys. Where the soil became locally sandy and poor, and more particularly in some of the more elevated parts of the high ridges above described, a thick growth of scrub pine and spruce, in which the individual trees were small, was found, and in swamp regions the tamarack was not wanting, and grew generally intermixed with the spruce.

East of Smoky river, and southward toward the Athabaska, the prairie country was quite insignificant in extent, the region being characterized by second growth forest, which was only beginning to struggle up.

Whatever theory be adopted, and may have been advanced to account for the wide prairies of the

western portions of America further to the south, the origin of the prairies of Peace river was sufficiently obvious, Doctor Dawson thought. There could be no doubt that they had been produced and were maintained by fires. The country was naturally a wooded one, and where fires had not run for a few years, young trees began rapidly to spring up. The fires were, of course, ultimately attributable to human agency, and it was probable that before the country was inhabited by the Indians it was everywhere densely forest-clad. That the date of the origin of the chief prairie tracts now found is remote, was clearly evidenced by their present appearance, and more particularly by the fact that they were everywhere scored and rutted with old buffalo tracks, while every suitable locality was pitted with saucer shaped “buffalo wallows.”



The 23rd Base Line between Townships 88 and 89, Range 14, West of the 6th Meridian.

In its primitive state the surface was probably covered with a dense heavy growth of coniferous trees, principally the spruce (*Picea Engelmanni* and *P.*

alba), but with scrub pine (*Pinus contorta*) in some localities, and interspersed with aspen and cottonwood. These forests having been destroyed by fire, a second growth, chiefly of aspen, but with much birch in some places, and almost everywhere a certain proportion of coniferous trees—chiefly spruce—had taken its place. The aspen being a short-lived tree, while the spruce reached a great age and size, the natural course of events, if undisturbed, would lead to the re-establishment of the old spruce forests.

Mr. Charles Mair ("Through the Mackenzie Basin", p. 91), estimates the prairie areas of upper Peace river at about half a million acres, "with much country in addition, which resembles Dauphin district in Manitoba, covered with willows and the like, which, if they can be pulled out by horse power, as is done there, will not be very expensive to clear."

Mr. Mair notes a wide and beautiful table-like prairie, begirt with aspens, at Peace point.

Mr. Fred S. Lawrence explained to the Senate committee of 1907 that in the valley of Peace river, the bottoms of the river, the islands—and there are large islands in the river—and the points, are largely covered with a heavy growth of spruce, which grows to a large size. The largest he had ever measured was four feet four inches in diameter. A tree of that kind would carry its trunk well up, clear of branches for forty or fifty feet. Of course that is an unusual size, but timber three feet in diameter is common on the hills, and in the lower part of the bottoms. There is no oak, but there are spruce, birch and poplar. The poplars grow to a large size. The cottonwood often grows to four feet in diameter, and the poplar grows to a diameter of two feet.

CHAPTER XIII.

NORTHERN ALBERTA.

Economic Minerals.

Travellers, Explorers and Prospectors Describe the Country as a Veritable Store House of Mineral Wealth.—Gold Found in the Bars in Peace river.—Indications of Plentiful Supply of Iron.—Lignite Found in Abundance.—Historic Deposits of Salt.—The Famous Athabaska Tar Sands.—Their Commercial Value.—Indications of Petroleum.—Boring Experiments.—Natural Gas Under a Wide Area.—Travellers Use Natural Gas Jets to Boil their Camp Kettles.

Northern Alberta, according to the reports of travellers, geological explorers and prospectors, is a veritable storehouse of mineral wealth, its natural richness in this respect including gold, iron, coal, gypsum, salt, sulphur, galena, natural gas, petroleum, tar sands or asphaltum, etc.

In his report of 1888, Mr. R. G. McConnell of the Geological Survey (See p. 18) states:—"Gold was found in many of the bars in Peace river, and in several places in sufficient quantities to deserve attention. Three miles above the mouth of Battle river, a large bar nearly a mile long on the left bank was examined, from which we obtained fifteen to twenty colours of fine gold, by washing a few handfuls of the mixed gravel and sand in an ordinary frying pan. We tried the bar at several points, and always with the same result. A small stream descends from the plateau on the opposite side of the river, and by leading its waters across the river, which is here about one thousand feet wide, the bar might be easily and inexpensively worked on a large scale. Twelve miles farther up the river, another bar was

examined, which yielded from twenty to forty colours when washed in the same way. Numerous other bars occur in this portion of the river, which would probably give as good results as those examined.

"The presence of fine gold in some quantities in the bars above the mouth of Battle river is probably due to the diminution in the strength of the Peace river current which takes place here, and its consequent loss of transporting power. The same fact is shown in the gradual substitution of sand bars for gravel bars which occur at the same point.

"Besides the gold on Peace river, two colours were also washed out of a bar on Loon river, an eastern tributary of the Peace."

Mr. Alfred von Hamerstein, a German gentleman who has lived in the Athabaska country for many years, latterly devoting his attention wholly to prospecting for petroleum, was examined before the Senate committee of 1907 and explained that before beginning boring operations for oil, he had been engaged in gold mining in Athabaska and Peace river districts. He had inspected McLeod river at a place called Assiniboia. A half-breed took out one hundred and fifty dollars from a bar there. He himself

TOOK OUT GOLD

at a little bar right opposite the mouth of Lesser Slave river in the Athabaska. He worked it for part of two summers. He would take out enough to last him for the winter, and then quit. It is hard work. The Indians and natives have gold and diamonds on the brain. They had taken to him rocks containing very nice garnets, but they were very mysterious about them.

Mr. von Hamerstein explained he had also worked for gold on Peace river. There is very good mining there, a little below Battle river, but the gold is so very fine that for every dollar you save there, about four and a half go away, and there are some peculiar things that no one can account for. After you have got it there is trouble with the quicksilver, which does not take up the gold. The method he adopted was to run the quicksilver, and then before running it over again, to roll it in acid.

Before the Senate committee of 1888, Bishop Clut stated that in Peace river and Liard river, certainly there was gold in large quantities. On Peace river, twelve or thirteen years prior to 1888, miners made from fifteen dollars to twenty dollars a day washing, but in the winter and when the water was high they could not work, and they abandoned the mines. "If the country were settled," the bishop remarked, "those mines might be worked to better advantage, because the miners could find other occupation in the winter and when the water was high."

According to Mr. von Hamerstein, at Black bay, on Lake Athabaska, there is first-class galena—none better. It carries gold, silver and copper. They assayed some of the product at Chipewyan, and found that it carried roughly about six dollars or seven dollars worth of gold, and some copper. There is a big seam near Black bay, and one can follow it up right along until it comes to an island. That is a very fine country for gold, and there have been several attempts to make something out of it, but the time is not ripe.

Indications of Iron.

Indications of the presence of iron have been

found on Peace, Clearwater, and Athabaska rivers. A specimen rock from near Pelican rapids on Athabaska river contained 12.4% of metallic iron. J. B. Tyrrell found indications of iron in Churchill river district, and also north of Lake Athabaska.

According to Mr. R. G. McConnell's 1888 report: —Clay ironstone in nodules and thin beds, is of universal occurrence in the Cretaceous shales of the Peace region, but is especially abundant in some of the outcrops of the Fort St. John shales on Peace river, between Battle river and Smoky river. The ironstone, here, owing to the rapid erosion of the soft shales, has been silted out, and in many places forms thick accumulations at the foot of the cliffs lining the valley, some of which may prove to be of economic value. The Pelican sandstone on the Athabaska is usually capped with a bed of hemitiferous sandstone varying in thickness from a few inches to four or five feet. A specimen of the rock was examined in the laboratory of the Geological Survey, and found to contain 12·4 per cent. of metallic iron.

Mr. von Hamerstein, in his evidence before the Senate committee of 1907, stated that there are indications of iron along Clearwater river. He found some very nice pieces of iron, and he found limestone in the centre of Athabaska.

Once, in Peace river district, on the way from Lake Chipewyan, he found a deposit of red stone; he did not know whether it was ochre or hematite of iron. He had any amount of it, but upset with his canoe and lost it. A large amount of ochre is found on the eastern bank of the Athabaska, between Athabaska and Grand rapids. He had also observed what seemed to him a large amount of hematite of iron between Athabaska and the mouth of greater Slave river, while on Slave river itself, at a certain

point, large bodies of magnetic ore are indicated by the action of the compass, which gets entirely out of order.

Coal and Lignite.

Mr. von Hamerstein informed the committee that there is a fine seam of coal at McKay, and went on to say that he had taken out, the season before his examination by the committee, about twenty tons, right on the river bank. There was a good quantity of bituminous coal, which could be used for common blacksmithing, but not for welding. Where exposed and worked, this seam goes down about five or six feet deep, and it seems to be getting larger. There is quite a bit of coal taken out every year by the people who live at Chipewyan.

There is, according to Mr. von Hamerstein, another fine seam of coal at a little creek named Horse creek, which is about a mile and a half south from McMurray on the east side of Athabaska river. Coal may also be found in other places. There is a seam, for instance, about two miles below Stony island.

W. F. Bredin, M.L.A., confirmed Mr. von Hamerstein's evidence as to the deposits of coal near McKay, which is about twenty miles north of McMurray.

In his report of 1888, describing his explorations the previous season, Mr. R. G. McConnell stated:—

"Lignite was found in Peace river sandstone in Peace river in several places, but in seams too small to be workable. It also occurs in the plateaus south of Lesser Slave lake. In one section at the latter place, four seams, ranging in thickness from one to four feet, besides a number of smaller ones, was found,

distributed through about a thousand feet of sandstone and shales. Drift lignite was also found in Marten river near the base of Marten mountain, but it was not traced to its source. On the Athabaska, the Grand rapid sandstone is lignitiferous, some of the seams being from four to five feet thick, but the quality is usually inferior. Several small seams also occur imbedded in the tar sands."

Deposits of Gypsum.

Mr. McConnell states in his report that "Gypsum is deposited in small quantities by the mineral springs at La Saline, and it also occurs on Peace river between Bouillé rapid and Peace point, where beds ten to fifteen feet in thickness are said to exist. Blocks of gypsum several feet in diameter were found on Peace river above its confluence with Loon river, and on Red river a few miles above its mouth. They have probably been derived from the Peace point exposures, and carried up the valley of Peace river by ice during the Glacial period."

Mr. Alfred von Hamerstein gave evidence to the same effect before the Senate committee of 1907. He stated that there "are large deposits of gypsum on the southern bank of Peace river, near Peace point, which is situated somewhere near the mouth of Peace river. Very large deposits of the same economic mineral are in the neighbourhood of Salt river."

Salt Mines.

Harmon, writing in his journal at Chipewyan as long ago as 1808, wrote:—"About sixty miles from

this, down Slave river, there are several places where almost any quantity of excellent, clean, white salt may be taken, with as much ease as sand along the sea shore. From these places, the greater part of the North West is supplied with this valuable article."

Before the Senate committee of 1907, Mr. von Hamerstein stated that at Salt river, salt was found right on the surface. There is a spring which comes out of the ground, and the water is so salty that it cannot take up any more. Right at McMurray one hundred and fifty feet of rock salt was found. The traders and Hudson's Bay Company's people come down and take it with shovels, and they sell all the salt that is used along there. It is taken from Salt river. Witness did not know what they got for it.

In his report of 1888, Mr. McConnell writes:—"At La Saline, on the Athabaska, twenty-eight miles below the Forks, and about two miles above the mouth of Red Earth creek, several mineral springs occur about half a mile east of the river on the edge of the valley there, sixty feet deep. The deposits from the springs, consisting principally of calcareous tufa, cover the face of the escarpment and have also built up a cone on the top of the bank ten to fifteen feet high and about two hundred feet wide. The water is strongly saline, holding a considerable percentage of sodic-chloride. Sulphuretted hydrogen gas escapes from the bank in several places and taints the air for some distance from the springs. Besides the calcareous tufa the cone contains small deposits of common salt, gypsum and native sulphur, while pure tar, derived from the tar sands beneath, issues from the bank in two places. The springs feed a shallow lake which is situated at the foot of the escarpment, and is surrounded by a clay flat partly bare and partly covered with coarse grasses."

Sulphur Beds and Springs.

While giving evidence before the select committee of the Senate in 1907, Mr. von Hamerstein explained that there are sulphur beds and springs between McMurray and Lake Athabaska. Extensive sulphur deposits are found on the east side of Athabaska river between McMurray and the lake. It is inland about two miles, and in some places it is found in large quantities, and beyond the lake, at several places on the east shore, as well as the west shore of Great Slave river. In some places there is a very large amount of sulphur. It comes from an old crater, in the shape of saline water, containing a large amount of sulphur. This saline water at spots runs over three or four acres, the water evaporates, and the sulphur remains.

Mr. von Hamerstein also stated that on "the lower part of the Athabaska the limestone which is exposed all along the river is of a very good quality. There is also found clay fit for puddling and for making brick." He added that sand of the very best quality for making glass is abundant, and this industry Mr. von Hamerstein said he believed was bound to come into existence and be profitable through the existence of cheap fuel, and intense heat in the shape of natural gas in the country.

The Famous "Tar Sands."

The occurrence of huge deposits of an oily bituminous or tarry substance along Athabaska river was referred to in the journals of the pioneer explorers of the region. In the account of his historical journal in 1879, Mackenzie mentions that the exudation of the "bituminous fountains", as he

called them, when mixed with gum or the resinous substance collected from the spruce fir, was used by the natives and voyageurs to gum their canoes. After investigating the character of these deposits, geologists have agreed in describing the black plastic mass as “Tar Sands.”

Mr. McConnell described these deposits as resting on the limestone and well exposed in high cliffs on both sides of Athabaska river. At Cascade rapid, this formation is one hundred and fifty feet thick and is so saturated that pure tar oozes out of the bank in several places and streams down the slope. Mr. McConnell proceeds in his report to say:—“The tar-sands mentioned above belong to the Dakota formation and constitute in this region the basal member of the Cretaceous system. They rest unconformably on the Devonian limestones. Lithologically they may be described as soft sandstone, the cementing material of which is a bitumen or inspissated petroleum derived from the underlying limestones. The sands are siliceous and usually rather fine-grained, but also grade occasionally into a coherent grit. The eastern boundary of the tar-sands was not precisely defined, but their outcrop was estimated to have a minimum distribution of fully one thousand square miles. In thickness they vary from one hundred and fifty to two hundred and twenty-five feet. The tar is unequally distributed through the sands, in some places merely staining the grains, but in most of the sections examined it is present in sufficient quantity to render the whole mass more or less plastic. An analysis by Mr. Hoffmann of a specimen collected some years ago by Doctor Bell gave by weight:—

Bitumen	12·42	per cent.
Water (mechanically mixed)	5·85	per cent.

Siliceous sands	81·73 per cent.

A cubic foot of the bituminous sand rock weighs, according to Mr. Hoffmann, 117·5 lbs. This figure multiplied by the percentage of bitumen, 12·42, gives 14·59 lbs. as the amount of bitumen present in a cubic foot, or 14·59/63·7 = 22·9 per cent. in bulk, taking 63·7 pounds as the weight of one cubic foot of rock. At the minimum thickness of one hundred and fifty feet, and assuming the thickness as given above at one thousand square miles, the bituminous sand rock in sight amounts to 28·40 cubic miles. Of this mass, if the preceding analysis is taken as an average, although this is probably rather high, 22·9 per cent. in bulk or 6·50 cubic miles is bitumen. This calculation can, of course, only be regarded as an approximation, but will serve to give some idea of the enormous outpouring of bituminous substances which have taken place in this region. The amount of petroleum which must have issued from the underlying limestones required to produce 6·50 cubic miles of bitumen cannot be estimated, as the conditions of oxidation and the original composition of the oil are unknown. It must, however, have been much greater than the amount of bitumen.

"A few miles west of the Athabaska the sand rock, still saturated with tar, passes below the higher divisions of the Cretaceous, and its extension in this direction can only be ascertained by boring. It was not recognized on Peace river nor on the lower part of Red river, and must disappear somewhere in the intervening region.

"In ascending the Athabaska the tar-sands, after an exposure of over twenty miles, pass below the surface at Boiler rapid and are not seen again."

Commercial Value of the Tar Sands.

As to the actual value of these deposits, Mr. McConnell has this to say in his report:—"The commercial value of the tar sands themselves, as exposed at the surface, is at present uncertain, but the abundance of the material, and the high percentage of bitumen which it contains, make it probable that it may, in the future, be profitably utilized for various purposes, when this region is reached by railways. Among the uses to which it is adapted, may be mentioned roofing, paving, insulating electric wires, and it might also be mixed with the lignite which occurs in the neighbourhood, and pressed into briquettes for fuel."

Before the Senate committee of 1907 Mr. von Hamerstein was examined at length regarding these beds of tar sands, or "asphaltum," as he called it, and as it is generally called in the district. He described these beds as occurring where petroleum seemed to have broken through the surface and soaked the ground for miles around. This substance, Mr. von Hamerstein remarked, could scarcely be termed asphaltum. It is oil gum—something the nature of tar. He produced a piece of this material which he had taken out himself. He also produced a bottle containing liquid taken from springs in the ground. He described it as nothing else but a heavy petroleum, which comes out of the ground. There are inexhaustible quantities of that. It has formed pools over the land which are of considerable size in some places. In summer time it comes out in large quantities, but it hardens in the winter, and of course the springs take time to get started again. It is not flowing continuously, but flows whenever it has a chance. The cold seems to draw it together and bake

it. This is the largest quantity of petroleum witness had ever seen in the world. This area extends from McMurray for fifty miles along the road.

Mr. von Hamerstein said he thought there was

Nothing Like It in the World.

He had been in Texas, Kansas, and Indian Territory, and had looked over the asphalt beds in California, but had found nothing to compare with it. This "asphalt" does not resemble Trinidad asphalt, for the latter comes from a crater, and the substance is not the same. The Athabaska substance is not straight asphalt; it is nothing but oil gum, out of which asphalt can be made. There is a large amount of petroleum in it. He tested it himself, and got some paraffin out of it. If he could obtain transportation, he could apply it for practical purposes. After it is refined, and all the foreign substance taken out of it, it can be used for road making.

Lubricating oil can be made out of it, and in fact he made cylinder oil for his machinery out of it, and also got some paraffin out of it. The rest he used for making tar paper. This product would certainly become valuable as soon as there was transportation. The area covered by this substance amounts to about twenty square miles.

Mr. J. B. Tyrrell, in his evidence before the same committee, referred to these outcrops of tar sands. There is, he stated, an enormous amount of sandstone there impregnated with hard thick petroleum of tar. The probability is that when one gets back from the outcrop in some places this substance will be found as a liquid oil instead of a hard tar that is found there on the Athabaska. Mr. Tyrrell said he thought it quite a fair and reasonable

supposition that one would find good fluid oil in the beds of the same geological age as the tar sand of Athabaska river. This tar sand is very strongly in evidence along the river, and an enormous amount of tar has actually gone to waste, as it were—floated out and hardened there. The tar sand area extends for quite a number of miles along the river. As you descend the river you get to those tar-bearing beds, and then they are in evidence right along for a number of miles down the river. Then you leave them altogether, and they do not occur again. Mr. Tyrrell considered it highly probable that the petroleum or liquid would be found in close proximity. Of course the sandstone or tar would not have a marketable value at the present rates of transportation, but, outside of that, probably it would be used as paving material if it is ever needed in that vicinity. He thought it

Could Be Used for Making Pavement.

R. W. Ells, LL.D., F.R.S.C., in the Geological Survey report on "The Bitumen or Oil Shales of New Brunswick and Nova Scotia, also on the Oil Shale Industry of Scotland," says:—"The celebrated tar-sands of Athabaska river in Northern Alberta may at some time furnish material for distillation, since all attempts to find oil by boring have hitherto been unsuccessful. These tar-sands have been well described by Doctor Bell, and other officers of the Geological Survey who have visited the area. Doctor Bell, after describing the immense amount of tarry matter found along the river, states that 'the pitchy sand itself may be useful for a variety of purposes. When chopped out of the bank in lumps like coal it was found to burn freely, with a strong smoky flame,

if supported in such a way as to admit of the free access of air. As the bitumen became exhausted the fine sand fell to the bottom.' . . . . A very superior lubricating oil may be manufactured from it. Doctor Hoffmann of the Geological Survey, Mr. Isaac Waterman, the well known petroleum refiner of London, Ontario, and Lieutenant Cochrane, Instructor in Practical Chemistry at the Military College, Kingston, have found it to contain twelve to fifteen per cent. of bitumen. Although this proportion may appear small, yet the material occurs in such enormous quantities that a profitable means of extracting the oil and paraffin which it contains may be found. The high banks of the river and its branches offer an easy means of excavating it, and as it burns readily one part might be consumed to extract the oil from another, there being practically no limit to the quantity which may be obtained for the digging."



Oil Well at McKay, Athabaska river.

Doctor Bell, in a paper before the American Institute of Mining Engineers, Toronto, July, 1907, said:—"Different experiments made with the tar-

sands show that while they yield some good illuminating fluid, their principal value consists in the large proportion of

FINE LUBRICATING OIL

which they afford. This oil was found to remain liquid in the cold winter temperatures of the Canadian prairie provinces, and therefore, it is very suitable for car wheels and machinery working in the open air."

Mr. Crean in the report of his explorations in 1909 states:—"The outcrop of tar-sand commences about thirty miles south of McMurray on Athabaska river. It continues to about forty miles below McMurray on the river. It extends to the east and west for at least thirty miles, and varies in thickness from twenty to two hundred and twenty-five feet, with probably an average of one hundred and fifty feet thickness. . . . . The value of this immense deposit on the Athabaska is not known. . . . . During the past season representatives of interests in England and France have made examinations of it on the ground. Should it be found to be capable of being converted to any commercial use, the enormous extent of it would ensure that industries of considerable public importance would be established in connection with it as soon as railway communication is provided. Since Mr. McConnell's report was published, several other outcrops of the mineral have been reported. A. W. Ponton, D.L.S., reports an outcrop near the fifth meridian, which is about ninety miles west of McMurray. I reported an outcrop of tar-sand in my report of last season on Buffalo lake which is one hundred and twenty miles southeast and in the province of Saskatchewan. That

these outcrops are part of the same field is probable."

Indications of Petroleum.

Apart altogether from the commercial value of the tar sands themselves, they are regarded by many geologists and practical operators as chiefly important as indicating the existence of deposits of petroleum. For instance, as long ago as 1888, Doctor G. M. Dawson of the Geological Survey stated before the Senate committee:—"The pitch found along the Athabaska may probably be of considerable value in the future; but in the meantime was most important as giving reason to believe that extensive deposits of petroleum existed in the country in which it occurred. The quantity appeared to be practically inexhaustible."

Mr. McConnell, in his report, enters very thoroughly into this phase of the question. He writes: —"The tar sands evidence an upwelling of petroleum to the surface unequalled elsewhere in the world, but the more volatile and valuable constituents of the oil have long since disappeared, and the rocks from which it issued are probably exhausted as the flow has ceased. In the extension of the tar sands under cover the conditions are different, and it is here that oils of economic value should be sought. In ascending the Athabaska, the tar sands are overlaid at Boiler rapid by a cover of shales sufficient to prevent the oils from rising to the surface, and in ascending the river, this cover gradually thickens. The geological attitudes of the shales is not the most favorable, as the beds dip away from the outcrop at the rate of five to ten feet to the mile, and it is possible that a part, or even the whole of the oil may have flowed northwards and eastwards through the

sands, and escaped where these come to the surface. It is unlikely, however, that all the oil has escaped in this manner, as small anticlinals in the covering beds are almost certain to exist, and a differential hardening of the beds themselves may serve to enclose reservoirs or inverted basins of large capacity. It is also possible that the sands at their outcrop may, by the deposition of tarry substances, be plugged tightly enough to prevent further egress. Favourable indications of the presence of oil in the vicinity of the Athabaska are also afforded by the existence of the natural gas springs."

Tar Springs Reported.

Mr. McConnell proceeds to show that "Indications of the presence of oil in the district are not confined to the tar sands, as on Peace river and Lesser Slave lake inspissated bitumen was found in a number of places lining cracks in nodules, and at Tar island in Peace river small quantities of tar are brought to the surface by a spring. Tar springs are also reported from several other places, but their existence lacks verification."

In his Summary Report of the operations of the Geological Survey, for the year 1894, Doctor G. M. Dawson, the director, referring to Mr. McConnell's explorations and report, wrote:—"The occurrence of great quantities of bitumen or maltha along a portion of Athabaska river has long been known, having been noticed and commented upon by the very earliest travellers in the region. Beds of sand or very soft sandstone of Cretaceous age, varying from one hundred and forty to two hundred and twenty-five feet in thickness, are there found to be more or less completely saturated with bitumen, for a distance of

some ninety miles along the river. These beds are known as ‘tar sands.’ More recently a number of smaller occurrences of bitumen in the form of ‘tar springs’ as well as sources of combustible gas, have been found at different places over a very extensive district. All these circumstances point to the probable existence of a great petroleum field, of which possibly some parts have already exhausted themselves in saturating the lowest Cretaceous sands, but of which probably the greater portion is still effectually sealed by the thick covering of overlying rocks. It is believed that the source of the petroleum which has given rise to the deposits of bitumen is in the Devonian strata, which here immediately underlie those of Cretaceous age.”

Experimental Borings.

In 1893, at the suggestion of Mr. McConnell and Doctor Dawson, the Dominion government began experimental borings for petroleum in the Athabaska region.

The importance of actually ascertaining by means of boring operations, the existence or otherwise of economically valuable bodies of petroleum in the region had been recognized for many years, but the remoteness of the region and the apparent impossibility of immediately utilizing any discoveries which might be made, had hitherto prevented the necessary experiments. A vote of seven thousand dollars was obtained from Parliament for the purpose of initiating this work, the arrangements for which were entrusted to the Geological Survey. After careful consideration, it was determined that a bore-hole should in the first instance be sunk at Athabaska, at which place the depth of strata to be

passed through in order to reach the horizon of the "tar sands" had been estimated by Mr. McConnell at approximately from twelve to fifteen hundred feet.

On October 24 the bore-hole had reached a depth of one thousand and eleven feet, when it was found necessary, owing to the incoherent character of the rocks, to stop work pending the arrival of more casing. This was placed in the hole during the winter, but the drilling itself could not be resumed till the spring, as the great quantity of gas met with rendered it dangerous to keep a fire in the derrick or anywhere in the vicinity of the well. This first boring was unavoidably abandoned at a depth of one thousand seven hundred and seventy feet, without reaching the probably oil-bearing beds at the base of the Cretaceous formation but within a short distance of attaining these beds.

During these particular boring operations, according to the engineer in charge, at three hundred and thirty-four feet a large flow of gas was struck. The roaring of the gas could be heard half a mile away from the works. The foreman who had seen the big gas well at Kingsville, Ontario, stated that the flow of gas was as strong as in that well.

Second and Third Borings.

The second and third of the experimental borings in search of petroleum in the northern part of Alberta were begun early in the summer of 1897 near the mouth of Pelican river on the Athabaska and at Victoria on the Saskatchewan below Edmonton, respectively. The sites selected for these borings were determined largely by the knowledge of the stratigraphical succession and the thickness already gained in the first bore-hole at Athabaska.

The borings at Pelican and Victoria had reached depths of eight hundred and twenty and seven hundred and five feet respectively before winter. Operations were resumed at both places in the spring of 1898, as soon as the requisite arrangements could be made. Work had been suspended at Pelican in 1897 because of a very large flow of natural gas, under great pressure. It was hoped that most of this gas might blow off during the winter, and it was found, in fact, to be considerably reduced in amount when the locality was again reached by the engineer in charge in 1898. Work was resumed, but additional and very strong flows of gas were soon met with in the underlying beds, and after exhausting every method of mastering them and continuing the boring, it became necessary again to suspend operations.

In regard to the actual existence of petroleum, the results of the government borings have not up to the present stage been satisfactory.

The boring near the mouth of Pelican river penetrated the lower sandy beds of the Cretaceous for some distance and demonstrated the existence in these beds of a thick tarry petroleum or maltha, besides that of great reservoirs of natural gas. It proved impossible to carry out this boring to the very base of the Cretaceous and into the underlying formation, in which the existence of a more fluid and merchantable oil was still to be hoped for.

Doctor Dawson, reporting upon the result of these operations, stated:—"The bore furnishes additional evidence of the existence in the Northwest territories of a vast gas-field. The seemingly uniform continuity of the Cretaceous beds, makes it almost certain that gas-wells may be obtained by boring, over a great area. Unfortunately the Pelican boring, like the

boring at Athabaska, did not penetrate deep enough to furnish reliable information as to the existence or non-existence of petroleum of a high quality. The presence of low-quality petroleum—maltha—is demonstrated, but as the more liquid oil may very probably underlie this, and as we did not reach a sufficient depth to determine the point, the result is unsatisfactory."

Why the Boring Was Stopped.

The following extracts from the report of the engineer in charge of the boring operations at Pelican river, Mr. A. W. Fraser, are interesting, and show how and why the operations came to an abrupt termination:—"I used some of the heavy petroleum or maltha which flowed from the well in raising steam, and it made an extremely good fuel.

"If the hard slate stratum at eight hundred and twenty-one feet six inches had been pierced, a great flow of petroleum might have, in my opinion, been encountered. Indeed it is altogether possible that at that depth we were within a few feet of a large body of petroleum. Had it been struck while the flow of gas was in an unconquered condition, the result would have been disastrous, as there might have been no possible means of checking the flow. The flow of gas was so great that a cannon ball could not have been dropped down the pipe.

"At seven hundred and seventy three feet a heavier flow of gas was struck. It made a roaring noise coming out of the bore, and had quite a pronounced petroleum odour. Increased quantities of petroleum in the cuttings at these depths were encountered.

"At eight hundred and twenty feet a tremendous

flow of gas was struck, which blew every drop of water out of the bore. The roar of the gas could be heard for three miles or more. Soon it had completely dried the hole, and was blowing a cloud of dust fifty feet into the air. Small nodules of iron-pyrites, about the size of a walnut, were blown out of the hole with incredible velocity. They came out like bullets from a rifle. We could not see them going, but could hear them crack against the top of the derrick. It was impossible to do anything with the bore that day, so we were forced to let it stand just as it was. There was danger that the men would be killed if struck by these missiles. The next day a long stick was put on the tools, so that the men could turn them without getting too close to the bore. In this way we succeeded in penetrating through eighteen inches of a conglomerate mass of these iron-pyrites nodules embedded in heavy petroleum. As we drilled through this the gas blew out the nodules of iron-pyrites embedded in oil.

"At eight hundred and twenty-one feet six inches a very hard stratum of slate was encountered, which we penetrated about three inches. We could get no water down the well on account of the strong flow of gas, so we could make no further progress with the drill in this hard cutting. The danger to the men was so great that they refused to work longer over the bore. We then put the four and five-eighths inch casing down to the very bottom, hoping to shut off gas, but it failed to do so."

Terrific Pressure of Natural Gas.

Work was resumed here in 1898 (Geological Survey Report, Vol. XI, page 33a). It was thought that the flow of gas might have decreased, but on

work being resumed and the hole being cleaned out "the gas which had increased in power with the cleaning of the hole cut the walls down and blew great clouds of sand and gravel higher than the derrick." Subsequently at eight hundred and thirty-seven feet such a strong flow of gas was struck that they were obliged to suspend operations. Mr. Fraser further says in the same report:—"I proved the general excellence and utility of the gas during the season, using it for my boiler, cookstove and for lighting. I had only a one inch pipe, tapped into the side of the casing, and probably did not use the one-hundredth part of the gas coming from the bore, but there was sufficient to make all the steam necessary on my twenty-five horse-power boiler, keep fire in the stove, and also to supply a strong flare-light. The gas burned beautifully clean. In working at the bore, the screeching and hissing of the gas, when at all confined by the presence of the tools inside the casing, or from other causes, was so great that the men complained of pains in their ears and heads."

Begged to be Excused.

When giving his evidence before the Senate committee of 1907 Mr. von Hamerstein begged to be excused from divulging results of his work in boring for petroleum in the McMurray district, as other people had entrusted their money with him in the enterprise. He said he felt at liberty to state that their works so far made him very confident that they were going to have one of the biggest petroleum fields in the world. There was no doubt he said, petroleum would be found all through that country, from Athabaska river to Peace river. He remarked that when his party was boring once they struck natural

gas, and one hundred and fifty feet of salt. They went down through a hundred feet of salt, and then they abandoned it. At this particular place they went about eleven hundred feet altogether. They never went lower than eleven hundred feet.

Mr. von Hamerstein added: “As far as petroleum is concerned, I have all my money put into it, and there is other people’s money in it, and I have to be loyal. As to whether you can get petroleum in merchantable quantities, that is a matter about which I would not care to speak. I have been taking in machinery for about three years. Last year I placed about fifty thousand dollars worth of machinery in there. I have not brought it in for ornamental purposes, although it does look nice and home-like.”

In the winter of 1910, Corporal A. H. Schurer, of the Royal Northwest Mounted Police, made a patrol from Athabaska to McMurray. In his report he states: —“I visited the oil wells sunk by Baron A. von Hamerstein at Poplar island, six miles below McMurray. I could see very little with the exception of the machinery, as the snow had covered everything up. A Mr. Falkner, supposed to be representing a party of eastern capitalists, has been staking out claims between McMurray and McKay for oil, during the past two months, and I understand that he is also to prospect Clearwater river east of McMurray for petroleum and other minerals. In December last Mr. Julius Alteschul, a German, claiming to be a representative of a London, England, financial house, visited McMurray, and after having been there for a few days, stated that he had found a mineral more valuable than radium, and that as soon as Athabaska river was navigable, he would place one hundred workmen and their families at McMurray, where he intended to start an industry;

what this industry was to be Mr. Alteschul did not make clear. It is the general impression that Alteschul was merely paying a visit to a much talked of place in order to find out what minerals actually existed, but did not want his mission to be known."

Natural Gas.

Corporal Mellor states (Royal Northwest Mounted Police report of 1909) that when patrolling the buffalo country near Peace point he came across "a large natural gas spout burning in a muskeg and was informed it never goes out."

During his examination before the select committee of the Senate in 1907 Mr. von Hamerstein drew the attention of the committee to the waste of natural oil gas at the government bore hole at Pelican portage or Pelican rapids. It was still burning. When Mr. von Hamerstein went up in the month of June, 1906, it blew about eighteen or twenty feet. About four years previously he found it was about forty feet, a vertical stream. It exploded with such force that not a hundredth part of the gas had a chance to be inflamed. The ground all around it had fallen in. Mr. von Hamerstein expressed the opinion that this is the biggest gas well on the face of the earth. He had a gas expert, a Mr. Chamberlain, from Petrolia, who told him that it was the biggest well in the world. Mr. Chamberlain operated in Indiana, Kansas, and all over the United States, and was the largest operator in the natural gas business.

In connection with their prospecting, mining and boring operations in Athabaska district Mr. von Hamerstein's parties use quantities of natural gas for lighting purposes. They light their camps with it, and do their blacksmithing with it, and it comes in very

handy. They get the gas at all kinds of depths, and get several veins of it. They never get petroleum without gas, as they have to strike gas before they strike petroleum, so there must be a large quantity of petroleum there.

According to Mr. von Hamerstein's evidence upon this occasion, on Peace river there is evidence of natural gas also, small amounts of tar and also evidence of petroleum. That would be sixteen miles from Peace River Landing, on an island called Tar island. The natural gas springs there throw out small amounts of tar, and about thirty miles from the mouth, on the north shore, there is also a spring. It is what Mr. von Hamerstein called an oil spring or tar spring.

W. F. Bredin, M. L. A., before the Senate committee of 1907, stated that for miles along Athabaska river the natural gas is all the time escaping from the clay banks of the river and in the river itself, because all across the river you can see the bubbles rising. The witness had lighted some of the gas vents, and boiled his tea pail by hanging it over the flame.

More Important Gas Springs.

According to Mr. McConnell, the most important natural gas spring in the district occurs on the Athabaska at the mouth of Little Buffalo river. The gas here forces its way up from the tar sands, through two hundred and fifty feet of the Clearwater shales and issues from the surface in numerous small jets distributed over an area fifty feet or more in diameter. Some of the jets burn steadily when lighted, until extinguished by heavy rains or strong wind, and afford sufficient heat to cook a camp meal.

A second spring was noticed on the left bank of the Athabaska about thirteen miles below the mouth of Pelican river. The volume of gas escaping here is less than at the mouth of Little Buffalo river, and in order to reach the surface it is obliged to penetrate five hundred and seventy feet of shales and sandstone which here overlie the tar sands. Escaping jets of gas were also noted at several points farther up the river; but these were mostly small and may possibly be due to decaying vegetable matter. On Peace river natural gas issues from the tar springs on Tar island, in small quantities.

Mr. McConnell adds:—"The natural gas springs have less value in themselves at present than in the indications they afford of the existence of petroleum beneath."

In his introduction to Mr. G. A. Young's descriptive sketch of the geology and economic minerals of Canada (1909) Mr. R. W. Brock, Director of the Geological Survey, wrote:—"Petroleum and natural gas are obtained in Ontario; Alberta is also producing a large quantity of gas, and will probably develop petroleum fields. . . . . The interior plain (of the Canadian northwest) is underlain for the most part by sedimentary rocks, chiefly of Cretaceous age, and containing coal, building stones, clays, and cement materials. Natural gas over wide areas and under great pressure has been tapped, and there is every indication of a large oil field in the northern portion, at least, of Alberta."

CHAPTER XIV.

NORTHERN ALBERTA.

Game, Fur-bearing Animals and Fish.

The Land of the Wood Buffalo.—Where the Last Remnant of American Bison Living in a Wild State Roam.—A Splendid Moose Country.—The Home of Numerous Fur-bearing Animals.—The Prolific Fisheries of Lake Athabaska and Other Waters.

As the northernmost portion of northern Alberta includes a considerable part of the range of the herds of wood buffalo (*Bison athabascae*), which are the sole remnant, living in a natural state, of the countless millions of American bison which existed when the northwest was first opened up, it is a country of especial interest to the naturalist and sportsman. It seems to be agreed that the wood buffalo is exactly the same species as the buffalo of the plains, being descended from herds or individuals which drifted into the wooded country to the north for pasturage or protection, and finding conditions congenial remained there. Within the memory of living men the wood buffalo of northern Alberta and beyond were immeasurably more numerous than they are to-day, and they would probably have suffered extermination before this had the Dominion government not stepped in and enacted laws to protect closely the remaining herds.

The wood bison formerly ranged over immense areas north to Great Slave lake and Liard river, but it is now restricted to a few small herds inhabiting the region north of Peace river.

The bison was first recorded from this region by Samuel Hearne, the first traveller to penetrate its

unknown wilds. After crossing Great Slave lake (his Athapapuskow lake) from the north, in January, 1772, he entered the level country to the eastward of Slave river, and there “found buffaloes very plentiful.” He travelled southward for some days and then left Slave river and proceeded to the eastward, still finding the animals abundant until he reached a point near the longitude of the eastern end of Great Slave lake. (Preble.)

Hon. William Christie, ex-member of the Northwest Council, and late Inspecting Factor of the Hudson’s Bay Company, examined before the Senate committee of 1888 stated that at that date the wood buffalo roamed over the Athabaska country, chiefly in the woods; but in the summer they came down to lick the salt at the salt springs in the valley of Salt river, which flows into Great Slave lake. He understood that these wood buffalo were in small bands of four or five. Mr. Christie considered the wood buffalo to be identical with the plains buffalo. Long ago the latter species was found as far north as Peace river in great numbers, and the plains Indians, the Sarcees and others, were then in Peace river country. There is a place called Battle river in Peace river valley, where these plains Indians had a tremendous battle, and it is called Battle river from that circumstance. The plains buffalo were in that country then in thousands, just the same as they were in the plains. As they got hunted by the Indians, they moved out, and the Indians moved out of Peace river country also after this great battle and went into the plains. The battle in question was fought perhaps one hundred years previously. A number of the plains buffalo got into the woods and bred and remained there and were still living in the woods there.

in some way, but they were just the same as the plains buffalo. Those who had killed some of them said they had increased in size in the woods, possibly from not being disturbed so much and not having to move about as the plains buffalo had to do. The wood buffalo lived in the woods, on the grasses that they found. The buffalo does not scrape; he breaks the snow with his nose and eats that way. Unless the grass was pretty long he could not get his living there in the winter. About four or five hundred pounds would be the weight of a wood buffalo. A buffalo cow in the plains, after being dressed, would weigh about three hundred pounds; one of these wood buffalo would weigh about three hundred and fifty to four hundred pounds dressed.

Mr. Christie, speaking of the possibility of using the wood buffalo for hybridization purposes, explained that as far back as 1842, the Hudson's Bay Company had at Edmonton a herd of buffalo. They began by taking some calves, and from these the herd increased until they had some thirty altogether. These used to herd out with the other cattle and come in with them. All at once the buffalo came near Edmonton and this herd went off with the others. It was the impression then, from their mixing with the other cattle, that they would not cross, because there were not any signs of it.

Mr. H. J. Moberly, another Chief Factor of the Hudson's Bay Company, submitted a statement in writing to the Senate committee of 1887 in which he stated that as to wood buffalo there was a band, probably about two hundred, between the Saskatchewan and the Athabaska. They kept on the mountains between Lac la Biche and McMurray, and

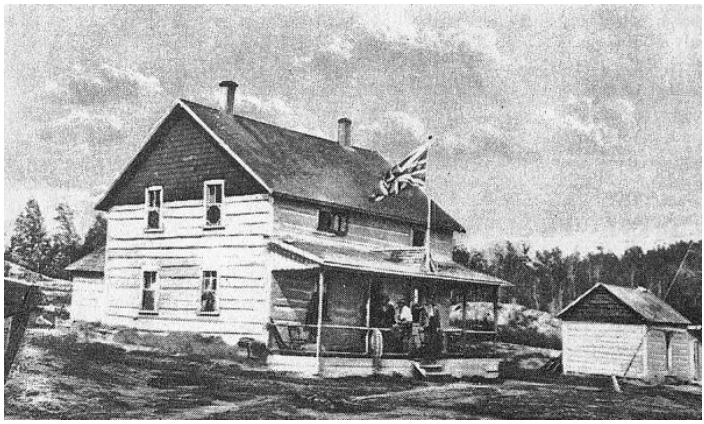
another band, probably about three hundred strong, was between Athabaska and Peace rivers on Thickwood and Birch mountains. A third band, probably seven hundred strong, was scattered through the mountains between Liard and Peace rivers, and from Salt river to the foot of Rocky mountains.

A Tale of Slaughter.

Mr. William Ogilvie, in his report of 1888 wrote: —"The wood buffalo which formerly roamed around all the upper waters, is now nearly a thing of the past. A few still remain scattered over a wide district. Could some means be devised to protect them for some years they would probably soon multiply and become a source of food supply and revenue to the natives. Mr. McDougall (of the Hudson's Bay Company), who has for some years past been gathering information concerning the number of these animals and their locality, has kindly given me the following notes:—In the winter of 1887-88, on the head waters of Hay river, which flows into point: —"Rumours that the wolves were destroying the buffalo were current everywhere. Some went so far as to say that these wolves were a new and larger race come in from the barren grounds, to prey on them. Such rumours were repeated at every point in much the same words, without details. This aroused my suspicions."

At Smith Landing, where the party arrived June 7, the Inspector met Pierre Squirrel, chief of the Chipewyans, and arranged for a meeting of the chiefs and hunters who knew the buffalo country near there. At the meeting next day, Mr. Jarvis told them he had come to investigate the buffalo question, and

if necessary, to take steps for the destruction of the wolves; that he must go in person to the buffalo country, and if possible see the buffalo and the wolves. Countless objections were raised to his plans. The whole country was under from one to five feet of water, according to one statement. The party would not get a dry spot to sleep on, according to another. They would be devoured by flies; would die of rheumatic fever; it was impossible to find the buffalo; they might be hundreds of miles off at that moment.



Royal Northwest Mounted Police Barracks at Smith Landing.

On the thirteenth, Inspector Jarvis left Smith Landing and after a long day's march in a west-southwest direction reached Salt river. None of the swamps so much talked of proved very serious, and it was evident that all were dry in late summer. At one point only was a true bog seen and it extended for only half a mile. The following day, following the course of Salt river downward, the first buffalo were sighted. Inspector Jarvis writes in his report:—"The trails, wallows and chips of buffalo became noticeable, but as they were old we gave them only

passing note. But when two perfectly fresh ones appeared, we dismounted to follow them on foot. I took charge of the horses as the flies were very thick. Great Slave lake, and west of Battle river, a tributary of the Peace, the Indians saw three bands containing seventeen, ten, and four, respectively; they killed five, but Mr. McDougall did not ascertain whether or not these were in addition to the above numbers. The same winter three bands were seen between Salt river and Peace point on Peace river, numbering fifty, twenty-five, and about twenty-five, respectively. None of these are reported to have been killed. During the winter of 1886-87, between the north end of Birch and the south end of Thickwood mountains, distant about one day or thirty miles from McMurray on Athabaska river, one band of about thirteen was seen. Since then five of this band have been killed. Below Red river, a tributary of the Athabaska, and between Birch mountains and Athabaska river, and ranging down to Poplar point on the Athabaska, another band said to contain about twenty was seen. Altogether we have only about one hundred and eighty head of wood buffalo in this vast extent of territory. The paucity of their number is, to some extent, a protection to them. If they escape epidemics and such a winter as almost exterminated them on the upper Peace some years ago, they may possibly increase. Whenever the Indians come across a band they try to exterminate them whether they need them for food or not. They try to drive them into a bog, if one be convenient, and, if they succeed in this their object is soon accomplished, for the poor brutes mire in the bog and are quickly killed. The Indian feels, after accomplishing a feat of this kind, as if he had won a battle, and never thinks of a reduction in his food

supply."

Since Mr. Ogilvie's report was penned; and partly as a result of it, steps have been taken to protect the wood buffalo, and for years back, the few members of the gallant Northwest Mounted Police in Athabaska country have devoted considerable energy to enforcing the law which prohibits the hunting of the buffalo. The most authentic portion of the more recent information we have as to the present extent and condition of the herds of wood buffalo is obtained from the reports of officers and non-commissioned officers of the distinguished force mentioned.

Present Condition of Wood Buffalo.

In 1907 Inspector A. M. Jarvis, C.M.G., was specially despatched from headquarters at Regina to the Athabaska country[17] to ascertain the existing numbers and condition of the wood buffalo and to recommend means for their protection.

Inspector Jarvis, accompanied by the well known naturalist, Mr. E. Thompson Seton, left McMurray for the north on June 29. He wrote in his report at this and sent Mr. Seton on with his camera. Beaulieu stalked them exactly as he would a moose, and in about an hour led Mr. Seton to an open glade where in plain view was

A Herd of Thirteen Buffalo,

two big bulls, one calf of this year, and the rest cows and yearlings. Their photograph was taken three times at sixty yards, before they became alarmed and ran off.

"Bear tracks abound everywhere, and that night Beaulieu shot an old bear and two cubs within fifty yards of our camp."

The Inspector reports as follows as to the next day's operations:—"Beaulieu and myself started out at 6:45 a.m. and travelled around the west side of Salt mountain until 10:40 p.m., following fresh tracks of two buffalo, until we came upon fresh tracks of what appeared to be a large herd. We tied our horses in the woods and followed along for about a mile through wet, swampy ground, until we came in sight of a bunch, all of which were lying down except three large bulls. They were on a large salt lick. We crawled up to within (which we afterwards measured) fifty paces of them, through the brush. I took out my glasses but owing to our position, could not get a correct count of them. After resting for a little while we both walked into the open. I took out my pocket book and wrote down as follows:—'Four big bulls, one yearling, four little calves, three two-year-olds, and eight cows.' They then saw us and got up one by one and stared at us, showing how easily they can be approached and killed. Beaulieu then shouted and they galloped into the woods. The bulls were magnificent looking animals. They had not yet shed all their winter coat, but the cows were sleek and fine looking. Before going into the open, Beaulieu, who had his rifle along, said, 'Mon Dieu, major; let me kill him one cow.' I explained to him that we would be fined five hundred dollars and that I would lose my position. He then said, 'Let me kill him one for the Government.' But I would not permit it. We returned to the camp where we had left Mr. Seton and that evening moved our camp to a spot where we thought these animals might pass. But we saw no more of them. As we

and the fresh tracks of ten or twelve more, possibly bulls, in the woods, we concluded that we had seen all the buffalo in this particular district. And as there was no time to go to Peace point and rapid de Beaulieu, and keep our word with the guide, I decided to return, to go to Fort Smith and arrange if possible to see the band reported to be in the Caribou mountains, near Hay river. We looked everywhere for buffalo bones, but found only four very old skeletons, with nothing to tell how they had been killed. At all drinking places, muddy lakes, marshes and salt licks, we looked particularly for tracks of wolves and found very few. I got a glimpse of one small wolf, or possibly coyote, in the woods, and heard one coyote calling, just as we were leaving the mountain, he having smelt the bear we had killed. We found the skull of one wolf killed years ago, but I am forced to conclude that wolves are scarce here, and I found ample justification for my suspicion that the constant cry of 'wolf' is a mere ruse to divert attention from the two-legged depredators, who are really doing the mischief.



Looking across Slave river from Fort Smith.

"Other game abounded. Bear tracks were seen on every side. Caribou are said to be plentiful in winter. Moose are common. I saw one without doing any hunting. This is important for the buffalo, as several well known hunters claim this region as their hunting and trapping grounds. They go in ostensibly to kill moose and come out abundantly supplied with pemmican, but bring out very few moose skins. I am informed by the traders here, that a few years ago these hunters begged sale for moose skins, but of late years scarcely any have been brought out. This is very suspicious, to say the least of it. These men did all they could to prevent my going in, and I consider it no longer doubtful what is destroying the buffalo.

"The following morning the guide announced that his time was nearly up and he wanted to return to Smith Landing, which we did, arriving there at 4 p.m. on the afternoon of June 16. It will be seen by the map, that we barely entered the buffalo country, so were fortunate in seeing so many head.

"In case it were desired to capture some calves for the purpose of infusing fresh blood into other national herds, it could, I think, be easily done, as in the early summer, when the calves are young, they could be run down and roped. A fresh cow could be taken out from Smith Landing or some other point, calves captured, and weaned on to the cow. I consider this feasible.

"To sum up I conclude:—

"(a) That it is impossible for me or any one else in this country to give you an intelligent report as to the numbers of the buffalo, without first making a thorough patrol of the country, which would take from two to three months with a complete pack outfit.

"(b) That the buffalo are in danger of

extermination not by wolves, but by poachers;

"(c) These poachers are all known and live at the village of Smith Landing in the summer time;

"(d) They could easily be controlled by a local police patrol;

"(e) Without some protection the buffalo will not last five years longer. Therefore I strongly recommend, as I did some ten years ago, that, if it is the wish of the Government to protect the buffalo, resident guardians be placed on the grounds."

Wolves Not The Destroyers.

Inspector Jarvis started from Fort Smith for his second trip on June 24. The party proceeded in a westerly direction for about nine miles through a level, dry country, covered with jackpine and poplar, following nearly the course of Slave river to Gravel point, where they turned southwesterly to Salt river, which they reached in another nine miles. The party proceeded as far west as Little Buffalo river which flows into Great Slave lake west of Slave river, but saw no signs of buffalo beyond some old trails and wallows.

Reporting on this trip Major Jarvis wrote: —"Although we found no fresh buffalo signs, we learned a great deal about the range and were glad to hear that the main herd is the one we expect to reach by Canoe river. We saw no signs of wolves, not even a trail, and I am confirmed in my suspicion that the wolves are not the destroyers of the buffalo. In conclusion I would point out that the range of the buffalo herds is very limited; that it has certain natural boundaries; that the buffalo do not attempt to leave this area; that it is removed from any village or permanent habitation; and that, finally, it would

be an efficient and easy measure of protection if the whole area in question were at once turned into a National Park. Animal life was not abundant. We saw no big game whatever, and but few signs of moose or bear. Mr. Preble was fortunate to find the nest and eggs of a very rare bird, the Bohemian Waxwing, but we saw no game birds in the woods, and only a few ducks on the ponds."

The Little Buffalo Country.

Major Jarvis, accompanied by Mr. Thompson Seton and Mr. E. A. Preble, naturalists, made a third trip by canoe into the buffalo country from a point on Slave river below Fort Smith. A water and portage route of five and a half miles took them to the Little Buffalo, down which they paddled to its mouth. On this trip fresh signs of buffalo were seen, but no buffalo.

The Inspector writes in his report of this trip:—"We saw three bear, three beaver, and some duck along this part of the river, and all along we saw numerous signs, and fresh, of beaver, rat and mink. We also saw an exposure of limestone on the left bank during the afternoon. We found the river abounding with jackfish, Mr. Preble catching four with a troll in a very short time. During the night Buffalo river seemed to be alive with mink swimming forwards and backwards across it."

As a result of Major Jarvis's report more stringent regulations regarding the protection of the buffalo were put into force. A system of occasional patrols by selected non-commissioned officers and men of the Royal Northwest Mounted Police into the buffalo country was inaugurated, and some resident hunters were engaged as special constables.

A Band of Seventy-Five.

Corporal Mellor, Royal Northwest Mounted Police, on a patrol into the buffalo country southwest of Smith Landing in 1909, found buffalo tracks very numerous at Beaver lake and also on the "Big Salt prairie" at Hay lake and about Peace point. In the district last named Corporal Mellor was able to get within five yards of a band of about seventy-five buffalo, and obtained a good look at them. He says in his report:—"Owing to the fact that many of them were hidden from view in the bush, I was unable to count them correctly. Those nearest to view were nine large bulls, all splendid animals and rolling fat. I saw only four calves in the band, although there may have been more in the bush, but the guide, after examining the tracks, told me that there were no more. We tried to get around to see them all, but something alarmed them and off they went. This band was evidently composed of the different small bands whose tracks we had been following at times."

In the summer of 1910 Sergeant Mellor, accompanied by Constable Johnson, ascended Big Buffalo river from Sulphur point on Great Slave lake to Buffalo lake. The main object was to determine as far as possible the northern boundary of the wood bison habitat. As a result of his exploration Sergeant Mellor concludes that the wood bison never range as far as Buffalo lake, nor across the Caribou hills, neither do they reach Great Slave lake at any point; on the other hand, they come close to Slave river from a point about fifty miles below Fort Smith right up to Peace river, and also reach Peace river, at any rate, as far as Jackfish river. Their habitat would therefore appear, he says, to be bounded on the west by Caribou mountains, on the south by Peace river,

on the east by Slave river, and on the north by an imaginary line drawn from Caribou mountains on the west to Slave river on the east, touching the latter at about Point Ennuyeuse, and the former about fifty miles south of Buffalo lake. The buffalo have, as far as he could make out from careful inquiry, never been seen for many years north of these two points.

A Tremendous Animal.

Mr. H. A. Conroy of the Indian Department, in his evidence before the Senate committee of 1907, said that he believed that there were then approximately three hundred and fifty wood buffalo still roaming wild at that date. He obtained a specimen for the Department of Agriculture in 1906 to be mounted. The Indians got it for him. This herd are the only wild buffalo on the continent, he believed. They are very large, much larger than the plains buffalo. One old Indian told the witness that years ago they found a herd of buffalo between Liard and Hay rivers, and one time they got a herd of them at Fort Providence, and they slaughtered all that were in there. There had since been a close season for buffalo for a good many years. The skin of the buffalo that the witness procured for the department was a tremendous size, and he would say that the animal must have weighed fourteen or fifteen hundred pounds. Mr. Conroy in his evidence said:—"You do not require to enforce the law to protect the buffalo. The Indians will not kill them. They want to preserve them as much as any one else. They are the Wood Cree Indians in the country north, as far as the 60th parallel, and the Chipewyans north of latitude 60 degrees, until you come to the Aleutians or Esquimaux. The Indians think if the buffalo are gone they will have nothing

left. The Wood Crees are benefiting by the errors of the Indians south of the Saskatchewan. They know that the buffalo are all gone, south of them, and they want to protect the wood buffalo."

Sergeant R. W. Macleod, Royal Northwest Mounted Police, in the report of his long patrol across country in December 1910 from Fort Vermilion to the mouth of Hay river on Great Slave lake, corroborates the final statement of Mr. Conroy. The sergeant states:—"The Indians I met were familiar with the regulations for the protection of the buffalo and protested strongly against a white man being permitted to kill any. The Indians told me the extreme western range of the buffalo is thirty-five or forty miles east of Buffalo lake, and there is certainly no feed for them in any part of the country I passed over."

During the summer of 1911 the special supervision of the wood buffalo was taken out of the hands of the Royal Northwest Mounted Police, and transferred to a government agent who is stationed at Smith Landing.

Other Game and Fish.

Some interesting evidence as to the general fish and game resources of the whole north, and more particularly northern Alberta, was submitted in writing to the Senate committee of 1887 by Mr. H. J. Moberly, a chief trader in the Hudson's Bay Company's service. This gentleman, through long residence and frequent travels therein, was quite familiar with this country. According to his statement lake trout is found in almost all the large lakes all over the country, and river trout in Athabaska and Peace rivers and other streams close

to Rocky mountains. Speckled trout and mountain trout are found in waters on the east and west slope of Rocky mountains; whitefish, all over the country from the Saskatchewan north, in lakes and most rivers; pickerel, in most lakes; jackfish or pike in most lakes; suckers, in all waters; gold-eye, Athabaska river, Peace river and their tributaries; a peculiar kind of salmon (doubtless the inconnu), in Mackenzie river as far up as Salt river rapids, above Great Slave lake.

Ducks are found all over the country and geese and swans along the Athabaska, the Peace, and the Mackenzie and the shores of Hudson bay; cranes, along the Athabaska, the Peace and the Mackenzie; prairie chickens, Athabaska and Peace river countries; ruffled grouse and spruce partridge all over the Northwest Territories; ptarmigan, Athabaska, Peace river, Hudson bay; plover and snipe, all over the Northwest Territories.

According to Mr. Moberly, moose run all over the wooded country north of the prairies and east of Rocky mountains.

The distribution of other game and fur animals in far northwestern Canada was given by Mr. Moberly as follows:—Reindeer (cariboo), large, all over the wood countries from Saskatchewan, to the barren grounds in the north; reindeer, small, all over the barren grounds in the north, and come south in winter as far as Lac la Brochet, Athabaska lake and Peace river, close to Rocky mountains; red deer, Athabaska and Peace river valleys; black tail deer, jumping deer and chevreux, same country as the red deer; black and brown bears, all over the wooded country and Rocky mountains; grizzly bears, Rocky mountains, valley of the Peace, Athabaska, Liard, and Fraser, but seldom farther than two hundred and

fifty miles from the foot of the Rockies; beaver, Athabaska, Peace river, and in fact all over the wooded country,

Back's Grayling.

Professor John Macoun, before the Senate committee of 1888, said he had caught Back's grayling in the tributaries of Peace river, in Rocky mountains. It is both an Arctic and a mountain fish, and delights in clear water. It is very gamesome and takes all kinds of bait. When it took the bait it would jump clear out of the water, many times a couple of feet or so, and of course, the beautiful colours (more beautiful than those of the mackerel even), glistening in the sun, made the anglers thrill with excitement. They are a white fleshed fish, and not anything like as hard as the trout.

Writing of the immense quantities of fish caught in Lake Athabaska, Mr. Wm. Ogilvie states in his report:—"At Chipewyan, the Hudson's Bay Company required, in the fall of 1888, thirty-six thousand fish for the use of the post; the Roman Catholic mission, twelve thousand; and the rest of the population at least thirty thousand more. Most of these were caught in three weeks, while I was there. Sometimes they are numerous in one place and sometimes in another, so that long journeys are often necessary from the place where they are caught to the place where they are to be used. This necessitates a large number of dogs to haul them home, which is a very poor method, though it is the only one in use. To overcome this inconvenience, Mr. McDougall, at Chipewyan, has built an ice-boat, but has so far met with indifferent success, as the ice has been unusually rough during both of the last two falls."

As to the fish and game in the district explored by him in 1909, Mr. Frank Crean reports that the principal fish to be found in the north is the whitefish. The chief use made at present of this valuable fish is for dog feed, large numbers being caught for this purpose in the annual “fall fisheries,” as they are termed. Beside the whitefish, the jackfish is also found in most of the lakes, and indeed in that country which lies to the west of the height of land and on the watershed of Athabaska river this is the principal fish. Although extremely good food in these cold northern waters they are, of course, not to be compared with the whitefish. The perch, or as the natives sometimes call them, the doré, are found in most of the rivers and lakes. During the summer months they form the staple diet, as the whitefish apparently go into the deep holes in the lakes and are not caught by the natives, who rarely fish in deep water.



Roman Catholic Mission at Chipewyan.

Describing an ascent by him of Big Buffalo river, in 1909 Sergeant Mellor states:—“The cutbanks are riddled with sulphur springs (the odour of which

overhangs the whole river), interspersed in peculiarly intimate proximity with streams of beautifully fresh water. The river was literally alive with ‘coneys,’ a species of fish somewhat resembling a salmon, and which attains a large size; the name is a corruption of the French name for the fish ‘poisson inconnu,’—‘the unknown fish.’ They were apparently ascending the river for spawning purposes; it was quite unnecessary to use a net or line to catch them, as it was a simple matter to throw them on land with a paddle or stick. For the next twenty miles the river, while still running with great velocity, has not so many rapids to encounter, and the going is considerably better. The banks are lower, and in many places were clothed in berry bushes of all kinds, and simply riddled with bear tracks. We did not have the good fortune to kill one of these latter, although we saw them several times.”

A Moose Country.

Sergeant R. W. Macleod, Royal Northwest Mounted Police, in a report of a patrol in 1909 from Fort Vermilion to Hay river, states that while descending Hay river on January 27 one of his men shot a two-year old bull moose about one hundred yards from the river bank. After the patrol got almost one hundred miles down the river from the Horse track they saw moose tracks all the way as far as within twenty miles of Great Slave lake, and they saw three moose, but did not shoot, as they did not need the meat. They did not see a snow-shoe track in the whole distance of two hundred and thirty-eight miles, which accounts for the moose being so plentiful. One fox track was all the indication of fur to be seen.

Between December 2 and 24, 1910, Sergeant Macleod made a patrol from Fort Vermilion across country to the post at the mouth of Hay river on Great Slave lake, a distance of five hundred miles. Sergeant Macleod took advantage of some Indians travelling through to make the trip, which was a very hard one, particularly on the dogs, as the snow was deep. No white man is known to have made this journey before, and it was twenty years since Indians had attempted it. The country is quite unexplored. The width of Cariboo mountains is about one hundred miles and the country is mainly moss-covered muskeg and lakes. Sergeant Macleod made enquiries regarding a large unmapped lake he saw the previous year and found that it is called Fish lake by the Indians. It is as large as Lesser Slave lake and is in Cariboo mountains. This is believed to be the lake which a Mr. Radford, an American naturalist, claimed he discovered and reported to the Department of the Interior as Lady Grey lake.

Sergeant Macleod reported that all the lakes he passed during this long trip seemed to be deep for their size, and in the sergeant's opinion they no doubt contain whitefish and lake trout. In Fish lake there is good fishing. There were three half-breed families belonging to Fort Vermilion and two Chipewyan Indian families living on Deer Mountain creek four miles southeast of Buffalo lake, it being a good place for fall fishing. Caribou were plentiful on the mountain. Moose were plentiful on the north side, and there were considerable fur tracks on the north side of the mountain. Sergeant Macleod's party "tracked" four wolves.

The latest data available as to fish and game in the region immediately under discussion appear in the annual report for 1911 of Superintendent G. E.

Sanders, D.S.O., commanding “N” Division, Royal Northwest Mounted Police, with headquarters at Athabaska. In his report Superintendent Sanders writes:—“The fur catch during the past season has improved; lynx were plentiful in the far north; they have been very scarce for some years and are now reappearing with the rabbits. The value of the fur which passed through Athabaska this year on its way out of the country is estimated at three hundred and fifty thousand dollars. Moose were scarce in some parts where they are generally plentiful and appeared in large numbers at points where they are not usually seen; this is accounted for by the wolves moving them about. Wolves are reported thick in all directions and at Peace River Landing a small pack chased a moose through the settlement. Chicken and partridge are numerous in the southern portion of the district. This year the chief game guardian of the provincial government has notified that the close season for beaver will remain in force. Hitherto it has been the custom to open the season during the winter for a short time. The effort to preserve the beaver by having a close season in this country fails entirely, and I would repeat what I said last year in regard to this subject about which I made careful inquiries. ‘I am strongly of opinion there should be an open season for beaver. I found during my travels that Indians kill more beaver when there is no open season than when there is. When they do not kill for the fur, and there is no reason in their minds to preserve the animals, they exterminate whole families for food, whereas if they have an open season, and the fur is thereby more valuable, they are careful not to destroy certain colonies, but leave some to breed. They kill only when the fur is prime. The majority of the hunters and trappers whom I

consulted agreed that between October 15 and December 15 would be the most suitable time for an open season.' "

Corporal S. G. Clay, Royal Northwest Mounted Police, made a patrol through Grande prairie country in August, 1911, and in his report states:—"Indians in this locality are in fairly good shape, moose and bear being plentiful, and consequently there has been practically no destitution amongst the Indians."

[17] A considerable portion of the wood buffalo range lies immediately beyond the northern boundary of Alberta and is consequently within the limits of the region particularly treated of in the later chapters especially devoted to the "Mackenzie country." On reference to the map (and the map must necessarily be consulted frequently by the reader of these pages) it will be noticed, also, that much of the data quoted here really refers to those sections of the wood buffalo range within what is arbitrarily defined in this volume as the Mackenzie country; but as the southern part of the range is in northern Alberta, and as the wood buffalo, probably on account of its scientific designation, is associated in most people's minds with the Athabaska region, it was considered advisable to treat the question of the wood buffalo, as a whole, in the present chapter. E. J. C.



THE MACKENZIE RIVER REGION

CHAPTER XV.

THE MACKENZIE RIVER REGION.

Topography, Agriculture and Arable Land.

Mackenzie River a King of Northern Waters.—Over Three Thousand Miles of Waterway.—Domestic Cattle have Succeeded.—Barley Always Ripens at Fort Simpson.—Potatoes and Other Vegetables have for Many Years Been Grown at Fort Good Hope, a few Miles from the Arctic Circle.—Wheat and Barley Grown at Liard for Many Years.—Interesting Comparison With the Russian Province of Tobolsk.—A Large Town as Far North as Fort Wrigley.—Why Better Results in Grain Growing May be Expected in the Future.

Northern Alberta, including the Athabaska and Peace countries treated of in the chapters immediately preceding, is generally considered, and properly, as forming part of the Great Mackenzie Basin, and that it has been in this volume considered as separate from the immense region on both sides of the Mackenzie, surrounding Great Slave lake, and on both sides of Slave river from Fort Smith to its mouth at the lake in question, is due to the purpose, previously expressed, of treating as separate geographical units regions possessing particular characteristics either of location, soil, climate or natural resources.

The region discussed in the present and immediately succeeding chapters as “The Mackenzie River Region” includes the country north of the Alberta and British Columbia boundary line (the

60th parallel of north latitude) extending as far north as Beaufort sea. To the westward it is bounded by the Yukon territory boundary line, and to the eastward by the height of land east of Slave river, the height of land between the valley of Coppermine river and the lake and river system extending from the north arm of Great Slave lake to Great Bear lake, and a line in prolongation thereof northward to the sea.

There might be some question as to the advisability of considering the country north, south and east of Great Bear lake as part of the country lying more immediately adjacent to the great river of the north. It is true that the slight knowledge of the country north, south and immediately east of Great Bear lake tends to show that it is a region far less inviting than the immediate valley of the Mackenzie, and that it practically forms part of the so-called "Barren Lands" which extend as far eastward as Hudson bay. But this unfavourable evidence is not quite conclusive, and after all, the whole of the country within the limits decided upon is in the Mackenzie watershed, and has been considered in a broad sense as part of the Mackenzie region by the explorers, missionaries, traders, and travellers who have written of the country. So the adoption of the limits decided upon should simplify the geographical situation for the reader, and that is an important thing in considering a territory so vast as that immediately under review.

A King of Northern Waters.

Mackenzie river is one of the longest and broadest streams in the world. According to Mr. R. G. McConnell, of the Geological Survey, one of the first to attempt a scientific survey of the river, the

Mackenzie “drains an area of six hundred and seventy-seven thousand, four hundred square miles, and has an approximate discharge at a medium stage of the water, according to some rough measurements made by the writer, of five hundred thousand cubic feet per second. Its basin is traversed for nearly one thousand three hundred miles by Rocky mountains, and the Mackenzie is probably unique among the rivers of the world in the fact of having a large proportion of its basin situated on the farther side of a great mountain chain. Two of its principal tributaries, Liard and Peace rivers, pierce Rocky mountains and drain large areas beyond, while the third, the Athabaska, originates in the heart of the same range, and is confined entirely to the eastern slope. The country from which the Mackenzie draws its supplies is of the most varied description and includes part of the broken plateau region west of Rocky mountains, Rocky mountains themselves through fifteen degrees of latitude, the northern part of the prairie district and the wooded and moss-covered country which succeeds it towards Arctic ocean, while tribute is also drawn from a wide belt of rough Laurentian country on the east, and from portion of the “Barren Lands.” From Great Slave lake to the sea the Mackenzie is an imposing stream, averaging about a mile in width with occasional expansions for long distances to twice this size. It is characterized by the comparative purity of its water, by its long straight reaches and by the absence of sudden bends. Its valley, usually shallow, follows closely all the sinuosities of the stream without the intervention of large flats. Clusters of islands obstruct its channel in a number of places, and are met with at intervals all the way down, while ranges of lofty mountains run parallel with it for part of its course,

and form a fitting background to this king of northern waters."

Silent Sweep of a Mighty River.

"Opposite Fort Simpson," according to Mr. McConnell, "the main channel of the Mackenzie is almost exactly a mile wide, and it maintains and often exceeds this width for many miles below. Its course, as far as the Great Bend, a distance of seventy miles, is north-northwest, and its current in average stages of the water has a velocity of about four miles an hour. The banks of the valley appear low owing to the great size of the river, but in reality have often a height of two hundred feet or over. The appearance of this part of the Mackenzie and of the unending spruce forests which border it is monotonous and uninteresting, and is only relieved by the majesty inseparable from the silent sweep of a river of its magnitude."

Slave river, which discharges the water of Lake Athabaska and Peace river into Great Slave lake, is practically an upper reach of the Mackenzie, its course being in the same general direction but the name "Mackenzie" is given only to that long stretch of navigable water from Great Slave lake to the sea.

As Mackenzie river itself is the outstanding geographical feature of the country, as it is the main channel of communication, and as all the settlements are situated upon its banks or those of its tributaries, a table of distances along this gigantic waterway may prove to be a useful guide to those readers of these pages, who are not familiar with the geography of the country. The table is compiled from the report by Wm. Ogilvie, D.L.S., of his survey, and the figures cover the route from Fort Smith, on Slave river,

practically on the Alberta boundary line, to Fort McPherson on the delta of the Mackenzie:—

	MILES.
Fort Smith	0
Fort Resolution	190·5
Buffalo creek	202·5
Buffalo river	249·5
Hay river	276·5
Great Slave lake	311·5
Fort Providence (lat. 61·4°)	357·5
Little lake	381·5
Yellowknife river	417·9
Head of Line	444·0
Fort Simpson (lat. 61·8°)	515·0
Nahanni river	590·2
Willow lake river	606·5
River between Two Mountains	645·5
Fort Wrigley (lat. 63°)	649·0
Le Vieux Grand Lac river	723·0
Gravel river	764·2
Fort Norman (lat. about 65°)	829·3
Great Bear river	829·5
Carcajou river	945·5
Mountain river	950·2
Sans Sault rapids	950·8
Beaver river	987·8
Ramparts	989·9
Fort Good Hope (lat. 66·16°)	998·8
Hare Indian river	1001·1
Loon river	1022·7
Large river entering on east side, name unknown	1153·0
Red river	1213·4
Delta of Mackenzie	1241·4
Fort McPherson (lat. 67·26°)	1273·5

The Dominion census of 1911 gives us the following figures of the population of these places, and of one or two other posts which will be referred to later:—Fort Good Hope, 434; Fort Liard, 136; Fort McPherson, 387; Fort Norman, 315; Fort Providence, 473; Fort Rea, 774; Fort Resolution, 766; Fort Simpson, 375; Fort Smith, 50; Fort Wrigley, 79; Hay river, 146.

These figures do not represent only the local population at the posts, but in addition the inhabitants, white and red, of the surrounding districts.

Mackenzie Navigation.

For many years the Hudson's Bay Company have maintained steam communication on the Mackenzie from Fort Smith to Fort McPherson by means of steamers. The pioneer steamer "Wrigley" is one of the historical associations of the country. According to Mr. William Ogilvie, the "Wrigley's" log shows the following average between Fort Smith, the most southerly part of her run, and Fort McPherson, the most northerly, the distance between these points being about one thousand two hundred and seventy miles. From Fort Smith to Fort Resolution, nearly all on Great Slave river, average running time, about eighteen hours; between Resolution and Providence about seventeen hours, of which twelve and a half are in Great Slave lake; between Providence and Simpson about fourteen hours; Simpson to Wrigley about ten and a half; Wrigley to Norman, about fourteen hours; Norman to Good Hope, about thirteen hours; Good Hope to McPherson, about twenty-four and a half hours. The total running time is one hundred and twenty-three and one-half hours,

somewhat over ten and a quarter miles an hour.



A Typical “Husky” dog.

On “up” runs the following averages have been made:—McPherson to Good Hope, forty hours; Good Hope to Norman, thirty-four hours, Norman to Wrigley, thirty-nine hours; Wrigley to Simpson; nineteen hours; Simpson to Providence, about twenty-eight hours; Providence to Fort Rae, not certain, appears to be about thirteen hours; Providence to Resolution, about twenty hours; Resolution to Smith, about thirty-five hours; Resolution to Rae, about fifteen hours and a return about the same, as it is all lake water. The duration of these runs varied somewhat by the force and direction of the wind. The total running from McPherson to Smith as shown above is two hundred and fifteen and one-half hours, which give a rate of 5·9 miles per hour. The mean of the up and down times is a fraction over eight miles an hour, which is said to be her normal speed.

A Long Navigable Stretch.

Mr. Ogilvie, in his report, points out:—"Excepting a short distance at the head of Mackenzie river, where it is doubtful, it is certain that vessels drawing at least seven or eight feet of water can navigate from the delta of the Mackenzie to the rapids on Great Slave river, a distance of one thousand two hundred and seventy-three miles. If Mackenzie delta also allows that draught, we have about one thousand three hundred and forty miles of navigable water from the rapids to Arctic ocean."

"Wherever possible the width of the river was determined by triangulation. Between the narrows and Fort Good Hope it is never less than a mile wide and is often more than two, even reaching three miles at some points.

"Since I followed the shore, I cannot speak of the depth of water from personal observation. Captain Bell, of the Hudson's Bay Company's steamer 'Wrigley,' informed me that the shallowest water found by him in any part of the river, in what he considered the channel, was eleven feet. But as, when I saw him, he had made only two trips on the lower river, he could not speak very definitely as to its depth. Sir Alexander Mackenzie, who discovered the river and descended to its mouth in July, 1789, had a lead line with which to make soundings; but in the swift current a short distance above Fort Simpson his lead caught in the bottom, the line broke and the lead was lost. I have the depths according to him, and will give them in their proper place. One would expect, in such an expanse of water as this, to find some of it shallow, but it appears from all the evidence I could gather that vessels drawing from eight to ten feet of water would find no difficulty in navigation as far as Great Slave lake. Although the river is reported to be shallow where it leaves this

lake, doubtless a channel could be found affording the draught above mentioned.

"In the fall of 1887, a whale made its way up the river to the Ramparts, remaining there the whole season, and before the river froze over it was often seen blowing. At first the Indians were afraid, but they soon became accustomed to the sight, and shot at the whale whenever it approached the shore. In the spring its dead body was beached by the ice on the west shore seven or eight miles below Fort Good Hope, and the Indians used part of it for dog meat. I enquired its dimensions of several who had seen it. They described it as being about twice as long as one of their canoes and thicker through than their own height. This would mean a length of from twenty-five to twenty-eight feet. I have often heard it stated that all the channels of Mackenzie delta are shallow, but the presence of this whale assures us that one of them at least is over six feet deep."

Over Three Thousand Miles of Waterway.

Mr. Ogilvie claims that there is a grand total of three thousand three hundred and sixty-nine miles of water in Mackenzie basin, all navigable, except for eighteen miles, at but two points, one a rapid two miles long on Peace river, and the other Sixteen Mile rapid on Great Slave river. A thorough knowledge of the two great lakes (Great Bear and Great Slave) with all their tributary streams would probably increase this vast length of navigable water by several hundred miles. This does not take into account the Mackenzie delta and sea near its mouth, of the navigability of which nothing very definite is known at present.

Mr. Ogilvie, writing in 1890, figured out these

distances in this way:—"The Hudson's Bay Company's steamer 'Grahame' traverses the waters of Peace and Athabaska rivers, the former from the falls to the rapid at Fort Smith, and the latter up to McMurray. The distance from Chipewyan to the post at the falls on Peace river is two hundred and twenty-two miles."

"During the last two years the Hudson's Bay Company has had another steamer, the 'Athabaska,' plying on upper Athabaska river, between Little Slave river and Grand rapids. Both this steamer and the 'Grahame' on the lower river are flat bottomed stern-wheelers, drawing, when loaded, not more than two and a half to three feet of water. They can each carry about one hundred and forty tons."

"Upper Peace river is navigable for steamers drawing three or four feet of water, and, with a little improvement at two points, a draught of five to six feet could be utilized. This upper Peace river affords a navigable stretch of five hundred and fifty-seven miles, which, with two hundred and twenty-two miles on lower Peace river, and two hundred on Lake Athabaska, and, say, two hundred on the lower Athabaska, together with the distance given in the above table, gives us two thousand five hundred and sixty-nine miles of navigable water."

"From our present knowledge, meagre as it is, I think we may assume that Great Slave lake affords us at least five hundred miles more, considering its length and its many deep bays. To this we may add two hundred and forty miles on the Liard, and at least sixty on Peel river."

The Season of Navigation.

As to the length of the season of navigation on

the Mackenzie, Mr. Wm. Ogilvie, in his report, publishes some tables showing dates at which the ice formed and broke up at Fort Norman (latitude about 65°), and Fort Simpson (latitude 61° 52′ north). These tables were compiled from figures taken from the journals kept at all Hudson's Bay Company's posts. From these figures it appears that the first ice, between 1872 and 1888, never formed earlier than October 7 at Fort Norman, and in 1883 did not form until October 24. The earliest date at which the river was closed by the ice was November 2, in 1879, and the latest November 18, in 1874. The earliest date at which the ice broke up was May 9, in 1879, and the latest May 24, in 1887.

At Fort Simpson, during the decade of 1876-1886, the drift ice was seen as early as October 11, in 1884, and as late as November 12, in 1879. The earliest date at which the river closed was November 17, in 1876, and the latest was November 30, in 1882. The earliest date at which the ice broke up was May 1, in 1883, and the latest May 14, in 1876.

Landmarks Along the Mackenzie.

Some notes culled from Mr. Ogilvie's report as to the principal tributaries of the Mackenzie between Great Slave lake and the sea, and as to a few of the more remarkable stretches of the main river, will prove interesting at this point. Seventy miles below Great Slave lake is Little lake, which is about twelve miles long and ten to twelve miles wide, being merely an expansion of the river, like Lakes St. Francis and St. Peter in St. Lawrence system. Thirty-six miles lower down, Yellowknife river enters the Mackenzie from the south. It would appear from the

statements of Indians to Mr. Ogilvie that this is the largest tributary of the Mackenzie between the Liard and Fort Providence. Twenty-seven miles below the confluence of the Yellowknife, and continuing to a short distance above the confluence of the Liard, the Mackenzie narrows to an average width of a little over half a mile, with a generally swift current. This continues for seventy and a half miles or nearly as far as Fort Simpson, near the mouth of the Liard and causes this part of the river to be called “The Line,” from the fact that large boats cannot be rowed against the current, but have to be hauled by a line attached to them, and pulled by men on shore. This is the common mode of navigation on all the northern rivers where there are no steamers, as it is less laborious than rowing against a current.

By the survey it is seven hundred and fifty-eight and one-half miles from Fort Simpson to Fort McPherson. The former fort is situated on an island just below the junction of Mackenzie and Liard rivers.

Ninety miles below Fort Simpson, on the west side, a river flows in from the southwest. Mr. Ogilvie had seen its name spelled Na-hone, but remembered that it is spelled by the Reverend Father Petitot, Na-hauner. It is, however, now known as North Nahanni river. This stream, as seen from the opposite side of the river, seems about two hundred yards wide, but it is shallow and rough at the mouth as was ascertained by the noise of its waters being plainly heard across the Mackenzie, here a mile wide. Mr. Ogilvie could get no information as to what it was like for any distance above its mouth, but it pierces the range of mountains to the west, which here come close to the river. The valley thus formed can be seen extending southwesterly through the mountains for

many miles. The banks in the stretch of the Mackenzie from Simpson to this point are alternately low and swampy and moderately high, consisting of gravel and sand.

Some Tributaries.

Sixteen miles below the confluence of the North Nahanni, but from the opposite or eastern side, Willow lake river enters the Mackenzie. It is a quarter of a mile wide, deep with a slack current. It is said to flow out of a lake of considerable extent, not far from the Mackenzie.

Thirty-nine miles lower down, and three and a half miles above Fort Wrigley, a stream known to the Indians as "The River between Two Mountains" discharges into the Mackenzie from the east. It is about one hundred and fifty yards wide and shallow.

Seventy-four miles below Fort Wrigley, on the west side, a river discharges a large volume of clear, black water, which rushes bodily half way across the Mackenzie, and preserves its distinctive character for several miles before it mingles with the main stream. The name applied to this river by the people at Fort Wrigley was "La Rivière le Vieux Grand Lac." It is said to flow out of a lake of considerable extent lying not far from the Mackenzie. Many peaks can be seen up its valley.

A little more than thirty miles lower down, on the same side of the river, another stream enters, apparently not more than a hundred yards wide at its mouth. Mr. Ogilvie saw it from the opposite side of the river only, and heard nothing concerning it.

A small stream enters the Mackenzie opposite this place, and up its valley, about two miles eastward from the river, a sharp peak rising one thousand five

hundred feet above the water was noted by Mr. Ogilvie.

Gravel River.

Forty-one miles below the confluence of le Vieux Grand Lac river, or sixty-five miles, by the survey, above Fort Norman, a large river enters from the west. It is shallow at its mouth, as it is throughout its course, according to the reports of the Indians. The current, they say, is swift. They ascend it a long way in the winter to hunt, and descend in the spring on rafts. How far they go up, Mr. Ogilvie could not learn, their unit of distance being the unknown quantity of a day's travel, but they go much farther than on any other tributary of the lower river.

Mr. Ogilvie obtained the name from some Indians who had travelled it and they called it "Pecat-ah-zah." This translated means Gravel river, by which name it is known to all the white men in the vicinity, on account of its shallowness and numerous gravel bars.

Mr. Keele, reporting upon his descent of Gravel river in 1908, wrote:—"On Gravel river the high mountains approach to within a distance of about fifty miles of Mackenzie river, and are then replaced by a belt of foothills about three thousand feet in height above sea-level. These foothills in turn decline in elevation and finally die out in a broken, wooded plain, about six hundred feet above sea-level, bordering Mackenzie river. Gravel river has built up an alluvial flat at its mouth, and several alluvial islands in the Mackenzie below this point are probably due to the great load of sediment carried in at flood-time. On account of the long period of sunshine during the days, nearly all the snow

disappears from Mackenzie mountains before the summer ends. Vegetation advances very rapidly in summer, and where the soil is good, vegetables of many kinds may be grown along the river banks in the principal valleys."

Fort Norman.

Fort Norman is situated on the east bank of the Mackenzie just above the entrance of Great Bear river. This river is from two to three hundred yards wide at the mouth, with a moderate current, but a short distance up becomes shallow and the current increases. The color of the water is a beautiful greenish-blue, although when Mr. Ogilvie passed it was somewhat turbid.

Ten miles below Great Bear river, a stream about one hundred yards wide comes in on the westerly side.

Eighty-three miles below Fort Norman, or six and one-half miles above Sans Sault rapids, Carcajou river empties its waters into the Mackenzie from the west.

Nearly five miles lower down again, a river called Mountain river flows in from the west. It is from one hundred to one hundred and fifty yards wide, and shallow.

Sans Sault Rapid.

Less than a mile farther down Sans Sault rapid is reached. This is all on one side of the river, which is here a mile and a quarter wide. As Mr. Ogilvie went up the west side, and the rapid was on the other, extending but little more than a third of the way

across, he did not see anything of it. He heard the roar plainly enough, but saw nothing except a swift current. It is caused by a ledge of rocks extending partially across the river. Captain Bell of the "Wrigley," reported deep water in the channel at the end of the ledge, and the steamer has no serious trouble in ascending. In very low water it is said that this rock is scarcely covered.

About a mile above the Ramparts there is a similar rapid when the water is low, but when Mr. Ogilvie passed there was no sign of it.

Thirty-seven miles below Sans Sault rapid and twenty-one miles above Fort Good Hope, Beaver river joins on the west, but as Mr. Ogilvie continued only on the east side he saw only its mouth, which appeared to be about one hundred yards wide. An Indian with him said that it took its name from the number of beavers formerly found on it. This stream rises in the mountains, but does not seem to be of any importance.

Somewhat less than two miles from Beaver river, and only a short distance above the Ramparts, a river flows into the Mackenzie on its west side. Mr. Ogilvie saw it only across the river, but it appeared to be about two hundred yards wide at its mouth. All he could learn about it at Fort Good Hope was that it came from far up in the mountains.

The Ramparts of the Mackenzie.

Mr. Ogilvie remarks in his report that in the more southwesterly part of the country the Ramparts would be called a "Cañon." Here, for a distance of seven miles, the river runs between perpendicular and occasionally overhanging walls of rock. At the upper end they rise fifty or sixty feet above the

water, but their height increases towards the lower end, at which point they are not less than one hundred and fifty feet above water. At the upper end the cañon is not more than half a mile wide, but its walls gradually expand three miles down, and the width gradually expands to nearly a mile at the lower end. Sir Alexander Mackenzie when passing through sounded at its upper end, and found three hundred feet of water, which accounts for the fact that, although the cañon is so narrow, the current is not perceptibly increased.

According to Mr. McConnell's description:—"The Ramparts form one of the most interesting features of the Mackenzie. For some distance above, the river is expanded beyond its usual size, but here suddenly contracts to about five hundred yards in width, and bending to the east runs for three or four miles between vertical walls of limestone and shale. At the upper end of the gorge the bounding cliffs are a hundred and twenty-five feet in height, but increase towards the lower end to about two hundred and fifty feet. The current is steady and runs at the rate of four or five miles an hour. In high water there is no sign of a rapid, but in low water a considerable fall occurs near the head, and it is only with difficulty that York boats are taken up. The Ramparts are frequently the scene of great ice jams in the spring and the dammed-back water is stated to have risen on one occasion over a hundred feet, and on its recession left a boat stranded on the heights above."

Fort Good Hope.

Fort Good Hope is situated a couple of miles or so below the lower end of the Ramparts. According to Mr. Preble (See p. 22), Fort Good Hope probably

existed in effect as a Northwest post early in the nineteenth century, but accounts differ as to the precise location, both Sans Sault rapid and the foot of the Ramparts being given as the earliest site. A temporary post was built in the summer of 1805 at "Bluefish river," about sixty miles below the mouth of Bear lake river. (Masson, Les Bourgeois, II, p. 104, 1890). It was established as a Hudson's Bay Company's post on the west bank of the Mackenzie, about one hundred miles below the Ramparts, about 1823, after the union of the rival companies, being spoken of by Franklin in 1825, as "but recently established." It was removed about 1835 to Manitou island, below the Ramparts, where its site may still be seen on the eastern shore of the island nearly opposite the present establishment. It was destroyed in June, 1836, by a flood caused by an ice jam in the Ramparts, and was rebuilt on its present site in 1837.

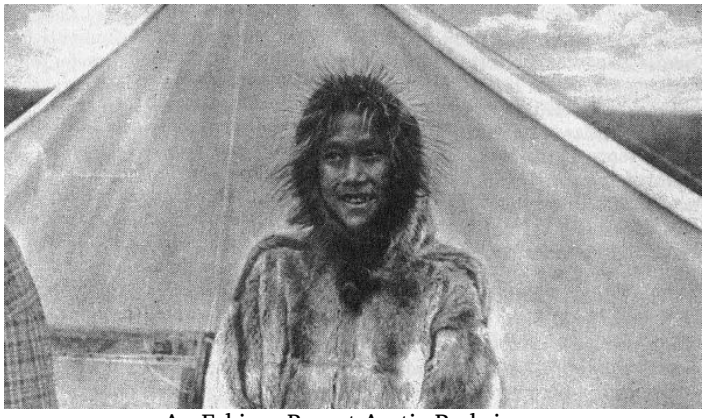
The Grand View.

The "Grand View" is a name given to an expanded portion of the Mackenzie below Fort Good Hope, about twenty miles in length. Mr. McConnell writes:—"The river here is almost straight, but curves gently to the north, and is from two to three miles wide. Its great width gives it more the appearance of a lake than a river, and in no other part of the Mackenzie is the magnitude of the mighty volume of water which this river carries to the sea, impressed so forcibly on the mind. The banks are low and the sinuous shore-lines show a succession of wooded points stretching out until concealed by the haze of the atmosphere. The bordering plains slope gently down almost to the water's edge, and are covered with a scattered growth of willow, spruce

and tamarack, with here and there patches of aspens on the drier ridges."

A little over two miles below Fort Good Hope, Hare Indian river flows into the Mackenzie on its east side. It is about two hundred yards wide at its mouth, and is said to preserve this width for a long distance. The Indians report that this stream rises in a range of hills on the northwest side of Great Bear lake, but about its navigability Mr. Ogilvie could learn nothing.

Twenty-two miles lower down Loon river enters from the east. This river is from eighty to one hundred yards wide. An old man whom Mr. Ogilvie met at Fort Good Hope had explored this stream for some distance and gave him the following notes:—For eight miles there is good navigation, then a rapid half a mile long occurs, at the head of which is a lake about three miles long and one broad, in which the Indians catch many fish. This is called "Rorrie lake" and, some distance above it, is another some two miles in diameter, and called "Round lake" from its shape. Above this again is a succession of lakes for many days' travel.



An Eskimo Boy at Arctic Red river.

One hundred and thirty miles below Loon river a stream one hundred yards wide enters from the northeast. This is a river which the old man at Fort Good Hope described to Mr. Ogilvie as one up which a Hudson's Bay Company's officer went many years ago to its source, which he found to be not far from the head waters of Anderson river, which flows into Arctic ocean. It would appear from the old man's statement that several trips up it have been made since, but this information was vague, and Mr. Ogilvie afterwards met no one who could give him a reliable account of this river.

Sixty miles lower down, Red river enters the Mackenzie on its west side just at the foot of the Narrows. It is about two hundred yards wide at its mouth and appears to be shallow. As far as Mr. Ogilvie could learn from persons acquainted with the river, it comes from a flat, swampy country.

Where the River Branches.

Where the upper end of the branch of the Mackenzie channel on which Fort McPherson is situated connects with Mackenzie proper, according to Mr. Ogilvie:—"The channel is three-fourths of a mile wide, but it is only one of four, there being four large islands there. The whole width of the river cannot be less than three or four miles.

"Looking northward down the westerly channel the view is bounded by the sky and widens in the distance so that one can fancy he is looking out to sea. This can hardly be so; but, from the altitude of the bank where I stood, added to my own height, the horizon must have been six miles away, and a bank in the channel of equal height to that on which I stood would have been visible twice that distance.

Now, if the supposed bank was timbered, as was that on which I stood, it would be visible ten or twelve miles farther, but none was in sight.

"From the entrance of the small channel of Peel river to the head of the upper island in the Mackenzie is nine miles. From the west shore to the southerly point of this island is a mile and a quarter; from the island to the east shore the distance is nearly as great, showing the river to be more than two miles wide at this point. However, it gradually narrows, and five miles above this is a little over a mile wide, which it averages up to the narrows, about sixty miles from Fort McPherson, or twenty-eight from where we entered it.

"A north wind raises quite a swell here and the salty odour of the sea air is quite perceptible above the delta."

Agricultural Possibilities.

Alexander Mackenzie and the explorers who immediately followed him down the great river of the north, being fur traders, devoted no space in their published journals to a discussion of the agricultural possibilities of the country, and as their time was necessarily restricted they took no time on their journeys to examine any part of the territory, contenting themselves with noting the main features affecting the navigation of the main stream, the mouths, the tributaries, the occurrence of game, Indian camps, etc.

Following close upon the establishment of permanent trading posts and missions, came the pioneer attempts at agriculture in Mackenzie valley, and we find members of the first exploring parties sent to the country for scientific research

commenting upon the crude experiments of the pioneer agriculturalists.

Doctor John Richardson, who accompanied Franklin's expedition in 1826 (See p. 13), in his volume "The Polar Regions", in a general description of the resources of the country at that date, wrote:—"Wheat has not been raised within the Arctic circle in America, nor indeed within six degrees of latitude of it. It requires a summer heat of one hundred and twenty days, but it is said to be cultivated up to the 62nd or 64th parallel on the west side of Scandinavian peninsula. Barley ripens well at Fort Norman on the 65th parallel, in the valley of the Mackenzie, after the lapse of ninety-two days from the time of its being sown. All attempts to cultivate it at old Fort Good Hope, two degrees farther north, have failed. Sixty-six degrees of latitude may therefore be considered as the extreme limit of the barley in Norway. Oats do not succeed so far north as barley here.

"At Fort Good Hope, on the Mackenzie (the new fort), in latitude 66¼ degrees north, a few turnips and radishes, and some other culinary vegetables, are raised in a sheltered corner, which receives the reflection of the sun's rays from the walls of the house, but none of the cerealia will grow, and potatoes do not repay the labour."

Domestic Cattle Introduced.

Doctor Richardson again referred to the same subject, after his return from his trip with Doctor Rae in 1848 in search of Sir John Franklin's missing party, and we find in his book published after his return to England, "The Arctic Searching Expedition" (Vol. 1., p. 153), the following:—"We reached Fort

Resolution at 10 a.m. and having received some supplies of fish, and two or three deals for repairing the boats, we resumed our voyage, after a halt at the Fort for an hour. Domestic cattle have been introduced at this place, and at the posts generally throughout the country, even up to Peel river and Fort Good Hope and within the Arctic circle. At this season the moschetoes (mosquitos) prevent them from feeding, except when urged by extreme hunger, and fires are made for their accommodation near the forts, to which they crowd, and lying to leeward amidst the smoke, ruminate at their ease."

At page 165, regarding Fort Simpson (61° 51′ 25″ north 121° 51′ 15″ west) Richardson in the same book writes:—"Barley is usually sown here from May 20 to 25, and is expected to be ripe on August 20—ninety-two days. In some seasons it has ripened on August 15. Oats do not thrive quite so well, and wheat does not come to maturity. Potatoes yield well and no disease has yet affected them, though early frost sometimes hurts the crop. Barley in favorable seasons gives a good return at Fort Norman, which is farther down the river; and potatoes and various garden vegetables grow there. The 60th parallel of latitude may, therefore, be considered as about the northern limit of cerealia in this meridian; for though in good seasons and in warm sheltered spots a little barley might possibly be reared at Fort Good Hope, the attempts hitherto made there have failed.



Oat field at Fort Simpson.

"A number of milch cows are kept at Fort Simpson, and one or two fat oxen are killed annually. Hay for the winter provender of the stock is made about one hundred miles up the river, where there are good meadows or marshes, and whence it is rafted down in boats in September."

Lapland Reindeer.

The occurrence of immense numbers of caribou in the Canadian Northland (see chapters XVIII and XXII), and the fact that this animal in its appearance and habits is practically identical with the Lapland reindeer, which has been successfully introduced into Labrador and Alaska, have led to the belief that the last mentioned animal might be introduced with splendid results into the country, and the Department of the Interior has inaugurated an experiment to ascertain if the plan is feasible. In September, 1911, three carloads of reindeer were despatched to Fort Smith, where they are being taken care of. As these animals serve as beasts of

burden, as well as provide meat, milk and leather, this experiment might have an important effect upon the future development of all these northern areas.

Grain Growing at Fort Liard.

At page 170 in the same volume, referring to Fort Liard, Richardson states:—"Though this post is more elevated than Fort Simpson, by at least one hundred and fifty feet, and is only ten degrees of latitude to the southward, its climate is said to be very superior, and its vegetable production of better growth and quality. Barley and oats yield good crops, and in favorable seasons wheat ripens well. This place, then, or the 60th parallel, may be considered as a northern limit of the economical culture of wheat."

Whatever the discouragements of the pioneer agriculturalists in Mackenzie valley may have been, there was sufficient encouragement to induce the missionaries and employees of the fur companies stationed in the country to persevere.

Mr. A. Isbister, a native of the West, who had lived for three years in Mackenzie river district, but left that country when under twenty years of age, examined before the British parliamentary committee of 1857, stated that he had himself raised barley, oats and potatoes as far north as Fort Norman on Mackenzie river, upwards of a thousand miles from the United States boundary and near the Arctic circle. On the Liard, large crops could be raised, as the soil is better on that river, and wheat had been occasionally raised there. It was possible that settlement might extend to Great Bear lake. There would be sufficient territory in the north to make "a very large state indeed." Asked if he thought that the whole country on Mackenzie river was all adapted to

the wants of civilized man, Mr. Isbister remarked:—"The climate is very severe there, but the soil, so far as I have an opportunity of judging, is tolerably well adapted for cultivation. You can raise barley and potatoes very well indeed, without any risk whatsoever."

Barley Always Ripened There.

In the Dominion Government Pacific Railway report of 1878 it is stated (p. 333):—"Mr. Hardisty, late Chief Factor in charge of Fort Simpson in latitude 61·8°, informed Professor Macoun that barley always ripened there; that wheat was sure four times out of five. Melons if started under glass ripened well, frost seldom doing them much harm." In the 1880 report Reverend D. M. Gordon is quoted (p. 102) as authority for the statement that "wheat is grown as far north as Fort Simpson." In the report of 1878 (p. 333) it is also stated:—"Chief trader Macdougall, in 1875, said all kinds of grain and garden stuff always come to maturity at Fort Liard (latitude 60·25°)."

In 1882 Doctor Bompas, the heroic Church of England Bishop of Mackenzie river, in the course of a report to the Society for the Propagation of the Gospel, wrote:—"The English schoolmaster at Simpson has made successful experiments of farming in that northern region, and through his energetic labours a good crop of barley was raised in the mission fields; also some wheat and potatoes, beans, pease, beet roots and other vegetables."

The evidence taken before the select committee of the Senate of Canada in 1888 as to agricultural possibilities in Mackenzie valley, excited general interest.

Many Natural Prairies.

The Right Reverend Isidore Clut, O.M.I., missionary Bishop of Arindele, whose diocese included Mackenzie basin, and whose name is still held with reverence throughout this country, examined before the Committee stated that in several places in the basin of the Mackenzie there were a great number of natural prairies, those with round hay and those with flat hay. The round hay, in certain places, grew from three to five feet in height. The flat hay was also very fine but a little shorter. It grew everywhere in the low and wet places.

At the Roman Catholic mission at Providence, the residence of the bishop, one year he had one thousand four hundred and forty barrels of potatoes —(one barrel, ten gallons)—from sixty kegs of seed, but this was a very favourable year. They had been greatly favoured by the heat and by rain at opportune times. On two or three occasions they had had a thousand and twelve hundred barrels of the same roots.

At the Providence mission there was an excellent clay, which was very good for cultivation. Throughout the country in general the bishop found all sorts of land, black soil, loam, clay, sand, marl, etc. Generally they harvested their potatoes at Providence from September 20 to 30. Turnips, carrots, beets, etc., they harvested a little later. Wheat on the banks of Peace river and Liard river was ripe towards the end of August; at Athabaska and at Providence from September 15 to 25. Barley was ripe a little sooner throughout. Rye does not ripen any sooner than wheat, but witness had not made many experiments, for the reason that they like wheat better than rye. Oats they harvested at the

same time as wheat, but they had sowed them only once. Potatoes they harvested at Athabaska and at Providence, from September 20 to 30. Turnips, carrots, beets, radishes, etc., they harvest later. Indian corn generally cannot get ripened below Athabaska or on the Mackenzie. Strawberries commenced to ripen towards July 15; gooseberries ripened towards the end of August, and at the commencement of September. Raspberries and currants come after the strawberries. There were also in places many blueberries, cranberries, and other small fruits, such as poires sauvages (Saskatoon), etc. Barley ripened at Fort Norman, at the mouth of Great Bear lake river. Consequently it grew at Fort Wrigley, Fort Simpson, and at Fort Providence. In Liard river and Peace river countries it succeeded also very well. Brother Kearney and the Hudson's Bay Company had grown potatoes at Fort Good Hope (Arctic circle). At the mission at Providence, and at all the Roman Catholic missions on Mackenzie river, Liard river, Peace river and Slave river, etc., potatoes and other vegetables were

CULTIVATED VERY SUCCESSFULLY.

Wheat grew, according to the Bishop's evidence, at Providence mission, and at Fort Simpson, but it rarely arrived at perfect maturity. It ripened much better on the borders of Liard river and Peace river. At the mission of the Nativity (Chipewyan at Lake Athabaska) they had often grown fine wheat. At the mission of the Nativity (Athabaska), at Fort Resolution (Great Slave lake), at Fort Smith, at the mission of Fort Providence, they sowed from the time the land began to thaw, that is to say, from May 15 until June 8 or 10. Throughout the length of Liard

and Peace rivers, sowing began a little earlier. At the end of August they had already harvested barley and wheat.

Plants which were deep in the ground, such as potatoes, took a good deal of time to spring up because of the ground being frozen below, but those which were near the surface of the ground commenced to grow very soon, and the nearer one approached the north, for example at the Arctic circle, the more rapidly did the vegetation begin, because of the greater length of the days, or the days being without nights. In 1886 the bishop observed the matter at Good Hope. Towards June 7 or 8, vegetation commenced, and in five or six days the leaves of the trees had reached their natural size. It was because it commenced to be warm then, and very warm, and that continued, save when sometimes north winds set in, which would bring back the snow and cold and sometimes injure the crops.

It was difficult, Bishop Clut remarked, to say the extent of country fit for pasturage, and the cultivation of cereals or other plants, for the reason that cultivation had not been tried, except by the missionaries, and a little by the Hudson's Bay Company.

During his examination before the committee, Bishop Clut was asked:—"How far north has the potato been grown to your knowledge?"

He replied:—"We raise potatoes even as far north as the Arctic circle, at Fort Good Hope, but they are very small. We have no bread there, and an Irish brother has

RAISED POTATOES EVERY SUMMER.

Once I passed a winter there and they had very little potatoes. Out of five bushels planted they got only six bushels. Two years ago I passed the winter there, and out of ten kegs planted they got twenty-five." The bishop added that there were then at nearly all of the missions gardens in which were raised potatoes, carrots, beets, onions, cabbages, turnips and lettuce. Even at Fort Good Hope they raised turnips and carrots.

Wild roses grew in abundance as far north as Good Hope.

Horses, at that date, had not been taken farther than Great Slave lake, but cattle had been taken as far north as Fort Good Hope. They were found at the principal establishments of the missionaries, and at the forts of the Hudson's Bay Company.

Bishop Clut stated that he was certain that if Mackenzie country became settled and cultivated on a large scale, the occasional white frosts of the summer months would be much less frequent. That was the result which they had already observed at their principal mission posts; the more they cleared to any extent the less were the fields susceptible to frost. The months of September and October were generally dry, and the blue sky made them charming. In general they had a clear sky without a cloud and that is what makes the climate so healthy in the basin of the Mackenzie. People could live there to a greater age than in any other part of the globe.

"Chinooks" at the Arctic Circle.

At Arctic circle the southwest "Chinook" wind often made its effect felt, even in winter. The Rev. Father Séguin and Brother Kearney, who had been at Good Hope for twenty-eight years had observed its

effect. The bishop had observed it also himself during the winters of 1885 and 1886. This wind modified the temperature a good deal. The missionaries had not remarked that the intensity of the frost had any effect on the native trees of the country. The bishop had not kept account himself of the degrees of heat in summer, but he was able to say that it was excessively hot; and the farther one went towards the north the warmer he would find it becoming; and that heat lasted the twenty-four hours of the day, without sensibly diminishing in its intensity from 10 p.m. to 3 a.m.

Ex-Judge Malcolm MacLeod, Q.C., of Aylmer, Que., a northwesterner by birth, on examination before the committee produced a number of letters received by his father while he held the appointment of senior officer of the Hudson's Bay Company in the northern district. Among these letters was one which showed that the original explorers of the country between the Mackenzie and the Yukon described it as "a land of milk and honey."

Judge McLeod added:—"We know for certain that at Fort Liard, wheat is a reliable crop for four years out of five, at any rate."

Hon. William Christie, ex-member of the Northwest Council, was at one time inspecting chief factor of the Hudson's Bay Company service. This witness was examined before the committee and explained that as inspecting factor of the Hudson's Bay service he was in charge of all the districts from Red river to Fort Simpson—from Fort Garry northward—Red river district, Swan river district, English river district, Athabaska river district, and Mackenzie river district. All of these were

UNDER HIS SUPERVISION.

He had travelled over the whole of them and descended Mackenzie river as far as Fort Simpson. He did not think that any authoritative attempt had ever been made up to that time to collect statistics, etc., as to resources of this region. The business of the Hudson's Bay Company was confined to the fur trade, and if there were any scientific investigations in the old days these were conducted under the authority of the British government. The Hudson's Bay Company's posts on Mackenzie river were established at convenient points for the fur trade all the way down the river. Fort Simpson was at the head of the whole Mackenzie river district.



Potatoes at Fort Simpson.

There was no settlement around any of the company's forts. The white men in the forts were largely from England and Scotland—gentlemen's sons—and some were married to Indian girls and French half-breeds. Traders, other than those of the company, were at that date going in for furs, up as far as Great Slave lake. The Hudson's Bay Company opposed them the best way they could, but had sold the country to the Canadian government. The Church

of England, as well as the Roman Catholic Church, had missions throughout the region, and had had them for many years.

Mr. Christie informed the committee that he did not think there would be any difficulty in navigating with suitable steamers the Mackenzie from its headwaters to Arctic ocean, because the year before his examination they had had the experience of a successful voyage of the Hudson's Bay Company's steamer from Fort Simpson down Mackenzie river nearly to its mouth, below Peel river. They could have gone through to Arctic sea if they had wished to do so, but having no pilot, and not knowing which of the channels they should take, they did not like to venture. It would have been a disastrous thing to the company if that steamer had met with any accident which would have prevented it from returning to Slave river that season.

Reached the Mackenzie From the North.

As to outside communication via the north, Mr. Christie considered navigation by Hudson bay more certain than by Behring strait. During the search for Sir John Franklin's lost expedition, however, Commander Pullen, of H.M.S. *Plover*, sailed from Honolulu for Behring strait and Mackenzie river. He went as far north as he possibly could get with the *Plover*. Then with Lieut. Hooper and some sailors he took to the boats and coasted along to the outlet of Mackenzie river. The party ascended that river with their boats to Fort Simpson the same fall—tracked their boats. The *Plover* returned to Honolulu that same season.

Donald McIvor, farmer, of Kildonan East, Manitoba, who had been sixteen years in the

Hudson's Bay Company's service, and had been stationed in Mackenzie river district for over six years, communicated in writing to the committee a very interesting series of answers in response to a schedule of questions submitted by the committee. Witness explained that he considered he had fair knowledge of the district watered by Mackenzie, Athabaska and Slave rivers.

The soil is black loam chiefly, sometimes a little sandy. Witness considered three-fourths of the country fit for pasturage or coarse grains. Barley and potatoes had been grown successfully as far north as Fort Norman. He saw some wheat, very fine, at Methye portage, grown by an Indian, but did not know of its being tried further north then. He never saw any Indian corn during his stay in the district. At Fort Athabaska, barley sown the middle of May was ready the first or second week in August. Farther north, at Fort Norman, barley sown the middle of May could be reaped the middle or the last week in August. In cases where wheat was grown it ripened about the last week in August, potatoes the first of September. The ground was usually fit for seeding about three weeks after the first spring flowers showed. The summer rains began about the latter end of May. At the time witness was in the country nothing was done to any extent in agriculture. Stock raising was carried on at most of the forts, and succeeded admirably.

Ten Years at Fort Liard.

Written answers to a set schedule of questions prepared by the committee were submitted by Mr. William James McLean, chief trader of the Hudson's Bay Company, Lower Fort Garry, Manitoba.

Witness explained that his personal knowledge of the country under investigation covered trips over the following routes:—From the watershed of Mackenzie river basin at the height of land whence Clearwater river takes its rise, down the aforesaid river to its confluence with Athabaska river, thence down Athabaska river to Lake Athabaska and from there to Great Slave lake down Slave river, and out Lake Athabaska, and on through that lake down Mackenzie river to Fort Simpson, thence up Liard river to Fort Liard, where he was stationed for ten years, from 1863 to 1873. He stated that he planted potatoes and barley at Fort Liard generally about May 10, and reaped barley about August 20. Potatoes were fit for use about that time, but were generally taken out of the ground about September 20. Turnips were planted and dug about the same date as the potatoes. Wild flowers first appeared in the spring about May 25 at Fort Liard, and June 10 at Fort Simpson. Wild strawberries were ripe about the first week in July, gooseberries about the first of August. Other small fruit came in from the middle of July to August 10. The wild vetch or pea grew at Fort Liard, but not to any great extent. Good barley grew at McMurray, Chipewyan, and at Forts Resolution, Simpson and Liard.

Wild Berries Plentiful.

Among some information as to the fertility of Mackenzie basin communicated in writing to the committee by Mr. Frank Oliver of Edmonton was the following:—Berries of various kinds were the only considerable natural food product of Mackenzie river country. They were plentiful in their season throughout the whole of the wooded region which

extended to within one hundred miles of the Arctic coast. The blueberry was the most plentiful and was found throughout the whole region. It resembled the huckleberry of the east. The blackberry and mossberry come next in quantity in the far north. The former was not the blackberry of Ontario, and the latter somewhat resembled the strawberry. From Liard river south to the Saskatchewan, the raspberry, strawberry, Saskatoon berry, gooseberry, high and low bush cranberry, chokeberry, and black and red currants flourished as well, besides numerous minor varieties of berries. In some years berries were much more plentiful than in others. In plentiful years they formed an important item of the Indians' food. There was every reason to believe that the varieties found there which were cultivated profitably in other countries could be as satisfactorily cultivated there, at least from the 61st parallel southward, between the main streams of the Mackenzie and Rocky mountains.

Mr. Oliver explained that the information communicated was chiefly acquired from Murdock McLeod, of Edmonton, who spent the years 1862-63 and part of 1864 in the Hudson's Bay Company service at Fort Anderson, since abandoned, east of the Mackenzie and about eighty miles up Anderson river from Arctic coast. In the summer of 1863 he accompanied an expedition undertaken on behalf of the Smithsonian Institute, along the Arctic coast from the mouth of Mackenzie to that of Coppermine river. In 1865 he was at Fort Liard. Mr. McLeod stated that in the summer of 1865, while in the Hudson's Bay employ, at Fort Liard, latitude 59¾°, he sowed about three acres of wheat on May 26; this was in the stook on August 1. It was good grain, though somewhat smutty, and had not been frosted; barley sowed at

the same time did equally well, also potatoes. During several summers' residence at Fort Liard, Mr. McLeod never saw summer frost. He also stated that at Fort Simpson, in latitude 62½° wheat, barley and potatoes had done well. This was borne out by the statement of Reverend Mr. Spendlove, missionary at Fort Simpson, except that in 1887 the barley was frosted.

Professor Macoun's Testimony.

Professor John Macoun (See p. 16), Botanist to the Geological Survey of Canada, examined before the committee stated that barley ripens at Fort Simpson, latitude 62°, every year between August 12 and 20. Barley and potatoes had been grown at Fort Norman at the mouth of Great Bear lake river, about latitude 65°, and even at Fort Yukon, in the Arctic circle, barley is a sure crop. These are not particular points noted for their good soil, but located solely for the fur trade. Five-sixths of the country is just as good as these points, and will in future produce as good crops. There is no point east of the Mackenzie suitable for agriculture.

Professor Macoun said he had been informed by Chief Factor Hardisty, brother to Senator Hardisty, who had charge of Mackenzie river district for many years, that wheat was a sure crop at Fort Simpson four times out of five, but that the country around Fort Liard, on Liard river, was much superior to Fort Simpson for agricultural purposes. All kinds of garden produce succeeded well, and melons, after being started in a hot bed, ripened well.

According to Professor Macoun's evidence Mackenzie valley and the whole of the northern prairie country has a soil that is largely composed of

what is called alluvium; and passing northwards farther down Peace river to the Mackenzie the surface, from all he could gather from what he had read, is precisely of the same character as the second prairie steppe, which is the surface of black mould mixed with limestone gravel and deeper down there is more gravel and sand in the subsoil.

The whole of the country from Edmonton northwesterly to Arctic ocean in Mackenzie valley, Professor Macoun explained, is underlain by Devonian or cretaceous rock, and by the disintegration of these rocks good soil is produced always. From everything he could gather, the whole region naturally out to the Arctic coast, west of Mackenzie river, has a good soil. Easterly is a land of barrenness. The line of the Mackenzie is not exactly the line. Geologists know that there is a portion of the valley east of the river and up to the base of the Laurentian rocks where the land seems to be good—as regards the soil. Professor Macoun said he was decidedly of opinion that domesticated animals would in the future be raised in Mackenzie basin. Sheep, horses, pigs and cattle could and would be raised there. It is a law of nature that they cannot fatten cattle in southern Texas because it is not cold enough to solidify the fat, as it were, and they have to drive the Texan cattle north and fatten them. As you go north you find that the cattle

PRODUCE MORE FAT,

and are more easily fattened, because it is a law of nature that in cold climates fat should be laid up.

Asked as to the native grasses, Professor Macoun remarked:—"As to the natural grasses of this country, having just completed an examination of

the whole grasses of the Dominion, I am safe in stating that they are the grasses best suited for pasturage of any known to stock men or farmers. The grasses referred to are those known as red-top and Kentucky blue grass, or, scientifically, *Poa Pratensis* and *Poa Seratna*, *Poa Tenniflora* and *Ceasia*. These four species are well known to American stock men and are considered of the highest value. They are the commonest of the grasses in our northern forest region and along the foot hills of Rocky mountains. Three of these species are known in the eastern provinces. One of them is exclusively western and the greater part of the common pasturage of Ontario is altogether composed of *Poa pretensis* (Kentucky blue grass, or red-top)."

Expert Investigation.

While a committee of the Senate was hearing this evidence as to the natural resources of Mackenzie country, two experts, scientific explorers, Messrs. McConnell and Ogilvie (See p. 18) were enquiring into the subject on the spot on behalf of the Dominion government. The publication of the official reports of these gentlemen, in due course, strengthened the impression made upon the public mind by the evidence taken by the Senate committee, but the practical result was not much, for there was at that date still plenty of free land to be had in the so-called "Fertile Belt", and lack of communication effectually prevented any deflection of the tide of immigration towards Mackenzie river.

Mr. R. G. McConnell in 1887 explored Hay river from its mouth at Great Slave lake as far as Alexandra falls, about thirty miles in a direct line up. He reports that for some distance up and while

passing through the delta, the river is wide and encloses a line of alluvial islands, but on getting above these it contracts to about one hundred yards in width. Its banks are low and grassy, and the country on both sides is thickly forested. Proceeding up the river the general elevation of the country increases, and the valley becomes higher and wider, and bordering flats make their appearance.

Grassy and partly wooded plains skirt its southern shores and extend southward towards Peace river, and Hay river may be regarded as practically the northern limit of the prairie country, although small isolated plains occur much farther north in the vicinity of Slave river.

Picturesque Water-Falls.

As to Alexandra falls, so named by Bishop Bompas in honour of the then Princess of Wales, Mr. McConnell states that they present a clear unbroken sheet of falling water, and are exceedingly picturesque in appearance. The gorge through which the river below flows here suddenly ceases, and the river precipitates itself over the hard limestone band through which the latter is cut, with a sheer descent of about eighty-five feet, as measured by a single reading of the aneroid barometer.

From the base of the falls the river flows along rapidly for about a mile, and then makes a second leap of about fifty feet, below which are three miles of rapids. At the lower falls the cliff is broken down near the centre, and the descent of the water is interrupted by projecting ledges. Above the falls the river loses its valley almost altogether, and has failed to produce more than a feeble impression on the hard limestone beds which floor the surrounding

country. Near the foot of the rapids below the falls “a graceful effect is produced by a couple of small streams which fling themselves on either hand over the brow of the cliffs bounding the valley and make one clear leap to the floor beneath.”

Agriculture at Resolution.

Mr. McConnell reported the western arm of Great Slave lake “bordered all around by a flat wooded country, which has been proved to be adapted to cultivation of barley, and of potatoes and other vegetables. The soil is usually a loam, but in the ridges is often sandy, and in low places passes into a clay. The alluvial lands along Slave river and the grassy plains on Little Buffalo river are the best sections of the district, and deserve the first attention. At Fort Resolution a few acres of land are farmed every year with good results by the Hudson’s Bay Company. Mr. Flett, who has charge of this post, informed me that barley is usually sown on May 15, and requires about one hundred and ten days to reach maturity. Potatoes are planted about the same date, and are dug about September 15; wheat, according to the same authority, has been tried three times with only one failure. At Hay river, sixty miles west of Fort Resolution, some potatoes are annually grown by the Indians, and even at Fort Rae, which is situated on a bleak island in the northern arm of the lake in latitude 62° 39′, some gardening has been attempted by the energetic Roman Catholic missionaries who are stationed there. The soil at this place is very stony, and much difficulty was experienced in removing the boulders, and in bringing the ground into a proper state for cultivation. When this was once effected several

kinds of vegetables were grown without trouble. Potatoes planted on May 25 are dug in the middle of September, and yield twenty fold, and the list of garden vegetables raised here includes turnips, onions, cabbages, carrots, radishes, beets and peas. Wheat and barley have not been tried on a large scale, but a few grains were sown at the end of May one season, and became mature, the latter on August 26, and the former four days later. A less favourable spot for farming purposes, than this rocky island, could scarcely be obtained, and the successful raising here affords a promise that the more fertile lands to the west and south will one day be utilized."

Mr. McConnell in his report on the exploration of Slave river states that the soil there "is often sandy, but good crops of potatoes and other garden vegetables are grown at Fort Smith, and also by the Indians on the east side of the river."

Wheat at Fort Providence.

Mr. McConnell referred specially in his report, also, to the agricultural operations at Fort Providence (where he wintered), Fort Simpson and Fort Good Hope. He wrote:—"Fort Providence is surrounded by flat arable lands of good quality, and capable of producing excellent crops. Agriculture is engaged in here both by the Hudson's Bay Company and the Roman Catholic Mission, and large quantities of farm produce are annually raised. Wheat has been sown at the Hudson's Bay Company's farm for nine years, and, according to Mr. Reid, has never been a complete failure, although on some occasions it has been slightly touched by summer frosts. It is usually sown about May 20, and requires about three months to ripen. As much as twenty-nine bushels have been

obtained from one bushel sown. Barley is a sure crop. It is sown at the same time as the wheat, and is ripe almost a week earlier. Potatoes are planted between May 16 and 25, and are taken up about September 20. Turnips, cabbage, beets and numerous other garden vegetables are grown with scarcely greater difficulty than in latitudes ten degrees farther south. The soil is a stiff clay, with in some places surface beds of sand, and is seldom thawed out to a greater depth than six feet. The muskegs which cover a considerable proportion of the country back from the river are permanently frozen at less than two feet from the surface. It must be borne in mind, however, in this connection, that the histories of other districts have shown that when the country is cleared and the moss burnt off, the penetrative powers of the summer thaw is at once greatly increased, and lands have become productive, which at first appeared hopelessly barren. A number of cattle are kept at Fort Providence, but require to be fed about seven months in the year. Hay of excellent quality is obtained in abundance from neighbouring marshes."

The Farm at Fort Simpson.

"Like the other posts Fort Simpson has its farm, and according to some statistics which I received from Mr. Laviolette, the various crops raised, with the exception of wheat, which does not ripen, and the dates for planting and reaping are much the same as those previously stated for Fort Providence. Potatoes are usually planted between May 15 and 20, but this season (1888) were not put in, owing to the unusually late spring, until May 28, and require about four months to mature. In the ordinary year forty bushels of seed will yield from six to seven

hundred bushels, but the crops are sometimes injured by summer frosts. Barley, which is the only cereal grown, is sown about May 20, and is usually ripe by September 20. No difficulty is experienced in raising such garden vegetables as cabbages, turnips, beets, etc., and Mr. Camsell seemed sanguine that even melons and tomatoes would ripen if properly tried. The soil here is a stiff clay loam. . . ."



Mission Garden at Fort Providence.

"Fort Good Hope is situated a short distance below the Ramparts and is the lowest fort on the Mackenzie. It was originally built over one hundred miles lower down, and has been moved several times before the present site was finally selected. It is situated only a few miles south of the Arctic circle, but this does not prevent some gardening from being attempted. Potatoes, turnips and other garden vegetables are raised in some quantity, and even barley has occasionally been ripened, although the ground is permanently frozen three or four feet from the surface. Cattle and poultry are kept at the fort, but the former have to be fed over seven months in the year. . . ."

Can Furnish Local Food Supply.

In summing up the result of his explorations, Mr. McConnell stated in his report:—"At all the posts of the Hudson's Bay Company, along the Mackenzie and its tributaries, with the exception of Fort McPherson, small plots of land are annually cultivated and large quantities of potatoes, turnips, beets and other vegetables are grown for use in the district, while at Fort Liard and Fort Providence, the two most southerly posts in the district, both wheat and barley have been tried with success. There is, however, little reason to hope that Mackenzie river district as a whole, or even the southern part of it, except in limited areas, will ever be able to support a purely agricultural community, or that its products will ever be able to compete in the open markets of the world with the produce of more favoured regions. Its agricultural development will depend on a local market being obtained. When the time comes, as come it must, when the undoubted mineral resources of the region are drawn upon, the food required by the mining population, or the greater part of it at least, can be supplied locally. The amount of arable land is small compared to the total area, and is mostly confined to the vicinity of the larger streams. Away from the rivers, frozen marshes and muskegs and shallow lakes cover the greater part of the surface. The alluvial lands along Slave river, the upper part of Mackenzie river, and the country bordering the Liard for some distance above and below Fort Liard and west of the mountains, are the best parts of the district."

Climate of Mackenzie Region.

Mr. McConnell, in his report of his explorations of both 1887 and 1888, makes the following references to the climate along Mackenzie river:—"The warm weather which commenced at Fort Simpson on May 1, continued throughout the month, and under its influence the snow quickly disappeared, and the spring advanced with astonishing rapidity.

"In the lower part of the river the ice was broken up at Fort Wrigley on May 18, at Fort Norman on May 19, and at Fort Good Hope on May 21. The ice on the river above Fort Simpson, between the mouth of the Liard and Great Slave lake, did not, however, move until after June 1."

May 31, 1888, Mr. McConnell found *Anemone patens*, the first flower of the season, in full bloom above Fort Wrigley. When Mr. McConnell left Fort Norman June 12, 1888, the trees were still leafless, but the various species of willows and birches had hung out their catkins, and the early flowering anemones and other flowers brightened the valley with colour. June 18, when Mr. McConnell left Fort Good Hope, *anemone patens* and other early flowering plants were in bloom, but the general forest still remained leafless.

The Liard District.

Mr. McConnell's report gives us occasional comprehensive glimpses of the territory on either side of the Mackenzie. He says that the surface of the country bordering the Mackenzie in the latitude of the Liard, on both the lower and higher levels, is usually more or less undulating, and is diversified by innumerable shallow lakes of all sizes, while a large proportion is underlaid by muskegs and marshes, covered with sphagnum or bog-moss, which remain

frozen throughout the year. The higher lands and ridges separating the lakes and marshes are usually rather densely forested, chiefly with white spruce (*Picea alba*), the Banksian pine (*Pinus Banksiana*) and the aspen (*Populus tremuloides*).

As to the basin of the lower Liard itself, Mr. McConnell mentions the following facts:—On his way down to the Mackenzie in 1887 he arrived at Fort Liard, fifteen miles below the mouth of the Nelson, on July 29. In the reach from the Nelson to Fort Liard, the river is generally wide and filled with sandbars and wooded islands. It is bordered in many places with wide alluvial flats, covered with tall, straight cotton wood, large spruce and canoe birch. Its valley is wide and shallow and lined with gently sloping, spruce-clad banks. On some of the flats the Indians have built houses, and fenced in small plots for farming purposes, for which the greater part of this section of the district seems well adapted. Mr. McConnell passed one small Indian farm about thirteen miles below the mouth of the Nelson, and another one at the mouth of Fishing creek, a few miles above Fort Liard, while others were noticed in the lower part of the river.

Fort Liard and its Environment.

Fort Liard is situated on a fertile flat, part of which has been cultivated for years with unfailing success. Wheat and barley are grown here year after year, while potatoes, cabbages, turnips, and other vegetables are raised without the least difficulty. At the time of Mr. McConnell's visit, August 1, "all the crops were well advanced and in good condition; the barley was just turning colour, and the potatoes were almost large enough to eat. There is no reason, either

climatic or otherwise, why the whole country bordering the Liard, from Beaver river to near its mouth, should not, when needed, support an agricultural community." Mr. McConnell climbed one of the mountains near Fort Liard to a height of three thousand feet and "obtained an extensive view from the summit, over the plains to the eastward. The country in that direction rises gradually from the river in easy undulations, and appears to culminate at a distance of twenty-five or thirty miles in a low plateau through which Black river has cut a wide gap. A dense forest, relieved in places by gleaming lakes and light green marshes, stretches to the horizon."

Mr. McConnell also states in his report that the valley depression for some distance below the fort is insignificant in size, and farther down disappears altogether, and the river undulates through a low, level plain, elevated only a few feet above its surface. Liard river is over a mile wide at its mouth.

A Mackenzie Valley Plateau.

Ten miles above the Blackwater, Mr. McConnell, in his descent of the Mackenzie in 1888, made a visit to a small plateau which there borders the river at a distance of three or four miles. The valley of the Mackenzie there has a depth of two hundred feet. After leaving it Mr. McConnell crossed a level plain which stretches eastwards to the foot of the plateau. This plain proved to be exceedingly wet and swampy, and most of the way across he was walking knee-deep through yielding moss or ice-cold water. It is partially wooded with small pine, spruce, aspen and tamarack, none of which had a diameter exceeding six inches. From the top of the plateau, the

main range of Rocky mountains, which is here too far from the left bank of the river to be seen from the valley, came into sight to the west, while in an opposite direction a good view was obtained of the rocky range which borders the river to the east. The plain between these ranges, through which the river flows, has a width of sixty or seventy miles. It shows numerous lines of wooded heights running parallel with the river, but possesses no conspicuous elevations.

Mr. McConnell explains that rugged limestone ranges are visible along the reach below Fort Norman on both sides of the river, but seldom approach within thirty miles of each other. The plains between, and lower slopes of the mountains, are continuously clothed with forests of small spruce and aspen. The depression in which the river flows has a depth of from one to four hundred feet and a width of from two to three miles. River flats are seldom present, and the banks of the valley slope more or less steeply up from the edge of the water.

Mr. William Ogilvie's Report.

Mr. Ogilvie, in the splendid report of his survey in 1888 (Sessional papers, 4th Ses. 6th Parlt.), made a special and most comprehensive reference to the agricultural capabilities of the Mackenzie country. Mr. Ogilvie's reputation as an experienced and most accurate observer justifies an extended quotation from this section of the report.—"Everywhere, the Mackenzie basin", he wrote (p. 82), "is quite as capable, so far as quality of soil is concerned, of supporting an agricultural population, as the greater part of the provinces of Ontario and Quebec. The soil, as seen from the river, is generally good, and

the probability is that it continues so at least as far back from the stream as the woods extend. This extent is said to vary from twenty to forty miles on the east side, where no stream flows in, but where there are streams the distance is much greater, as the timber follows the valleys. Beyond the fringe of timber we come to the so-called barren lands, on which nothing but mosses and lichens grow and which, except as the pasturage of the musk-ox and a few other animals, are practically useless, so far as known at present. On the west side of the river the woods extend to the timber line on the mountains.

"Assuming the limits to be as above, the area of the fertile soil can readily be found. Speaking only of that portion of Mackenzie basin extending from Athabaska lake to Arctic ocean, we have a strip of land nine hundred and forty miles long, and something over sixty wide. This gives in round numbers sixty thousand square miles of land, the agricultural capabilities of which we may reasonably discuss. I think the above area is less than that actually wooded, but on the west side much of the surface is probably at such an elevation, being near the mountains, as to be outside the limits of our discussion. Theoretically, the points involved are the prevalent temperatures during the growing months, the period of vegetation and the duration of sunshine.

Temperature and Sunlight.

"I do not know of any regular record of temperature having been kept at Fort McPherson, the most northerly point at which anyone is permanently settled in the district. The only information which I have is my own record for the last ten days of June

while I was camped in the valley near the fort. The lowest temperature during that period was 37.3° Fahr. on June 20, and the mean minimum from June 20 to June 30 was 43.3° Fahr. The highest observed temperature during the same period was 74° Fahr. at 1:30 p.m. on June 21, and the mean temperature at that hour for the ten days was 62° Fahr. The lowest of these temperatures would not injure vegetation. The mean minimum for the whole month would be below this, probably two or three degrees, but even that would not arrest vegetable growth. When, in connection with the temperature, we consider the number of hours of sunshine in June and July, it seems evident that Fort McPherson has all the essentials for the successful cultivation of most cereals and vegetables. At this northern point refraction extends the time during which the sun does not set, so that there are about twenty-four hours of sunshine each day from June 1 to July 15. On May 1, the sun is up for about seventeen and one-half hours, and during August the hours of sunlight vary from nineteen on the 1st to fifteen on the 31st. The total hours of sun are seven hundred and six in May; seven hundred and twenty in June; six hundred and eighty-four in July; and five hundred and twenty-seven in August; in all two thousand six hundred and thirty-seven hours of sun out of the total, day and night, of two thousand, nine hundred and fifty-two hours in the four months. As twilight continues while the sun is less than eighteen degrees below the horizon there is actually no darkness during this period. When the temperature is suitable, vegetation under these conditions thrives to an almost incredible degree, as the following shows. When I arrived at Fort McPherson on June 20, the new buds on the trees were just perceptible, and on

the evening of June 22, the trees were almost fully in leaf.

"The mean minimum temperature for the month of July was 45.4° Fahr. The mean temperature for 1:30 p.m. was 64.7° Fahr., but on two occasions the thermometer went to 78° in the shade, and ten times to 70°. These temperatures were noted along the river, at different points of course, although during the greater part of the month my latitude did not change very much.



View on Peel river.

"This combination of favorable temperature and long hours of sunlight promises well for vegetable growth, but there are interfering causes. Unfortunately snow storms are apt to occur at any time during the year at Fort McPherson. On July 2, five inches of snow fell and the thermometer went down to 25° (7° below freezing point), yet, strange to say, the frost did not appear to hurt anything. A northeast wind continuing for a day or more, lowers the temperature in a few hours from pleasant, summer heat to what reminds one of the approach of winter.

"As far as I could learn, no attempt at cultivating cereals or roots has been made at Fort McPherson. But at Fort Good Hope some of the people grow potatoes and other garden produce, and, as the difference of latitude is not much over a degree, the same things ought to grow nearly as well at Fort McPherson. The potatoes grown at Fort Good Hope are small, averaging about the size of a large hen's egg. Those which I tasted were bad, as if they had been frozen, but they were of the previous season's growth, and it was then the middle of July. Even in Ontario potatoes of that age are not very palatable. This tuber appears to have always vitality enough to increase, as at Fort Good Hope they have had

NO CHANGE OF SEED FOR SEVERAL YEARS.

This tends to show that the frosts are not very severe, during the time potatoes are growing and ripening. When I passed, the onions, lettuce and other things planted in the gardens were pretty well advanced, the onion stalks being about as large as pencils. No cereals had been sown, but I think barley would succeed fairly well. I am not aware of any continuous record of temperature at Fort Good Hope, so I cannot say whether the climate at that place is suitable for the growth of plants during June, July, and August. While I was there the days were pleasant and warm and the nights not unpleasantly cool. Nor, if we omit July 2, when snow fell, did I anywhere note any temperature below freezing during July and August.

"It may be said that my observations extended over too great a range of latitude, to be of any value in indicating the temperature any period or any place, as while they were being taken we were constantly moving south. This is true, but it must be

remembered that in moving south we were leaving the area of constant sunlight and getting to where night has a cooling effect, so that the objection has not the same weight it would otherwise have.

"The statement given below of the duration of sunlight in the months of May, June, July and August, serves to show that a difference in latitude has not the same effect in changing the summer temperatures of places in high latitudes as it has in more southerly localities. Unfortunately, the records at posts in the district are too few and meagre to either confirm or disprove this theory, and to use the records of such places as Fort Franklin, on Great Bear lake, and Fort Rae, on Great Slave lake, is hardly fair. These points are over three hundred miles apart in an air line, and the temperature at either or both may be influenced by the local conformation of the ground, or other unknown causes. However, taking the records at these places, we have the following comparison: —

Mean temperature during	Fort Franklin, lat. 65° 12′
May,	35.2° Fahr.
June,	51.4°
July,	52°
August,	50.6°

"The Fort Franklin data are given in Professor Loomis's Meteorology, published in 1875. He gives as his authority Dove's tables in the report of the British Association for 1847. Who the observer was is not stated, but it was probably Franklin. The Fort Rae statistics were furnished by Mr. Carpmael to the Senate committee appointed to inquire into the resources of Mackenzie basin, and cover the same months as those given for Fort Franklin. These

statistics, as far as they go, confirm the theory, for the extremes at Fort Franklin differ 16.8°, while at Fort Rae the difference is 33.5°, and the monthly differences at the former place are much less than the latter.[18]

"I have computed the following table which shows comprehensively the different durations of sunlight for the latitudes of Ottawa, Chipewyan, and Forts Simpson, Good Hope and McPherson.

	Ottawa.		Chipewyan.		Simpson.		Goo Hop
Latitude	45°	26′	58°	43′	61°	52′	66°
H. Sun.	H.	M.	H.	M.	H.	M.	H.
May 1:	14	08	15	34	16	05	17
June 1:	15	16	17	36	18	39	21
June 21:	15	30	18	44	19	14	22
July 1:	15	24	18	36	19	02	22
Aug. 1:	14	32	16	16	16	56	18
Aug. 31:	13	08	13	52	14	08	14

H. Sun.	H.	H.	H.	H
May:	456	514	538	5
June:	462	549	570	6
July:	464	530	558	6
Aug.:	423	467	481	5
Totals.	1805	2060	2147	23

"The number of hours of sunlight in each month has been obtained from the mean of the numbers at the beginning and ending of the month. This does not give a strictly correct result, as the sun's declination, on which the length of the day depends, does not change uniformly, the daily change in June, when the sun has attained its greatest declination,

being small as compared with that of September, when the sun is near the equator. Were the light of each day separately computed, the difference would be even more decidedly in favor of the north. In computing the above table, refraction has not been taken into account except in the case of Fort McPherson. Allowance for refraction would increase the duration of sunlight at all the other places, but much more in the north than in the south. As the table now stands it assigns to Fort McPherson eight hundred and thirty-two hours, or thirty-four and two-third days more sunlight than Ottawa, during a total period of two thousand five hundred and fifty-two hours. A better mode of comparison is to reduce the number of hours of sunlight at each place to days. It stands thus:—Ottawa, seventy-five days, five hours; Chipewyan, eighty-five days, twenty hours; Fort Simpson, eighty-nine days, eleven hours; Fort Good Hope, ninety-nine days, twenty-two hours; Fort McPherson, one hundred and nine days, twenty-one hours, and this out of a total of one hundred and twenty-three days.

Agriculture at Fort Norman.

"At Fort Norman, the Hudson's Bay Company had a garden planted with turnips, potatoes and other garden produce. I was at that point during the last days of July, at which time potato vines were from six to ten inches long, and did not promise a good yield. The Roman Catholic mission had two patches, together about an acre in extent, planted with potatoes. The soil here was much better than in the first patch, being a warm clay loam, while in the other it was nearly all decaying vegetable matter, commonly called 'muck'. The mission potatoes were

much stronger in the vines than the Hudson's Bay Company's, and, at the time, nearly covered the ground. The Anglican mission had planted a small piece of ground near the river on a sheltered bench below the top of the bank and facing the south. Here the growth was much stronger than at either of the two other places. Some barley had been sown in it, and was well grown, the stalks averaging from two to two and a half feet high, and the heads being long and just beginning to fill. The growth of grass on this flat is luxuriant, and nettles grow as strong and large as any I have seen elsewhere. Near the edge of the woods wild vetches grow as long and vigorous as they do near Edmonton. Everyone complained of the cold, wet weather which prevailed during the summer and much retarded vegetation. The Roman Catholic missionary in charge of the mission here, told me that in twenty years' residence at the place he did not recollect such a cool, damp, cloudy summer.

At Fort Wrigley.

"At Fort Wrigley some slight attempts had been made at cultivation, but I do not consider them a fair test of the capabilities of the place. When I was there, on August 15, the people were gathering blueberries, then fully ripe and as large and well-flavored as they are in Ontario. Ripe strawberries were found on August 9 ninety miles below this, and a few raspberries soon afterwards. Above Fort Wrigley wild gooseberries and both red and black currants were found in abundance, some of the small islands being literally covered with the bushes. The gooseberries were large and well flavored, and the currants would compare favourably with the same

fruit as cultivated in the vicinity of Ottawa, the black currants being especially large and mellow. This was the middle of August, latitude 63°.

One thousand one hundred and fifty Miles Farther North than Ottawa.

"At Fort Simpson the Hudson's Bay Company has a large plot of ground planted with turnips, potatoes, onions, and other garden produce such as is generally grown without artificial means in Ontario. On August 24, when I visited this place, the growing vegetables looked almost as good as the same kinds seen at the Ottawa market at the same date. Lettuce particularly was very large and fine. There was also a large area of barley, which looked well and promised an abundant return if allowed to ripen. The grain was then full and plump and just beginning to harden, but fears were entertained that a frost might come and spoil it. The people there claimed that the prevailing cool, cloudy weather had retarded its growth, as otherwise it would then be out of danger from frost. This cereal has been grown with success at Fort Simpson for many years. I understood that wheat had been tried, but with indifferent success. The garden altogether presented an appearance hardly to be expected at a point eleven hundred and fifty miles farther north than Ottawa. It is situated on an island in the river, and the presence of the large body of water may moderate the climate and account for the fine appearance of the garden. Whether the same fine result can be attained a mile or more away from the river can only be decided by trial. I am strongly of the opinion that it cannot.

"On the high river bank below Fort Providence wild gooseberries and currants were very plentiful,

though on the eighth of September they were somewhat over-ripe.

"At Fort Providence the usual garden produce is grown every year and generally turns out well. Barley is also grown with success, but in 1888 it was, as everywhere else in the valley, much retarded by cool weather. Up to my departure from the post, the lowest temperature, exclusive of July 2, was 31.8° on August 29. The mean minimum for the month of August was 43°. When I was at Fort Providence the barley was beginning to change color, and, unless a very severe frost came soon after, would ripen. Wheat has been grown here for many years by the Hudson's Bay Company, generally being fairly ripe before it is touched by frost and sometimes escaping altogether. The wheat is ground in a small hand mill, and the flour used in the ordinary way by the people of the fort. While there I ground a few pounds of the crop of 1887, and had the flour made into a cake, which, though not quite so good as that made from 'XXXX' flour, was palatable, and would probably sustain life as effectually as any other, those using it appearing as well and strong as could be desired. I brought home a sample of this wheat for inspection.

Pea Vines still Green in September.

"At Fort Resolution the Hudson's Bay Company were growing potatoes, turnips and barley. The first were of good quality and size, but there would be no yield of the last. The Anglican missionary also had a garden in which were potatoes, cabbage, cauliflowers, turnips, onions and peas, the latter still green on September 21. The potatoes and cauliflowers were both good in size and flavor. I was informed that small potatoes were grown in a garden

at Fort Rae, situated on a long arm of Great Slave lake, but, according to report, there is not much land around the lake available for farming, even were the climate suitable, as it is nearly all rock. At Fort Smith nothing of importance from an agricultural point of view had been done, and the autumn frosts were very severe.

"In conclusion, I may say that I do not wish to be understood as representing this country as suitable for agricultural operations, as I do not think it is. I have merely presented the results of the attempts which have been made. These results are doubtless much more favorable than might be expected, but how far they would hold good elsewhere than in the immediate vicinity of the river is not known. It is probable that the presence of such a large body of water, with a temperature of about 55°, has a beneficial influence on vegetation.

"Before that part of our territory will be required for settlement, there will be ample time to determine by experiment exactly what it is worth for agriculture.

European Comparisons.

"In looking over the world for countries lying in the same latitude to compare with it, we find Norway extending from latitude 58° to 70° 30′, with an area of one hundred and twenty-three thousand two hundred and six square miles, and a population of one million eight hundred and six thousand nine hundred. Of her territory only about one-thirtieth is under cultivation, one-fourth being covered with forest, and the rest barren mountain land. But as Norway is exposed throughout its whole length to Atlantic ocean, the comparison is hardly apposite.

Better suited for comparison is that division of Russia known as Finland, lying between 60° and 70° north latitude, with an area of one hundred and forty-four thousand two hundred and fifty-four square miles, and a population of two million one hundred and forty-two thousand and ninety-three.

"This shows us that we must not regard the district as altogether useless nor despair of its ultimate occupation to at least the same extent as the countries named. When we take into consideration also the adaptability to settlement of Athabaska and Peace river valleys, which are parts of the same great drainage basin, we may look forward with confidence to its ultimate occupation by several millions of inhabitants."

In the report of his trip in 1891, Mr. Ogilvie gives the following notes on agriculture in Mackenzie valley:—

"Fort Providence was infested with grasshoppers to such an extent that every bit of grain sown there was cut to the ground, nothing but the stubs of the stalks being visible. Wheat has been grown there with varying success for many years, and the fact that in latitude 61° 20′ 38″ it has been completely devoured by grasshoppers is itself worthy of record.

"At Simpson the garden stuff, although very nice in appearance, was not up to what I saw there in 1888, just at the same time of the year too, though it would compare very favourably with the appearance of those in places ten and fifteen degrees farther south. At that date (August 25 to 28), garden stuff was well advanced, green peas were in use, as were cabbage, potatoes, carrots and other vegetables, all large and well flavoured. The barley sown was short and stunted looking from drought, but of fair quality.

"In 1888 the Company's officer in charge planted

ash-leaved maples sent in from Manitoba to see how they would stand the climate, eleven degrees farther north than their native home. Last year they were quite large and seemed to flourish as well as they would have done in their native soil. Many head of cattle were kept here, which seem to thrive as well as they would anywhere else in our country. The hay for their winter subsistence is cut on the hills south of the fort.

At Liard in 1891.

"At Fort Liard the same drought seems to have prevailed, and prevented the usual development of what was planted. At the date (September 4) of my arrival, the barley had been harvested some days, and though the straw was short the grain was plump and hard and of fair yield. Potatoes were of good size and of fair quality. Wheat had often been grown here successfully, but as it can only be used whole, it is considered better to grow barley, which can be, and is, used as cattle food. Cattle are kept here, and seem to thrive as well as they do in other places of the country. At this post the soil is a rich, black loamy clay, and the surface is thickly wooded all around. As seen from the high ground on the opposite side of the river, the country to the south and east appears undulating, rising into extensive ridges all heavily wooded. This condition is said to continue through to Hay river. In the valley are many lakes, some of considerable extent, and many large swamps. I could not learn anything of the character of the soil, but it is fair to assume from the general character of the woods, that it is of fair quality.

"While at this fort I examined the daily journal of events kept at every post, for the purpose of getting

some information as to the times of the general run of farming events, opening or closing of the river, or any other fact of agricultural, meteorological, or general interest. I will here make a few explanatory remarks with regard to these journals. It is a standing rule in the Company's service that a journal of daily events be kept at every post, but each officer seems to have a different idea of what a daily journal even is, and there seems to be a want of continuity, so to speak, in the records when there is a change of writers or officers, some officers aiming at making it what it was intended or ought to be, a chronicle which could at any time hereafter be consulted with confidence regarding historical, meteorological and agricultural events in particular, and information generally. Unfortunately, many seem to have considered it an unpleasant duty, and put it off from day to day, until a long interval had elapsed, then went at it in desperation and made the best record they could from memory, of course often omitting many items of interest and general importance. In many of the journals I have seen there are great gaps, the officer at the place being absent on a journey, or sick or otherwise unable to write the journal at the post.

Notes from Liard Journals.

The journals at Liard gave me the following dates and facts:—

> 1878. Planted seed May 9; reaped barley, omitted; first ice drifting in the river, October 18; ice set in river, October 29.
>
> 1879. Planted seed April 22; reaped

barley August 14; first ice in river October 15; ice set fast November 7.

1880. Planted seed May 7; reaped barley August 14; first ice in river October 25; ice set fast November 9.

1881. Planted seed May 5; reaped barley August 12; first ice in river October 10; ice set fast November 13.

1882. Planted seed May 9; reaped barley August 22; first ice in river October 16; ice set fast November 7.

1883. Planted seed May 3; reaped barley August 10; first ice in river October 29; ice set fast November 9.

1884. Planted seed May 1; reaped barley, omitted; first ice in river October 10; ice set fast October 29.

1885. Planted seed May 22; reaped barley August 11; first ice in river October 23; ice set fast, omitted.

1886. Planted seed May 7; reaped barley August 19; first ice in river November 9; ice set fast November 20.

1887. Planted seed May 3; reaped barley, omitted; first ice in river October 22; ice set fast November 9.

1888. Planted seed May 9; reaped barley, omitted; first ice in river October 20; ice set fast November 5.

1889. Planted seed April 16; reaped barley, omitted; first ice in river October 28; ice set fast November 14.

1890. Planted seed April 30; reaped barley, omitted; first ice in river October 15; ice set fast November 14.

Potatoes are generally harvested about

September 20. The ice generally breaks up in the river about May 1.

Between the Liard and the Peace.

"On the west side of Liard and East Branch rivers it is not very far to the mountains, consequently the area of land which might be utilized agriculturally is not very extensive on that side. On the east the same character of surface holds I believe from the Liard southward to the Peace watershed, high dry ridges with many intervening swamps and lakes, many of the swamps being very extensive. This is as the Indians and one or two white men who have made journeys into it have said of it. The soil is generally of fair quality, some of it good. On my return from Sikanni Chief river to Peace river I found the same general characteristics, ridges with swamps between. I am afraid the elevation above the sea level along this route (the average reading of the barometer being about 27.00 inches while I was on it) is too high to allow farming in the sense in which we understand it. On the streams flowing into the Peace, there is much prairie, but it is confined mainly to the immediate valleys of the streams; much of it is springy and wet, evidently the water from the adjacent swamps percolating through. The soil is all good, and if the climatic conditions were suitable, a very large percentage of good country would be found in this section. Many of the swamps could be drained as the natural facilities for drainage are good. Although it was in October I passed over it I witnessed no severe frosts, very little ice being visible anywhere, and the flora giving no evidence of having been much injured by the frosts. In the prairies along the creeks, the grasses and plants are

generally of as luxuriant growth as in places much farther south and east. The grass was generally long and meadow-like, but as we approached Peace river it became more like true prairie grass, until extensive areas of true prairie were passed over along the tributaries of Peace river.

"The weather for some days previous to my arrival at Nelson (September 15) had been showery and unsettled; this culminated on September 16 in a very heavy rainfall which changed to snow on September 17 and 18. This was damp and stuck to and loaded the trees in the forest to such an extent that the weight broke thousands of them. The snowstorm appears to have been local, as I afterwards learned that it had not extended to Peace river nor more than one hundred miles south from Nelson. The weather cleared on September 19."

In a communication to the press in 1910, Mr. Ogilvie wrote:—"From Fort Vermilion to Fort Liard on Liard river, where wheat has been successfully grown for more years than many people would credit, is three hundred and ten miles; by trail, say three hundred and fifty. On this stretch just across Peace river Hay river prairies are highly spoken of, and certainly look well from the river. A railway line would probably follow down Black river valley to Liard, and extensive meadows in this valley were reported by natives when I was there in 1891."

Evidence Before the Late Senate Committee.

The select committee of the Senate of Canada which sat in 1907 devoted considerable attention to the agricultural possibilities of Mackenzie valley. Mr. R. G. McConnell of the Geological Survey was examined before the committee and said he did not

happen to be in places where there was any farming going on, but was at Fort Providence in the autumn and wintered there one winter, and ate potatoes, turnips and other vegetables like that all winter that had been grown there. That is north of Great Slave lake. Going down the Mackenzie, Mr. McConnell explained, once you get away from the river flat you get into a rolling country partly with muskeg, with hard ridges between. The only possible part of that country suitable for agriculture, he thought, would be the large flats down Mackenzie river. It is a wide valley, but there is the same thing there: you never know exactly beforehand what is going to happen. Certainly it does not look like a favourable country for agriculture once you get away from the river.

The prairie on Liard river is a little north of the 60th degree of latitude. There is a lot of marsh hay growing around Great Slave lake. It would be good for feeding stock. Along Great Slave lake itself there is a large tract of flat country which may come in some time. Most of the grass Mr. McConnell saw there was a heavy marsh grass. It is not jointed, though there is some of that kind. He remembered seeing patches of it on Hay river.

Asked as to the extent of good agricultural land in the country, Mr. McConnell said it depended on what was called good agricultural country. He knew that at Fort Good Hope, right down on the circle, they can raise good potatoes, because he saw them, and there is no reason why they cannot raise vegetables all the way down the Mackenzie as far north as that. The land on both sides of the river suitable for agriculture does not extend far. There are flats two or three miles wide—bottom flats of the Mackenzie a mile to a mile and a half wide. Once you get up out of the valley the country is rolling and partly

muskeg. There is a large tract of that sort of country extending as far north as Fort Good Hope. It is about a thousand miles altogether from Great Slave lake to the sea, and that flat would be six or eight hundred miles in length.

Intense Summer Heat.

Mr. Elihu Stewart (See p. 136), describing his trip to the far north before the Senate committee of 1907, said that after leaving Lake Athabaska there is rock along the Athabaska, but there are plains, said to be good land, extending from Slave lake down to Peace river. Below Fort Smith there is a deposit of alluvial soil very similar in appearance and in character to that of the prairie, extending as far as Rocky mountains, below Fort Simpson, and even along the valley then all the way down as far as Mr. Stewart went. It was a surprise to him. Mr. Stewart was at Fort Providence on July 15, 1906. Fort Providence is near Slave lake, on Mackenzie river, in latitude 61·25°. This is nine hundred and seventeen miles by travelled route from Athabaska, but, as near as Mr. Stewart could calculate it, about five hundred and fifty miles farther north than Edmonton. He saw there on July 15 wheat in the milk, potatoes in flower, peas fit for use, tomatoes, turnips, rhubarb, beets, cabbage, onions, and other garden vegetables. The tomatoes were not fully formed, and Mr. Stewart did not think they ripened. They grew them under glass. The strawberries ripen at any time; in fact they had ripe strawberries before that, also raspberries, currants, gooseberries and saskatoons. The wheat that Mr. Stewart saw there was just in milk. He inquired when it was sown, and was told May 20. It seemed incredible, until it was remembered that

there is scarcely any darkness during summer there. There were about twenty hours' sun each day, and the heat was greater for several days than anything Mr. Stewart had ever experienced in Ottawa. Along the lower Athabaska and at Chipewyan, Mr. Stewart and his fellow travellers had it over one hundred in the shade for several days. There was a thermometer on the steamer in the shade. Perhaps the heat was greater on the boat than it would have been ashore. Certainly it was exceedingly hot weather, and continued all night. There was very little night at that time. The hot wave extended down to the Arctic sea as Mr. Stewart ascertained from Indians who had come from Rampart House, near the Alaskan boundary, to meet the steamer, the "Wrigley." He returned with them instead of coming back with the boat, and they lost two of their dogs from the heat, and that in the Arctic circle. From his observations along the river, that portion of the Mackenzie he travelled through presented a better appearance than Athabaska basin. He did not see much hay around Slave lake. He was not travelling through the country there.

Nine Hundred and Seventy Miles North of Edmonton.

Fort Good Hope, in latitude 66·16°, is nine hundred and seventy miles farther north than Edmonton, yet Mr. Stewart saw cabbages, onions and other garden vegetables growing in the gardens there. Beyond Fort Good Hope the frost is so near the surface of the ground that it is pretty hard to raise anything. At Fort Macpherson, and in that neighbourhood where the portage is crossed, there is frozen soil. The vegetables at Fort Good Hope looked

as good as any others. The soil there was very fertile. The fort which is nearest to the mouth of the Mackenzie is "Point Separation." It is not on the Mackenzie, and was so named because it was there that Sir John Franklin and Doctor Richardson separated on Franklin's memorable second trip. There were no evidences of vegetation along the river that far north that would lead the witness to conclude that agriculture could be carried on there. As far as Fort Good Hope, on this side of that place, and around Providence the country is a fine one. It is a wooded country.

In Mr. Stewart's 1906 official report (p. 13) he writes:—"On July 15, the garden at Fort Providence (latitude 61·4°) contained peas fit for use, potatoes in flower, tomatoes, rhubarb, beets, cabbages, onions. Besides vegetables, there were cultivated flowers and fruits such as red currants, gooseberries, strawberries, raspberries and saskatoons. But most surprising thing of all was a small field of wheat in the milk, the grain being fully formed." This was stated to have been sown on May 20 and harvested before July 28, slightly over two months from sowing.

Sit Out all Night and Read.

Mr. H. A. Conroy of the Indian Department (See p. 136) informed the Senate committee that he had been down at Fort Providence mission in 1902. The missionaries had a splendid farm about latitude 62·30°, and he saw beautiful crops of wheat, oats, barley and peas. He left there on July 28, and their barley was fit to cut, and they were cutting it. Their oats and wheat would be ready to cut in a day or two from the looks of it, and the priest later told him all

their grain was cut without a bit of frost. They have lots of sunlight. One could sit out all night and read. The altitude is low, and you can see the reflection of the sunset and sunrise.

W. F. Bredin, M.L.A., (See p. 104) in his evidence before the committee, remarked that the southern shore of Great Slave lake seems to have good agricultural prospects. One notable place there is Hay river. There they raise barley and all the common vegetables. At the mouth of Great Slave river and at the mouths of all the rivers running in there, large quantities of hay grow. In fact there is a very rank growth of grass along all those streams as far north as one likes to go. Where the ground along the river is not covered with trees, grass grows. At Fort Providence, about forty miles down the Mackenzie from Great Slave lake, they raise barley and all the vegetables every year, and some years wheat and oats.

One hundred and seventy miles below, north of Fort Providence, is Fort Simpson, where Liard river comes in. The Hudson's Bay Company for many years have raised barley and vegetables at that point. In some years they might raise wheat, but not every year. At all those Hudson's Bay Company's posts they always raise vegetables. They do not pretend to raise any other grain regularly but barley, because

They Use Barley for Soups.

They pound the hull of it in a hollow piece of wood and use the grain for soups. At Fort Simpson he saw cauliflowers, cabbages and cucumbers growing under exactly the same conditions as they would grow them in northern Alberta. The cucumbers were simply planted in a hotbed, and allowed to remain

there protected in the early spring from the frost, and then allowed to grow in the hotbeds, with the sashes off, in the summer time.

One hundred and forty miles north of Fort Simpson is Fort Wrigley (north latitude 63°). That is where Mr. Bredin stated he once wintered. In the spring they put in a garden there. The Hudson's Bay Company officials plant gardens every year at that point. The spring that Mr. Bredin was there they got their seed potatoes from Fort Good Hope, which is fourteen miles south of the Arctic circle. They went there for seed because they had none, having used up theirs during the winter. Mr. Bredin saw those potatoes. They were a played-out seed, a white-blue variety. They were not the improved potatoes but they were a fair size. They had the same class of potatoes at Hay river, but since that they got in new seed (the Early Rover) from outside, and they grow very much better crops. The season at Wrigley is quite long enough, because the sun shines there during all the growing season. That is the great secret of the growth in that country. There is not much fertile land at Wrigley. Down there Rocky mountains are on both sides of the river, and there is a great deal of muskeg. The garden at Fort Wrigley

WAS ORIGINALLY MUSKEG

and covered with moss. As soon as the timber is cut off a muskeg the moss dies, the frost comes out of the ground, and gardens can be cultivated. The trees throw out their leaves in Mackenzie basin about the middle of May, before the ice goes out of the river. The year Mr. Bredin was there the ice went out of the Mackenzie at Fort Wrigley on May 23, and the trees were all out in leaf before that time. On

Mackenzie river the trees leaf out almost in a few hours. The quickness with which the leaves appear on the trees in the spring is simply marvellous.

Mr. Bredin was never up Liard valley, but heard a great deal about it at Fort Simpson, and he had seen the journals of the Hudson's Bay Company that were kept at Fort Liard, two hundred miles up Liard river. From these sources he gathered that they raised all the cereals there, such as wheat, oats and barley, as well as all the vegetables of the commoner varieties.

Mr. Bredin informed the committee that the spring he was at Fort Wrigley the months of March and April were the finest he ever saw. He was there just one spring, and it was as pleasant weather as he ever saw in his native province of Ontario, for those two months, while the winters were no worse than he had seen them in Manitoba. Mackenzie river closed on November 19 that year and there was a little snow then—and it lasted until March. Practically all the snow went off the latter part of March.

Mr. Edward A. Preble of the United States Biological Survey (See p. 22), speaking of his trip down the Mackenzie in 1904, states that the country about Fort Providence is level and is mainly grown up to poplars (*Populus tremuloides*). Back from the river are many muskegs, with their characteristic tamarack and spruce forests. The Roman Catholic mission established is now one of the largest in the north. The Hudson's Bay Company's post was established there in 1868, and the post at Big island was abandoned. Both establishments cultivate large fields of potatoes and the various root crops.

Mr. Preble reports that on June 17, below Fort Norman, a small quantity of snow fell. On June 21, at Fort Good Hope, the leaves on most of the trees

were about half grown. On the same date the sun was visible at midnight from a low hill near the post, and many birds were in full song at that hour. For the next three weeks, north of this point, the sun was continually above the horizon. Vegetation now advanced rather faster than Mr. Preble's rate of travel northward, but was not at its height when he reached the delta of the Mackenzie on June 30.

United States Official Report.

Mr. Preble in his published report (North American Fauna No. 27) presents a map of the Northland, showing the "life zone." What he calls "the Canadian zone" extends from the southern margin of the map to an irregular line trending in a northwesterly direction from a point about 52·30° north latitude, just south of Hudson bay, to a point about 58·30° north latitude at Rocky mountains. The main irregularity in the course of the northern boundary of this zone is due to a wedge shaped projection into the zone to the north, due to the well known northern trend of the isothermal lines from a point in eastern Saskatchewan. The line from about longitude 150° runs direct across Lake Athabaska, cutting it in half practically, then to the mouth of Slave river on Great Slave lake, thence in a sweep to where the 65th parallel of north latitude strikes the Mackenzie. Thence the line runs back southeast to the Liard, following that stream to the western margin of the map.

North of the "Canadian" zone, the "Hudsonian" zone is represented, its northern limit being an irregular line running northwesterly from north latitude 55·11° on Hudson bay to the delta of the Mackenzie. This zone is represented as extending

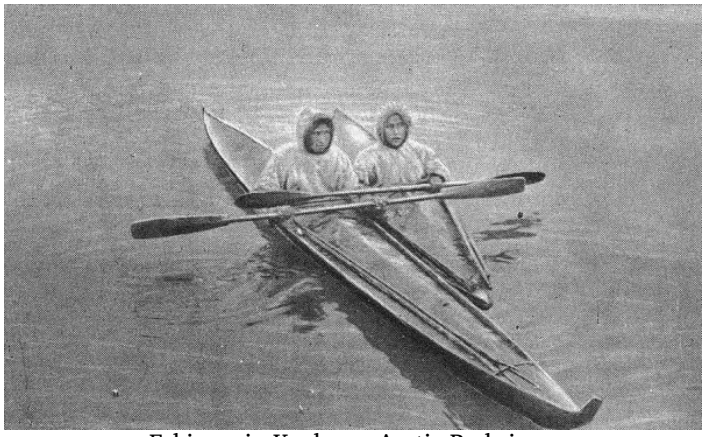
northward in wedge shaped projections for some distance down the valley of the Dubawnt, down that of the Coppermine, and into the lake country north of Great Bear lake. All of the country north of this is described by Mr. Preble as the “Arctic zone.”

Mr. Preble remarks in his report:—“The northern border of the Canadian zone in the Mackenzie region limits the successful cultivation of barley, potatoes, and the more hardy root crops, although with special care most of them are raised in certain favoured localities in the southern part of the Hudsonian. Even in the Canadian, however, an occasional failure occurs, in the case of the less hardy crops, because of the occurrence of unusually late spring or early autumn frosts. In most parts of Peace river valley, and even in lower Liard valley, wheat is a successful crop. Peas, potatoes, radishes, turnips, beets, carrots, cabbages, lettuce and onions are raised with a considerable degree of success as far north as Fort Norman, near latitude 65°, near the northern extremity of the Canadian strip. Nearly all of these meet with a fair amount of success at Fort Rae and also at Fort Good Hope, in the lower Hudsonian, but at Fort Rae the situation is specially favourable as regards slope exposure, and the permanent frost, which remains near the surface in most parts of the Hudsonian, probably retreats to a much lower depth. At Fort Good Hope the almost continuous sunlight of summer probably compensates in part for its extreme northern position.”

The importance of these extracts from Mr. Preble’s report lies in the fact that this is an official report of a trained, scientific explorer who has lived in the north country for months, who has travelled extensively, and whose sole object as a responsible salaried official of a foreign country is to provide

indisputable data for scientific study.

An English Traveller's Testimony.



Eskimos in Kyaks on Arctic Red river.

Mr. Alfred H. Harrison, the English traveller and explorer (See p. 22), in his volume “In Search of a Polar Continent” relates that just as he was leaving Fort Simpson in 1905 for the descent of the lower Mackenzie “Père Vacher appeared with a sack of potatoes which he had grown in his own garden, and which were as good as any we can get at home.”

When Mr. Harrison reached the post at the mouth of Arctic Red river on October 4, he found that that tributary had been frozen fast for three weeks, and it was reported that a few miles lower down the Mackenzie itself was ice-locked.

In his account of his return trip up the Mackenzie in 1907, Mr. Harrison writes (p. 268):—“On July 25 we arrived at Fort Good Hope, where I was glad once more, to meet Mr. Gaudet, who, it will be remembered, was in charge of this post. I was particularly impressed here by the gardens which I visited. They produced fine crops of nearly every kind of vegetable that we grow at home. I did not, indeed, see either pease or beans, but I noted how very fine the potatoes and cabbages were, as also the

onions, beet root, lettuces, and turnips. We took some of these vegetables on board, and they tasted every whit as good as they looked".

Mr. Harrison devotes several pages of his book to what he describes as the commercial geography of the country extending from Athabaska to the delta of the Mackenzie. He writes:—

As to Illinois, Iowa and Missouri.

"The natural resources of this country are very great. I remember once hearing my father say that the states of Illinois, Iowa, and Missouri were commonly believed, when he was a young man, to be barren wastes, where agriculture was impossible, and where no white men could live, but that by the few who knew of the capabilities of that region great hopes were entertained of its future. To-day these very states are the most productive in the Union. In like manner one might be tempted to hazard a prophecy as to the importance and prosperity of that country, so vast, but so little known, which lies to the north of the new province of Alberta; and, accordingly, I will venture briefly to submit an estimate of the commercial prospects of what may well be a career of immense industrial expansion which seems to await the great region now known as Mackenzie river basin.

"Canada, be it remembered, has an area greater than that of the United States, and at the last census (that of 1901) the smaller country showed a population of eighty millions, as against the mere five millions at which the larger was registered. If, therefore, the resources of the larger of these two countries are relatively as great, the scantier population will admit of being increased fifteen

times. The question of resources thereupon emerges, and before speaking of these in detail, it may be noted (1) that the soil here is as good as in other parts of the Dominion; and (2) that the winters are not more severe than those which are undergone in other portions of Canada. Six months, moreover, of open water may be reckoned upon—from the beginning of May to the beginning of November. The lakes and rivers abound with fish; there are inconnu, or Mackenzie salmon, whitefish, pike, and suckers, doré, trout, and herrings. The large inland sheets of water—such as Great and Lesser Slave lakes, Athabaska and Bear lakes—teem with fish, which forms to-day the staple food of the scanty inmates of these tracts. The fishing, indeed, would of itself be no slight asset were there any means of shipping the produce out of the country.

"This brings me to the subject of transport. Population will not merely increase with, but will itself enable the increase of,

The Means of Communication.

The two will advance, like a couple of boys playing at leap-frog, each by the aid of the other—and will advance, like those youngsters, 'by leaps and bounds.' As the settlers become more frequent the great waterways will be rendered navigable, and their banks, like the land abutting the railways that will make a trellis-work of the country, will be dotted with noble cities and with prosperous towns. There are at the present day three huge tracts that would quickly be inhabited were they invaded by the locomotive. A railroad from Edmonton to Athabaska river would give access to two hundred and ten miles of waterway, in one direction, up to Lesser Slave

lake, and one hundred and sixty-five miles of stream running down to Grand rapids. A railroad from Edmonton to Peace river would open up six hundred miles of a river yet finer, and running through a finer country, than that approached by the first-named line. The third railway to be looked for would connect Athabaska river at McMurray with Prince Albert, hereby giving easy access to the name-sake lake from this fort.

"It might be objected that there are no markets in this country, but this objection we have already virtually forestalled. Given the spread of railways and the inflow of settlers, the establishment of markets will follow as a matter of course. Let me conclude my statement of the country's capabilities by mentioning its lime and stone, its oil and gas, its asphaltum, coal, and salt.

"In cherishing these sanguine hopes as to its future, I do not think I am alone. They are shared by a few who have gone off the beaten tracks, and made themselves acquainted with the country. When the immensity of these northern lands is realized, one cannot wonder that few men should be familiar with them. In my travels there I have met with only one man who really knows the country from end to end, and if asked whether he did so, he would doubtless answer that he did not. I refer to Mr. Conroy (of the Indian Department) who has traversed its entire length year after year, has departed from the beaten tracks, and has in many places penetrated far into the interior. How, then, in the absence of railways, can men whose enterprise and qualifications are less eminent than his obtain in a lifetime an adequate knowledge of this outlying region?"

Mounted Police Reports.

We get some interesting information regarding unknown or little known sections of the Mackenzie country from recent reports of the Royal Northwest Mounted Police.

Inspector Jarvis, C.M.G., in the report of one of his patrols in 1907 into the wood buffalo country about Fort Smith and the Little Buffalo, wrote:—"We went westerly from Fort Smith through a level dry country, covered with jackpine and poplar for about nine miles, following nearly the course of Slave river to Gravel point, where we turned southwesterly through a region of swamps and muskegs for nine miles more. This brought us to Salt river where we camped for the night. The next day we went northwesterly along the banks of Salt river, in a region of extensive prairies, some of them wet, some dry, but all covered with a fine growth of grass and capable of supplying unlimited quantities of hay. After three miles we came to the crossing of Salt river, and went up the thickly wooded slope of Salt mountain, which is here, as farther south, a plateau of no great elevation. From there on the country was beautiful, the ground was slightly rolling with occasional lakes, the soil rich, and the timber, spruce, poplar, jackpine and tamarack. The pasture was of the richest description, so that the horses fared well in spite of the swarms of the mosquitoes and bulldogs (flies). We now left the mountain to cross this open stretch and at noon reached the east side of this prairie, where we camped. Thence forward we travelled through dry poplar woods of scattered large trees, under which the richest grass abounded. The whole of this region seemed ideal for stock. About 3 p.m. we once more reached Salt river, and followed its banks through the same dry poplar country to its junction with Slave river, which we

reached at six o'clock. A boat was handy so we put all baggage in this, and swam the horses, camping for the night. On June 28 we broke camp at 8 a.m. and rode southerly for two miles through a dense growth of spruce, varied with a few stumps. This gave place to the open poplar woods with rich pasture which continued for seven miles, bringing us to Gravel point.

"There is a good deal of swamp in this region. There is, however, much land that is dry, rich, and eminently suited for ranching and mixed farming."

The inspector relates how, northeast of Little Buffalo river, "we came to the top of the mountain and had a clear view of a great extent of country below us. To the north were some muskegs, but northeast were the open plains of Salt river stretching away for many miles."

LIARD IN 1909.

Sergeant (at that date Corporal) A. H. L. Mellor, Royal Northwest Mounted Police, made a patrol from Smith Landing to Fort Liard in 1909. In his report he says:—"Fort Liard enjoys a much more temperate climate than this country (Fort Smith) and splendid gardens are raised there. The Roman Catholic mission has been growing wheat and barley there for a considerable time, always with success. I am sending herewith a sample of their last year's wheat."

Sergeant Mellor ascended Buffalo river from Great Slave lake in 1910 and made detours inland on foot at several points for the purpose of getting some idea of the nature of the country, and found the whole region to be of a swampy nature, with here and there a sandy stretch. Along the southern shore

of Buffalo lake is a "dreary muskeg country, thicketed with dwarf spruce and riddled with innumerable streams of water, both sulphur and clear."

Hay River and Resolution.

Sergeant R. Field, in charge of the Chipewyan sub-district, under date August, 1909, reported:—"The gardens at Hay river and Resolution look very promising, especially the potato crop. The Reverend Vale at Hay river informed me that he grew one thousand bushels of potatoes last year on three acres of land, and also splendid cabbages and cauliflowers, besides all other kinds of vegetables. The potato crop at Chipewyan is going to be very poor this year owing to the extremely hot weather and very little rain."

In his annual report for 1910-11, Superintendent G. E. Sanders, D.S.O., commanding at Athabaska, gives this interesting reference:—"As regards weather conditions the winter of 1910-11 was one of the coldest known, the thermometer at different times in January and February registering 60° below zero at Athabaska, Lesser Slave lake and Fort Vermilion. In the far north the same months were cold, but the thermometer did not go as low, 58° being the severest at Fort McPherson and 40° at Herschell island. Forty below on the coast, however, would be much more trying than 60° below inland. It is interesting to note that Athabaska river and Mackenzie river, one thousand eight hundred miles farther north, froze over within four days of each other, the former on November 8 and the latter on November 4. The ice left the Athabaska on April 22, and the Mackenzie on May 13."

To the East of the Mackenzie.

It will no doubt be remarked that so far very little has been said with reference to arable land and agriculture in that section of the territory to which this chapter is devoted, east of the actual valley of Mackenzie river itself. This is easily explained.

In the first place, except at Fort Rae on the north arm of Great Slave lake, no attempts at practical agriculture have been made in the eastern division of the region being treated of, for there are no posts there. Fort Confidence and Fort Franklin on Great Bear lake, and Fort Enterprise near the head waters of the Coppermine, were never ordinary trading posts, being merely winter headquarters, deserted by their tenants as soon as travelling was practicable.



Staff and pupils, Church of England Mission, Hay river.

In the second place, the question of the country's agricultural possibilities have not been considered by the few lightly equipped explorers who have hurried through sections of it intent upon some special mission or other. The only references we find in the journals of such travellers as have ventured through

this region in summer, are such as we get in Mr. Preble's account of his trip via the lake, river and portage route from Great Slave lake to Great Bear lake, when he states that on August 24 "Currants (*Ribes rubrum* and *prostratum*) were abundant and ripe" along the route.

Doctor Richardson (See p. 13), commenting upon the observations made by himself and colleagues of the Franklin expedition at Fort Franklin at the southwest corner of Great Bear lake, gives the following notes regarding the progression of the seasons:—"The relative temperatures of December, January, and February differ considerably; any one of these months may be the coldest in different years. In some years snow exposed to the sun thaws very slightly during these months; in other winters there is no thaw whatever. The snow attains its greatest depth, about three feet, in March. By April 10, the snow begins to thaw decidedly in the sunshine. From May 1 to May 6, the earlier waterfowl arrive. The small streams break up about May 10 or 12. Between the middle and the end of May, most of the small birds arrive. At the end of May or early in June, the earlier shrubs and herbaceous plants flower and sprout their leaves. Frogs are heard at the same time. By the last week of May there is

BRIGHT LIGHT AT MIDNIGHT.

No snow, excepting the remains of deep drifts, is left. On June 8 (1826), the small lake was clear of ice, having been frozen for two hundred and forty days. By the middle of June the summer is fairly established. Great Bear lake begins to break up about June 20, and drift ice sometimes obstructs navigation until the first or second week in August. By July 25

blueberries (*vaccinium uliginosum*) are ripe. At the beginning of August or first of September snow falls. Several frosts set in by the last of September. In October, when the soil begins to freeze, the summer thaw has penetrated about twenty-one inches, beneath which the ground is perpetually frozen. The small lakes are frozen over by October 10 or 12, and the last of the waterfowl depart. The bays of Great Bear lake are filled with new ice by the end of October or early in November, but the centre of the lake does not freeze over until December. The ice attains a thickness of about eight feet."

Bear river opens at its head early in May, the result (according to Richardson) of its being fed by warm water from the depths of the lake. Probably from the same cause the lake remains open at the outlet until very late in the autumn, or throughout the winter. At the rapid of Bear river the ice forms from the bottom and sides and finally completely blocks the stream. The resulting overflow continually adds to the volume of ice, which reaches an enormous thickness. The heat of an ordinary summer is insufficient to melt this mass entirely, and great quantities of it usually exist on the south or sheltered bank throughout the season. This vast accumulation of ice probably prevents the lower part of the river from opening as soon as the early disruption of its upper part would seem to justify. Richardson states that the lower part usually opens in June, while Petitot gives the usual time as the last of May. In 1904 it was already open when the Mackenzie broke up at Fort Norman on May 21.

Great Bear lake, according to the Geological Survey, has an area of approximately eleven thousand four hundred square miles and lies three hundred and ninety-one feet above the level of the

sea. Its shores, with the exception of parts of MacTavish bay, are rather low.

The area between Great Bear lake and the Arctic coast is said to be fifty thousand square miles, or about equal to England in size. It is nearly all to the north of the Arctic circle, and it is doubtful if it has any agricultural value, unless Doctor Grenfell's idea of introducing reindeer ranching as a commercial enterprise develops.

Anderson River Country.

According to Mr. MacFarlane's description of Anderson river region, north of Great Bear lake, the greater part of the ground is every season covered with short grasses, mosses, and small flowering plants, while patches of sedgy or peaty soil occur at longer or shorter distances. On these, as well as along the smaller rivulets and river and lake banks, Labrador tea, crow-berries, and a few other kinds of berries, dwarf birch, willows, etc., grow. Large flat spaces had the honeycombed appearance usually presented in early spring by land which has been turned over in the autumn. There were few signs of vegetation on these, while some sandy and many other spots were virtually sterile.

The area between Great Bear lake, the Mackenzie and the western part of Great Slave lake, represents some thirty-five thousand square miles. With respect to this region, the indefatigable missionary, Abbé Petitot, made numerous journeys through it, of which he subsequently published an account. They are, however, merely valuable on geographical and geological grounds. References to these reports will be found elsewhere.

Mr. Preble states in his report:—"To the westward

of the northern arm, and north of the main body of Great Slave lake, lies a low, broad plateau, dotted with many lakes and muskegs. It contains no rivers of consequence and is mainly rather thinly wooded, though a number of large prairies occur in the western part, north of the outlet of Great Slave lake."

Russian Provinces in the Same Latitude.

Reference has already been made in this chapter to an interesting comparison made by Wm. Ogilvie, D.L.S., between the Mackenzie country and Finland and Scandinavia.

In his examination before the Senate committee of 1888, Doctor G. M. Dawson instituted a comparison between parts of northwestern Canada and a province of northern European Russia as follows:—"I have a few notes here worth considering while we are dealing with the question of this northern country. I looked up the circumstances of the northern provinces of Russia and I found that the province of Russia which seemed to compare most nearly with that shown on this map, both in its relation in Russia to the Atlantic, corresponding to the relation of this country to the Pacific, and also in its latitude, is the province of Vologda. That province has a total area of one hundred and fifty-five thousand, two hundred and sixty-five square miles, and it is chiefly drained to the north like the country shown here. It lies between latitudes 58° and 65°. It is about seven hundred and fifty miles in greatest length and three hundred miles greatest width. It is drained by the Dwina river chiefly. Its products are carried by this river to Archangel and exported thence in vessels by White sea in the same way that we hope this northern country of ours may be served

by the Mackenzie and Arctic sea. The mouth of the Dwina is in latitude 65°, only a little south of the latitude of the mouth of the Mackenzie. The climate of the two countries is very similar. The winters are severe and the summers warm. There is no very heavy rainfall, such as we find near the western coasts bordering on the Atlantic and on the Pacific. The exports from that province of Vologda are oats, rye, barley, hemp, flax and pulse. The mineral products are salt, copper, iron and marble. Horses and cattle are reared, while the skins of various wild animals, as well as pitch and turpentine, are exported. This province supports a population of one million, one hundred and sixty-one thousand inhabitants.[19]

"That province is not in Siberia but in Russia proper. Now, we have areas to the north which may make several provinces like Vologda, and for the purpose of illustrating this point I have made a very rough calculation here, which as it is founded largely on suppositions, is perhaps scarcely worthy of being presented to the committee, but may serve to give an idea. With reference to the agricultural area of Peace river, I confine myself to a tract roughly marked on the map as to which I have some personal knowledge. Without going over what I have already written in reply to that question and which is largely embodied in a report published some years ago, I may say that the area which is included in the upper portion of Peace river country, is about thirty-one thousand five hundred square miles. The proportion which I estimated as arable land is twenty-three thousand, five hundred square miles. That would give ninety-four thousand quarter-sections if it were subdivided. Reckoning a family of five persons on each, that area would be capable of supporting a

population of four hundred and seventy thousand, or in round figures say five hundred thousand. I do not think it would be at all beyond the mark (though I am speaking now from the report of others, because I have not been farther down Peace river myself) to assume that there is another area at least equally great of arable land in Mackenzie valley to the north of this. That will give another population of say five hundred thousand. Now, if we take the headwaters of the Mackenzie and the Yukon west of the mountains, I think we shall be well within the limits of probability if we say that we have there thirty thousand square miles of that region which may be cultivated with advantage. This, on the same basis as before, would support a population of six hundred thousand persons, or a total of say one million, five hundred thousand persons in Mackenzie valley, and adjacent tracts, to the north altogether of the Saskatchewan watershed, and on the west of the mountains, north of British Columbia. I think we might, without exaggeration, by including miners, fur traders, hunters, lumbermen and those engaged in transport or trade, besides those in outlying fertile sections not included in this—double the total just arrived at. This will give us a population of three million people in that part of the Dominion alone. As I am not personally familiar with lower Mackenzie region east of the mountains, I may have underestimated its value.

A Siberian Province.

Along the same lines the late Robert E. Young, D.L.S., at that time Superintendent of Railway Lands and Chief Geographer, giving evidence before the select standing committee of the Canadian House of

Commons on Agriculture and Colonization, March 11, 1908, instituted in a graphic manner a comparison between Mackenzie basin and the Siberian province of Tobolsk.

Mr. Young had prepared a map of the province of Tobolsk drawn to the same scale as a map of Canada hanging in the room, and attached the small map to the larger, overlying part of the valley of the Mackenzie, taking care that the lines of latitude corresponded exactly.

This demonstrated that rather more than half the province of Tobolsk is north of the 60th parallel, which is the southern limit of the country immediately under discussion, although the southern portion of the Russian province extends in a narrow point as far south as 52° 15″, its general southern boundary is, in latitude, about ten miles north of Athabaska or one hundred miles north of Winnipeg.

Mr. Young proceeded to point out on the map of Tobolsk, the location of the chief cities of the Russian province:—Tobolsk, with a population of twenty thousand, four hundred and twenty-seven, situated at exactly the latitude of Fort Vermilion on Peace river; and Omsk, on the line of the great Siberian Railway, with a population of thirty-seven thousand, four hundred and seventy, situated at a spot corresponding with a point ten miles north of Athabaska, and about a hundred miles north of Edmonton. Mr. Young also pointed out the situation of the city of Tomsk, with fifty-two thousand and five population, a province adjoining Tobolsk, situated at about the same latitude as Chipewyan on Lake Athabaska, or a trifle farther north. Mr. Young went on to explain that in 1900 the population of the province of Tobolsk was one million five hundred thousand.[20]

A Large Town North of Wrigley's Latitude.

Asked how far north the line of habitation extended, Mr. Young replied:—"I might say that two-thirds of the way up we find a road marked on the map which would indicate settlement, I suppose. I also have figures here of the population of some eight or ten towns in the province of Tobolsk. There is one of one thousand, another of three thousand, another of seven thousand, one of eight thousand, and so on. The farthest north is the town of Berezoff, with a population of one thousand two hundred and in latitude 63·50°" (some ten miles north of Fort Wrigley).

Mr. Young, being asked as to the number of convicts who had been sent into Tobolsk, replied:—"I do not know as to that. Whether they were convicts or not, in 1900 they raised six million, four hundred and eighty thousand bushels of wheat, three million odd bushels of rye, nine hundred and seventy-two thousand bushels of barley, and ten million, six hundred and seventeen thousand bushels of oats. These figures are contained in the Encyclopedia Britannica." (In 1906 the figures were:—Wheat, eleven million, seven hundred and seventy-nine thousand bushels; rye, four million, three hundred and forty-four thousand bushels; barley, eight hundred and twenty-nine thousand bushels; oats, thirteen million, eight hundred and eighteen thousand bushels).[21]

Asked if it was not the southern portion of the province in which most of these crops were raised, Mr. Young replied:—"It certainly would be. I think there is no question that it would be in the most southerly portion. All the information I have would go to show that settlement would not extend to the

most northerly regions. Still the fact that there were towns of one thousand people in the northern portion would go to show that there must be something being done there that would support a town of that size. I have tried to work out some parallel between the climatic conditions there and our own country, but I am not able to give it to you exactly. I think that the figures given by the Russian government would probably be the most favourable that they could furnish. The mean temperature for the period from September 1 to June 1, which would include the winter months—I think that is all it is necessary to discuss—would for the province of Tobolsk be practically the

Same Temperature as at Fort Simpson.

It is a very striking thing that a million and a half of people live in that province, and that they raised six million, four hundred and eighty thousand bushels of wheat in 1900. Surely if our country is as good as we think it is, we ought to people it to as great and even a greater extent, and to complete the parallel between the two, I think I can say without any hesitation that we have something which they have not got, and that is the benefit of British institutions."

Mr. Young, later on in his evidence, remarked that there are a great many other statistics about Siberia that are interesting. For instance, from a province adjoining Tobolsk they exported forty thousand pounds of honey in 1900.

Samples of Northern Grown Wheat.

Mr. Young, during his examination upon the occasion here referred to, gave a great deal of information regarding agricultural development and possibilities in the Mackenzie country. He showed the committee a sample of Ladoga wheat grown at Fort Simpson, and in producing it said:—"I got it from Doctor Saunders, Director of Experimental Farms. Fort Simpson is the farthest north of these red points[22] just short of latitude 62° or just about it. I showed that wheat to a gentleman who is accounted an authority on the subject, and I think you could not get a better authority; I am referring to Senator Finlay Young. I said, 'Mr. Young, would you please look at that wheat, but do not refer to the label on the bottle, and tell me what you think of it?' Mr. Young examined the sample in the way that men who are experts on wheat often do. I think he saw nearly every grain of it; he took good care to do so. He said, 'It is very nice wheat, I would call it good wheat. It has been slightly frosted, but I think that wheat would go about sixty-four pounds to the bushel.' Well, the label on the sample says 'Ladoga wheat, grown at Fort Simpson on Mackenzie river, sixty-two pounds to the bushel.'"

Producing another sample of grain, Mr. Young remarked:—"Now gentlemen, here is a sample of wheat from Fort Vermilion." I showed that also to Senator Young and got his opinion on it. In both instances he expressed his opinion before he knew where either of the samples came from. He said, "That is pretty nice wheat. It is not so nice a wheat as the other, but I think it would make first rate flour; it is good wheat."

Better Results Expected.

Mr. Young, in his evidence, drew attention to the fact that the posts in the far north at which grain had been grown had not been selected for wheat raising, but because they were convenient locations for the fur trade. He proceeded:—"I want to discuss that point a little further. I say there are three reasons why we can expect better results in wheat raising in our northern country than has been accomplished up to the present time.

"(1) I will quote what Professor Macoun has stated in a pamphlet relating to the Yukon:—'When grain ripens in the country and is again sown there, it will take on the conditions of its environment and mature earlier, and early frosts like those attributed to Manitoba will have no effect, as the crop will mature before they come. I may remark here that the wheat in the northwest ripens earlier now than it did twenty years ago, and many people believe that it is the climate that has changed, whereas it is only that the wheat has adapted itself to its environment.' I think that any gentleman who has been following the trend of affairs in the northwest will agree with me that the conditions are better with respect to possible injury by summer frosts than they were twenty years ago. I think that cannot be questioned. That is one reason that is given.

"(2) Now, a few days ago, I asked a gentleman who is better able to express an opinion on the point than I am, what he thought of that statement of Professor Macoun's. He said:—'I don't altogether agree with that statement. I do not hesitate at all in saying that the improvement is marked, but I will account for it in another way. If you raise wheat on virgin soil on the prairie it will grow to perhaps about the height of a man's shoulder the first year. The next year it will not be quite so high. The third

year it will be perhaps not so high as the second year, but it will mature earlier. Devote that land to some other use for a year or two and then go back to the cultivation of wheat again, and you will get the wheat growing to the height of about the second or third year, but it will mature earlier. The soil is sharpened.' He explained to me that in Red river valley, where the land is heavier, it would take very many years to bring about that result, and it would not be of so much value to this generation, but in the lighter soil, farther west, it has a marked effect, and, as he argued, there is no question about it.

"(3) The third reason why we can expect better results in that north country is because the staff at the Experimental Farm have been steadily carrying on experiments with a view to obtaining a variety of wheat that will ripen a few days earlier, and if they can shorten the term for the ripening of wheat by four or five days or a week, it will bring into the certain line, as to wheat growing, an enormous area of land. There is no question about it. They have accomplished some good things already, and they expect to accomplish a great deal more."

Mr. Young stated before the committee on this occasion that "there is no question about it that in the north country there are grasses of the greatest possible value to cattle raising, finer grasses than there are in other parts of the northwest."

Professor Macoun's Estimate Still Holds.

Speaking in his evidence generally about the suitability of the far northwestern country for agricultural pursuits, and specially discussing the climatic condition, Mr. Young remarked:—"About three weeks ago I wrote to Professor Macoun and

gave him a list of questions about that country to which I asked him to give me answers. I think it is a very remarkable thing that in his reply he says: ‘In my report to Mr. Alexander Mackenzie in 1877, just when I was fresh in the northwest, I gave details about certain districts of the northland which I could not give in a letter, but I would suggest that extracts from this report may be taken and placed upon file with this letter, as my statements and conclusions as printed thirty years ago still remain without impeachment at the present time.’ I think it is a remarkable thing that with respect to the country through which Professor Macoun went in 1872 and 1873, and which excited his enthusiasm—this is the country that I am trying to tell you about—he now says of it: ‘My statements remain without impeachment at the present time.’ Now, he speaks in this letter of two facts that I think are very striking. He says, ‘In conclusion, I may say that the climate of the whole northland is a stable one, and as local conditions change it will improve, and where small spots are now called good land, whole areas will take that term. The low altitude and the long day are fixed conditions and will always be the same. The forest will be cleared and the muskegs drained, and as the land becomes drier the frosty conditions will pass away and a good country will result.’ ”

[18] Franklin (“Narrative of a Journey, etc.”) relates that the thermometer during the month of October, 1820, at Fort Enterprise (headwaters of the Coppermine) never rose above 37° but never fell below 5°. The mean temperature for the month was 23°. The highest temperature at the same place in the following April was 40° above zero, the lowest 32° below. The mean was 4° above zero. May 9, the snow had disappeared from the ground. The first robin appeared May 14. The average temperature for May was nearly 32° above zero; the greatest heat 68° and the lowest 8°. At the end of the month there was constant daylight.

When the Franklin expedition was at Fort Franklin (west side of Great Bear lake) in 1826, the first flower was gathered on May 27. (“Narrative of a Second Expedition, etc.”)

[19] The population of Vologda, in 1910, the latest available, was one million, five hundred and ninety-seven thousand, five hundred, or ten per square mile. (E. J. C.)

[20] The figures for 1906 were:—city of Tobolsk, twenty thousand, eight hundred; Omsk, forty-three thousand, four hundred; province of Tobolsk, one million, six hundred and fifty-six thousand, seven hundred. In 1910, the total population of the province of Tobolsk was given as one million, seven hundred and sixty-nine thousand, eight hundred. According to latest statistics available the population of the four million, eight hundred and seventeen thousand, six hundred and eighty-seven square miles comprising Siberia is eight million, two hundred and twenty thousand, one hundred. Siberia in 1910 raised one hundred and seventy million poods of cereals. A pood equals thirty-six pounds. E. J. C.

[21] According to a blue book issued by the Board of Trade of Great Britain in 1905, the province of Tobolsk in 1901 contained three million, eight hundred and four thousand, eight hundred and forty-seven head of life stock, and from one district alone, viz: Kurgan (about the latitude of Peace river) there was exported in 1902, nineteen million, seven hundred and eleven thousand, four hundred and forty-six pounds of butter, which was largely marketed in Great Britain. E. J. C.

[22] Referring to the map produced by Mr. Young before the committee, on which he had shown the position of places where wheat had been grown in northwestern Canada by a scheme of red discs appearing on the map.

CHAPTER XVI.

THE MACKENZIE RIVER REGION.

Tree Growth and Timber Resources.

Forests About Great Slave lake and Slave river.—
Remarkable Extension of Forest Growth Northward

Down the Mackenzie.—Wide Distribution of the Economically Important Canoe Birch.—Magnificent Forests of Spruce and Big Cottonwood Trees in Liard valley.—Useful Birch and Large Spruce Grow Within the Arctic Circle.—Trees that are Centuries Old.—Northern Tree Growth May be Hastened by Drainage.

The splendid forests along the banks of Slave and Mackenzie rivers have been remarked by all who have ever travelled along the truly magnificent waterway of the far northwest, and the fact has been abundantly established that the growth of timber extends, along the rivers at least, far beyond the Arctic circle, and well down the delta of the Mackenzie. It is true that there are large muskeg and rocky areas in the basin of the Mackenzie which support no tree growth, but the aggregate forest wealth of the country is immense.

Mr. Elihu Stewart, formerly Superintendent of Forestry, testified before the Senate committee of 1907 that the principal tree between Rocky mountains and the plains is the spruce, mostly the white spruce, and from its position near the prairie there is no doubt that it will be more sought after to meet the increasing demands from that quarter. The country along the upper waters north of Saskatchewan, Athabaska and Peace rivers, is partly prairie and partly wood. The varieties of timber are principally aspen and balsam poplar, the former predominating, and white spruce. The poplars, as we go north, seem to increase in size and height. Below the junction of the Smoky they grow very clean and straight, not over a foot or fourteen inches in diameter, but reaching a height of seventeen or eighteen feet, making excellent building timber, as well as fencing and fuel. In some parts there are stretches of good spruce well adapted for lumbering purposes. There has so far been but little destruction

from fire in this quarter. The land is mostly level, soil excellent, and if the summer frosts do not prevent it, the country will begin soon to settle up and there will be an ample supply of timber for local uses, if not for export to the adjoining prairie regions. Mr. Stewart said he never saw as fine poplar as he saw there. A considerable number of poplars were over a foot, but a foot would be a fair average. He had seen poplar in all parts of the prairie country, but never saw anything growing up as straight.

Limit of Tree Growth Far North.

Mr. Stewart explained that spruce suitable for commercial purposes grows to Arctic sea. He was astonished to find that the limit of tree growth extended as far north as it does. He thought it extended probably ten degrees farther north in this district than in Labrador. The different kinds of trees that grow in Mackenzie basin include white spruce, black spruce, the larch or tamarack, which is found as far north as the spruce, the jackpine and the balsam. Mr. Stewart did not see any balsam in the Arctic circle; aspen, white poplar, balm of Gilead and birch are all found down as far as Fort McPherson. The natives make their canoes out of birch bark at Fort McPherson. The size of the timber becomes less towards the north. There is timber probably fourteen inches in diameter growing near the junctions of Peace and Slave rivers. Below Fort Good Hope the timber is smaller. Some of it has been made into flooring, and lumber is made from the timber there. There is a large supply of spruce suitable for pulp as far north as that.

Mr. Stewart, replying to a question, said he thought it possible to use this poplar wood for

commercial purposes. It is very good poplar. It will make pulp, and where it is large enough it can be sawed. It makes excellent flooring. The white poplar in the north is of a better quality than the poplar in Ottawa district. In Saskatchewan district and in the far west it is different. In a colder climate it grows more slowly.

As to the extent of the forests, Mr. Stewart remarked that wherever there was a stream there would be a belt of timber.

Along Athabaska river there is a very big waterpower. There are Grand rapids and various other points eighty miles north. On Slave river there are about sixteen miles of rapids, which constitute the interruption to navigation, and it would make excellent waterpower. There is no waterpower on the Mackenzie below Fort Smith, on the main stream. From Smith Landing to Fort Smith the timber is jackpine, some of which is quite large enough for railway ties. The timber on the heavier soil consists of black and white poplar, spruce, birch and willow of small size and of little value.

Timber Along Slave River.

Mr. McConnell states (Geol. Survey Report, 1887-8) that on both sides of Slave river below Salt river are level plains, which extend without any evident elevation as far as the eye can reach, and support extensive forests of white spruce and Banksian pine mingled with larch and rough and smooth barked poplar. The spruce frequently attains a diameter of eighteen inches and makes excellent timber. In the vicinity of Slave river rapids the country is mostly level, and is covered with white spruce, Banksian pine, the rough and smooth barked

poplars and various species of willow and alder. The Mackenzie river steamer "Wrigley" was built here in the winter of 1887, and the timber used in construction was all obtained from the surrounding forest.

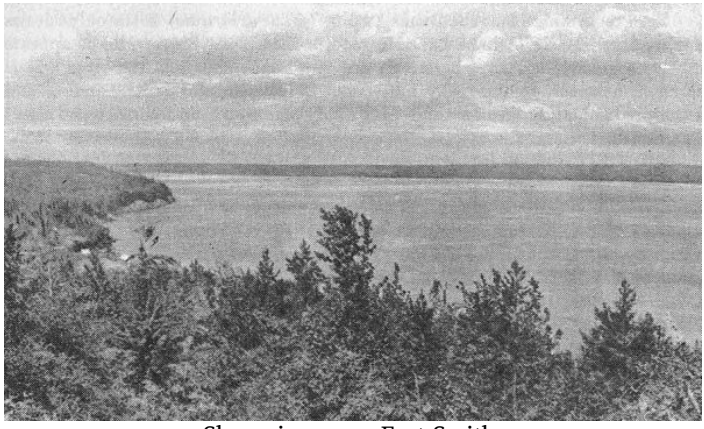
Mr. Wm. Ogilvie says in his report:—

"The level country surrounding the lower half of Great Slave river is all well timbered with fine large spruce, equalling in this lower Athabaska and Peace rivers, and I think, when the time comes, that here will be found this district's principal supply lumber. On the high, light soil round Fort Smith, the trees are small and generally of no value except for fuel. Along the river, between the rapids and Lake Athabaska, there are many small areas of flat, swampy ground which would supply some very fair timber.

"The varieties of trees along the lower part of the river are few, spruce, with a few small tamarack, some small birch, and a few poplar constituting the bulk of the forest. The spruce far outnumber all the rest. On some of the islands there is much shrubbery, willows, and alders growing in profusion in the swampy places; but, in general, the undergrowth is stunted and thin, especially on the uplands."

Mr. E. A. Preble of the United States Biological Survey, describing Slave river in his report writes: —"Here the willows and poplars which border the stream alternate with stretches of fine white spruce (*Picea canadensis*), some of which attain a diameter of three feet and rear their summits to a height of one hundred and fifty feet."

The aspen poplar (*Populus tremuloides*), according to Mr. Preble, occurs nearly throughout the wooded region. In favourable places along the Athabaska and Slave it attains a large size, and this is the case also about Fort Simpson.



Slave river near Fort Smith.

THE WHITE SPRUCE.

Mr. E. A. Preble states that the white spruce (*Picea canadensis*) reaches its perfection in the alluvial bottoms of Slave river valley:—"In favourable places along Slave river it attains a diameter of three feet, and a height of nearly one hundred and fifty. This species, usually called 'pine' in the north, is the commonest timber tree of the region, and occurs north to the limit of the forest. Along certain rivers which enter the Barren Grounds from the southward, the range of this species is extended far beyond its general limits, and sometimes the isolated colonies are of large extent. Most of the lumber used in building and general constructive work throughout the region is furnished by this species. Its wood is soft and easily worked, and though admirably adapted for some purposes, is used for others only from necessity. Its slender fibrous roots, split into long strips are used by the natives to sew together the pieces of birch bark in the constrution of canoes and various utensils. Its

bark, stripped from the trunks in early spring, forms the usual roofing material, taking the place of shingles throughout the region, except at a few favoured posts."

Mr. Preble states that the Banksian pine (pinus divaricata) is the only species of pine north of the Athabaska. He reports that along Slave river it appears only occasionally, usually where high gravelly banks approach the river. It is common, however, on the rocky hills about Chipewyan and Smith Landing, and is the predominating tree on the rolling sandy plains on Smith portage and about Fort Smith.

A Comprehensive Summary.

A very comprehensive summary of the evidence available as to the timber resources of the Mackenzie was prepared by R. E. Young, D.L.S., and submitted by him to the House of Commons committee on Agriculture and Colonization in 1908. In this document, Mr. Young had his information classified according to valleys, a very convenient arrangement considering that the best of the timber growth is in the valleys, and that the rivers are the only routes of exploration as yet generally available. Some additional data have since been obtained which will be incorporated with Mr. Young's statement, or substituted for portions of it, this being according to a suggestion made by Mr. Young himself shortly before his most regrettable death. The succeeding pages of this chapter consist largely of Mr. Young's own statement (see report of committee, pages 159 to 188).

Of the excellence of the forests from Salt river down there can be no doubt. As long ago as 1772

Samuel Hearne, the first white man to reach Great Slave lake on his return journey from the mouth of the Coppermine, entered the mouth of Slave river and went up it some distance before starting inland on his journey back to Hudson bay. It is very interesting to note what Hearne at that distant date said: “The woods around this river, particularly the pines and poplars, are the tallest and stoutest that I have seen in any part of North America. The birch also grows to a considerable size and some species of the willow are likewise tall, but none of them have any trunk like those in England.” On the island of the lake near the mouth of the river, Hearne saw great quantities of driftwood. He says: “some of this wood is large enough to make masts for the largest ships that are built. The woods through which we were to pass were in many places so thick that it was necessary to cut a path before the women could pass with their sledges, and in other places so much of the woods had formerly been set on fire and burnt that we were frequently obliged to walk farther than we otherwise should have done, before we could find green brush enough to floor our tents.”

Bishop Clut, O.M.I., before the Senate committee of 1888, stated that from Fort Smith to Fort Resolution there is a great quantity of beautiful forest, white spruce or ordinary larch. Spruce from two to three feet in diameter is found. The birch of the country is very hard and would make good furniture. It is from birch that they make traineau, buggies, chairs and snowshoes. In the country lying to the south and west of Great Slave lake there is a good deal of forest of beautiful coppice wood, ordinary spruce, and black or red spruce.

The Timber About Great Slave Lake.

Hay river flows into the southwest part of Great Slave lake. Of the country around, Mr. McConnell says: “Grassy and partly wooded plains extend northwards from Peace river and skirt its southern shores. It is the northern limit of the prairie region. Near its mouth the country on both sides is thickly forested with Banksian pine and white spruce to Alexandra falls.”

The country from here east to Slave river is known to be well wooded, but strange as it may seem, the country from Slave river east has never been explored since Samuel Hearne passed through it in 1772, one hundred and thirty-six years ago. Somewhere southeast of the lake, Hearne spoke of a long narrow lake “entirely surrounded with high land which produces a vast quantity of fir trees, but none of them grow to a great height in those parts. Their branches, however, spread wider than those of firs three times their height and thickness do in Europe, so that they resemble an apple tree in shape. They seem rich in tar as the wood of them will burn like a candle and emit as strong a smell and as much black smoke as the staves of an old tar barrel. The under woods were so thick in these parts as to render travelling through them very difficult.” Of the part of Great Slave lake where Hearne crossed it, he says: “The point where we crossed it is said to be the narrowest. It is full of islands most of which are clothed with fine, tall poplars, birch and pines, etc.”

Mr. E. A. Preble, in his report, has this to say of Great Slave lake:—“Great Slave lake lies wholly within the forested region, though some of its eastern affluents drain large areas of treeless country. Its southwestern shores, being watered by rivers coming from the south and southwest, are well wooded, while the northern shores, exposed for most of the

year to cold winds from the north and watered by colder streams, are poorly wooded. The soil conditions, also, being more favourable on the southern side of the lake, exert a marked influence on the foresting. The eastern arm of the lake, however, is largely removed from these modifying influences, and the conditions on its northern and southern borders are more nearly uniform."

Forests North of the Lake.

The country to the north of Great Slave lake has been much more thoroughly examined.

R. G. McConnell (Geol. Rep., 1887-88) wintered at Fort Providence on the Mackenzie and made a winter journey northeast to Fort Rae, on the long arm of the lake that reaches out to the north. From Fort Providence to Birch lake, half the distance across, he crossed the Grand Brulé, the scene of a former destructive fire, wherein he says there were three wide prairies with the intervening timber belts. From here on he crossed first a well wooded country where some excellent spruce was seen, then a more scantily clad country with groves of spruce, poplar, birch and alder, and thence to Fort Rae a thick spruce forest.

J. M. Bell (Geol. Rep., 1904) describes the country along Martin river and chain of lakes emptying into the long northern arm of the lake as thickly wooded with aspen, balsam poplar, canoe-birch, white spruce and Banksian pine.

Mr. Preble made the trip from the north of Great Slave lake to Great Bear lake via the lake, and portage route. August 25, a few days after passing the height of land, he reports:—"The portage track led over rocky ground on the left bank. Favourable

spots at the rapid supported a good growth of spruce, with a luxuriant undergrowth of *Viburnum pauciflorum*, *Rosa acicularis*, *Rubus strigosus*, and *Vaccinium uliginosum*. Since leaving Lake Hardisty I had observed an increased luxuriance in the forest growth, evidently the result of a more favourable soil and the slightly decreased altitude."

Mr. Preble states that the Banksian pine "occurs commonly about the northern arm of Great Slave lake. On my route to the northward of Fort Rae it was seen in many places on Grandin river, reaching a diameter of eighteen inches, but not growing very tall. North of the height of land it was rare, but I saw many trees on a portage a few miles north of the outlet of Lake Hardisty."

Mr. Preble states that on the canoe route between the north arm of Great Slave lake and Great Bear lake the white spruce is common, varying in luxuriance according to the local conditions.

The Canoe Birch.

The canoe birch (*betula papyrifera*), according to Mr. Preble, is a common tree throughout the wooded region. It reaches its perfection in the southern part of the country and northward gradually decreases in size. On the canoe route north of Fort Rae, it was found to be common, reaching a diameter of nearly one foot as far north as Lake St. Croix. A tree five inches in diameter, examined near that lake, had sixty-five annual rings. Another specimen one and three-quarter inches in diameter, on the shores of Lake Hardisty, had been growing twenty-five years, and one three-fourths of an inch thick was fifteen years old. This tree is of great economic importance to the natives of the region. Its wood, though soft

when green, is rather hard when seasoned, and takes a high polish. The frames of snowshoes, the runners of sleds and toboggans, and the handles of axes and other tools are usually made of it. In addition to furnishing the covering for canoes, its bark is used in the construction of baskets, and various household utensils, and to some extent for constructing shelters.

The natives gather up the sap in spring and boil it down into syrup. An incision is made with the axe on the side of the tree, and the sap gathers and drops from a projecting point of bark. At Fort Simpson in 1904, the sap was running freely from April 20 to May 1.

Yellowknife river flows into the eastern side of the north arm of Great Slave lake coming from a northern direction. Sir John Franklin, who ascended and descended this river in his journeys of 1819-22, says that this river flows between high rocky banks on which there is sufficient soil to support pines, birch and poplars, but in the upper stretches the country has a very barren aspect. From here to Fort Enterprise the country is much the same. Mr. Back (afterwards Sir George Back), one of his party on his winter journey back from Fort Enterprise, wrote that after passing Reindeer lake "the scenery consisted of barren rocks and high hills, covered with lofty pine, birch and larch trees. There was a visible increase of wood, consisting of birch and larch, as we inclined to the southward."

Fort Enterprise.[23]

In his journal of August 19, 1820, Sir John Franklin, speaking of his winter quarters known as Fort Enterprise, says: "The trees were numerous and of a far greater size than we had supposed them to

be yesterday, some of the pines being thirty or forty feet high and two feet in diameter at the root." Near by was the Winter river, whose banks, he says, were well clothed with pines. On the same day they unfortunately set fire to the woods. "A fire was made on the south side of the river to inform the chief of our arrival, which, spreading before a strong wind, caught the whole wood, and we were completely enveloped in a cloud of smoke for the three following days." Their winter quarters were made from wood cut in the vicinity, though of the size of the logs no mention is made. From here to Coppermine river the only trees were scattered dwarf pines.

Mr. Wm. Ogilvie states that on the flats between Great Slave lake and Fort Simpson, as well as those adjoining the lake, "there is much forest that would yield a large amount of good sized spruce and poplar."

Mr. Elihu Stewart says that the land at the entrance to Mackenzie river is low and covered with spruce and tamarack of small size. Islands covered with green timber are numerous and the appearance is suggestive of the lower St. Lawrence. The timber along the Mackenzie to Fort Simpson is smaller than that found along Slave river, but nevertheless it is of sufficient size in some cases for lumber.

Sir John Franklin (Journey, 1819-22) says that around Fort Providence the surface of the hills is generally naked, but in the valleys between them a few spruce, aspen and birch grow.

Sir Alexander MacKenzie (1789) also speaks of the country north of the Mackenzie after leaving Slave lake as follows: "He (an Indian) at the same time informed us that a river falls in from the north, which takes its rise in Horn mountain, now in sight,

which is the country of the Beaver Indians, and that he and his relatives frequently meet on that river. He also added that there were very extensive plains on both sides of it, which abound in buffaloes and moose deer."

Mr. R. G. McConnell (Geol. Survey Rep. 1887-88) says that from Fort Providence southwest along Beaver river to Lake Bis-tcho is a desolate looking plain scantily covered with spruce and tamarack. Lake Bis-tcho is surrounded by a flat country, wooded with spruce, birch and tamarack of fair size.

About Fort Simpson.

James Anderson of Winnipeg left Fort Simpson in 1852 when eleven years old (Senate Report 1888). He says: "Round Fort Simpson itself, I remember the timber was very large. It was fir, poplar and birch." He calls the fir hemlock but no doubt means the spruce. Poplar and birch he says were the other varieties. He says that the fir was a very large kind. The men used to square the timber to about one foot square, for building their houses, and the fort itself was built of squared timber. He says the way he remembers the birch was that it was used so much in the making of snowshoes and other things.

Mr. Stewart (1906) says there is a small-sized sawmill at Fort Simpson, not now running, in which lumber twelve inches in width was cut and used in buildings at this post. "One cannot but be struck," he says, "with the vast quantity of spruce along the route traversed (from Fort Providence to Fort Simpson), which is a little under size for lumber but would make excellent pulpwood."

Mr. R. G. McConnell, in his evidence before the Senate committee of 1907, stated that the timber

about Fort Simpson is confined to large spruce. White spruce is the main tree all through that country. Spruce from a few inches up to two feet through occurs all the way along the Mackenzie, on the flats, and on nearly all the tributary streams.

Reporting upon the Banksian pine Mr. Preble states:—"On the Mackenzie it is common north to about latitude 64 degrees. About Fort Simpson, in suitable localities, it forms groves of well-grown trees reaching a diameter of eighteen inches. A tree eleven inches in diameter near the base, examined at Fort Simpson, had one hundred and two annual rings. On the north slope of the Nahanni mountains, seventy-five miles below Fort Simpson, the species ascends to about one thousand feet and then becomes a dwarfed shrub and disappears. On the southern slopes of the same mountains it occurs as a fairly well-grown tree about two thousand feet near the summit."

As to the balsam poplar (*Populus balsamifera*) Mr. Preble reports:—"The balsam poplar inhabits the entire length of Athabaska, Slave, and Mackenzie rivers, reaching its greatest perfection of habit on Athabaska, Slave, Peace, and Liard rivers. On the Mackenzie, at Fort Simpson, it is a stately tree, but below that point it rapidly decreases in size, and on the lower Mackenzie and Peel rivers occurs only as a small tree. Its wood is put to very little use except for fuel, and even for this purpose it is not well adapted."

The Tamarack and its Uses.

Mr. Preble reports the Koch tamarack (*Larix Laricina*) "is common at Fort Simpson and reaches a good size. On June 1, 1904, the leaves were just beginning to appear, tinging the swamps with their

beautiful shade of green. As I descended the river the progress of vegetation kept pace in a general way with my rate of travel. At Fort Norman, on June 11, the leaves and cones of the tamaracks were just appearing and at Fort Good Hope, ten days later, they were about half grown.

"The tamarack is found throughout the region north to the limit of the forest, occurring mainly in muskegs where it is sometimes the predominating tree. Since its wood is tougher than any other native to the region, it is used to a considerable extent to form the keels and gunwales of boats, and for other purposes where extra strength is required."

According to the evidence of Mr. R. G. McConnell before the Senate committee of 1907:—"Along the Liard there are good bunches of timber, and it is the same with all these tributary streams. Once away from the flats the timber is sparse and the trees are small. Small black spruce grow on the muskegs. The timber is simply on the flats and extends back two or three miles from the river. That is not solidly timbered on either side of the river. The poplar does not grow to a large tree as it does down here. It runs about three to six inches through. The rough bark poplar grows up to a foot or more."

Magnificent Forests of Spruce.

Bishop Clut, before the Senate committee of 1888, stated that on Liard river, the south branch of which he had ascended often, and on Peace river also, there were magnificent forests of spruce. The trees were from eighty to one hundred feet high on the islands.

The branch of the Liard which extends south is called the Nelson. William Ogilvie explored this

whole region across to the Peace, coming out at Fort St. John. Across the height of land the timber is very poor. On the Nelson above the forks where the Sikanni Chief branch flows in, it is heavily timbered. Mr. Ogilvie passed many extensive flats covered with beautiful spruce trees. The valley is quite wide and clothed with fine timber for a distance above the forks of about thirty miles. Farther down, above Fort Nelson, there are many extensive areas of open woods which almost might be classed as prairie, no doubt the result of forest fires.

Of Fort Nelson, Mr. Ogilvie says it is surrounded by dense, high forest, and as the clearing around it is only a few acres in extent, much of the sun's warmth is lost during the day. The surface is all heavily wooded and there are many very large trees, both spruce and balsam poplar. He selected the average sized balsam poplar at Fort Nelson, cut it down and made the following measurements of it:—Diameter at stump, exclusive of bark, twenty-nine inches; at first limb, exclusive of bark, seventeen and one-half inches; stump to first limb, ninety feet; number of growing rings, one hundred and forty-five. The bark would add at least four inches to the diameter.

Large Trees of Liard Valley.

Entering the valley of the Liard, from the Mackenzie, Mr. Elihu Stewart says, there is a good deal of fine large spruce, which would make better lumber than most of the spruce used in the settled part of the territories, but as it is on the Arctic water system it is practically out of reach. The balsam poplar, or as it is called here, cottonwood, is very plentiful and very large, trees nearly four feet in diameter being often seen, though between two or

three feet is the average diameter of the trees. These two trees constitute the great mass of the forest. A few small white birches are occasionally seen and more frequently the aspen or poplar. There are also, sometimes, a few balsam pines on the top of sandy knolls.

A man who had explored the Liard told Mr. Stewart that he had never seen finer saw-log timber anywhere. He also said that good birch, which is highly prized by the Indians for bark for their canoes, was found there.

Mr. R. G. McConnell, in his report of his explorations in 1887, stated that along the lower Liard the trees observed consisted of white spruce, aspen and tall, straight cottonwood, with some Banksian pine and canoe birch, and an undergrowth of willows and alders.

According to Mr. Ogilvie the country about Wrigley is wooded. He noticed a spruce log near the post that was twenty inches in diameter. Mr. Ogilvie states in his report: “It may, in short, be said, that away from the immediate vicinity of the river, there is no timber of value in the sense in which the term is used in the east. Below Fort Wrigley, and even above that point, in some places the banks are low, flat and swampy, with trees much larger than those on the higher lands, many of them being fit to make fairly good lumber.”

Mr. Joseph Keele reported in 1908:—“The timber resources of Gravel river (which flows into the Mackenzie from the westward above Fort Norman) are very moderate, the white and black spruce trees of any importance being confined to the alluvial flats, which on this river are very limited in extent, and the best white groves average about ten inches in diameter. Generally very few trees grow higher

than about one thousand feet above the river, owing to the steep slopes of rock and talus of the valley walls."

Fort Norman Region.

According to Mr. Preble, the white spruce on the Mackenzie does not attain the size reached farther south, but is still a stately tree. One measured by Richardson on the Mackenzie above Fort Norman was one hundred and twenty-two feet in height. On the alluvial banks and islands of lower Mackenzie and Peel rivers it attains a diameter of eighteen inches. On the northern slopes of the mountains near the mouth of the Nahanni this tree ascends to timberline, but above an altitude of five hundred feet seldom exceeds a height of twenty-five feet.

As has been already said, the general aspect of the forest does not alter in the descent of the Mackenzie. The white spruce continues to be the chief tree. In the Fort Norman quarter (speaking generally) it attains a girth of four or five feet, and a height of about sixty in a growth of from two to three hundred years, as shown by the annual layers of wood. One tree, cut down in a sheltered valley near Clark's hill, south of Great Bear river which flows into the Mackenzie at Fort Norman, measured the unusual length of one hundred and twenty-two feet, but was comparatively slender. Most of the timber is twisted, particularly where the trees grow in exposed situations. The Banksian pine was not traced to the north of Great Bear river, but the black spruce, in a stunted form, is found on the borders of swamps as far as the woods extend.

Great Bear river is described by J. M. Bell (Geological Survey Report 1904) as follows:—"The

clear waters of Great Bear river join the Mackenzie through a deep wooded valley. For the first forty miles the banks are well wooded with white spruce, canoe birch, aspen and balsam poplar. Mount Charles rises to a height of one thousand five hundred feet on the left side of the river. In climbing the hill I was surprised at the size of the trees around its lower slope. White spruce of about twenty inches diameter were quite common as well as fine specimens of canoe-birch, balsam, poplar and aspen. At the lake the country is quite destitute of trees, as they have all been used for fuel by the Indians."

Doctor Dawson stated before the Senate committee of 1888 that Richardson had described the white spruce as attaining a girth of four or five feet, and a height of sixty feet in Mackenzie valley as far north as Bear lake river. One tree in that locality measured one hundred and twenty-two feet in height. It appeared that the white spruce was the most prevalent tree throughout Mackenzie valley, and its wood was fairly good for all constructive purposes.

The Black Spruce.

Mr. McConnell (Senate Committee Report, 1888) says that jackpine occurs in places as far north as Fort Good Hope. Although not growing very large some of the trees would be big enough for railway ties. He explained that the country is not forest continually as it is here (Ontario), but most of the country is open wood. Nearly all the muskegs are covered with, or surrounded by, black spruce. Mr. McConnell agrees with other travellers of this region in saying that very little change in the character of the forest was observed in descending the Mackenzie,

and with the exception of the Banksian pine, which disappears south of Bear river, the same species as previously noticed by Richardson are found from Great Slave lake to the mouth of Peel river.

The Mackenzie has no rapids suitable for waterpower, but the streams flowing into it must have.

Mr. Preble says of the black spruce (*Picea Mariana*):—"The black spruce extends northward to the limit of the forest, but is confined mainly to the muskegs, seldom growing on the alluvial bottom lands, where the white spruce attains its perfection. It furnishes a poorer quality of lumber than the white spruce, and is put to fewer uses. I noted it in places all along the main route to the mouth of the Mackenzie and on my canoe route to the eastward, nearly to Great Bear lake."

Mr. McConnell (Geol. Survey Report 1887-88) reports that along part of the reach of the Mackenzie below Fort Good Hope the banks are low, and the bordering plains are covered with a scattered growth of willow, spruce and tamarack, with here and there patches of aspen on the drier ridges. The spruce along part of this reach presents a remarkably stunted and dwarfish appearance, but this is due more to the marshy character of the ground than to climatic severity, as the same tree, straight and well grown, was found much farther north.

Below Fort Good Hope.

Mr. McConnell reports that the Mackenzie below the site of old Fort Good Hope, where the stream takes a sharp turn to the west-south west, as far as the mouth of Red river, is bordered by wooded plains. Groves of white spruce were seen along this

reach, containing trees measuring over fifteen inches in diameter, but the average tree does not exceed six inches. Mr. Stewart says that on an island near Fort Good Hope very good spruce timber is cut into lumber by whipsaws. Below this the timber seems to get poorer, although it improves again farther north. Mr. Stewart says that below Fort Good Hope the timber is smaller although some of it has been made into flooring and lumber is made from the timber there. There is a large supply of spruce suitable for pulp.

Northeast of Fort Good Hope, through a chain of lakes to the headwaters of Iroquois river, R. MacFarlane (Canadian Record of Science, vol. IV.) says that the country appeared to be well timbered in every direction with pines, juniper, several species of willow, and a few small groves of poplar and birch.

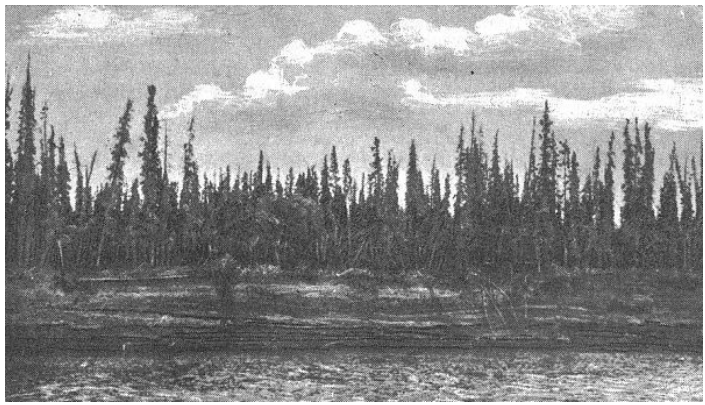
On the Mackenzie itself the forest continues to within a comparatively short distance from the Arctic ocean. The following extract is from Sir John Richardson's journal in 1848:—"The agency of man is working a change in the aspect of the forest even in the thinly peopled north. The woods are wasted by extensive fires, kindled accidentally or intentionally, which spread with rapidity over a wide extent of country, and continue to burn until they are extinguished by heavy rains. These conflagrations consume even the soil of the drier tracts, and the bare and whitened rocks testify for centuries to the havoc that has been made. A new growth of timber, however, sooner or later springs up, and the soil, when not wholly consumed, being saturated with alkali, gives birth to a thicket of aspen instead of the aboriginal spruce."

Within the Arctic Circle.

Mr. Elihu Stewart explained before the Senate committee of 1907 that spruce suitable for commercial purposes grows to Arctic sea. He was astonished to find that the limit of tree growth extended as far north as it does. He thought it extended probably ten degrees, or nearly seven hundred miles farther north in this district than in Labrador. The different kinds of trees that we have in Mackenzie basin include white spruce, black spruce, the larch or tamarack, which is found as far north as the spruce, the jackpine and the balsam. Mr. Stewart did not see any balsam in the Arctic circle, but aspen, white poplar, balm of Gilead and birch are all found down as far as Fort McPherson near the delta of the Mackenzie.

Mr. Ogilvie states in his report:—"On the lower Mackenzie, the timber large enough for commercial or manufacturing purposes is all in the river valley. On the plains above, the trees are small and unfit for anything except for fuel or the few uses to which trees six to seven inches in diameter can be applied. There is some fine material for lumber on some of the islands in the river, but many are bare, with the exception of a few willows."

According to Mr. R. G. McConnell's report: —"From the head of the delta of the Mackenzie the coast is low and sandy, and is exposed to the full rigour of the arctic storms, and the general vegetation of the bordering plains is stunted and diminutive in appearance, but is relieved by the presence of a few large spruce trees, which look like survivors from an ancient and more luxuriant forest. Some of these trees have a girth of over six feet, and are tall and well shaped, while the average spruce in this latitude does not exceed six or seven inches in diameter."



Spruce Timber on Peel river inside the Arctic Circle.

Timber of the Delta.

Sir John Richardson descended the delta to the ocean in 1848, and the following is his account of the timber:—

"Most of the islands constituting the delta of the Mackenzie are alluvial and many of the smaller ones are merely a ring of white spruce trees and willows on a sand or mud bank. Twenty-two miles below Point Separation the banks of the river and the numerous islands are well wooded. The balsam poplars rise to the height of twenty feet and the white spruce to forty or fifty feet. At the creek which bounds Harrison island on the north, the valleys and borders of the river are well wooded, but the summits of the eminence present only scattered spruce firs, with stunted tips and widely spreading depressed lower branches. The canoe-birch is frequent, and the trees we measured were about five inches in diameter. The balsam poplar grows to the height of twenty feet. In latitude 68° 55′ north, the trees disappeared so suddenly that I could not but attribute their cessation to the influence of the sea-

air. Beyond this line a few stunted spruces only were seen struggling for existence and some scrubby canoe-birches clinging to the bases of the hills."

According to Mr. Elihu Stewart's official report "At Point Separation, which lies between the junction of Mackenzie and Peel rivers, and where Franklin and Richardson were camped, are two spruce trees, which were marked as lob-sticks at the time of their separation and in commemoration of that event. Both are still standing (1906), though one of them is dead. Judging from their appearance at a distance, I would say that they are about sixteen inches in diameter and seventy feet in height, and this nearly one hundred miles *beyond* the Arctic circle. I have been very much interested in the tenacity of life shown in the growth of trees under the adverse conditions prevailing in this north country. Since crossing the Arctic circle we have seen no vegetation, but trees such as the spruce, birch, tamarack and willow are seen all the way." Mr. Stewart adds that as his boat rounded Point Separation and ascended Peel river he noticed that spruce lined the banks.

Mr. Alfred H. Harrison, in his book "In Search of a Polar Continent," describes a visit to these lob-sticks in September 1906:—"After leaving Point Separation, we came to a very shallow place about half-way between this point and what are called the Lob-Sticks. At the last-named spot the river turns sharply to the east. These Lob-Sticks, which are supposed to have been trimmed by Commander Pullen some sixty years ago, are two pine trees. The branches have all been cut off, but the tops remain. One of them is a very fine old tree, and the other, which is much younger and smaller, stands directly in front of its nobler brother."

Arctic Grown Birch.

Mr. Preble points out that along the Mackenzie the canoe birch occurs as an economically important species even north of the delta.

According to Mr. Stewart, birch about the delta of the Mackenzie attains a size of twelve to sixteen inches and is used at Fort McPherson not only for their log buildings, but it is also whip-sawed into lumber for general use, and the birch bark here is used by the Indians for their canoes. For a distance of a few miles from the Peel the country is partially wooded with spruce, birch, balsam-poplar and willow, but after this the only timber is that found skirting the shores of the small streams on the way. A fringe of timber, mostly small spruce, lines the banks of the Bell, but apparently does not extend far back.

Mr. Malcolm Macleod, in his statement to the Senate committee of 1888, said:—"As to the wood of that far north I would observe that it is remarkably hard. I have a pair of snowshoes of peculiar shape, made right and left, of birch for frame, like iron in texture, and though perhaps about a hundred years old, perfectly sound."

The frozen subsoil of the northern portions of the woodland country does not prevent the timber from attaining a good size, for the roots of the white spruce spread over the icy substratum as they would over smooth rock. As may be expected, however, the growth of trees is slow in the high latitudes. On the borders of Great Bear lake, four hundred years (according to Sir John Richardson) are required to bring the stem of the white spruce to the thickness of a man's waist. When the tree is exposed to high winds, the fibres of the wood are spirally twisted, but

in sheltered places, or in the midst of the forest, the grain is straight and the wood splits freely.

Great Bear Lake Country.

As to the country about Great Bear lake and its tributaries, Sir John Richardson, in 1826, reported that there were pine trees in clumps on Dease river, and the valley to the north was well wooded.

Mr. Malcolm Macleod informed the Senate committee of 1888 that in a letter of Thomas Simpson to his father he says that the wood at Fort Confidence had been found suitable for house and boat building. Doctor J. M. Bell says that the location of Fort Confidence was one of the few well wooded spots in Great Bear lake and the trees are fine specimens worthy of a more southern latitude.

Between Keith bay and Smith bay, Doctor J. M. Bell found a small lake well wooded with white spruce, willows and alders, but none of them of great size. Here he saw the most northern specimen of white birch. The surrounding country was wooded in the valleys. It was, he says, a pleasing change from the cheerless, gravelly, treeless shores, to reach Limestone point thirty miles west of Fort Confidence, with its pronounced shore-line and white spruce in the bay. West of Fort Confidence along the coast of Dease bay for some distance the deep bays are well wooded, but towards Cape McDonnell the land gets barren and continues so till the coast turns east again where the trees improve.

“Some forty-five miles east of Cape McDonnell,” says Doctor Bell, “a good sized river enters, probably the Takaatcho. Near its mouth,” he says, “we found great quantities of driftwood among which were some good-sized trunks. I was rather surprised to see

these, but learned afterwards that in the interior the valley of this river is well wooded. All the eastern shore of McTavish bay is wooded. In the valleys in the interior and around the bays and sheltered channels this timber may be of economic importance. White spruce is the prevailing forest tree, although canoe-birch is found as far north as Eda Travers bay, and is sufficiently large in Klarondesk bay to permit of its bark being used for making canoes. Tamarack and both balsam poplar and aspen abound in Klarondesk bay, although not of any great size."

South of this, the eastern part of the lake, Doctor Bell describes Camsell river and chain of lakes as all well wooded. At Lake Ray Banksian pine was noticed.

Trees a Hundred and Thirty Years Old.

Sir John Franklin, in his description of the country around Fort Franklin on Great Bear lake (1825), wrote:—"The trees at some distance from our fort consisted of black and white spruce, and larch, generally small, though a few of the better grown measured from four to five feet in girth, and were from fifty to fifty-five feet high. Doctor Richardson ascertained, by counting the annual rings, that some of them, in a sound state, were upwards of one hundred and thirty years old, while others which were not much greater in size, had two hundred and fifty rings, but these were decayed at the heart."

Mr. E. A. Preble of the United States Biological Survey, the most recent scientific explorer of Great Bear lake and its basin, in his report, states:—

"The northern shores of Great Bear lake are mainly low and thinly wooded, although the country

at some distance inland is better wooded. The tributaries of Great Bear lake are comparatively few in number. Dease river, which discharges into the northeastern extremity of the lake, is probably the best known of its feeders. It rises on the treeless height of land between Dease bay and the lower Coppermine. Several important streams enter the lake from the north. Several others draining a very large extent of country to the southward enter MacTavish and McVicar bays. The latter receives also the waters of a chain of large lakes lying north of Marten lake, which discharges into Great Slave lake. The country drained by the southern tributaries is very rough and rocky, though fairly well wooded, and is traversed in various directions by ranges of low mountains.

"The southern and western shores are well wooded, while its northern and eastern borders are more thinly forested. The immediate shores are mainly of sand or gravel and are usually devoid of trees, but are well clothed with willows and various ericaceous shrubs and herbaceous plants. In most places along the south shore this treeless stretch is only a few hundred yards in width, and in the bays the forest extends to the water's edge. In the vicinity of Leith point, however, a treeless area stretches from near MacTavish bay to McVicar bay, and extends inland for several miles. On this area the faunal and floral conditions are practically those of the Barren Grounds."

The Spruce of Great Bear Lake.

According to Mr. Preble, along the southern shore of Great Bear lake, the white spruce "forms the bulk of the forest. In exposed situations near Leith point it

is somewhat dwarfed, seldom exceeding a diameter of one foot and a maximum height of forty feet. A few miles back from the shore, in slightly more favourable locations, trees two feet in diameter at the base were seen, but none of these exceeded thirty feet in height. A tree twelve inches in diameter growing in an exposed situation near the shore had two hundred and fifty-seven annual rings. In this specimen the outer layers were exceedingly thin and could be counted only by the aid of a fine-pointed needle. At this rate, the age of a tree of twice this diameter can scarcely be estimated at less than one thousand years. Farther west along the shore the species attains greater perfection of habit, especially in some of the sheltered bays. At Fort Franklin it is the commonest tree, but at present is represented by scarcely any individuals of the original forest, which has been removed for building purposes. Trees over eight or nine inches in diameter are rare. A sapling four feet in height and one inch in diameter, on the site of Fort Franklin, had been growing for thirteen years."

The Site of Fort Franklin.

"The country about Fort Franklin (which Mr. Preble visited September 16, 1903) is slightly undulating, and except for certain semibarren points near the shores of the lake, is well wooded with spruce, tamarack, willow, and the usual sub-arctic vegetation. Much of the ground is covered with lichens of the genus *Gyrophora* and various mosses. At the time of our visit the leaves of the tamaracks, willows, and other deciduous trees were falling. The site of the post itself is the summit of a rather steep bank elevated about fifty feet above the shores of the

lake. The buildings have long since been destroyed, and only the debris of the stone chimneys and the faint outlines of the sills of the principal houses now remain to mark the spot. The original clearing is partially grown up to willows, but much of the ground supports only a growth of grasses and herbaceous plants. The site overlooks, to the southward, the broad expanse of Keith bay, at the extremity of which at a distance of four or five miles, Bear river has its efflux.

"The banks at the head of Bear river are low, but rapidly increase in height. The bordering country is mainly swampy and is well wooded. The more gently sloping banks are grassy or wooded, and a dwarf willow (*Salix reticulata*) is a conspicuous shrub for some distance below the lake."

Mr. Preble reports the Koch tamarack (*Larix Laricina*) as "rather common along the southern shores of Great Bear lake, where the large stone seen, near Leith point, was about twelve inches in thickness at the base, but was not over thirty feet in height. While travelling along this shore in the autumn of 1903, I first noted the leaves of the species beginning to change colour on September 12, near McVicar bay. Two days later its yellow foliage gave a decided impress on the scenery. On September 18, at Fort Franklin, its leaves were dropping, and soon afterwards the trees were bare."

Mr. Preble states that along the southern shores of Great Bear lake the canoe birch occurs only in a somewhat dwarfed state, but it reappears as a fair sized tree on Bear river.

The Basin of Anderson River.

Mr. R. MacFarlane, chief factor Hudson's Bay

Company, was sent in 1857 by James Anderson to explore Anderson river. The report of his trip was published in the Canadian Record of Science, vol. iv., and the following notes therefrom give some idea of the timber along the rivers and lakes draining the country north of Great Bear lake into Arctic ocean:—At Canoe lake, the headwaters of Iroquois river, the main tributary of the Lockhart, the country is tolerably wooded. The batiks of the Iroquois seem to be all wooded, as Mr. MacFarlane found the navigation impeded by immense quantities of driftwood, and he says the ridges on both sides were well covered with pine and willow.

The country along Lockhart river below the Iroquois is better timbered. On the banks of the Anderson below the Lockhart, there is timber of medium size gradually disappearing towards the north.

On his return trip Mr. MacFarlane proceeded up the Anderson from the Lockhart and found the banks well wooded. Further on, near a succession of rapids, he found the banks tolerably wooded. He says:—"The country along the Anderson was latterly very well wooded, and some goodly pines were seen. The tract of country embraced by a line drawn west from the borders of the woods on the Anderson to the Mackenzie, southward to Peau de Lièvre river (Hare Indian river), at Good Hope, is very well timbered.

He says the banks of Ross river are partially timbered. A chain of well wooded hills, Mr. MacFarlane says, encircle Colville lake or more probably the large lake west of the lake marked Colville. The banks of Simpson lake are well timbered. From here southwest towards Hare Indian river, Mr. MacFarlane found the country well wooded. He says "the timber consists of pine,

juniper, fir, willow, and a few groves of poplar and birch. Some of the pines were of a large size. The belt of timber which at Fort Anderson extends for over thirty miles to the eastward, rapidly narrows and becomes a mere fringe along Anderson river, and disappears to the northward of the 69th parallel of latitude."

Running parallel with Anderson river is MacFarlane or Wilmot Horton river. Mr. MacFarlane says that one or two intersecting affluents of Wilmot Horton or MacFarlane river flow through valleys in which a few stunted spruce, birch and willows appear at intervals. On the banks of one of these, near its mouth, he observed a sheltered grove of spruce and willows of larger growth. They met with no more spruce to the eastward.

Mr. Preble passed up Lockhart river, and thus describes the stream and its banks:—"Our route lay up the left fork. The shores here are low and the channels winding, and much obstructed by fallen trees. Above here we paddled through several small marshy ponds and portaged past a small fall. We then passed through a rocky defile above which we made four portages, and ascended several small riffles with paddles or with the help of the line. On August 3 we avoided eight falls or rapids by making portages and ascended several others with the line. At the last rapid, where we encamped, the river rushes for a hundred yards through a rocky gorge. The spruce woods about here have escaped the fires which have devastated most of this section. Some of the small ponds and channels passed through were bordered by banks of clay, clothed mainly with white birch."

Mr. Preble states that the belt of timber which at Fort Anderson extends for over thirty miles to the

eastward, rapidly narrows and becomes a mere fringe along Anderson river, and disappears to the northward of the 68th parallel of latitude.

Mr. Hanbury reports that he found Dease river (east of Great Bear lake) to be completely concealed by a heavy belt of spruce.

How to Increase Northern Tree Growth.

In a letter published in the *Ottawa Journal* on February 19, 1910, Mr. William Ogilvie, the well-known surveyor and explorer, and ex-governor of the Yukon, wrote, in speaking of Athabaska and Mackenzie regions:—"As time goes on much increase to the commercial timber area might be made by draining the swamps, and drying the moss on the surface which now keeps the ground beneath cool, indeed preserving the frost in it during the whole summer. Once dried the moss would die, and instead of keeping the ground cool would absorb heat and help to warm it. Anyone who has travelled in the north cannot help noting the difference in the size of the timber on mossy ground, as compared with that where there is no moss. On mossy ground you will see trees from one hundred to two hundred years old, according to the annual growth rings, only three, four or five inches in diameter, while only a few yards away where there is no moss or moisture, trees of seventy and eighty years' growth will be nearly a foot in diameter, and of a different quality of lumber."



Anglican Church, School and Rectory at Fort Simpson.

In the same communication Mr. Ogilvie wrote: —"Those who have never seen a northwest forest, when told of it, naturally compare it with others they have seen, but one from the eastern parts of Canada would find a great difference between his native woods and those of the northwest. The varieties of trees are fewer, and smaller in size, than those in the east and south. Of varieties the principal are spruce and poplar; of the poplar there are two kinds, one of which, the balsam poplar, in some places grows to be a very large size. On the lower stretches of Liard river I have seen them well over four feet in diameter, stump high, but generally such large ones are unsound and full of cracks. The other kind seldom grows more than a foot thick, and the trunk is seldom suitable for turning out lumber.

The Spruce Bears the Palm.

"When dry it makes good fuel but is not comparable as a heat producer with the eastern hardwoods. As commercial lumber the spruce bears

the palm, metaphorically, as well as literally. It seldom grows to more than fifteen to seventeen inches in diameter near the ground, and where it stands thickly together grows to a good height with straight tapering trunk, but where scattered it is not so long nor so graceful, consequently less useful. It supplies all the lumber for local demand all over the northwest, and north, and is found from the forty-ninth parallel of latitude to Arctic ocean, and on the alluvial flats of Mackenzie delta I have seen specimens about as large as any I have noticed elsewhere in the territories. The other varieties of trees are so few and far between that they are hardly worth mentioning except white-birch which is found all over, but is seldom of sufficient size or shape to be useful. I have seen a few tamaracks at odd spots, and on the Athabaska I saw a small grove of Canada balsams, the only place I ever saw them in the northwest. They seemed as vigorous as any I ever saw, which proves that they would grow there if given the opportunity, and if they, why not other specimens of our more southern trees. It has often occurred to me that it would be well to try planting our white pines and other commercial trees in those northern forests, to see if they would naturalize, and if so, increase greatly the value of the northern domain. It would cost very little to do it, and a fostering care of them might by selection at last make a success of the experiment, if it did not succeed from the start."

[23] Fort Enterprise is a little east of the eastern limit, of the tract of country defined in a preceding chapter; but as it is in the Mackenzie watershed, it may well be treated of in this chapter.

CHAPTER XVII.

THE MACKENZIE RIVER REGION.

Economic Minerals.

The Territory Has Never Been Thoroughly Examined for Minerals.—Tar Springs on the North Shore of Great Slave lake.—The Devonian Rocks Throughout Mackenzie valley are Nearly Everywhere More or Less Petroliferous.—Lignite Discovered in Many Places, Also Gypsum.—Large Deposits of Excellent Salt.—Indications of Gold and Copper.—Indians Report Finding Mica.

Ever since Sir Alexander Mackenzie first passed down the river which now bears his name on his famous voyage of discovery in 1789, and described the burning beds of coal and the salt springs along its banks, the district now under review in these pages has excited the interest of the geologist and the prospector, but on account of the remoteness of the country from civilized settlement and the difficulties of transport, very little, comparatively, is known of the actual extent of mineral wealth of this immense area of country. True, expert explorers like Sir John Franklin, Sir John Richardson, Mr. R. G. McConnell,

Mr. William Ogilvie, and Doctor J. M. Bell have conducted scientific surveys along the chief waterways and over some routes overland, and their reports have been splendid and valuable, but from scantiness of their equipment and the omnipresent necessity to economize time, these surveys, from a geological point of view, can be considered only as reconnaissances.

Comparatively brief summaries of what some of these explorers and some others have written and said as to the mineralogy of Mackenzie valley below the 60th parallel of latitude, will suffice to give an idea of what we really know on the subject.

During his explorations about Great Slave lake in 1887, Mr. R. G. McConnell, of the Geological Survey, inspected the tar springs on the north shore. The springs are situated a couple of hundred yards from the shore, at the base of a low limestone cliff, which runs inland from the lake, and are three in number, each of them being surrounded with a small basin, three to four feet in diameter, filled with inspissated bitumen, while the soil and moss for some distance away is impregnated with the same material. A small quantity of pitch is annually taken from these springs and used for boat building purposes, while a much larger supply could be obtained if needed. A sulphur spring resembling those at Sulphur point on the south shore of the lake, but much more copious, issues from the foot of the cliff in close proximity to the bituminous springs, and feeds a considerable stream. The rock through which the petroleum ascends here is a heavily bedded greyish, rather coarsely crystalline cavernous dolomite, and is entirely unlike the bituminous beds south of the lake and down the Mackenzie, which in most cases consist of calcareous shales. The dolomite is

everywhere permeated with bituminous matter, which collects in the numerous cavities, and oozing up through cracks, often forms small pools on the surface of the rock.

It was also reported to Mr. McConnell that sulphur and tar springs occur at a point half way between the springs he visited and Fort Rae. On the south shore bituminous shales and limestones outcrop at several points, and it would thus appear, according to Mr. McConnell, that the oil-bearing beds underlie the whole western part of the lake.

Promising Indications of Oil.

The Devonian rocks throughout Mackenzie valley, Mr. McConnell reports, are nearly everywhere more or less petroliferous, and over large areas afford promising indications of the presence of oil in workable quantities. He states that he noticed, in descending the Mackenzie, that bituminous limestones outcropped at the "Rock by the River Side", at Bear Rock, at the Ramparts, and at numerous other places. Near Fort Good Hope several tar springs exist, and it is from these that the Hudson's Bay Company now obtain their principal supply of pitch. The springs are situated at some distance from the river and were not examined. Still farther down, in the vicinity of the site of old Fort Good Hope, the river is bordered for several miles by evenly bedded dark shales of Devonian age which are completely saturated with oil. The possible oil country along Mackenzie valley, he concludes, is almost co-extensive with that of the valley itself. On the Mackenzie, the Tertiary beds at the mouth of Bear river hold several seams of lignite, ranging in thickness from two to four feet, and one seam which

was concealed at the time of Mr. McConnell's visit is reported by Richardson to be nine feet thick. The lignite there is of inferior quality, and has been burnt in many places for some distance from the surface by fires which have been in existence since the river was first discovered. Gypsum occurs in large quantities in the Devonian rocks of Bear mountain at the mouth of Bear river.

Deposits of Excellent Salt.

Mr. McConnell also explored part of Salt river in 1887. He reported:—"Several salt springs drain into Salt river, near Fort Smith, about twenty-five miles above its mouth. The springs are enclosed by small evaporating basins, the largest of which is about fifteen feet in diameter, and is crusted with a remarkably pure deposit of sodic chloride. The salt obtained here is of excellent quality, and has been used in Mackenzie river district for many years. Salt is also reported to occur on the headwaters of a small stream which enters the Mackenzie about fifteen miles above Fort Norman."

Mr. McConnell in 1887 examined the Nahanni Butte at the junction of Nahanni river with the Liard, below Fort Liard, and he states that copper stains were noted in a number of places, but no specimens indicating deposits of economic value were obtained.

In his 1893 report regarding his investigation of the Athabaska tar-sand-petroleum deposits, Mr. McConnell mentioned, as indicating the presence of petroleum deposits over an immense area, that north of Athabaska district "tar occurs at intervals in the Devonian limestone exposed along the valleys of Slave river and the Mackenzie, all the way to Arctic ocean."

Some Notes by Rev. Father Petitot.

Professor Robert Bell submitted to the Senate committee of 1888 a letter received from Rev. Father Petitot, O.M.I., of Fort Good Hope, dated August 16, 1873, in reply to a letter from Professor Bell, written May 30, the previous year.

The reverend gentleman explained in his letter that he had travelled extensively through this vast region, and proceeded to give a most interesting geological account of the country, although he undoubtedly disclaimed any merit as a geologist.

Points of practical interest to which attention was drawn in this communication were the following:—

"To the south and to the east of the banks of Great Slave lake are flats, composed of alluvium and gravel. On the islands off shore asphalt is found, the hardened debris of which is strewn on the beach.

"Six miles above Fort Norman, and for an extent of from eight to ten miles, the Mackenzie is bounded on its right bank by a precipice which reaches at first about one hundred and fifty feet in height, and gradually diminishes to a height of thirty feet. It is a vast Tertiary deposit composed of alternate stratifications of friable schist, lignite, pipe-clay and vegetable mould. The schists are in a state of combustion winter and summer, but the subterranean fire which shows itself on the surface through smoke holes, stinking of bitumen, is intermittent, and breaks out sometimes at one point, sometimes at another. It is not always visible at the surface, but at others is very active. The soil is very hot, damp and movable in the neighbourhood of these smoke holes.

Crude Forms of Lignite.

"The lignites are not fit for forging work. Sometimes even the trunks of the trees which form the beds of it have been transformed into clay; however, all this debris has evidently undergone the action of fire.

"Great Bear lake river, or Franklin river, presents alternations of granite, limestone, and coal-bearing sandstone.

"Traces of fire are visible in the mountain range at the mouth of the discharge of Great Bear lake. A little lower down, below the rock, the beaches of the Emir present unequivocal traces of other schistose holes which have been extinct for a long time, but which the writer of the letter found in combustion in 1869.

"The left bank of the Mackenzie, opposite Rocher Rouge, exudes ferruginous water, which stains all the water-borne shingle of the beach with oxide of iron. Three or four leagues below Fort Good Hope, iron pyrites is found on the beach, and the Peaux de Lièvre Indians formerly used it in striking fire.

"On the right bank opposite the site of the old Fort Good Hope, there are natural ramparts of limestone or schistose sandstone at the mouth of Thunder river. One finds there hematite, or oxide of iron; sulphate of iron and sulphate of magnesia; alum, which exudes from the fissures in the stone; and red ochre. It was here that the Peaux de Lièvre Indians discovered in ancient times the hematite, which on account of its colour, resembling the dung of the black bear, they called Sa-ts-anne, that is to say, bears' excrement.

Exude Alum and Saltpetre.

"The second ramparts of the Mackenzie, called

the Detroit or Narrows, are composed of lias and limestone, which exude alum and saltpetre. Lower down are schistose sandstones of which the Esquimaux make the heads of their arrows.

"On the sea coast and the right bank the Esquimaux have told me that there are caves containing fossilized bones of large antediluvian animals, particularly of the mastodon, of which they have shown me pieces of tusks of the finest ivory which they call *killagvark*, and which they know how to distinguish from the ivory of the walrus, or *turark*. They have also told me that there are, upon the sea shore to the eastward, Tertiary deposits in combustion, similar to those at Fort Norman."

Writing in his report of the information he had obtained as to the deposits of economic minerals in Mackenzie valley, William Ogilvie, D.L.S., wrote as follows:—"On the Mackenzie, the first coal I heard of was a seam of which Mr. McDougall at Chipewyan told me, and which is situated in the base of the mountain just above Rapid Sans Sault, on the east side of the river. He could not give me any details concerning its extent, more than that he believed it to be about four or five feet thick, and that it was in the limestone rock of the mountain. If this is true, it indicates that this coal is older than the lignite coal of the country, and probably much harder and better. I did not know of its existence until I got to Chipewyan, or I would have tried to have had a specimen sent out after me.

"About three and a half miles above Fort Norman, on the east bank of the river, two extensive exposures of lignite crop out. The upper one is overlaid by about fifty feet of clay and a few feet of friable sandstone, and is about fifteen feet thick. The other seam is probably forty feet below this. When I

was there it was nearly all under water. It is said to be as thick as, if not thicker than, the upper one.

On Fire For Over a Century.

"The upper seam has been on fire for over one hundred years, as it was burning when Sir Alexander Mackenzie passed in 1789. The place is locally known as le Boucan. The fire extends at present about two miles along the river, not continuously but at intervals. When I passed, it was burning in three or four places. After it has burned a certain distance into the seam the overlying mass of clay falls down and, to some extent, suppresses the fire. This clay is in time baked into a red colored rock, in which are found innumerable impressions of leaves of plants. Some specimens of these I brought home, and handed to Doctor Dawson. Traces of this red rock were noticed on the bank fourteen miles below Fort Norman, but no trace of lignite was seen near it, having probably been all burned.

"The burning seam appears to be of poor quality, containing much shale and sand, which is converted by the heat into scoriæ. It did not appear to me that it would be difficult to cut off all the burning places, and thus stop the further advance of the fire, which is destroying what yet may be of use. In order to find if the combustion could be checked I took a shovel at one place and soon had all the burning coal for a short distance cut off completely, so that the fire ceased for a time at that spot. It is a pity that at least an attempt to put out the fire is not made. Many persons in that district have an idea that it is subterraneous, and that the seat of it cannot be reached. This is a mistake, as at the point mentioned I cleaned off the fire from the face of the seam to its

base and found underneath no trace of burning. The lower seam appears to be of better quality, there being no shale or sand mixed with it, so far as I could see. Heavy rain detained us here for two days, and we burned a good deal of lignite from the lower seam, as we could not reach the top of the bank to procure wood, and could find only a log or two of driftwood. The coal burned well in the open air, and threw out a much stronger heat than a wood fire. These seams are visible at frequent intervals along the bank for eight and a half miles, after which not a trace of them appears for seven miles, where there is another small exposure at the water's edge. This seam appears, from the reports of many travellers, to extend up Great Bear river for a considerable distance. No other traces of coal were observed on the river.

"While at Fort Good Hope I noticed that many of the outbuildings and fences were painted with a dull red coloring matter, which, on inquiry, I found consisted of the ashes of wood that had lain in the river for some years. It was said poplar trees yielded the best paint and that logs that had been in the river long enough were known by the dull blue color of the wood. A sample of the ashes I brought home, and handed to Doctor Dawson. It may be that the color is due to the presence of oxide of iron; if so, this would indicate the existence in the water of iron in solution. But where the iron comes from is a mystery, as none of this peculiar wood was seen or heard of in the upper river. The inference is that the iron occurs far down in the river, but whether in the soil or in the beds on some of the tributary streams, or whether it is iron at all, has yet to be determined.

Indians Report Mica.

"The Indians report very large deposits of mica on the south side of Great Slave lake, and have brought small samples of it to Fort Resolution. While there I tried to get a specimen, but none was available. It is described as being very abundant.

"No other minerals of economic value were seen or heard of, except bitumen. On the way up (from Fort Providence to Chipewyan) the first indication of this was seen on Great Slave lake, in the form of the bituminous limestone which has already been referred to. Tar springs, as they are called in the vicinity, exist on the lake. I do not know of any of them on Slave river, but they abound on the Athabaska from near the delta for over two hundred miles up, and one is reported only a few miles from Athabaska, less than one hundred miles from Edmonton."

Mr. von Hamerstein, in his evidence before the select committee of the Senate in 1907, stated that up the rivers that flow into the Mackenzie there are large quantities of native salt thrown up. It is mostly underground, and there seems to be a crater. The salt appears to be close to the ground in large quantities.



Roman Catholic Mission at Fort Resolution.

Mr. Keele, in the report of his explorations in 1908, states:—"Drift lignite is found on the lower part of Gravel river, which is no doubt derived from the Tertiary coal-bearing areas of Mackenzie basin. Hematite occurs on Gravel river about ten miles below the mouth of Natla river. This iron ore is coarsely laminated with red siliceous slate, having a thickness of from fifty to one hundred feet, and is interbedded between conglomerate and dolomite. An assay of an average sample of this ore was made at the assay office of the Mines branch, and gave only twenty-five per cent. of iron."

Two Hundred Square Miles of Coal.

Mr. Brock, Director of the Geological Survey, in his report for 1909, quoted an estimate made by Mr. D. B. Dowling that the known available coal area in Mackenzie district is two hundred square miles, representing five hundred million tons of lignite.

Tertiary coal is known to exist in large quantities along the Arctic coast east of the Mackenzie and in the Arctic islands. Doctor Armstrong found it on Banks Land and Doctor Richardson mentions that "the Garry islands, lying off the Mackenzie, contain beds of a Tertiary coal which takes fire spontaneously on exposure to the atmosphere. Higher up the Mackenzie, at the junction of Bear lake river, on the 65th parallel of latitude, there is a Tertiary coal deposit of considerable extent, which yields hand specimens entirely similiar to Garry island ones."

In his annual report for 1911, Superintendent Saunders, D.S.O., of the Royal Northwest Mounted Police, commanding the force in the Athabaska, Peace and Mackenzie countries, wrote:—"Very little

progress has been made over last year in the development of the mineral resources of the country. Three companies are boring for oil near McMurray but I cannot ascertain that they have met with much success. No work is being done in connection with the tar sands although very favourable reports have been made as to their value for asphalt and street paving, probably the lack of transportation facilities is the reason of the delay.

"From Mackenzie river sub-district I have reports of a few prospectors in different parts, but of no success. Mr. D. F. McRae, however, who went down the Mackenzie in 1910 and went out the same year, has returned again with a party and well equipped outfit, consisting of a powerful gasoline launch, three scows with provisions, two horses, etc. He and one of the other members have their wives with them, and are wintering near the mouth of Herschell river. The fact of his having gone back in this manner would indicate that he has made a discovery of some kind, the nature of which has not been disclosed, as the whole party are very reticent."

CHAPTER XVIII.

THE MACKENZIE RIVER.

Game, Fur-bearing Animals and Fish.

Over Forty Moose Killed in one Season Near Fort Simpson. —Caribou of both Woodland and Barren Lands Varieties Plentiful.—Pass Great Slave lake in Countless Numbers.

—Mountain Sheep Plentiful in the Mountainous Districts.—Incredible Numbers of Geese, Swans and Ducks in Season.—Inexhaustible Supplies of Fish.—The Speckled Trout, Lake Trout, Grayling, Herring, Inconnu, etc.

Everyone who has visited Mackenzie river region seems to have been much impressed with the variety and the quantity of the fish and the game there, all the books written by the explorers, traders, missionaries and sportsmen who have visited the country, containing numerous references to its wonderful resources in this respect. As a matter of fact the fish and the game of the country have hitherto been and still are the support of the slender resident population, and will play a very important part in the ultimate development of the region. Without discussing the commercial value of the apparently inexhaustible inland and coastwise fisheries, it might be pointed out that once settlement begins to flow into the country the fine waters and immense game ranges of this huge country will contribute most usefully towards the support of the pioneer settlers during the critical period when the local agricultural, lumbering and mining industries are in their early experimental stages. Undoubtedly, too, the game and fisheries will contribute, as they have done elsewhere, to the ultimate development of the country by attracting to more remote sections sportsmen who by reason of their natural intelligence, world experience, education and influential connections, are sure to discover and to attract attention to natural resources at present unthought of.



A Fur Shipment of One Season from Mackenzie basin, estimated value over two million, five hundred thousand dollars.

Frequent references have been made in the preceding chapters to the work accomplished by Mr. E. A. Preble, of the United States Biological Survey, in the Mackenzie country in 1901 and 1903, and to his report "North American Fauna, No. 27," published by the Biological Survey at Washington in 1908. In no respect is this altogether admirable report more instructive than in its complete references to the game and the fisheries. Mr. Preble naturally devotes much attention to that monarch among northern game animals, the moose.

The Majestic Moose.

Mr. Preble points out that "Hearne was the first to record moose from the Mackenzie region, finding them 'very plentiful,' on the south side of Great Slave lake, east of the mouth of Slave river, during the winter of 1771-72, while on his way back to

Churchill during his famous journey of exploration." Harmon noted their occurrence on the plains of Peace river in 1808. "During Franklin's first northern journey a moose was killed near Fort Enterprise in the spring of 1821." During his second expedition moose were killed on Ellice island, near the mouth of the Mackenzie, in the summer of 1825, and near Fort Franklin in September of the same year, and in February, 1826. During the spring of 1834, while Back's expedition was wintering at Fort Reliance, a moose was killed on "Fish river" (in all probability the Thelon, or Ark-i-linik) several days' travel east of Great Slave lake. Simpson reports that tracks of moose were seen on MacTavish bay, Great Bear lake, during the winter of 1837-38. Ross recorded specimens taken at Fort Good Hope and Fort Simpson. Lockhart, writing in 1865 on the habits of moose, states that they were rarely killed in the vicinity of Fort Rae, though they were quite numerous at Big island and along the south shore of Great Slave lake, and that the moose of Peel river and the Yukon are much larger than those in Great Slave lake region. While exploring in a country between Athabaska lake and Churchill river in the summer of 1892, J. B. Tyrrell found that the moose occurred throughout the more thickly wooded parts of the country as far north as Stone river, near the eastern end of Athabaska lake. Russell states that a moose was killed near the mouth of Yellowknife river, Great Slave lake, in August 1903. A. J. Stone records the moose from several points in lower Mackenzie valley, giving evidence as to the large size of the animals found there, and from the headwaters of Nahanni river, where they abound.

"During the early autumn of 1895 a moose was killed by a member of Loring's party near the

headwaters of McLeod river. In the autumn of 1896, fresh tracks were seen almost daily along the trail between Smoky river and Jasper House.

Found to be Rather Common.

"In the spring of 1903, while descending Athabaska and Slave rivers to Great Slave lake, we saw tracks of moose occasionally, but observed none of the animals. During their return trip in the fall, however, my brother and Cary saw a young one on the Athabaska above Athabaska. In the lake country between Fort Rae and Great Bear lake, during my northward trip in the same autumn, the moose was found to be rather common, and became more abundant as we approached Great Bear lake, owing to the country being better suited to its needs. Tracks were often seen on the portages, and a large bull was observed on an inlet of MacTavish bay on August 25. Along the southern shore of Great Bear lake we found it a common and in some places an abundant species. Even in the exposed and semibarren country in the region of Leith point a few are found, and a female was killed there by my Indian canoeman on September 1. Owing to the rocky nature of its haunts, the hoofs of this animal were much worn and blunted. West of McVicar bay, especially along the base of Grizzly Bear mountain, the species was found to be abundant and numerous fresh tracks were seen wherever we landed. Its abundance here is partially explained by the fact that there are immense areas abounding with its proper food. A party of natives seen near Manito islands had repeatedly started moose without killing one, while my Dogrib (Indian) canoeman, in a far more difficult country, had secured the only animal he hunted. Moose are

seldom found about Fort Franklin, owing doubtless to the place having been a favourite resort of natives since time immemorial, but they are said to be common along Bear river. While ascending the Mackenzie in October we frequently saw fresh tracks.

Over Forty Moose Killed.

"During the winter of 1903-4 upwards of forty moose were killed within twenty-five miles of Fort Simpson, and moose meat comprised an important item of our food. During a trip down the river in January I saw the tracks of a band of four or five about thirty miles below Fort Simpson. An area of considerable size on the sloping side of the valley, grown up to willows, had afforded a fine feeding ground, and was well trampled. The animals had wandered out on the snowy surface of the river also, and had trotted about apparently with no particular aim, perhaps in play."

Mr. Keele, in the report of his reconnaissance across Mackenzie mountains, and down the valley of Gravel river to the Mackenzie, in 1907 and 1908, says:—"There are a few moose scattered along the valley of Gravel river, but it is not a good moose country, as there are no small lakes, and on account of the narrow valleys, and low timber line, the area over which they can feed is restricted."

Mr. Preble observed numerous tracks of both moose and bear along the left fork of Lockhart river, a tributary of the Anderson.

The Caribou or Cariboo.

Mr. Preble also devotes considerable space in his

report to information about the caribou (often spelled “cariboo”), another of the notable larger game animals of this region. He writes:—“Mr. Brabant, of Fort Smith, informed me that caribou were unusually common in that vicinity during the winter of 1902-3. Captain Mills, of the steamer Wrigley, told me that he saw one on Slave river, near McConnell island, on July 5, 1903. The Dogribs say that a few are found in the country between Fort Rae and Great Bear lake. Along the lower Liard the animals are occasionally detected in small bands and are often killed. Caribou meat was several times brought in to Fort Simpson during my residence there, but all my efforts to secure a specimen failed. The natives about there distinguish between the wood caribou of the lowlands and those of the mountains, and say that the former is smaller and lighter in colour than the mountain animal. Woodland caribou still occur along the Saskatchewan near Edmonton, and E. E. Whitley, who lives on Sandy creek, twenty miles south of Athabaska, Alberta, stated that he had seen a few in that vicinity.

The Woodland Caribou.

“The presence of the woodland caribou in this region was first noted by Hearne, who refers to the species as ‘Indian Deer.’ During his journey southward from Coppermine river he saw many in the sparsely wooded country north of the eastern part of Great Slave lake in December, 1771. While crossing the lake on the ice he found the wooded islands ‘well stocked’ with the same species. Deer (caribou) are enumerated by Richardson among the animals said to inhabit Birch mountain west of lower

Athabaska river. While exploring in the region between Athabaska lake and Churchill river in the summer of 1892, J. B. Tyrrell ascertained that the woodland caribou was reported 'to occur in the more southern portion of the district, near Churchill river, but none were seen.'

"R. MacFarlane, in a letter to the United States Biological Survey, written in January, 1902, states that the woodland caribou inhabits the country between Lake Winnipeg and Athabaska lake, and though nowhere in large numbers is more abundant on the southern than on the northern shores of this lake. Between Athabaska and Great Slave lakes he states that "the animal is chiefly met with on the west side of Slave river, and through all the country lying between Peace river and Great Slave lake.

The Migratory Herds.

"Along the southern shore of Great Bear lake, especially at the point where we reached it on MacTavish bay, numerous well-worn trails testify to the great numbers of caribou that pass back and forth in spring and fall. They arrive from the Barren Grounds about the time of the first deep snows, usually by the middle of October, and sometimes extend their migration west to the outlet of the lake, though they are not common in that vicinity. In the spring the greater number return, though a few remain through the summer on the semibarren areas near Leith point, and westward to the vicinity of McVicar bay. We saw fresh tracks of a number near our camp east of Leith point during the early days of September.

"The Hare Indians living about the southern and western shores of Great Bear lake, repair to its

eastern end about the end of July, usually coasting the southern shore, and spend a month or two among the caribou on the treeless country between the eastern end of the lake and the lower Coppermine, returning to their winter hunting grounds early in October.

"During the winter of 1903-4, caribou reached the Northern Arm and the eastern part of Great Slave lake in great numbers and some were killed within a short distance of the buildings at Fort Rae for the first time in several years.

West of The Mackenzie.

"Mr. John Firth, of the Hudson's Bay Company, for many years stationed at Fort McPherson and on Porcupine river, informed me that the herds of caribou west of the Mackenzie have a semi-annual movement to and from the sea-coast. In their journeys they head toward the prevailing winds, and consequently occasionally pass to the eastward of the mountains, though usually to the westward. The southward movement commences in August, and extends only about four hundred miles. They start to return in March. Though the bulk of the animals then proceed to the coast, a few remain throughout the summer in the elevated and semibarren country between the Peel and the Porcupine. The Indians from La Pierre House, who arrived at Fort McPherson during my stay there early in July, 1904, having crossed the mountains on foot, had killed a few of these animals on the way.

The Barren Ground Caribou.

"During Franklin's first northern journey, the Barren Ground species was first met with on the upper part of Yellowknife river, about the middle of August, 1820; toward the end of September it had become common about Fort Enterprise; on October 10 an estimated number of two thousand were seen during a short walk in the vicinity; by October 26, they had departed southward, but about the middle of November, on account of warmer weather, they returned to the neighbourhood. During the following summer, while the party was exploring the Arctic coast to the eastward of Coppermine river, caribou were found to be rather common at the mouth of Hood river, and were noted also on Parry bay and at Point Turnagain. During Franklin's second journey, reindeer were killed near Fort Franklin, Great Bear lake. J. C. Ross states that great numbers were seen about the Isthmus of Boothia.

"During Richardson's journey along the Arctic coast east of the Mackenzie, in the summer of 1848, he observed the species near Liverpool bay in August, and on Darnley bay later in the same month, and saw many at Bloody fall, on the lower Coppermine, on September 5.

"West of the Mackenzie they are still abundant along the barren coast and in the mountains south of it. They migrate southward in autumn, but how far is not known. Rampart House was a 'deer post,' being situated in a pass traversed semi-annually by the caribou.

"The whalers reported that the caribou were abundant among the islands between the mouth of the Mackenzie and Cape Bathurst in July, 1894."

Game at Fort Confidence.

Ex-Judge Malcolm Macleod, in his evidence before the Senate committee in 1888, referred to a very interesting letter his father had received from Mr. Thomas Simpson, the Arctic explorer, dated from Fort Confidence at the northeast end of Great Bear lake. Fort Confidence was, at the time this evidence was given, the most northerly habitation on this continent that was inhabited by white men. It was within the Arctic circle (67 degrees 53 minutes and 36 seconds). Simpson spoke of the food resources of Fort Confidence as being abundant. The distances between posts were so great that even Dease and Simpson's, which was a Hudson bay expedition thoroughly equipped, could carry food barely sufficient for use on the way. They were there three winters (those of 1836-37, '37-38 and '38-39), nearly three years, and never failed a single day to have an abundant supply of food. Franklin suffered more, because his party was not so well equipped at times, but it is a striking fact that, notwithstanding the severity of the climate, especially in 1838, when the letter was written—an exceptionally severe season—they never ran short of food. They had abundance of fish, deer (caribou), musk ox, and meat of other kinds at all times.

Fort Rae, on the northern branch of Great Slave lake, according to Mr. R. G. McConnell, who visited it in 1888, is surrounded by a deer country, and is looked on rather as a provision post than as a fur post, although it also ranks high in the latter respect. In the winter, thousands of the "Barren Lands" caribou, which have been driven south by the severity of the climate, are slaughtered in its vicinity, and their flesh is converted into dry meat for use in the district.

Mr. Keele says in his report:—"Caribou were

observed only at one locality on Gravel river, near the edge of the first timber, about twenty miles from the divide."

In Countless Numbers.

Mr. A. H. Harrison, writing of his first visit to Great Slave lake in 1902 and 1903 ("In Search of a Polar Continent"), makes the following statement: —"The first winter that I spent on this lake I went out after caribou and when we got among them, after six days' hard travelling, they were in countless numbers. This is no exaggeration. They were on a lake ten miles in length and five in width, and it was packed so closely with deer that you could not catch a glimpse of the ice-flooring anywhere. We started from Fort Resolution on that occasion with thirty sledges, but only five of these arrived. The mode of hunting employed was curious. Clad in deerskin, the hairy side of which was outermost, one Indian walked right through the deer to the other end of the lake, without any of them taking much notice of him. This surprised me very much, nor was the cause for surprise at an end. Two more Indians, clad in the same way, followed at a distance of about two miles behind the first, one on each side of the lake, and each of these was similarly followed by yet another, whilst I myself remained where I was at the lower end of the lake. When the foremost Indian had reached the other end, he began to shout, and the deer, not knowing which way to go, started running round and round the lake. I killed half a dozen myself, and my companions each brought home a load. Had I cared to do so, I could have killed many more.

"At the north end of Great Slave lake lies Christie

bay and thirty miles northeast of this bay is a second bay, of considerable size, enclosing an island, on which, upon another occasion, I had pitched my camp. I was just cooking my midday meal, when a herd of deer passed within a few yards of the camp fire, and I killed five of them in as many minutes. In this locality I stayed for a whole month, with one Indian, and after catering for ourselves and for our dogs, I made a cache of fifty deer, some of which I gave to the mission, and some to Mr. Gaudet, in charge of the Hudson's Bay Company's post here. The end of November and the whole of December is the best time of year for going from Fort Resolution after caribou."

Mr. Harrison also mentions that his party, while camping or travelling about the country around the delta of the Mackenzie in 1905 and 1906, often shot caribou.

Other Big Game—The Mountain Sheep.

In a previous chapter lengthy reference has been made to the wood buffalo, the most northern port of whose range lies in the southern part of the country immediately under consideration. Besides the moose, caribou, and buffalo, the game animals of the Mackenzie include the red deer, bears of several kinds, the lynx, the hare, the wolverine, the mountain sheep, etc., etc. Mr. Keele, in his report of his reconnaissance across the Mackenzie mountains in 1907 and 1908, states that mountain sheep are plentiful on parts of Gravel river, particularly on the low mountains between the Sayunei and the Tigonankweine ranges. Among the hundreds of sheep seen by the writer in this locality none but those with pure white wool were observed. The sheep are

highly prized for their heads, and on account of their flesh, which is the best of all the wild meat; consequently they are hunted to extermination in any of the accessible localities.

As to the smaller fur-bearing animals, the beaver, mink, otter, marten, ermine, fox, etc., they exist in great numbers and sustain the only present industry in the country, the fur trade.

Feathered Game.

As to the feathered game there are grouse and ptarmigan, and in season ducks of all kinds, geese, etc. In his evidence before the Senate committee of 1888, Bishop Clut stated that Mackenzie river, where it leaves Great Slave lake, and the mouths of Athabaska, Peace, Salt and Great Slave Lake rivers, were places where the imperial birds (outardes), the grey goose, the white goose, large and small, and the swan prefer to stop to fatten themselves. They were there in such numbers sometimes in the spring and the autumn that one could hardly sleep when camping near them. These fowl remained there nearly six weeks each spring and as long in the autumn. The ducks passed all summer there. The outardes, the grey goose, white goose (large and small), swans, ducks of numerous species and varieties are of great value, and constitute the greater part of the people's food in the spring and the autumn. These fowl are very numerous. The number of them is incalculable.

Inexhaustible Supplies of Fish.

The wealth of the Mackenzie country in fresh

water fish may be said to be a tradition.

One of the most interesting sections to sportsmen, of that part of Mr. Preble's report referring to the fish of the Mackenzie basin, is that under the heading "Speckled Trout," in which he says:—"Under this general heading I include a few notes collected from various sources regarding the occurrence of speckled or brook trout, probably of several species, in a number of widely separated localities in the Mackenzie basin. Mr. John Firth, of Fort McPherson, assured me that speckled trout are found in West Rat river, a tributary of the Porcupine west of Fort McPherson. It is probable that these are either *Salmo mykiss* or *Salvelinus malma*, both of which are known to occur in Alaskan streams. In East Rat river, also, which is connected with the westward flowing stream (and therefore may contain trout of the same species), but which flows eastward into the Peel, he said that speckled trout are common. Mr. Firth also informed me that a form of speckled trout is found in the stream which enters the sea a short distance west of the mouth of the Mackenzie. Mr. MacFarlane states that speckled trout have been taken in lower Anderson river. As anadromous trout of the *Salvelinus alpinus* type are known to occur in the Coppermine, these records may refer to the same species. I also learned from several independent sources that speckled trout occur in Tawattinaw and in one or two other tributaries of the Athabaska, but I was never able to procure specimens."

The Arctic Grayling.

Before the Senate committee of 1888, Doctor G. M. Dawson stated that in all the waters tributary to the Mackenzie, the Arctic grayling, or Back's

grayling, which is an excellent fish, was to be found. It is a fish resembling the trout in appearance and size, but has a very large back fin. It is a very game fish very much like the trout, takes the fly and is excellent eating. That fish witness found in the headwaters of the Mackenzie, as far up as the very source of Peace river, and also that of Liard river. It also occurs in Nelson river to its headwaters. It is a purely fresh water fish, and a two-pounder would be a fair sized one.

Mr. Keele, speaking of his reconnaissance explorations in 1907 and 1908, says that grayling, herring and a variety of brook trout were found in Gravel river, there being an abundance of grayling, but herring and trout were rarely taken.

Mr. E. A. Preble has the following to say in his report with reference to this fine fish:—

"The Arctic grayling, usually called bluefish in the north, has a very extensive range. It occurs throughout the region from Peace river and Athabaska lake northward and northwestward to Arctic ocean. I can not find that it has been detected in the Athabaska. As it prefers clear streams it is somewhat local in distribution, occurring but seldom in the main rivers, which are usually muddy, but being abundant in many of the clear tributaries and the lakes which they drain. During my explorations I met with the grayling in the lake country between Great Slave and Great Bear lake and at a number of points on the Mackenzie. It was especially abundant in the rapid stream which I descended to MacTavish bay in August, 1903, and I caught many while fishing for trout with a spoon hook. It was common also in Great Bear lake near Fort Franklin a little later, where many were being taken in the whitefish nets.

"The grayling is said to be scarce in the Liard below the mouth of the Nelson, but to be common above that point. It is also found in most of the tributaries of the Mackenzie, several of which have local names referring to its occurrence.

"As an index to the distribution of this interesting fish I have selected the following references: Back recorded it from the mouth of Hoarfrost river, Great Slave lake; from the head of Backs river; and from Lake Pelly on the same stream. Doctor G. M. Dawson reported its capture in upper Peace river, and in the Finlayson, a tributary of the upper Liard. MacFarlane has recorded it from Anderson river.

"I am not aware that the grayling has been recorded from any stream tributary to Hudson bay, except in one instance. Doctor Bell mentions that it was taken in tributaries of the lower Churchill, and that a specimen was identified by Professor Gill as *Thymallus signifer*. A possible explanation of the occurrence of this fish in the Churchill is suggested by the fact that there is a direct water connection between Churchill river and Athabaska lake. The grayling occurs in Black or Stone river, which flows from Wollaston lake into Athabaska lake. The waters of another outlet of Wollaston lake, Cochrane river, flow by way of Reindeer lake into the Churchill, thus affording to a torrent-loving species like the Arctic grayling a ready means of communication."

Great Slave Lake Fisheries.

The marvellous productiveness of the fisheries of Great Slave lake and many of the rivers in its vicinity have been time and time again commented upon by travellers.

In the account of his journey in 1772, Samuel

Hearne, writing (p. 249) of the fish in Great Slave lake (his Athapapuskow), states:—"The fish that are common in this lake, as well as in most of the other lakes in this country, are pike, trout, perch, marble, tittameg, and methy. The two last are names given by the natives to two species of fish which are found only in this country. Besides these, we also caught another kind of fish, which is said by the northern Indians to be peculiar to this lake; at least none of the same kind have been met with in any other. The body of this fish much resembles a pike in shape, but the scales, which are very large and stiff, are of a beautifully bright silver colour; the mouth is large, and situated like that of a pike, but when open it much resembles that of a sturgeon, and though not provided with any teeth, takes a bait as ravenously as a pike or a trout. The sizes we caught were from two feet long to four feet. Their flesh, though delicately white, is very soft and has so rank a taste, that many of the Indians, unless they are in absolute want, will not eat it. The trout in this lake are of the largest size I ever saw; some that were caught by my companions, could not, I think, be less than thirty-five or forty pounds weight. Pike are also of an incredible size in this extensive water. Here they are seldom molested, and have multitudes of smaller fish to prey upon. If I say that I have seen some of these fish that were upwards of forty pounds weight, I am sure I do not exceed the truth."

Multitudes of Fish.

Richardson in his "Arctic Searching Expedition" (Vol. 1, p. 160), speaking of Demarais's fishery on Great Slave lake, writes:—"During the whole summer, in the eddies between the islands of this

part of the lake, multitudes of fish may be taken with hooks, and by nets, such as trout, white fish, pike, sucking carp, and inconnu. In spring and autumn wild-fowl may be procured in abundance at several places in the neighbourhood which are their accustomed passes, and the fishery on the north side of Big island seems to be inexhaustible in the winter. With good fishermen, and a proper supply of nets, a large body of men may be wintered here in safety and plenty. In no other part of the Hudson's Bay Company's territories, with which I am acquainted can so many people be maintained, with so much certainty, on the resources of the country."

The Ordinary Fishing Season.

Mr. R. G. McConnell reports that during the ordinary fishing season on Great Slave lake, which usually lasts from September 20 to October 10, the fish leave the deeper parts of the lake and migrate in vast numbers to certain favored waters where almost any quantity desired can be obtained. The Big island fishery supplied Fort Simpson and Fort Providence in 1887 with about forty thousand fish, besides affording constant support to a number of Indians. At the mouth of the Beaver about twenty thousand were taken, and the fisheries at the mouth of Hay river, in the bay in front of Fort Rae, and near Fort Resolution, besides other places, yielded corresponding quantities. Mr. McConnell estimated the total yield of the lake for the year 1887 at about half a million pounds. The most abundant and valuable of the fishes of the lake is the widely distributed whitefish (*Coregonus clupeiformis*). With the whitefish are associated the lake trout (*Salvelinus namaycush*), which often attains a weight of over

fifty pounds, the inconnu (*Stenodus Mackenzii*), the pike (*Esox lucius*), and the sucker (*Catostomus longirostris*), besides others of less importance. A stray salmon was captured about forty miles below the outlet of the lake, and was described by Mr. Reid of the Hudson's Bay Company as being identical with the common Yukon salmon, probably *Oncorhynchus Chouicha*, but visitors of this kind are very rare.

Mr. McConnell informed the Senate committee of 1907 that there are great quantities of whitefish in nearly all the lakes. Mr. McConnell wintered at Fort Providence, just below Great Slave lake, and in ten days there were about one hundred and forty thousand fish caught. They come into the shallow part of the lake about September 15. They are caught by the Hudson's Bay Company, the missions and some Indians, and are used to feed the men and dogs. It is the staple food of the country, or was the year witness was there. They catch the fish at all seasons, but late in the fall is the particular time for catching them for the winter supply. They get salmon trout there also. At the Fort he had had them weighing fifteen to twenty pounds, and they told stories about catching them forty pounds in weight. There was one king salmon caught at Fort Providence—only one. They also get pike or jackfish. Mr. McConnell did not know about pickerel.

The inconnu is a fine fish, and is caught all the way along the Mackenzie and up Slave river as far as the rapids. It is a large fish weighing from ten to twenty pounds.

A Specimen Haul.

Mr. A. H. Harrison says ("In Search of a Polar Continent."):—

"Most of the small streams which run into Slave river come from large lakes that abound with fish. To these lakes we often went up in a small canoe, and set a net, which, as a rule, if left out all night, contained a couple of dozen fish the next morning; or, to give the component weights of a specimen "haul", we had on one occasion two pounds of whitefish, twenty-five pounds of inconnu, ten pounds of trout, and twenty pounds of pike. We had always, in fact, to throw back a great number keeping only two or three for immediate eating. In the spring of 1903 I had taken an Indian and his family with me on to this river to shoot duck and geese, and before a fortnight was out we had killed sixty-three geese and a great quantity of duck. I had trouble, however, with this Indian, who was but a poor spirited fellow, and he left me by myself at the mouth of a small river that ran down from a lake about sixty miles from Fort Resolution. Here for a whole month I was encamped alone, and had no difficulty in keeping myself—fish, wild-fowl, and black bear being plentiful. I had a net in the water, thereby securing, as I have already intimated, some two dozen fish a day, the bulk of which I threw back. In Slave river itself, which is very muddy, I have never caught many fish, but the lakes off the river swarm with them.

"Fort Resolution is a delightful place. I spent a winter there in 1902-03, making many excursions into the surrounding country. There are three trading posts there, also a Roman Catholic mission, where Bishop Breynart makes his headquarters, and a convent in which about forty native children are educated. Everyone relies upon fish and reindeer for subsistence. I heard a story of a trout weighing eighty-four pounds having been taken in Great Slave

lake, but though I saw many trout that were caught during my stay there, I never set eyes upon any weighing more than forty-five pounds. While passing through on my recent journey I offered fifty dollars, or ten pounds, sterling, to anyone who should bring me a trout that scaled fifty pounds, but when I came back Mr. Harding of the Hudson's Bay Company said that he had not in the meantime seen any which weighed over forty-three pounds. Even this, of course, is a large weight for lake trout. The whitefish, however, rather than the trout, is the chief food. It weighs about two pounds, and is caught in great quantities. The dogs never get anything to eat except fish, and they thrive on the diet. Two pounds of fish apiece daily is barely enough to keep them alive, but two fish weighing two pounds each are an ample ration for a dog.

Bishop Clut's Testimony.

During his examination before the Senate committee of 1888, Bishop Glut emphasized the fact that an important natural resource of the Mackenzie basin lay in immense quantities of fish found in the great lakes, the Athabaska, Great Slave and Great Bear. East of those lakes there were many other great lakes which were full of fine fish.

The bishop had not been at Great Bear lake, but from reports of Fathers Petitot, O.M.I., and Ducot, O.M.I., he knew that the lake was immense and abounding in fish. There was an abundance of small fish, which he believed to be herring.

To the eastward of Mackenzie river, separated from it by a chain of mountains, running in the same direction as the great river, a succession of beautiful and magnificent great lakes, full of fish, was found.

They had named them “Pius IX”, “Demazenod” and “Tache”. These were the three largest lakes. The bishop had crossed them in winter from Fort Good Hope to Fort Norman.

Lakes were innumerable in the basin of the Great Mackenzie, and nearly all of them abounded in fish of different kinds. The regions east, northeast, and north, above all, abounded in lakes of all sizes, and were very rich in fish. Lake Athabaska furnished a very great quantity of whitefish, of small and large salmon trout, of pike, of pickerel, of carp, of large loches, etc. The whitefish weighed at least three pounds; the small trout from four to ten; the large trout from ten to thirty-five; the pike from four to twenty pounds; the carp the same. In Clear lake pike were caught weighing from twenty-five to thirty-five pounds. Whitefish, pike, pickerel, carp and trout were caught in nets in which the meshes were four and a half inches in size.

Great Slave lake produced the same species of fish that Great Athabaska lake did, and also in much greater quantity. They find there also the inconnu, a species of salmon which came from Arctic ocean. It was undeniable that it comes from the sea. It was found all the way up the Mackenzie as far north as the river at Fort Smith. There the rapids and the cascades prevented it ascending higher. It was a beautiful and fine fish—the shape of the whitefish, but much larger. It weighed from eight to thirty pounds.

Herring and the Inconnu in the Mackenzie.

W. F. Bredin, M.L.A., in his evidence before the Senate committee of 1907, stated that herring from Arctic ocean ascend the Mackenzie to about Fort

Wrigley. They are good fish. He said he had been told that Great Bear lake just teems with that same herring.

In his report, William Ogilvie, D.L.S., gives the following information about the chief fishes of Mackenzie river:—"Fish are numerous in the Mackenzie, the principal species being that known as the 'Inconnu.' Those caught in the lower river are very good eating, much resembling salmon in taste, being also firm and juicy. The flesh is a light pink in color, but as they ascend the river and become poor, this turns white and the flesh gets soft and unpalatable. They average ten or twelve pounds in weight, but have often been caught weighing thirty or forty. They ascend as far as the rapids, on Great Slave river, where they are taken in the fall in great numbers for dog-feed, being then so thin that they are considered unfit for human food, if anything else is obtainable. This fish is not fed to working dogs, unless scarcity of other fish compels it. There is a small fish known locally as 'herring' somewhat resembling the inconnu in appearance, and which does not grow larger than a pound or two in weight. The staple fish of the district, and for that matter, of the whole northwest, is the whitefish. They abound in many parts of the river, but especially in all the lakes discharging into it, and form the principal article of diet during the greater part of the time, as very little food is brought into the country. This fish is caught in large numbers everywhere."

Fish in Great Bear Lake.

Mr. Hanbury mentions that one August night his party's nets in Great Bear lake caught sixteen whitefish, "some of them very large, seven or eight

pounds; none of them under four pounds. This was the largest average of whitefish of which I had heard. In Great Slave lake their average weight is three pounds."

Mr. E. A. Preble describes the lake trout so often referred to (*Cristivomer naymacush*) as a beautiful fish inhabiting nearly every body of water in the north, but abounding in the larger sheets of water, including Great Bear lake, and as the water is there beautifully clear the traveller frequently sees them pursuing their prey in the depths, or lying motionless near the bottom.

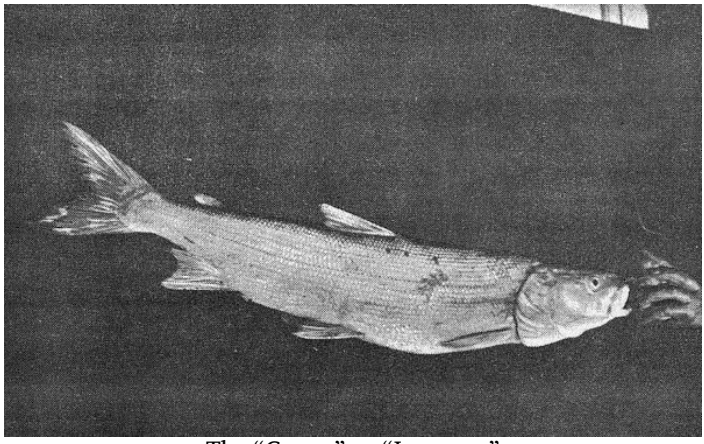
A trout taken by Simpson's party at Fort Confidence, Great Bear lake, measured four and one-half feet in length and twenty-seven inches in girth, and weighed forty-seven pounds.

Richardson states that Franklin's party, during eighteen months' residence at Fort Franklin in 1825-26, took three thousand five hundred trout weighing from two to thirty pounds each.

The Lower Mackenzie.

Writing of his visit to the small post at the mouth of Arctic Red river on the lower Mackenzie in the autumn of 1905, Mr. Harrison ("In Search of a Polar Continent") remarks:—"Before starting we loaded up nine sledges, at the mouth of Arctic Red river, with dried fish, which was now to be obtained in abundance. On reaching this post, indeed, I had calculated that there were about twenty thousand dried fish hanging up there, which had all been caught in nets and smoked over the camp fires. This industry of catching fish is busily and extensively carried on each year upon Mackenzie river. The natives begin operations in August and continue as

long as the river is open; few fish are taken after the ice has set fast. The chief kinds of fish which are caught are the inconnu (or Mackenzie river salmon, though it would seem rather to be a sort of herring), the white fish and the trout. The inconnu, which turns the scale at anything between twenty and forty pounds, is excellent provender alike for men and for dogs; when dried, it becomes, of course, much lighter by shrinkage, and can conveniently be carried on sledges. The whitefish, as I have previously stated, average about two pounds a piece; the heaviest I saw here weighed eight pounds. The whitefish, moreover, furnish a more toothsome repast than any other kind obtainable in these waters. There are numerous trout in the surrounding lakes, but I seldom procured any of them."



The “Conny” or “Inconnu.”

Mr. Harrison mentions that in 1906 in the country between Point Separation on the Mackenzie delta and Liverpool bay on the Arctic coast, at the mouth of a small river, his Esquimaux caught several huge pike, one of which he weighed and found to scale forty-two pounds. They were excellent eating, but they tore the nets to pieces. This stream, Mr. Harrison says, is fifty yards wide, and is thickly timbered on both banks.

The Whaling Industry.

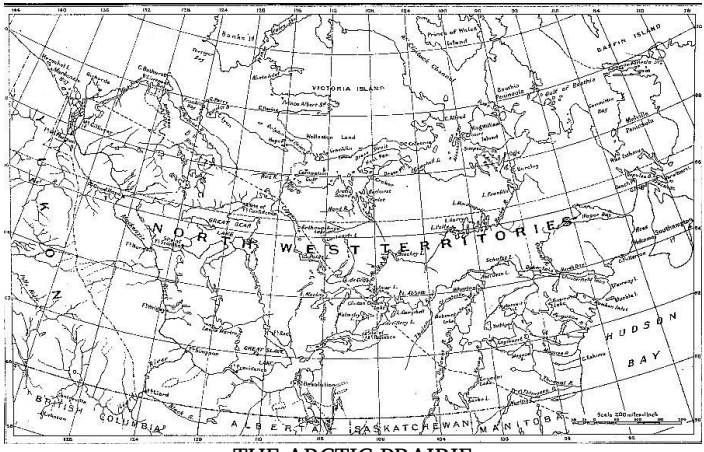
It is not proposed to discuss here the fisheries of Arctic ocean and of the islands which lie therein, but having come down to the mouth of the Mackenzie we might well devote a couple of paragraphs to a fishing industry actively prosecuted in the immediate vicinity.

In his annual report dated Fort Macpherson February 16, 1910, Inspector G. L. Jennings makes the following reference to the whaling industry in

northern waters: “In August, 1909, the steamer *Karluk* arrived at Herschel island. She is an independent whaler, the stock of the venture amounting to thirty-two thousand dollars, being owned by the captain, the officers, and some merchants of San Francisco. The *Karluk* cruised in the neighbourhood of Baillie island and Banks Land until the close of navigation. She returned to Herschel island on September 23, having killed eleven bowhead whales, eight of which I understand were taken in Canadian waters, north and east of Cape Parry. The value of this cargo of eleven head is, by an estimate at the present low price of bone, eighty-five thousand dollars. The *Karluk* is wintering at Herschel island and will return to the eastward by first open water. As she will have the field to herself for at least six weeks before any other ships can arrive from the westward, the chances are that she will make another large catch, and will no doubt leave in the fall of this year for San Francisco with a cargo of bone valued from one hundred and fifty thousand dollars upwards. The value of the trade of the *Karluk* in pelts will also be several thousand dollars. I think it is greatly to be regretted that no Canadian whaling ships or traders from our Pacific coast come into this territory, instead of leaving everything to the Americans. With a good class of trade goods, no cheap trashy stuff, and having no duty on these goods, selling or trading at a reasonable profit, the whole trade of our Arctic coast could easily be secured. I think it is but a matter of a very few years before American trading concerns open stations at Herschel island, Kittigazuit and Baillie island. If a Canadian firm was established first there would be no opposition.”

In a later report the same year, Inspector

Jennings states that the *Karluk* had killed nine whales during July, making twenty in all for two seasons with an approximate value of one hundred and thirty thousand dollars. He had also fur to the value of ten thousand dollars received in trade. On leaving Baillie island on August 14, the *Karluk* cruised along the south and west coast of Banks Land, north of Cape Kellett, to north latitude 72·31°. She left Herschel on August 26 and reached Nome, Alaska, on September 3.



THE ARCTIC PRAIRIE

CHAPTER XIX.

THE BARREN LANDS OR “ARCTIC PRAIRIE”.

Topography, Soil, Climate and Flora.

Explorers Declare The Term “Barren Lands” a Misnomer.—Some Notes About the Chief Rivers and Known Lakes—An Inland Waterway for Steamers via Chesterfield Inlet a distance of Five Hundred and Fifty Miles Into the Interior.—The Progression of the Seasons.—The Country Similar to the Tundra of Siberia.—A Limited Amount of Agriculture may be Possible in Places.—Natural Prairies in the Valley of the Thelon.

Most of the recent explorers and travellers who have visited the vast sub-arctic region extending from the present boundaries of the provinces of Manitoba, Saskatchewan and Alberta to Arctic sea, and lying between Hudson bay and the heights of land defining the eastern limits of the watersheds of Mackenzie river and of the rivers flowing into the Arctic sea, north of Great Bear lake, have protested against the application to the country of the term “Barren Lands.” For instance we find Mr. David T. Hanbury (See p. 21) in his well known volume “Sport and Travel in the Northland of Canada” writing:—“I have always maintained that ‘Barren Ground’ is a misnomer for the northland of Canada. No land can be called ‘barren’ which bears wild flowers in profusion, numerous heaths, luxuriant grass, in places up to the knee, and a variety of moss and lichens. It is barren only in the sense that it is destitute of trees, hence the name ‘Dechin-u-le’ (no trees), which is the Indian name for it.”

In 1907, Mr. Ernest Thompson Seton, the author and artist, made a trip into the barren lands via Athabaska river, Lake Athabaska, and Great Slave and Great Bear lakes. Describing his trip in a course of lectures, Mr. Seton declared that the barrens were not in reality barren in any sense of the word. Nature had seized every available cleft in the rock, and had

massed it with anemones, Athabaska roses, and beautiful flowers of all hues. Between the vast flower stretches the bare rock was covered with rich mosses of varying colours. “In fact,” he said, “it seems that nature began at the barrens with a full palette, and when she got down to the tropical regions there was nothing left in her tubes but green. The scenery surpasses that of the central west in the beauty of the hills and the manifold variety of wild flowers.”

Term “Barren Lands” a Misnomer.

Mr. E. A. Preble gives us this sketch of the scenery of the Barren Lands eastward of the Coppermine:—“Thousands of lakes dot its surface, and they are often bordered by grassy plains and gentle slopes, on which, during the short summer, the bright flowers of a profusion of shrubby and herbaceous plants lend their beauty to the landscape, and prove the appellation “Barren Grounds” to be a misnomer, though in many parts, from the nature of the soil, there is little plant life. Alders (*Aldus alnobetula*) occur in a more or less dwarfed condition in favourable places well into the treeless area, and several species of willows, some of which here attain a height of five or six feet, border some of the streams as far north as Wollaston Land. These are the only trees which occur even in a dwarfed state on the barren grounds proper.”

Mr. J. B. Tyrrell, in one of his reports, describes the Barren Lands as consisting “very largely of rolling plains, underlain by stony till and covered with short grass or sedge.” He adds:—“Doubtless the ground is permanently frozen a great distance below the surface, and the surface in summer is almost constantly wet, like the plains of Assiniboia and

Saskatchewan in early spring. Rounded rocky hills rise here and there through the clay, and on these, as well as often on the more stony parts of the till, the surface is dotted with a thick growth of lichens, such as *Alectoria ochroleuca*, *A. divergens*, and *Centraria Islandica*. Many flowers brighten these plains during the short summer months."

As the country has been so long known as the Barren Lands, it would at present scarcely be recognized by any other designation, although when the exploitation of its mineral wealth once attracts population, it will some day be known by some other and more suitable name—"Hearne," for instance, after the cognomen of the first white man who undertook to explore its natural resources.

Authorities differ in their definitions of the limits of the Barren Lands. Some consider the territory coming under that designation as extending much farther south in the vicinity of Hudson bay; others include in the Barren Lands most of the area immediately north of Great Bear lake. Mr. Preble, the most recent scientific explorer to report officially upon the country, under the heading "The Barren Grounds", includes the area lying to the northward and northwestward of Great Bear and Great Slave lakes. J. B. Tyrrell, M.A., B.Sc., F.G.S., in a paper read before the British Association at its Toronto meeting in 1897 entitled "Natural Resources of the Barren Lands," confined himself to a roughly triangular area bounded on the north by the Arctic ocean, on the east by the west coast of Hudson bay and Fox channel, and on the southwest by a line extending from the vicinity of Churchill on Hudson bay, northwestward, roughly at right angles to the magnetic meridian, crossing Kazan river at Ennadai lake, Telzoa river at Boyd lake, passing south of

Clinton-Colden and Aylmer lakes, across Point lake and down the east side of Coppermine river to within fifty miles of its mouth, and thence striking westward across Anderson river till it reaches the Arctic coast near the mouth of Mackenzie river.

Mr. Tyrrell's Definition.

According to Mr. Tyrrell, this line follows very closely the line of the mean summer temperature of 50° Fahr. south of which some of the most hardy trees can grow and ripen their fruit, while north of it the summer is not sufficiently long or warm, to allow even the most hardy trees to bring their fruit to perfection.

This portion of the Barren Lands, according to Mr. Tyrrell, has a greatest length from the southeast to northwest of twelve hundred miles; a greatest breadth from southwest to northeast of seven hundred and fifty miles, and an area of four hundred thousand square miles, a region twice as large as the province of Ontario, or more than three times as large as the whole United Kingdom.

It will be observed that Mr. Tyrrell leaves out of consideration in this paper a couple of areas included in the term "Barren Lands" as used in this chapter, namely the country south and southeast of the eastern arm of Great Slave lake, and a triangular piece of country in the angle between the same sheet of water and Yellowknife river. Mr. Tyrrell also considers the Arctic strip of country north of Great Bear lake to the mouth of the Mackenzie as forming part of the Barren Lands.

In this paper, Mr. Tyrrell makes the following comprehensive reference to the physical geography of this extensive region:—He says:—"In general

character the country is a vast undulating plain, underlain by a stony clay, and covered with a short grass or deciduous Arctic plants. In certain sections no rising ground can be seen for miles around, and in other sections rocky hills rise through the general covering of clay. The whole land reminds one forcibly of the great plains of Western Canada, the chief points of difference being caused by the differences in the underlying rocky-floor. The boulder-clay underlying the plains is deposited on a floor of soft Cretaceous shales and sandstones, and even where the soft rocks crop out at the surface they rarely form conspicuous hills; the boulder-clay underlying the Barren Lands is deposited largely on a floor of igneous, or hard, highly altered rocks, which, wherever they appear at the surface, form rocky knolls that stand up distinctly above the surrounding clay, while the boulder-clay itself, being formed out of material derived from the hard granitoid rocks, is much more stony than the clay of the more southern plains.

No High Altitudes.

"No part of the country rises to any great altitude above the sea, the highest point being probably the ridge of rocky hills called Stony mountains, which run along the east side of Coppermine river, and are said to rise about fifteen hundred feet above the sea. Ennadai lake lies eleven hundred feet above the sea, Dubawnt[24] lies five hundred feet, and the Yathkyed lake three hundred feet.

"The country may conveniently be divided into two distinct portions, namely, the Interior Upland and the Coastal Plain.

"The Interior Upland includes all those parts of

the country lying above the highest ancient shoreline, either of Hudson bay or of Arctic ocean, and has a mean elevation of from nine hundred to one thousand feet above the sea. Its surface is composed largely of sandy boulder-clay, and rounded boulders or broken fragments of the underlying rock. Low ridges and rugged, irregular hills are common over the surface, while eskers, or long straight ridges of sand or gravel, extend in uninterrupted courses over hills and valleys alike. Here and there some ancient beaches mark the positions of small lakes which have long since disappeared.

The Coastal Plain.

"The Coastal Plain lies between the highest ancient post-glacial seabeach and the present seashore, sloping gradually from a height of five hundred to six hundred feet down to the sea-level. Much of this plain has a stony surface, like that of the Interior Upland, but it is diversified with sandy plains, and on all the steeper slopes gravel terraces or coast cliffs mark the lines of the old seashore. Many of the terraces fill narrow gaps between adjoining hills, and the lower ones are often strewn with shells such as are found in Hudson bay at the present time. The waves have reduced the surface irregularities of this portion of the country to some extent, but the more rocky districts, such as those in the vicinity of Chesterfield inlet are still, except for the presence of the little terraces, as rough and rugged as before they were covered by the sea, and the highest parts are probably barer, for any loose material that had been left on them by the ice-sheet of the glacial period has been washed by the waves into the depressions. The breadth of the plain in the

vicinity of Churchill is about fifty miles. Farther north it becomes broader, until, in the latitude of Yathkyed lake, it has a breadth of one hundred and twenty-five miles, and at the north end of Dubawnt lake extends westward for three hundred miles. North of Dubawnt river its extent is not yet known, but many of the old sand plains and terraces reported from the banks of Backs river probably mark old shore-lines on this Coastal Plain, there sloping northward toward Arctic ocean.

"In a few places the coast-line is fairly high but as a rule it is low, and slopes gently down into a shallow sea. The whole country has a fairly general slope northeastward, and the three principal streams which drain it have a more or less parallel course in that direction, while other smaller streams flow more directly towards the coast, northward to Arctic ocean and eastward to Hudson bay.

The Three Principal Rivers.

"These three streams are Thlew-e-cho, Great Fish or Backs river, Telzoa or Dubawnt river and Kazan river.

"Backs river rises in Sussex lake about fifty miles within the edge of the Barren Lands, in a basin surrounded by sandy hills, at an elevation of about five hundred and fifty feet above the sea, and after a course of six hundred miles empties itself into Arctic ocean a short distance south of the magnetic pole. This stream will always possess a melancholy interest for every man or woman of British stock, for at its mouth the crews of the Erebus and Terror, the two ships taken out by Sir John Franklin on his last ill-fated expedition, dropped in their tracks and died as they attempted to reach a place of safety and plenty.

"Telzoa or Dubawnt river rises in Daly lake a short distance south of the Barren Lands, and flows northeastward, roughly parallel to Backs river, until it strikes the wide valley which extends inland from Chesterfield inlet, where it turns abruptly eastward and flows into the west side of Hudson bay, its total length, including Chesterfield inlet, being eight hundred and seventy-five miles.

"Kazan river rises in Kasba lake, fifty miles east of Daly lake, and flows approximately parallel to Telzoa river for about four hundred and ninety miles to enter the south side of Baker lake though the exact position of its mouth has not yet been determined. Of the smaller streams the Anderson, Ferguson and Coppermine are the only three which have been explored."

Dubawnt Lake.

In his official report of his trip of exploration in 1893, Mr. Tyrrell gave some particulars about Dubawnt lake, situated a little south of the middle of the Barren Lands. He writes:—"Dubawnt lake is a body of clear cold water of unknown extent, the southern and eastern shores indicated by dotted lines on the map, having been laid down from rude sketches made by the Eskimo. Its western and northern shores were surveyed for one hundred and seventeen miles, but from the summits of the highest hills the opposite shores were nowhere distinctly seen. Its approximate altitude above the sea level is five hundred feet. By the Chipewyan Indians it is called Tobatna or Water-shore lake, possibly from the fact that the main portion of the lake is always covered with ice, and that in summer there is a lane of water between this ice and the shore. Its Eskimo

name is Tulemalugua. Judging from subsequent Eskimo reports, it has two principal affluents. One of them flows into its southern side, and has scattered groves of white spruce on its banks. The other is Dubawnt or Telzoa river which we had descended.

Before the Senate committee of 1907, Mr. Tyrrell explained that the outline of the lake as he sketched it still appears on the maps. He added that the most recent government maps of the Barren Lands do not pretend to be complete. They merely show the lakes that are known. There are thousands of others that we know nothing of, because nobody has been through there. Some of the larger ones are sketched in. Mr. Tyrrell sketched in many, from the reports of the Esquimaux, and they still appear as he so sketched them on the map. The whole country is studded with lakes.

Water Routes via Chesterfield Inlet.

From the reports of Messrs. Tyrrell and Hanbury and Inspector Pelletier, we have obtained a pretty good idea of the outstanding features of the great system of inland waterways which find their outlet at tidal water at Chesterfield inlet.

In his report, speaking of Thelon river, which he discovered during his trip in 1890, Mr. J. W. Tyrrell describes it as “one of the finest in Canada, navigable for river steamers and other boats of light draught all the way from Hudson bay to the forks of the Hanbury, a distance of five hundred and fifty miles, excepting perhaps at two rapids on the river above Baker lake, where some improvements to the channel may be made.”

He continues:—“Just what length of time this route may be open for navigation I am unable to say

precisely, but would judge that the river portion must be open for at least five months, and the inlet and larger lakes about a month less, that is during the months of July, August, September and October."

Mr. C. C. Fairchild, who was attached to Mr. Tyrrell's expedition and surveyed the waters between Baker lake and Chesterfield inlet, writes in his report: —"I am unable, owing to the short time at my disposal, to make anything but a cursory examination of the general depths of the water traversed, but I took soundings enough to satisfy myself that vessels

Drawing Ten Feet of Water

would have no difficulty in travelling from Hudson bay to the west end of Baker lake. Here boat navigation must end as far as the river between Schultz and Baker lakes is concerned, owing to rapids at either end of the river that would in low water not permit of the passage of any craft larger than a York boat."

"Chesterfield inlet in the main channel exceeded five fathoms in depth at all points tried, and soundings were only taken when I could see bottom, which was plainly visible at thirty feet and even more."

Inspector Pelletier of the Royal Northwest Mounted Police, who went down that river on his way from Great Slave lake in 1908, describes the lower reach of Thelon river just above Beverly lake as flowing through "low lying country with willows and grass. A high ridge of bare hills is seen in the distant north, running east and west. The river follows along the range, winding through what I would call foothills, until it opens on Beverly lake.

The country there is low lying."

Beverly lake to Hudson bay is a stretch of barrens. No wood grows on that stretch but a few small willows in some very scattered spots and far between. Beverly lake is surrounded by comparatively low lying sandy country. At the lower end the land is higher. Just entering into Aberdeen lake the shores are rocky and immediately give place to low sandy soil. This extends for about thirty miles, when the country again takes a rocky appearance and the ridges get higher and higher to the lower end where hills of from four hundred to five hundred feet in height are seen, with solid rock formation. The north shore of Schultz lake is of high rocky ridges, in places four hundred feet high. When getting to the lower end it alters to sand and gravel and becomes low lying. At the outlet of Schultz river it again becomes rocky. Below the last rapid, near Baker lake, the country immediately becomes low lying and sandy and gravelly. The north shore of Baker lake is high and rocky; in places the bare rocky ridges advance and run into the lake, forming rough, bare points. The lower end of Baker lake is high, the ridges being about four hundred feet. Baker river flows between high banks of solid rock. The formation of the country along Chesterfield inlet is mostly rocky, and is quite low lying, with here and there a prominent rocky point, but none above two hundred feet, except at the lower end, near Deer island, where there is a collection of fairly high ridges.

Upper Reaches of the Thelon.

As to the higher reaches of the Thelon, Mr. J. W. Tyrrell says in his report:—"About two miles below

the junction of Hanbury river, where we made camp, some measurements of the Thelon were made, from which the volume of the flow at the time was found to be over fifty thousand cubic feet per second. The width of the stream measured one thousand two hundred and twenty-seven feet, depth of channel five feet, and velocity three and a third miles an hour. These measurements being taken near the forks, show a less depth but greater width than exists at most parts.

"Eight miles farther down the stream soundings were taken, showing a depth of fourteen feet in mid-channel. At this point well grown spruce trees were plentiful on both banks.

"About thirty or thirty-two miles below the forks, two slight rapids occur where ridges of rock project into the stream, but they are so slight as not to seriously interfere with the navigation of the river either by canoes or large river boats."

Artillery Lake Region.

In the report of his 1908 patrol, Inspector Pelletier thus describes Artillery lake,[25] northeast of Great Slave lake, and the portages thereabout:—"The south end of Artillery lake is rocky, the ridges are of solid rock, and hills do not rise above three hundred to four hundred feet above the lake. Farther up the general character of the country changes into rolling plains of sand, with more or less vegetation. In places bare sand ridges are seen of fine yellow colour. This again changes at the upper end of the lake. There the formation is more broken, solid rock ridges are few, but large boulders are numerous, and sand gets coarser, I might say gravelly, a mixture of clay and gravel, with boulders more or less

numerous. All the country is comparatively flat; there are no high hills anywhere more than two hundred to three hundred feet above water. At the northern end of Artillery lake are some sand ridges, also at the northern end of Kasba lake. At the portages the ground is clay, with gravel and boulders, and in places, if one walks over the same spot a while to and fro, he will find that the ground will move under his feet and become dangerous. In poking a stick through the crust, water, air and mud immediately rush out. The whole country is covered with these places; they are usually bare of vegetation, and level and free from stones, affording good camping ground, but one has to be careful not to bustle too much or he will find himself sinking into a mud hole."

Mr. Pelletier, in his report, speaking of his route from Artillery lake to Hanbury river, says:—"The stretch from Height of Land to below Lac du Bois is not considered as a stream. It is only a succession of lakes separated by short, shallow and turbulent streams of no size. Hanbury river proper begins from below Lac du Bois, where it takes the appearance of a river. Above it can only be called the headwaters of Hanbury river. The general conformation of the country is low, and only ridges of gravel, or stones, not exceeding eighty feet in height, are seen. There are no cutbanks of any account. The slopes are gradual in most cases.

A few notes, as to the progression of the seasons in various parts of the Barren Lands, taken from the journals and reports of a number of explorers, will prove interesting.

A Smart Thaw Early in May.

Back records “a smart thaw” at Fort Reliance at the extreme eastern end of Great Slave lake, on May 6, 1834, and mentions that patches of green were daily becoming visible. He farther on states:—“On May 13, a single goose, the harbinger of summer, flew past the house, and during the day it was followed by five more, all of which took a northerly direction. This was six days later than they had been seen in 1836 at Fort Franklin, though a higher northern latitude. A fly and a flock of small birds appeared in the evening, and during the three succeeding days we had gulls, orioles, grosbeaks, yellow legs, robins and butterflies.

“On May 18, the catkins of the willows were half an inch long, and the snow was fast disappearing from the ground.

Sultry Towards the End of May.

“Towards the end of the month (May) the weather became sultry, the temperature in the sun being 106°—an extraordinary contrast to that of January 17, when it was 70° below zero. The snow was all gone, except that which had been drifted to a great depth in the narrow valleys, and under steep precipices, and the Al-hel-dessy, to the westward, had burst its icy fetters, and opened a clear channel to the portage opposite the house; loons, gulls, and ducks took possession of the water, and seemed to contend which should make the most noise; some small birds also, very prettily marked, hovered about a short time, and then both they and the ducks suddenly deserted us.”

Mr. Hanbury, writing specially of the region northeast of Chesterfield inlet, states:—“There is never much snow on the ‘Barren Grounds’, and a few

warm days suffice to lay the country bare. If spring overtook us far inland on rough ground, we should have an almost impossible march over bare ground to the Arctic coast. I therefore decided to begin that long journey not later than February."

Spring at Chesterfield Inlet.

Mr. Warburton Pike, writing of May 1, 1887, at a whaler's camp on Hudson bay in the vicinity of Chesterfield inlet, states:—"Water was standing in pools over the ice in the bay; the snow had disappeared except in the drifts; a light rain was falling, and the first goose was killed from the door of the master's house; small bands of wild-fowl were passing frequently, and cranes were calling in the swamps to the southward; daylight lingered in the sky all night, but there was always a sharp frost while the sun was down."

Mr. Hanbury, after crossing from Chesterfield inlet to the Arctic coast, writes:—"June is the one perfect month in the northland. The temperature is just right; there is not a fly or mosquito to trouble one. The land is clear of snow, with the exception of a few deep drifts and banks, and the walking is good, for the land dries with wonderful rapidity. The ice is still good to travel over. Plenty of salmon are now running."

Mr. Warburton Pike, on his canoe and overland trip in 1890, when north of the east end of Great Slave lake on June 16, wrote:—"A few warm days made a great difference in the appearance of the country. Leaves began to sprout on the little willows, and the grass showed green on the hillsides; sober hued flowers, growing close to the ground, came out in bloom, and a few butterflies flapped in the hot

sunshine, while we were still walking on eight feet of solid ice. Mosquitoes appeared in myriads; in the daytime there was usually a breeze to blow them away, and the nights were too cold for them, but in the calm mornings and evenings they made the most of their chance to annoy us."

On June 25, Mr. Pike's party planted their lodges on a high ridge overlooking Lake Mackay.

Ice on Aylmer Lake June 25.

At that same date the ice on Aylmer lake was still solid.

In 1821, when Franklin's party started to descend the Coppermine on July 1, the lakes on its upper course were still covered with ice. Apparently the river had opened only a short time before. In 1849, Doctor Rae noted the breaking up of the same river near its mouth on June 28. At this time the leaves of the dwarf birches were out, and the leaf buds of the willows had begun to develop. The lower part of the river remained blocked with ice until July 13.

Mr. Pike relates that about July 10 the weather in the neighbourhood of the headwaters of Backs river "was variable in the extreme; two or three hot days would be followed by a snowstorm and once we were visited by a hurricane that did much damage to lodge-poles, and caused us to shift camp hurriedly to the lee-side of a steep cliff hanging over the river. July 10 was exceptionally hot in the morning, with the mosquitoes at their worst; in the middle of the day there was a thunderstorm, and at five o'clock the ground was covered with snow. The ice now began to show signs of rotting, and the channel of open water round the weather edge of the lake grew rapidly broader."

Sunset at Half Past Eleven.

On July 19, according to Franklin, the sun set at the mouth of Coppermine river at half past eleven.

From the official report of Inspector Pelletier we find that at Artillery lake on July 23 “the atmosphere was quite smoky and warm.” On the morning of August 12 on Thelon river the ground was white with frost, and the ice on a kettle of water was a quarter of an inch in thickness. The sun got up warm, and the weather during the day was perfect. August 13 (Beverly lake) was “a warm still day”. August 31 (Chesterfield inlet) was “a nice still day, very warm.”

While on their way from York to Lake Athabaska, and descending Cree river, Sir George Simpson’s party, in 1823, picked “a good many ripe raspberries, currants and gooseberries on the portages” on July 30.

Mr. Tyrrell reports snow banks on the hillsides and great piles of rafted ice on the shore at Markham lake on Dubawnt river, south of Dubawnt lake, on August 3, 1893.

As to the close of the Barren Lands summer, Back mentions that while ascending the river which has since been given his name, on September 4, 1834, “a hard gale from the northwest indicated the commencement of the fall weather, and, while we were travelling, many hundreds of geese flew high past us to the south.”

Mr. Hanbury mentions that one year during his travels two inches of snow fell during the night of September 18 and ice formed on the smaller lakes north of Baker lake. He remarks:—“On my journey in 1899 we travelled on the ice with dogs the last days of June, and were beset by ice on Schultz lake on

July 31. Now in the middle of September we had ice again, and it looked as if it had come to stay. We had not gone far when we were obliged, by the state of the weather, to put ashore and camp. The rest of the day was spent in repairing our tent, which had suffered considerably during the recent storm."

Warburton Pike states ("The Barren Ground of Northern Canada") that the ice on Great Slave lake is usually not safe for travel till the middle of December.

Ultimate Development of the Country.

In his paper read before the British Association at Toronto, Mr. J. B. Tyrrell, referring to the temperature of the Barren Lands and its bearing upon the question of the ultimate development of the country, had this to say:—

"In this connection it may be stated that while the mean summer temperature (which is below 50¼° on the Barren Lands) determines the limit of the forest and the possibility of the growth of trees, the mean winter temperature would probably determine the habitability of the country by human beings.

"Now Churchill is the coldest inhabited place on this continent, with a mean winter temperature of -20.5° Fahr., and it is not likely that any part of the Barren Lands has a mean winter temperature of -30° Fahr., while Yakutsk, a town of about five thousand inhabitants in Siberia, has a mean winter temperature of -40.4° Fahr., and many other places in Northern Asia have a still lower mean, one place having a mean winter temperature of -50.2° Fahr. Most of these places have, however, a higher summer temperature than is found in the Canadian Barren Lands, and are therefore within the limit of woods.

"It can thus be seen that Europeans and Asiatics live and thrive in a much more rigorous climate than is found even in the most inhospitable parts of northern Canada, and that therefore the climate does not offer any insuperable objection to settlement in that country."

Present Inhabitants Two Thousand Eskimos.

According to Mr. J. B. Tyrrell (paper before the British Association): "The permanent inhabitants of the Barren Lands are about two thousand Eskimos, who live either along the coast or on the banks of Kazan and Dubawnt rivers. They subsist entirely by hunting and fishing, and the animals on which they live are chiefly the Barren Land caribou and several species of seals. Besides these, about five hundred Chipewyan Indians usually penetrate a short distance into the Barren Lands from the south during the summer in their annual deer-hunt, but they retire southward into the forest to spend the winter."

Like the Tundra of Siberia.

Doctor (later Sir John) Richardson was one of the first explorers to draw attention to the resemblance of the Barren Lands to the tundra of Siberia. In one place the learned scientist writes:—"The general character of the tundra of the east of Siberia is like that of the American barren grounds."

Again he writes:—"In character the Siberian tundra is very similar to the American ones. Thus Wrangell says,—'When one coming from the naked, frozen moss-tundra reaches the valleys of the Aninuik, which are sheltered by mountains from the

prevailing cold winds, and where birches, poplars, willows, and low creeping junipers (*Juniperus prostratus*) grow, he thinks himself transported to Italy.' "

All who have visited the Barren Grounds agree that the prospect of agriculture ever being successfully followed there on a large scale is very slight, unless it is proved possible to develop the breeding of the Lapland reindeer and make of it a profitable meat raising industry, or is found practicable to domesticate the native reindeer or caribou. Some of the scientific explorers, however, think there is a prospect of a certain amount of barley agricultural produce, even grain of hardy varieties being raised in one part—the valley of the Thelon.

Limited Agriculture Possible.

Mr. J. W. Tyrrell says in his report:—"The Thelon valley, though affording good grazing ground for musk-oxen and caribou, can scarcely be looked upon as a desirable agricultural district, although I judge from the growth and great variety of plants observed there, that some of our cereals and most of our hardy vegetables could be grown in the Thelon valley."

Mr. J. B. Tyrrell, brother of Mr. J. W. Tyrrell, in his evidence before the Senate committee of 1907, stated that to the west of Hudson bay and north of the line of the forest which runs from Churchill northwestward through Ennadai lake, and a short distance south of Dubawnt lake, there is practically no agricultural land. Mr. Tyrrell would not consider that any of the land north of the limit of forest growth was of any value for agriculture. The tree line starts practically at Churchill and runs northwesterly.

South of that there are trees, and north there are none. The country north of the tree line is partly rock, but the greater part broken rock and boulders, a rough stony country without any great elevation, and very little vegetation of any kind, except a great many Arctic plants and sedges. Mr. Tyrrell believes the country is permanently frozen. It did not appear to him that there would be any possibility whatever of growing anything on it. That, in Mr. Tyrrell's opinion, eliminates from an agricultural standpoint that portion northeast of that line.

To the west of Hudson bay and south of the line of the treeless land which runs from Churchill northwestward through Ennadai lake, and a short distance south of Dubawnt lake, there is a belt from one to two hundred miles in width of country that is sparsely wooded. It is not a forest country, but it is wooded along the streams, and in the more protected places, but there is comparatively little wood of any value upon it.

In that country there are, Mr. Tyrrell said, some low lying areas along the streams and in odd places that would support a northern vegetation, but it is not eminently suited for agriculture. The ordinary plants that are grown in many northern countries could doubtless be cultivated in many places. There is very little humus, very little decomposed soil there, except just in the valleys.

Inspector Pelletier, speaking in the report of his 1908 patrol of his route from Artillery lake to Hanbury river, says:—"There are large stretches of arid country covered with boulders. Nevertheless all over is good feeding ground for deer."

The country surrounding Hanbury river, Inspector Pelletier states, alternates from rocky ridges to sandy stretches and rocks broken up, with country

scattered with boulders. Moss and grass grow very poorly down to Dickson canyon. From there on vegetation improves gradually until when, below the last fall, it becomes most luxuriant. The contrast is very noticeable.

Good Pasturage Along the Thelon.

August 9, while descending Thelon river, Inspector Pelletier's party camped for the night on a big grassy flat with a clump of trees at the back of it on a little mound. The inspector says in his report: —"I got to the top of the mound, and with my glasses I could see an immense tract of prairie country growing good grass with a few little low trees in the far distance. This tract of land, if situated in a more accessible spot, would certainly make the very best ranching country, and there are many more stretches like this on Thelon river." The day previous they had passed places where the banks of the river had washed away "showing very good and fertile soil." Towards evening of August 10, the country, which had got quite barren about noon-time, resumed again a green and fertile appearance and became well-wooded." The following day another section "barren in places" was passed, while later again quoting the inspector's report:—"the country assumed a better appearance, and timber became larger and thicker, until it became a continuous forest alike on both banks, and as thick as on any river in the timbered belt. This kept on for about ten miles, and we camped near a bluff about eighty feet high, at the edge of the timber. The country then alters to low lying ground, and timber again grew, but very stunted, and only in bunches, which gradually became more scattered, and after fifteen

miles disappeared totally to give place to long willows along the banks with large grassy flats farther in."

Hardy Vegetables Might Grow There.

In his summary of observations on this section of his trip Inspector Pelletier states in his report: —"There are large stretches of prairie country (along the Thelon) growing grass profusely. The soil seems to be most fertile. I am told the river opens in May. If such is the case I would judge that some of the hardy vegetables would grow there. The days are very long in summer." Accounting for the absence of native settlements from this valley, Inspector Pelletier says the Eskimos do not like timber on account of the flies in the summer and soft snow in the winter. They like the open barren coast, where the wind has full sweep, where the snow packs hard in winter and where game is permanent. The Indians, on the other hand do not inhabit this tract because it is far from trading posts, and because there is no birch for them to make their canoes.

Mr. J. W. Tyrrell, in his book "Through the Sub-Arctics of Canada," says "Agricultural development is not to be expected anywhere in the northern parts of the district, but throughout the more southerly wooded portions there are great possibilities in this direction."



The Midnight Sun.

The Natural Flora.

As to the natural flora of the country, Mr. J. B. Tyrrell, in his expedition of 1893 across the Barren Lands, collected one hundred and twenty-four species of plants exclusively of algae and fungi. Reference has already been made to some observations made by explorers as to the flowers and other natural vegetable growths.

Inspector Pelletier, Royal Northwest Mounted Police, reports that between Beverly lake and Hudson bay "grass grows in favoured spots, but the balance of the country is bare."

Describing the country at Bloody fall on the Coppermine, Franklin writes in his narrative:—"The ground is well clothed with grass and nourishes most of the shrubs and berry-bearing plants that we have seen north of Fort Enterprise, and the country altogether has a richer appearance than the barren lands of the Copper Indians."

Mr. A. P. Low, of the Geological Survey, passed a winter in the far north near Cape Fullerton in the

"Neptune". He expressed the opinion before the Senate committee of 1907 that the whole northern region about Chesterfield inlet and Fullerton is unfit for agriculture. The tree line ceases on the coast close to Churchill and crosses off to the northwest towards the Mackenzie. The country on the mainland about Chesterfield inlet is quite low. The hills never extend more than three hundred or four hundred feet. There are no forests up there, and the only natural resources would be probably the minerals, the furs, and the sea and lake fisheries.

The Lure of the Barren Lands.

Mr. Hanbury, describing a view in the Barren Lands on July 23, writes in his book:—"Artillery lake looked very picturesque in the bright sunlight; the water, which was of a beautiful blue, was fanned into ripples by the gentle summer breeze. The 'Barren Ground' lay on either side beautifully green, and decked gay with a variety of wild flowers. Its charm, and the sense of freedom which it gives, are very impressive, but cannot be described."

The following is a pretty descriptive bit from Mr. Warburton Pike's book "The Barren Grounds of Northern Canada":—"To the man who is not a lover of nature in all her moods the Barren Grounds must always be a howling, desolate wilderness, but for my part, I can understand the feeling that prompted Salatha's answer to the worthy priest, who was explaining to him the beauties of Heaven. 'My father, you have spoken well; you have told me that heaven is very beautiful; tell me now one thing more. Is it more beautiful than the country of the musk-ox in summer, when sometimes the mist blows over the lakes, and sometimes the water is blue, and the loons

cry very often? That is beautiful, and if Heaven is still more beautiful, my heart will be glad, and I shall be content to rest there till I am very old."

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[24] The Geographic Board of Canada has adopted "Dubawnt" as the standard spelling of this lake and the river of the same name. The name is a corruption of the Indian name "Tobatna", meaning "water shore". (E. J. C.)

[25] So named by Captain George Back in 1833, out of respect to the Royal Artillery, to which distinguished corps some of his crew who joined him in Montreal belonged, "and from a grateful remembrance of the deep interest manifested by its officers for the success of the expedition, and of their friendly courtesies" to himself.

CHAPTER XX.

THE BARREN LANDS, OR "ARCTIC PRAIRIE."

Tree Growth and Timber Resources.

Phenomenal Extensions of Tree Growth Within the Barren Lands Along the Valley of Thelon river.—Black Spruce,

Larch, White Spruce, Banskian Pine and Birch.—Valuable Timber Along the Thelon, About the East End of Great Slave lake and Between Great Bear lake and Coppermine river.

In his valuable report, Mr. E. A. Preble, of the United States Biological Survey, states that Coppermine, Thelon, and many of the smaller rivers of the Barren Lands are wooded to some extent on their upper portions, but by far the greater part of the area drained by them is treeless.

Mr. Preble traces the northern boundary of the great transcontinental forest from the western shore of Hudson bay to the mouth of the Mackenzie as follows:—"Starting from the mouth of Churchill river, Hudson bay, the tree-line follows the shore closely for a few miles and then curves gently inland. Thence it extends northwesterly crossing Nueltin, or Island lake, Ennadai lake on Kazan river and Boyd lake on the Dubawnt. Just north of 63 degrees on Artillery lake is the next point where we have a definite dividing line. Between the Dubawnt and Artillery lake is the valley of the upper Thelon or Ark-i-linik, along whose banks the forest extends in a narrow line far into the general treeless area. From Artillery lake the line extends northwestward to Point lake, curving toward the southwest in the interval and crossing Lake Mackay, south of latitude 64 degrees. From Point lake, whose shores are practically devoid of trees, nearly to latitude 67 degrees the banks of the Coppermine are so thinly wooded that the river may be taken as the approximate boundary of the woods. Spruces occur on the Coppermine as far north as the mouth of Kendall river, but are absent from the summit of the divide between there and Great Bear lake and reappear on lower Dease river. Between Dease river

and the lower Anderson the boundary of the woods is not well known."

It will be remembered by those familiar with the subject, that, in defining the eastern end of the forest line, Mr. Preble has closely followed the definition laid down by Mr. J. B. Tyrrell in the official report of his exploration of the country south and east of Dubawnt lakes and Chesterfield inlet. Mr. Tyrrell states in his report:—

"The region may be divided into Forests, and Treeless Plains or 'Barren Lands', by a line which curves around the bottom of Button bay, and then continues within sight of the shore as far as Hubbart point, beyond which it strikes northwestward almost at right angles to the magnetic meridian, crossing Kazan river at the southern narrows of Ennadai lake, and Telzoa river about the middle of Boyd lake."

Black and White Spruce and Larch.

"The forested country is chiefly wooded with small black spruce (*Picea nigra*) and larch (*Larix Americana*) while the lowlands are almost everywhere covered with deep mossy swamps. Proceeding northwards, the woods become confined to the lowlands and the tops of the hills remain treeless. Such are the conditions of the surface around Kasba and Daly lakes. Farther northward the wooded plains give place more or less suddenly to level or rolling grassy plains, which constitute the Barren Lands. As the forest disappears, much of the surface is covered by deep frozen mossy bogs or tundras, but these occur only along the edge of the forest, and do not form part of the Barren Lands proper.

"Besides the two species of trees above

mentioned, the white spruce (*Picea alba*) grows to quite a large size on some of the dry estuaries, and on the stony, well-drained banks of Telzoa river. It extends northward almost to Dubawnt lake, forming a larger tree than either of the others. At Churchill, near the shore of Hudson bay, small white spruce were found to have entirely replaced black spruce in the swamps. A few miles farther inland, black spruce again takes its normal place in similar swamps, and white spruce almost disappears.

"Banksian Pine (*Pinus Banksiana*) grows on the sandy plains along Stone river, and northward, on dry sandy ridges, as far as Selwyn and Theitaga lakes, but it does not extend as far north as either spruce or larch. Canoe Birch (*Betula papyrifera*) grows to a fairly large size at the head of Thlewiaza river but as a rule it is a small tree in this region. It gradually decreases in size and disappears at the edge of the Barren Lands. Some small aspen trees (*Populus tremuloides*) were seen as far north as Daly lake on Telzoa river, latitude 60°, on the headwaters of Thlewiaza river, and at the mouth of Churchill river on Hudson bay.

Mr. Tyrrell's expedition of 1893 did not find much timber along Dubawnt river. Mr. J. W. Tyrrell ("Through the Sub-Arctics of Canada") mentions that the party found a little clump of white spruce trees on the north shore of Carey lake on the Dubawnt in latitude 62° 15′ north. Two feet above the ground the trunk of the largest tree measured eight feet in circumference.

Mr. Tyrrell also states that the southern affluent of Dubawnt lake "has scattered groves of white spruce on its banks."

Timber Along the Thelon.

There is considerable timber along the Thelon and the main tributary of its upper reach, the Hanbury, so named from the original explorer of both streams. Mr. Hanbury, describing his exploratory trip, writes:—"The peculiarity of the Ark-i-linik (the Indian name then applied to the Thelon and its tributary the Hanbury) is that, though so far north, it is wooded on either bank, and in places one might even say heavily timbered, spruce trees, with butts measuring one and one-half to two feet across, being by no means uncommon. It is a long way north of the limit of trees marked on the maps, and there is a large extent of country to the south of it destitute of trees. I can find no explanation of this peculiarity from the geological formation, for the same red and white sandstone which prevails nearly the whole length of the river occurs at places which are without trees.

"The woods as a whole amount only to a rather deep fringe, the trees for the most part being scattered and not continuous. Here and there along the banks are spots and short stretches quite bare of timber. After a short walk away from the river on either side one reaches the outer edge of the woodland fringe beyond which the land is typical prairie. Along the creeks and effluents, however, the growth extends to a considerable distance, in places as far as the eye can reach the trees diminishing in size until the spruce is mere scrub."

Ascending the main branch of the Thelon, Mr. Hanbury describes the timber as beginning about fifty miles above the mouth of the river at Beverly lake. That far northeast he states "spruce of fair-size growth is to be found, and the woods then increase in size of timber and in extent until the river divides, the larger branch coming in from the south, the

smaller—which we followed up—joining from the west."

Of Great Value to Canada.

Mr. J. W. Tyrrell, in the official report of his exploration along Hanbury and Thelon rivers for the Dominion government in 1900, remarks:—"The timber supply of the Thelon should be of great value to Canada."

Mr. Tyrrell mentions a grove of spruce on the Thelon, two miles below the junction of Hanbury river, and relates that eight miles farther down stream "well grown spruce trees were plentiful on both banks. Here, and for many miles below, the Thelon is a really fine and beautiful river, having grassy banks—well wooded in places by spruce trees —some of which measured some fifteen inches in diameter.

"The wooded or partially wooded banks of the Thelon extend altogether for a distance of about one hundred and seventy miles below the forks of the Hanbury. This distance is not to be understood as a continuous stretch of timber, but over that distance many fine spruce groves, as well as more or less continuous thinly scattered trees are found. The largest trees measured from twelve to fifteen inches in diameter, but would average about six inches."

In his book "Through the Sub-Arctics of Canada" Mr. Tyrrell again refers to the timber along the Hanbury and the Thelon, writing:—"In the valleys of the Thelon and some other rivers there are valuable belts of spruce and tamarack timber for local supply when required."

In the official report of his long patrol in 1908 Inspector Pelletier writes:—"A good amount of wood

for fuel is available on Hanbury river. In places timber is of fair dimension. In one or two ravines near Dickson canyon I would judge the timber to be of sufficient size to erect a comfortable log camp.

A Sixty Mile Stretch of Spruce Timber.

"The banks of the Thelon are very well stocked with timber. Of course there are fairly long stretches on which wood is very scarce, principally at the lower end, but still fuel is found everywhere, either drift or standing. The best stretches of solid timber are from about twenty miles below the Hanbury and extend for sixty miles. The stretch is nearly without interruption. There is another stretch of about ten miles, fifteen miles below Lookout point, and at numerous other points good timber, but in small quantity, is seen. This timber does not extend very far inland. It varies from a few yards deep to two or three miles. In some parts, the timber extends still farther inland. Lumber of fair size from six to ten inches in diameter is abundant. All the timber is spruce."

Inspector Pelletier speaks of a ten mile stretch on the Thelon, where there "was continuous forest on both banks, and as thick as on any river in the timbered belt."

Inspector Pelletier also reports:—"On Beverly lake (Thelon river) any amount of driftwood is to be found, on Aberdeen lake very little, and below none at all."

The Thelon Spruce Groves Phenomenal.

Mr. E. A. Preble, of the United States Biological

Survey, in his report has this to say as to the growth of timber along the Thelon:—"The northern extension of the coniferous forest along the banks of northward-flowing rivers has already been referred to. The most remarkable example of this phenomenon is found on the Thelon or Ark-i-linik, a stream tributary to Hudson bay. It was first explored by Hanbury in 1899, and by J. W. Tyrrell during the following season. From a point near latitude sixty-two and one-half degrees, which is as far south as the river has been explored, and which is within the main area of the Barren Grounds, a more or less continuous belt of spruce borders the river as far north as latitude sixty-four and one-half degrees, a distance of over two hundred miles by the river. A few species of woodland-breeding birds follow these extensions of the forest to their limits."

Eastern Part of Great Slave Lake.

Inspector Pelletier also gives us some information as to the timber resources of the eastern part of Great Slave lake and along the canoe and portage route to Hanbury river. He writes:—"On the south shore of Great Slave lake much good timber was met. On the north shore timber diminishes very perceptibly in size, and the farther one proceeds the more it gets stunted and scattered; only in some favoured spots is timber of any size, but no large area. It consists chiefly of spruce, birch, poplar and jackpine. At the upper end of the first portage from Great Slave lake timber gets very scarce, at French lake a large open spot and at Acres lake we are practically at the beginning of the Barrens, although there is a good lot of wood close to the shore and in sheltered spots. At north end of Burr lake is a nice grove of good sized

trees. The country gets rocky and barren, grass growing only in favoured spots.

"At the southern end of Artillery lake, along the small ravines on the east bank, is a fair amount of wood good for fuel and building dog sleighs, but as soon as one crosses Lockhart river where the lake gets wider, wood is seen here and there only in small bluffs. It is small, bent and dwarfed by the wind storms and snow. There is very little substance in the soil, and vegetation must be very slow. Trees grow mostly in the shelter of a bank, whether stone or sand. At about half way up the lake on the east side the last woods are met; on the edges they are low, bent and creepy, as if in readiness to grasp the soil for support to resist the force of the elements. Nothing further grows but some grasses in favoured spots, and at the rapids, where there is a lot of dampness, willows grow between the crevices of upturned boulders. Above Kasba lake on the route followed even willows do not grow. In the eddies at the foot of the rapids on Kasba river I have seen sticks, some of which had been cut with an axe or other tool. Those pieces of wood were small but of a size which leads me to believe that somewhere on Clinton-Colden or farther west on Aylmer lake, timber of some kind is to be found. These sticks or pieces of wood were very old as if they had been tossed up and washed by water for a long period. Moss grows in places and for fuel purposes a few experiments with the different kinds will demonstrate which is the best. We found the black thick sort, which grows on the stones, is very light and dry and burns the best. One makes a tunnel with stones and places the door towards the wind, the more wind and draught the better."

Scattered Timber East of Great Slave Lake.

In the report of his trip in 1900, Mr. J. W. Tyrrell also gives us some glimpses of the timber about the east end of Great Slave lake and the lakes and river to the east and northeast of that locality. According to Mr. Tyrrell, "Fairchild point (near old Fort Reliance), which is about ten miles in length, is well wooded with white spruce from six to twelve inches in diameter and is notable as being the source of timber in that locality.

"The shores of Carlton harbour are sparingly wooded with small spruce and a few Banksian pines. It might be noted here that on Fairchild point a few black poplars were observed, the last seen on our outward journey.

"At Fort Reliance, here and there, are to be seen the charred remains of large stumps, indicating the apparent recent destruction of the original forest.

"The largest young trees, which showed thirty-four to thirty-five years' growth, were from four to six inches in diameter two feet from the ground, and were not of stunted appearance.

"At the north end of Burr lake there is situated a nice grove of white spruce timber, containing trees of ten to twelve inches diameter. It proved to be the last timber of any consequence met with before entering the barren lands, excepting some on the west shore of Artillery lake near Timber bay.

"On the western side of Artillery lake, about ten miles from the south end, the shore is quite well timbered with small spruce and they continue northerly, although thinly scattered, for a distance of twenty miles, eight miles farther north than the last grove on the east shore. There the woods cease entirely."

It is interesting to recall that Back pointed out that "the pines are said to disappear along Artillery lake."

Mr. Warburton Pike thus describes the same country at the time he passed through it:—

"Scattering timber, spruce and birch, clothed the sloping banks to the sandy shores of the lakes; berries of many kinds grew in profusion; the portages were short and down hill; and caribou were walking the ridges and swimming the lakes in every direction. A perfect northern fairyland it was, and it seemed hard to believe that winter and want could ever penetrate here."

Timber of the Far North.

The first reference to the timber of the northern part of the Barren Lands we find in the report of Samuel Hearne, who in 1771, speaking of his discovery of Coppermine river, writes:—"Before I proceed farther on my return, it may not be improper to give some account of the river, and the country adjacent; its productions, and the animals which constantly inhabit those dreary regions, as well as those that only migrate thither in summer, in order to breed and rear their young, unmolested by man. That I may do this to better purpose, it will be necessary to go back to the place where I first came to the river, which was about forty miles from its mouth. Near the water's edge there is some wood, but not one tree grows on or near the top of the hills between which the river runs. There appears to have been formerly much greater quantity than there is at present, but the trees seem to have been set on fire some years ago and, in consequence, there are at present ten sticks lying on the ground for one green

one which is growing beside them. The whole timber appears to have been even in its greatest prosperity of so crooked and dwarfed a growth as to render it of little use for any purpose but firewood.

"Besides the stunted pines already mentioned, there are some tufts of dwarf willows; plenty of Wishacumpuckey (as the Indians call it, and which they use as tea); some jackatheypuck, which the natives use as tobacco; and a few cranberry and heathberry bushes; but not the least appearance of any fruit.

"The weeds grow gradually thinner and smaller as you approach the sea, and the last little tuft of pines that I saw is about thirty miles from the mouth of the river, so that we meet with nothing between that spot and the sea-side but barren hills and marshes."

Sir John Franklin on his first journey, in 1819-22, reached the upper part of Coppermine river at Point lake just east of the southern arm of Great Bear lake. He found the "valleys on its border intersected with clusters of spruce trees. On the borders of such of these lakes as communicate with Coppermine river, there are a few groves of spruce trees, generally growing on accumulations of sand."

Coppermine Valley.

Sir John refers as follows to the timber growths on the small lakes or expansions of the Coppermine as observed during the descent of his party:—

"Red Rock lake is in general narrow, its shelving banks are well clothed with wood, and even the hills, which attain an elevation of four hundred or five hundred feet, are ornamented half way up with stunted pines."

"At Rock-Nest lake (just north of Red Rock lake) the only wood is the pine, which is twenty or thirty feet high, and about one foot in diameter.

"At Fairy lake the river flows between banks of sand thinly wooded, and as we advanced the barren hills approached the water's edge."

West of that part of Coppermine river which is nearest to Great Bear lake, Sir John Richardson in 1826 said that they met with wooded valleys and saw much wood in the valleys far to the west. From the height of land between Coppermine river and Great Bear lake they had an extensive view of a lower and well wooded country.

Of the country above Bloody falls, on the Coppermine, Sir John Franklin writes:—"In the existence of many scattered stumps of decayed spruce fir trees, and the total absence of young plants, one might be led to infer that of late years the climate has deteriorated and that the country was no longer capable of supporting trees so near the sea coast as it had formerly done. The largest tree in the clump in which we bivouacked had a circumference of thirty-seven inches at the height of four feet from the ground. Its annual layers were very numerous and fine and indicated centuries of growth, but I was unable to reckon them."

Fine Spruce Northeast of Great Bear Lake.

In 1848, writing of the area between Dease bay (the extreme northeastern arm of Great Bear lake) and Coppermine river, Sir John Franklin states:—"At two we came to another branch of the Kendall, which runs through a ravine of red and spotted sandstone, under whose shelter there grew a remarkably fine grove of white spruces. The best

grown tree measured sixty-three inches in circumference and did not taper perceptibly for twenty feet from its root. Its total height was from forty to fifty feet. Other trees of equal girth tapered more, and one decayed trunk, which lay on the ground, looked to be considerably thicker."

Hanbury mentions that along the north shore of Barry island in Bathurst inlet he "picked up some drift sticks which evidently must have come from Hood river" which flows into Arctic waters some distance east of Coppermine river.

Sir George Back describes the banks of Backs river as being rocky and treeless ("without a single tree on the whole line of its banks").

CHAPTER XXI.

THE BARREN LANDS OR "ARCTIC PRAIRIE".

Economic Minerals.

Deposits of Native Copper in the Far North.—Several Areas West of Hudson bay Contain Rocks Similar to Those at Sudbury.—Belts of Huronian Rocks that are Expected by Geologists to be Eventually of Great Economic Importance.—Vast Probable Mineral Bearing Country in the Interior Which Can Now be Reached Via Chesterfield Inlet.—Iron, Gold and Silver in Small Quantities North of Lake Athabaska.—Free Gold in Melville Peninsula.—Lignite and Soft Coal Along the Arctic Coast.

From time immemorial tradition has ascribed to

the great northern wilderness which we have come to know as the Barren Lands or Barren Grounds, untold mineral wealth, and what tradition has so long asserted is substantiated by the testimony of scientific experts.

The original exploratory expedition despatched into the country, that under Samuel Hearne in 1771, was inspired by the desire of the Hudson's Bay Company to locate the copper mines in the far north of which the natives spoke to the pioneer traders.

Many of the principal witnesses examined before the British parliamentary committee of 1749 referred to the prospective mineral wealth of the country northwest of Hudson bay. Mr. Joseph Robson, at whose instance largely the investigation was held, testified that he had seen copper worn by the Indians about their necks and arms. He had also seen about a pound and a half of copper ore, which he understood from the Indians they had brought from a great distance.

Another witness, Alexander Browne, who had been six years in the company's service at Hudson bay as surgeon, informed the Committee that he had seen both copper and copper ore at Prince of Wales' Fort on Churchill river, which the northern Indians informed him they brought from an isthmus of land which lies by a lake at the farthest extent of their country. It was hard to ascertain the distance from the accounts of the Indians, but he judged it to be about three or four hundred miles. He never heard the Indians say whether there was a passage to this place from Hudson bay by water, but they informed him their river ran by it. They brought down the copper for ornaments, and the ore at the request of Governor Norton. Witness had seen about four or five pounds of it, both before it was smelted, and

after, and he

TOOK IT TO BE A RICH ORE,

but did not understand metals. He had heard of lead ore at Hudson bay, but never saw any. He never saw the Indians smelt the copper, but they informed him that the earth was washed from the ore by showers, and that they smelted it on a fire until it ran, and then beat it, it being very malleable. Witness never heard of a copper mine on the large arm of the sea, but the ore was brought down by canoes to the open sea, and the rivulet which washed the said copper is not known to have any communication with Hudson bay, the mine being about fifteen miles from the open sea, by the accounts of the Indians. He believed that the Indians came a little to the northward of Whale cove, "which bears a point or two to the west of the north from Churchill." If the Indians were encouraged they would bring great quantities of ore, as well as smelted copper to Whale cove, but if persons were sent up to the mine they would labour under a difficulty for want of fuel, the country producing no wood, and what the Indians smelt, they do in small quantities with moss.

Doctor Thompson, another of the company's surgeons, testified that he had heard the natives talk of a sea to the westward, which, by their accounts, is not far distant, and of a copper mine, which lay on the side of a "Streight", which takes them five days in crossing. They described the water of this "Streight" to be very deep, and they could not reach the bottom with two deerskins cut into thongs. If a sloop could be brought alongside this copper mine, they say they could fill it, in a little time, and by their account, this "Streight" has a communication

both with the bay and the south sea.

Doctor Thompson further informed the Committee, "that he went with Captain Middleton on the discovery of the North-West-Passage, and likewise with the last adventurers."

Christopher Bannister, who had been armourer and gunsmith to the Hudson's Bay Company, and had resided in the bay about twenty-two years, informed the Committee that he had seen lead ore at Moose river, which came from the northward, but he could not say whence. He had seen a good quantity of it, and some of it was tried by Mr. Longdon's apprentice, and it seemed extraordinary good lead, the boy

Making A Pair of Buckles of It.

The witness could not say what proportion the lead bore to the ore. The boy put in a piece of ore as big as a man's fist, and got lead enough to make a pair of large buckles. The witness was sure nothing was put in but the ore, none being present but himself, and the boy who brought it down. That was about three years previous to the investigation and witness never saw any lead ore at any other time. He had seen copper frequently brought down by the northern Indians, a piece of which he produced before the committee. He said he had seen great quantities of it there, and was informed by a young man, who is now at Hudson bay that the Indians told him that it was brought from a mine, in search of which the young man would gladly have gone."

Hearne at the Copper Deposits.

In the record of his famous trip (pages 173 to 176) Hearne makes the following references to his investigation into the subject of the traditional copper mines of the Indians on Coppermine river: —"After a sleep of five or six hours we once more set out, and walked eighteen or nineteen miles to the south-southeast when we arrived at one of the copper mines, which lies, from the river's mouth about south-southeast, distant about twenty-nine or thirty miles. This mine, if it deserve that appellation, is no more than an entire jumble of rocks and gravel, which has been rent so many ways by an earthquake. Through these ruins there runs a small river, but no parts of it, at the time I was there, was more than knee-deep. The Indians who were the occasion of my undertaking this journey represented this mine to be so rich and valuable, that if a factory were built at the river, a ship might be ballasted with the ore, instead of stone, and that with the same ease and despatch as is done with stones at Churchill river. By their account the hills were entirely composed of that metal, all in handy lumps, like a heap of pebbles. But their account differed so much from the truth, that I and almost all of my companions expended near four hours in search of some of this metal, with such poor success, that among us all, only one piece of any size could be found. This, however, was remarkably good, and weighed above four pounds. I believe the copper has formerly been in much greater plenty, for in many places, both on the surface and in the cavities and crevices of the rocks, the stones are much tinged with verdigrise.

"Before Churchill river was settled by the Hudson's Bay Company, which was not more than fifty years previous to this journey being undertaken, the Northern Indians had no other metal but copper

among them, except a small quantity of iron work, which a party of them who visited York Fort about the year one thousand seven hundred and thirteen, or one thousand seven hundred and fourteen, purchased, and a few pieces of old iron found at Churchill river, which had undoubtedly been left there by Captain Monk. This being the case, numbers of them from all quarters used every summer to resort to these hills in search of copper; of which they made hatchets, ice-chisels, bayonets (sic), knives, awls, arrow-heads, etc. The many

Paths That Had Been Beaten

by the Indians on these occasions and which are yet, in many places, very perfect, especially on the dry ridges and hills, is surprising; in the valleys and marshy grounds, however, they are mostly grown over with herbage, so as not to be discerned.

"The Copper Indians set a great value on their native metal even to this day, and prefer it to iron, for almost every use except that of a hatchet, a knife, and an awl; for these three necessary implements, copper makes but a very poor substitute.

"There is a strange tradition among these people, that the first person who discovered these mines was a woman, and that she conducted them to the place for several years, but as she was the only woman in the company, some of the men took such liberties with her as made her vow revenge on them, and she is said to have been a great conjurer. Accordingly when the men had loaded themselves with copper, and were going to return, she refused to accompany them, and said she would sit on the mine till she sunk into the ground, and that the copper should sink with her. The next year, when the men went for

more copper, they found her sunk up to the waist, though still alive and the quantity of copper much decreased, and on their repeating their visit the following year, she had quite disappeared, and all the principal part of the mine with her, so that after that period nothing remained on the surface but a few small pieces, and those were scattered at a considerable distance from each other. Before that period they say the copper lay on the surface in such large heaps, that the Indians had nothing to do but turn it over, and pick up such pieces as would best suit the different uses for which they intended it."

Sir Alexander Mackenzie is authority for the statement that there was a tradition among the Chipewyan Indians that their ancestors first reached the continent of America at Coppermine river. "Where they first made land, the ground was covered with copper, over which a body of earth had since been collected to the depth of a man's height." The tradition is interesting as indicating the fact that the Indians knew of the famous copper deposits for many generations.



Some of the Difficulties of Northern Transportation:—Crossing

a Swamp.

Sir John Franklin's Visit.

When Sir John Franklin's party in 1821 visited Copper mountains they found only a few small pieces of native copper. Franklin says in his narrative (p. 340) "The annual visits which the Copper Indians were accustomed to make to these mountains when most of their weapons and utensils were made of copper, have been discontinued since they have been enabled to obtain a supply of ice chisels and other instruments of iron by the establishment of trading posts near their hunting grounds. That none of those who accompanied us had visited them for many years was evident from their ignorance of the spots most abundant in metal."

Doctor G. M. Dawson, director of the Geological Survey of Canada, examined before the Senate committee of 1888, stated that as to the Barren Lands, it was a fact that an immense district—nearly half a million square miles of country—was at that date, except along its watercourses, as utterly unknown as the interior of Africa. Coppermine river runs through the Barren Lands and so does Back's Great Fish river, on which there are mineral indications. There was every reason to believe that there is a repetition along Coppermine river, and in its vicinity of those rocks which contain copper, on Lake Superior and which have proved so rich there. At the time Doctor Dawson gave his evidence, he stated, it seemed to be beyond the reach of the prospector. The Hudson's Bay Company sent Hearne up there in the latter part of the preceding century to discover where the copper found in the hands of the natives came from, but he could do nothing but

report that he found copper there. The sea to the north was ice-bound, so he did not see his way to utilizing it. Hearne travelled the barren grounds more than any one else, but he was not a scientific explorer. He travelled with the Indians in winter under circumstances of great hardship, and Doctor Dawson said he believed we had not yet got sufficient information up to that date about these "Barren Grounds." What mineral discoveries might be made there it was impossible to say.

Bishop Clut informed the same committee that copper was found on Coppermine river in great pieces. Witness had seen little crosses made of it by the savages themselves when they were not able to have other metal.

Similar to Lake Superior Deposits.

Mr. J. B. Tyrrell, in his paper read before the British Association for the Advancement of Science at its Toronto meeting in 1879, mentioned that the descriptions of Doctor Richardson, who visited the locality of Coppermine river in 1821 and again in 1826, show that some of the rocks which occur on the banks of the Coppermine are precisely similar to those on Dubawnt and Baker lakes, though they also indicate the occurrence of the underlying Animikie series, and they also show that the conditions under which the copper there occurs are very like those under which it occurs on the south side of Lake Superior.

The Keewenawan rocks (so called from the district so named on the shore of Lake Superior) would appear, according to Mr. Tyrrell, to have been first seen by Doctor Richardson on Red Rock lake, a short distance below Point lake, on Coppermine

river, and thence they occupy the banks of the river through most of the distance down to its mouth.

Continuing to discuss Doctor Richardson's report, Mr. Tyrrell proceeds in his paper to say:—"At 'Rocky Defile,' 'the walls of the rapid' are said to 'consist of a very dark purplish red, compact felspar rock, alternating with a rock which is composed of a light reddish and greyish felspar and quartz, the former indistinctly crystallized,' evidently referring to different varieties of quartz-porphyry or porphyrite. 'This rock is everywhere exposed in the bed of the river for ten or twelve miles below the rapid.'

"In the beds of the torrents flowing into the main river he (Richardson) found many rock fragments, most of which were probably derived from rock in places in the vicinity, and the list might readily be duplicated from the copper-bearing rocks of Lake Superior; he mentions 'fragments of reddish grey, granular, foliated limestone, of deep red sandstone, of gray sandstone, of red syenite. There also occur fragments of pale red sandstone, composed principally of quartz and a little felspar, with imbedded circular concretions of quartz, and of reddish quartzite sandstone. Fragments were also found of dark-greenish felpathose trap, of greenstone, of dark flesh-red felspar in granular concretions, with imbedded patches of hornblende, of red felspar partly coloured with hornblende, and containing amygdaloidal portions of prehnite.'

Copper Mountains.

"Copper mountains consist principally of trap rocks. The great mass of the rock in the mountains seems to consist of felspar in various conditions; sometimes in the form of felspar-rock or claystone,

sometimes coloured by hornblende and approaching to greenstone, but most generally in the form of dark reddish brown amygdaloid. The amygdaloidal masses contained in the amygdaloid are either entirely pistacite (epidote), or pistacite enclosing calc-spar. Scales of native copper are very generally disseminated through this rock, through a species of trap tuff which nearly resembles it, and also through a reddish sandstone on which it appears to rest. The rough, and in general rounded and more elevated parts of the mountain are composed of the amygdaloid but between the eminences there occur many narrow and deep valleys, which are bounded by perpendicular mural precipices of greenstone. It is in these valleys, among the loose soil that the Indians search for copper; masses of epidote containing native copper; of trap rock with associated native copper, green malachite, copper glance or variegated copper ore, of greenish gray prehnite in trap with disseminated native copper; the copper in some specimens was crystallized in rhomboidal dodecahedrons. We also found some large tabular fragments, evidently portions of a vein consisting of prehnite, associated with calcareous spar and native copper. The Indians dig wherever they observe the prehnite lying on the soil, experience having taught them that the largest pieces of copper are found associated with it. The Indians report that they have found copper in every part of this range, which they have examined for thirty or forty miles to the northwest. We afterwards found some ice-chisels in possession of the Esquimaux, twelve or fourteen inches long and half an inch in diameter, formed of pure copper."

"The surrounding country is underlain by a light-brownish red sandstone and gray slate clay in

horizontal strata, cut here and there by dykes of greenstone.

"It is hardly possible to imagine two more similar sets of conditions in such widely separated localities, as in Copper mountains and on Keewena point (Lake Superior), the native copper occurring in both places associated with prehnite and epidote, chiefly in an amygdaloid, cut by dykes of greenstone.

Long Range of Copper-Bearing Rocks.

"The copper-bearing rocks would seem to extend along the Arctic coast, both east and west of Coppermine river, for about five hundred miles in all, and probably many of the smaller islands off the coast are also of the same rocks and the total area covered by these rocks undoubtedly amounts to many thousands of square miles.

"Comparing the early account of the occurrence of native copper on Lake Superior with the accounts which we now possess of the copper on Coppermine river, and considering the enormous extent of the northern deposit, we have reasonable grounds for hope that before many years the Coppermine area will produce as much copper as is now mined in northern Michigan. The amount mined there in 1896 was one hundred and forty-four million pounds, valued at between fifteen and sixteen million dollars, or about a sixth of the total amount of copper mined in the world that year."

A Recent Visit to the Copper Country.

In the spring of 1902, having spent the winter with the Eskimos, Mr. David T. Hanbury made an

examination of some of the places along the Arctic coast where the natives obtain copper for their implements. He was first informed that the copper deposits were to be found on Dease strait, but later ascertained that the islands in Bathurst inlet are the source of supply, and proceeded thither. Mr. Hanbury from the natives on Fitzgerald islands obtained a good many copper articles, such as snow-dags, ice-chisels, etc. They appeared to be rich in copper implements. They stated that some of their copper had been obtained in Victoria Land, and some from the islands to the north.

Shortly after landing on Barry island in Bathurst inlet, two small fragments of copper were picked up by one of his Eskimos. Mr. Hanbury proceeds, in his book, "Sport and Travel in the Northland of Canada": —"The next day we devoted to examining the rock formation and searching for copper. We were successful in finding the copper, which appears to be abundant and widely distributed. Whether it would ever be worth working is another matter, and one on which I am not competent to give an opinion.

"The underlying basalt dips west at an angle of about twenty-five degrees, and it is in this rock that the native copper occurs. The copper is plentiful, for the quantity we obtained was found after but a brief search, and on a neighbouring island, Kun-nu-yuk, a mass of copper had just been found, so large that a man could hardly lift it. There also copper is found in the tide-way. The whole of the lower levels on Barry island are covered with debris from the basalt, and where the rock has been disintegrated by weathering,

COPPER HAS FALLEN OUT,

so that flakes of the metal may be found along the seashore. In many places, too, green patches indicate that nuggets or flakes of copper have recently fallen out from their matrix.

"The copper-bearing rock also contains crystalline quartz some of which forms beautiful amethystine veins, of which some specimens were taken. There is here some further evidence of coastal elevation in the occurrence of saucer-shaped lines of water-worn debris at from twenty to forty feet above the present level of high tides.

"The question whether it would ever pay to work the native copper of these regions remains for the consideration of experts. I have always understood that native copper occurring in small flakes or nuggets and sparsely distributed, is of but little practical value, and that copper can only, as a rule, be successfully worked from ores that are rich and easy of access. Much depends doubtless on its abundance and regularity of distribution. This island, Barry island, or Iglor-yu-ullig, is several miles in length, and perhaps three or four miles across. The island to the south-southeast, Kun-nu-yuk, is still larger, besides which there is an island to the southwest which has given much copper, and there are copper-yielding islands to the north. The copper-bearing formation holds good everywhere except on the summit cappings of the islands."

Later Mr. Hanbury examined a part of Lewis island also in Bathurst inlet. He relates in his book: —"At the northwest point of Lewis island, Bathurst inlet, we stopped to smoke. The formation of rock being similar to that on Barry island we commenced to search for copper, which proved to be plentiful. First of all only a few flakes could be found, but the longer we searched the more plentiful did the copper

become. Finally

IT GOT TOO COMMON

and we resumed our journey. The metal occurred in flakes and small chunks; the former were wedged in the rock always vertically. The rock was easily knocked to pieces by a light tap with the axe, the cleavage being both vertical and horizontal. Between two and three pounds of this native copper were picked up in the course of half or three-quarters of an hour, while we rested. The metal appeared to be very persistent in its occurrence in the partly decomposed basalt of which all the islands we passed that day consisted. The flakes of copper seemed to be always vertical when in their rock matrix. The rocks of this island, where they are not disintegrated, are well smoothed by glacial action, and the striæ are numerous and distinctly trend south and southeast."

Writing of a more northerly point on Lewis island, also visited, Mr. Hanbury (p. 266) writes:—"Although we did not find so much copper here, the green marks on the rocks were more numerous, but we did not spend an hour altogether in the search. One of our Eskimos knew of a large mass of copper on the southwest shore of the island, which he stated to be as much as five feet in length and three inches thick. It protruded from the rocks under the water, it was said, but there was too much ice for us to find the copper. A piece of quartz with copper ore and native copper was picked up on the seashore. Another specimen of the copper-bearing rock here is a decomposed basalt, fine grained, and vesicular."

Ascending Kendall river on his way to the headwaters of the Dease, whence he descended to Great Bear lake, Mr. Hanbury relates:—"We had the

good luck to meet the Eskimos from the Arctic coast, who resort to this river to obtain wood for their sleighs. These natives had never set eyes on a white man before, and had no articles of civilization whatever. They were all dressed in deerskins, and armed with long bows, arrows and spears,

Beaten Out of Native Copper.

The use of tobacco was quite unknown to them, and firearms they had only heard about. They gave me a good deal of information about their country and the copper deposits along the Arctic coast, and I obtained from them several copper implements, such as dags, spear and arrow-heads, needles, etc., all beaten out of native copper, giving them in exchange knives, files and needles, which last appeared to have by far the most value in their eyes,"

Mr. Wm. Beech of Churchill, in a communication to the press in 1911, stated that he had noticed that the Eskimos who visit Churchill yearly have nearly all their tools, such as snow-knives, ice-chisels, and fish-hooks, made out of native copper. They use copper tops over their pipes while smoking, and any break in their guns is usually mended by a strip of native copper.

So much for the deposits of native copper along the northern sea coast of the Barren Lands and on the islands off the coast, which were the means of originally attracting attention to the mineral wealth of this vast region.

Unquestionably the most comprehensive review of the geological features of the Barren Lands with respect to the prospective development of the country's mineral resources was that made by Mr. J. Burr Tyrrell in his paper read before the British

Association for the Advancement of Science at Toronto in 1897 on the resources of the Barren Lands. The review in question was so thorough that no excuse is needed for quoting it here at length. Mr. Tyrrell wrote:—"It is to the minerals of this region that we must look for any large contributions to the national wealth, and failing these it is difficult to see how the country can be any thing but a serious burden on those Canadians who live in the midst of more congenial surroundings. What are the prospects of finding minerals of sufficient value to induce people to open easy means of communication with that northern country, and to settle in it? Let us examine this question ground for hope in the future of

A Sub-Arctic Mining Province.

"The western arm of the Archaean horseshoe, around which the remainder of the American continent has been built up during successive geological ages, strikes the west coast of Hudson bay near Churchill, and thence extends northward, with an average breadth of from five hundred to six hundred miles to Arctic ocean. This Archaean belt is composed chiefly of Laurentian and Huronian rocks, but in the depressions are some large areas of rocks of a later age.

"As the only exact geological information at present available is that collected by the two expeditions sent out by the Canadian Geological Survey in 1893 and 1894 which I had the honour to lead, I shall describe the rocks as seen on those two expeditions and afterwards attempt to bring together such other information as has been recorded by others, and assign to it such value as it would seem

to possess.

"The Laurentian system, as here seen, consists almost exclusively of crystalline, massive, or altered crushed and contorted rocks of the 'Basement Complex', consisting of granites and diorites, and granite and diorite gneisses. As a rule, the massive and foliated rocks are very similar in composition being probably different phases of the same fluid or semi-fluid magma. These rocks are so similar to the Laurentian rocks of the northern Ontario, which are familiar to any one who has spent a summer in Muskoka or in Thousand islands, that it is unnecessary to describe them in greater detail here. They are not usually rich in valuable minerals except where they come in contact with the overlying Huronian rocks.

"On Dubawnt river they underlie the country northward from Daly lake, and thence continue northeastward along the west shore of Dubawnt lake and down Dubawnt river to Lady Marjorie lake, over which distance they were often seen in contact with overlying Huronian and Cambrian strata. North of Lady Marjorie lake they disappear under the Cambrian sandstones, and they were not again seen until the Cambrian belt was crossed and the north shore of Schultz lake was reached.

"On Kazan river they extend from Ennadai lake to beyond Yathkyed lake, with the exception of a small Huronian area near Angikuni lake.

"On the low flat shore of Hudson bay, between Seal river and Cape Eskimo, the few rock exposures seen were of granite and gneiss of typical Laurentian aspect. For forty miles north of Cape Eskimo no rock in place was seen, and thence northward to Baird bay some of the points were seen to consist of granite and gneiss, though the shore generally was

underlain by Huronian rocks.

"On the upper portion of Ferguson river Laurentian rocks prevail and similar granites and gneisses occur along the north shore of Baker lake, and down both shores of Chesterfield inlet to its mouth, whence they extend southward along the shore of Hudson bay to a short distance north of Baker's foreland. Any information which we possess about geology of Great Fish river and Coppermine river would seem to show that the Laurentian granites and gneisses outcrop with greater or less frequency along their banks, so that we may safely infer that the Barren Lands are largely underlain by these ancient igneous rocks, and consequently there are large areas which will not produce valuable minerals.

"But as farther south we find quartzite, greywackes, and highly altered eruptive rocks of Huronian age, folded in here and there with typical Laurentian rocks, so in the far north we may confidently expect to find the same set of conditions prevailing.

"Such is to be found the case in the country lately examined immediately west of Hudson bay, where several areas of Huronian rocks, precisely similar to

THOSE FOUND AT SUDBURY,

Lake of the Woods, and at many places around Lakes Huron and Superior, have been discovered. The largest of these areas extends more or less continuously for one hundred and twenty miles along the west coast of Hudson bay, from near Baker's foreland to a point forty-five miles north of Cape Eskimo, and from the bay shore for seventy miles inland on the course of Ferguson river. A

smaller area crosses Dubawnt river between Schultz and Baker lakes, a third occurs on the Kazan river below Angikuni lake, a fourth was recognized in the basin of Ennadai lake.

"Two more areas are represented by outcrops of white clastic quartzite on the north shore of Dubawnt lake, and on the east shore of Wharton lake.

"The rocks constituting the system in this region have been divided into three more or less distinct groups, viz: Marble island quartzites; the greenish quartzites and greywackes; and the more or less highly altered and often schistose diabases and gabbros.

"The Marble island quartzites are composed of hard white quartzite, consisting of more or less rounded grains of quartz, of fairly regular size, cemented together by interstitial silica. They are distinctly stratified in thick and thin beds, and the surfaces of the beds are often covered with beautiful ripple-markings. The thicker beds also often show distinct false bedding. They are usually in a more or less inclined position, but they were nowhere seen to be very much crumpled or squeezed into minute folds. These quartzites on the north shore of Quartzite lake dip regularly northwestward, away from a hill of diabase which lies to the south, and the latter therefore probably underlies the quartzite, though it is not necessarily older than it. In other places very little evidence was obtained of the relative ages of the white quartzite and the other parts of the Huronian. However, it would seem probable that, in the region near the shore of Hudson bay, this quartzite is

THE OLDEST PART OF THE HURONIAN,

and that the diabases, and other basic eruptions which are associated with it, have been intruded beneath it, and have also flowed over it. That Marble island quartzites were once spread over a large portion of the region under consideration is shown, not so much by the few scattered outlines here mentioned, as by the fact that the overlying Cambrian conglomerates, which cover large areas between Dubawnt and Baker lakes, are composed chiefly of pebbles of this white quartzite.

"Dark green eruptive rocks, chiefly diabase, are largely developed in the Huronian, composing a considerable proportion of the rocks of the system. In many cases these rocks have been crushed and sheared, a slaty cleavage or schistose structure has been superinduced, and the original minerals have been broken and altered, both in their shape and composition. In other cases the rock remains massive, or there is developed in it a concretionary or bomblike structure, the bombs, often a foot or two in diameter, being usually separated by somewhat schistose bands, which differ slightly in colour from the rest of the rock.

"On the east side of Hudson bay this rock was found to have, disseminated through it, a large amount of both iron and copper pyrites, while these minerals were often found collected somewhat more closely together in the numerous veins of quartz and calc-spar which almost everywhere traversed the rock. No large deposits of the sulphides were seen, but when they are so freely distributed through the mass of the rock it is not at all improbable that large masses may be found segregated out along the zones where these green schists are in contact with masses of eruptive granite or gneiss. Very little of the vein rock has been collected for assay, but some pieces of

vein quartz, picked up by Doctor Rae near the south side of Corbett inlet, were found to

CARRY A SMALL AMOUNT OF GOLD.

"On Great Fish river, Mr. Pike speaks of the ironstone formation, of dark fissile slates or schists, probably belonging to the Huronian system extending down the river from Musk-Ox lake to Beechey lake, a distance of seventy-five miles.

"The shores of Point lake, one of the expansions of Coppermine river, have been described by Sir John Richardson, who passed through that country in company with Sir John Franklin in 1821, and from his descriptions there is no difficulty in recognising the Huronian rocks. The following is his description of the rocks, slightly condensed:—Greywacke passing into greywacke slate, greywacke with small imbedded crystals of hornblende, dark greenish or blackish grey clay slate. Several of the islands in the lake consist of greenstone. A rock standing apart from the neighboring hills on the border of the lake, having a rounded summit, but bounded on three sides by mural precipices about two hundred feet high, is composed of compact earthy greenstone, containing disseminated iron pyrites, covered with layers of greenstone slate. On the north side of the lake there is a high bluff hill with a precipitous side, which seems to consist principally of a conglomerate. The basis is earthy-clay slate. The embedded masses have an ellipsoidal form and smooth surface, are from one to two feet in diameter and appear to consist of the same material as the basis, but impregnated with much silica, and not showing evident slaty structure. When broken they present an even fine-grained fracture.

" 'During our first and second days' journey down Point lake from the above mentioned encampment, being eleven and one-half miles on a west-northwest course, the rocks we had an opportunity of examining consisted of greenish grey clay-slate, generally having a curved structure, and splitting into slates of very unequal thickness.'

"From these few isolated and widely separated occurrences it may be seen that, as in the Archaean areas of northern and western Ontario, so on the Barren Lands, Huronian rocks occur at more or less frequent intervals, squeezed in between adjacent areas of Laurentian granite and gneiss.

"That these belts of Huronian rocks will eventually prove

OF GREAT ECONOMIC IMPORTANCE,

there can be no doubt whatever. In Ontario the wonderful general richness of these rocks is just beginning to be recognized, but from them were taken in 1896 gold to the value of one hundred and twenty-one thousand dollars, nickel to the value of one million one hundred and eighty-nine thousand dollars and copper to the value of three hundred and twenty thousand dollars; while in the states adjoining Lake Superior the total production of iron ore in 1895 from these rocks was ten million two hundred and sixty-nine thousand long tons, valued at about twenty million dollars. This was 62·31 per cent. of the total amount of iron produced in the whole United States. The rapid progress with which these mines are being developed is shown by the fact that the Mesabi range was first opened up in 1892, and in 1895 the product of the mines in the range was two million eight hundred thousand tons. Thus

you will see that in these rocks there is a prospect of discovering extensive deposits of valuable minerals.

The Lower Cambrian Rocks.

"But perhaps the most interesting rocks known in the Barren Lands are those which are regarded by the Canadian Geological Survey as being of Lower Cambrian age, and which are very similar in character to the Nipigon or Keewenawan rocks of Lake Superior.



A Survivor of Sir John Richardson's Arctic Expedition wearing the Arctic Medal given him for that Expedition.

"In the exploration of this country recently made these rocks were first met with about the centre of the west shore of Dubawnt lake, whence they were found to extend north-northeastward for one hundred and twenty-five miles to the forks of Dubawnt river. From this point they were traced eastward for one hundred and seventy-five miles to the outlet of Baker lake, at which point they veered

off to the south. Towards the west this series probably extends a long distance up the valley of Thelon river, and may perhaps cross the low watershed and connect with similar beds on the shores of Great Slave lake.

"The basal portion of this series is here represented by reddish thick-bedded sandstones and conglomerates, which are comparatively unaltered and undisturbed over large areas. In some places, as on the islands near the northwest shore of Dubawnt lake, they dip regularly at a moderate angle. The pebbles in the conglomerates are well rounded and water-worn, and consist almost entirely of white clastic quartzites like that of Marble island (Huronian) beds. The occurrence of quartzite pebbles, to the almost total exclusion of pebbles of Laurentian or other rocks, would indicate that these Cambrian strata were deposited off a shore composed very largely of Huronian quartzites. The sandstones and conglomerates are cut by dykes and masses of both acid and basic eruptive rocks. The acid eruptions were first met with on a hill of red quartz-porphyry at Teall point, on the west shore of Dubawnt lake. A similar massive quartz-porphyry forms a heavy east and west dyke, some distance farther north on the shore of the same lake, and in the vicinity of the dyke the surrounding conglomerate is very hardened, so that it breaks indifferently through the matrix or through the pebbles.

"Towards the north end of Dubawnt lake the orthoclase in the rock is replaced by plagioclase, the porphyry thus becoming a porphyryte. This porphyry is largely developed, and seems to underlie a large tract of country, along Dubawnt river between Lady Marjorie lake and the Forks, and again it was found

on the island towards the east end of Baker lake.

"Dark-green basic eruptions, chiefly, or perhaps exclusively, in the form of dykes, are extensively developed throughout the area covered by the rocks of the Cambrian system. On Dubawnt lake and on Dubawnt river near the Forks, most of these dykes

ARE OF TYPICAL DIABASE,

with interlocking lath-shaped crystals of plagioclase, between which are crystals, or crystalline masses of augite, often altered to chlorite.

"A heavy diabase dyke, crossing Dubawnt river at Loudon rapids, cuts the surrounding acid eruptions, and is clearly newer than they. It is also interesting to note that the rocks in this vicinity are very freely stained with green carbonate of copper, indicating the presence of a considerable amount of copper disseminated through the rock, just as copper occurs under similar conditions in similar rocks south of Lake Superior.

"Lithologically the whole of this terrain presents a remarkable resemblance to the red sandstones and quartz-porphyries of the Keewenawan (copper-bearing) rocks of Lake Superior. This resemblance is so strongly marked that small hand-specimens of the rocks from the shore of Dubawnt lake are usually indistinguishable from specimens from Lake Superior.

"Native copper was nowhere found, but it is not unlikely that it may occur in the vicinity of some of these basic dykes."

Mr. Tyrrell then proceeds to discuss the deposits of native copper in the far north as already quoted in this chapter and continues:—

"Besides copper a narrow vein of pure galena has

been found on the shore of Bathurst inlet.

"Whether any other metals but copper and lead will be found in that region remains to be discovered, but the evidence of the presence of Animikie slates and limestones would indicate the possibility of the occurrence of silver, such as was found at Silver islet on Lake Superior.

"This northern country, which, as we have seen, gives abundant evidence of rich mineral wealth, has up to the present been very remote from any settlements, but now it can actually

BE REACHED WITH VERY LITTLE TROUBLE

and expense either from Mackenzie river or from Hudson bay, and its general even unmountainous character would render the building of roads across it a matter of comparatively little difficulty.

"From Mackenzie river to Great Bear lake is only sixty-five miles, and from that lake to Coppermine river only another sixty-five miles, while the Keewenawan rocks on Baker lake may be reached by ocean-going steamers which can ascend Chesterfield inlet to its head, which is open for three months of the year. From the head of Chesterfield inlet it is only four hundred miles, over a gently undulating country, to the east end of Great Slave lake, or five hundred and eighty miles to Copper mountains west of Coppermine river.

"South of Chesterfield inlet good harbours exist, from which the Huronian rocks could readily be explored, or, if rich mines were discovered, would serve as means of access and outlet to and from these mines.

"Churchill, at the southeastern extremity of the Barren Lands, has long been known as an excellent

harbour, having been surveyed by Joseph Robson, an engineer, as long ago as 1746. On an average it is open five months of the year, from June 19, to November 18, the shortest open season known being four months and eight days, and longest season five months and eighteen days.

"It is true that in going to live in that northern land, one would leave far behind the forest, meadows, and pleasant orchards of this beautiful province (Ontario), but the wealth torn from the rocks would enable the people to procure all the products of more genial climates, and with the health and strength derived from a well-fed, but active and energetic existence, the country would be covered with homes as happy as could be found in any part of the world."

Iron, Gold and Silver.

Mr. Tyrrell was examined before the select committee of the Senate in 1907 and in his evidence upon that occasion stated that north of Lake Athabaska, for a certain distance, there are Huronian and Keewatin rocks which certainly contain iron and small quantities of gold and silver, but larger quantities have not yet been discovered. Ore being a mass of mineral that can be worked at a profit, no ore has yet been found there, but there are precious minerals. The country north of Lake Athabaska is one of the most likely looking mineral countries that Mr. Tyrrell had ever been in. After leaving the Huronian rocks north of Lake Athabaska, one then strikes through a granite country for seven hundred miles on the routes that he travelled which does not show much evidence of minerals. Then as he got to Dubawnt lake he got on copper-bearing rocks similar

to the copper-bearing rocks of Lake Superior, and those are undoubtedly the same copper-bearing rocks which extend across Coppermine river, and which have there been known to produce native copper—at least the Esquimaux bring in the copper from Coppermine river to make implements.

Mr. Tyrrell said he would not expect to find silver in connection with the copper. They do not find silver in any quantity with the copper of Lake Superior. They do find silver in places, but not on the Calumet peninsula. The silver appears in a slightly different formation. While it occurs in rocks of somewhat similar age, still it is not immediately associated with copper, and the rocks that one finds from Dubawnt lake northward, covering quite a large area, are very similar to the copper-bearing rocks on Lake Superior. Taking a set of specimens from the copper-bearing rocks of Lake Superior, Mr. Tyrrell declared he could duplicate them almost exactly from a set of specimens from these northern rocks in all the peculiar minerals—and there are a great many of them. He saw a small amount of copper in many places in these rocks, and we know that it occurs in the rock, because the Esquimaux pick up native copper and make their implements from it. So that he looked for a large development at some time of a copper industry in that country between Chesterfield inlet and Coppermine river. He had never been at Coppermine river himself. Really the principal exploration of Coppermine river, he explained, was done nearly one hundred years ago, and there has been very little exploration of it since. It was visited by Doctor J. M. Bell some three or four years previous to 1907, but he just barely touched it, and Sir John Richardson, in the early part of last century, really furnished all the information that is known

about Coppermine river.

A Large Area of Mineral Country.

In the far northern region, Mr. Tyrrell stated upon this occasion, there is a large area of mineral bearing country. As you come out to the mouth of Chesterfield inlet there is an area of Keewatin and Huronian rocks, similar to the conglomerates of northern Ontario, which have been found to be so rich there, and these rocks are known to contain a certain amount of gold and copper. Mr. Tyrrell saw them himself there, and he had, he said, every confidence that that area too will produce minerals of value—workable ores. There was no indication of nickel in any part of the country.

Mr. A. P. Low, of the Geological Survey of Canada, who was a witness before the same committee, stated that he had spent one winter at Cape Fullerton, north of Chesterfield inlet. He explained that on the mainland where there are marked indentations, there is a large development of Huronian rocks, which contain four per cent. of copper pyrites. These rocks have not been properly prospected yet, and there have been no claims taken up on them. They have not been proven in any way. Between Chesterfield and Fullerton there are several fairly decent deposits of iron pyrites, and some of these contain small deposits of gold. Gold was found by Doctor Wright somewhere in Whitcher inlet, but beyond those discoveries nothing of a definite character is known of the minerals of the far north.

The island of Southampton east of Fullerton is formed of limestone, and a band of ancient Huronian Laurentian rocks, which crosses at the north side of it.

Free Gold in Melville Peninsula.

Examined before the select committee of the Senate in 1887, Doctor Robt. Bell of the Geological Survey stated that free gold had at that date been found in quartz in Repulse bay, south of Melville peninsula, which is the extreme northeastern point of the continent, and considerably north of Fullerton. The free gold he spoke of as coming from Repulse bay was noticed by Professor James Tennant, of King's College, London, England. Plenty of copper had been found up there. Witness had found it in small quantities himself, and it had been found as occurring in large quantities among specimens brought from the west coast of Hudson bay by others.

Speaking of his voyage by sea to Hudson bay, Doctor Bell said he had not had an opportunity to satisfactorily investigate the mineral resources of the country. His own opportunities for discovery had been limited on account of the fact that when he was at the most likely places for finding gold or silver he had very little chance to get ashore. He had to take just what opportunity he had when going ashore with boats for ballast or to land materials at the stations. The main object of all the expeditions was to establish and supply the stations. If he had had an expedition under his own control, fitted out for that object, he had no doubt he could make valuable discoveries of minerals. He saw some quartz ledges himself. They varied in size. He could not look entirely for economic minerals, for in the few hours he had at any place he had to ascertain as much as possible of the geological structure of the country, and incidentally, if he found anything worthy of notice, he brought away specimens. He saw many

large veins of quartz, but those from which he brought the specimens which happened to contain gold and silver were not so large as others he had seen. Some were several feet wide. He did not find visible gold at all.

As to the gold prospects in the central part of the Barren Lands, Inspector Pelletier, Royal Northwest Mounted Police, states in his report:—"In many places along the Thelon, great sand bars are prominent, creeks flowing into it do so over gravel beds and when this country is prospected I expect to hear of placer gold discoveries. It is a good country for prospectors. A prospecting outfit going there would find plenty of good timber to build their camp, and any amount of fuel. They would have to carry only certain kinds of provisions, for fish is abundant. Musk-ox and deer at certain times of the year are very numerous."

Lignite and Soft Coal.

Large areas of lignite and soft coal have been discovered along the shores of Arctic sea between the Mackenzie and the Coppermine and in the islands off the coast.

Doctor Richardson in 1826 found the Arctic coast east of Cape Bathurst to consist of precipitous banks, similar in structure to the bituminous shale cliffs at Whitby in Yorkshire. This shale was in a state of ignition in many places.

According to the same authority "carboniferous limestone exists on the northwestern coast of Banks island, on Melville and Bathurst islands. At Village point, in latitude 76° 40′ and longitude 97° west, at Depot point, Grinnell land (of Belcher), latitude 77° 5′ north, and at various other places in the

carboniferous limestone tract there are coal beds. These coal beds are considered by Professor Houghton to be very low down in the carboniferous series."

In a valley in Banks island some distance from the coast and three hundred feet above sea level, Richardson relates that Captain McClure and Doctor Armstrong visited a carboniferous deposit. "The ends of trunks and branches of trees," says the last-named officer, "were seen protruding through the rich loamy soil in which they were imbedded. On excavating to some extent we found the entire hill to be a ligneous formation, being composed of the trunks and branches of trees, some of them dark and softened, in a state of semi-carbonization."

CHAPTER XXII.

THE BARREN LANDS, OR "ARCTIC PRAIRIE."

Game, Fur-bearing Animals and Fish.

Where Millions of Caribou Roam at Large.—Actual Value of These Immense Herds Very Great.—Can they Become Domesticated or Replaced by the Lapland Reindeer?—The Home of the Musk-Ox and Many Fur-Bearing Animals.—The Polar Bear.—Where the Wild Geese Nest.—Lakes, Rivers and Sea Coasts Teeming With Fish.—The Arctic Salmon, Trout, White Fish and Grayling.

The fish and game resources of the Barren Lands have hitherto been the sole support of the small human population, and unquestionably they could support an infinitely larger number of people than have hitherto resided in the far northern wilderness. As every explorer of the region from Hearne until the present date has had to depend primarily practically wholly upon fish and game for sustenance while in the interior, we know much more about the resources of the country in those respects than any of the others. The occurrence of fish and game has been a matter of life or death to the explorers, and naturally they have all dwelt upon the matter in the narratives of their trips. That so many adventurous and lengthy trips through the country have succeeded testifies to the abundance of fish and game even in the far north of this vast region.

The chief source of the food supply of the natives and of explorers in the Barren Lands is the Barren Lands caribou, *Rangifer arcticus* (Richardson). Mr. E.

A. Preble of the United States Biological Survey, in his report so often quoted in the preceding pages, says:—"This famous animal, usually in the north called 'deer,' and often mentioned in the narratives of Arctic travel, occurs more or less abundantly on the barren grounds of the region treated of, and on the large islands to the northward. It is the caribou, more than any other animal, which renders human residence in this desolate region possible.

"Within this great area it is probable that there are two or more races, perhaps distinct species, since the animals are separated by the physiographic conditions of the country into different herds, or aggregations of herds, which never associate with each other at any time of the year, and which have somewhat different habits. A series of skins and skulls will be necessary to a decision as to the number of recognizable forms. For the present, however, all the caribou of this region, excepting the woodland species, may without violence be

CONSIDERED AS ONE SPECIES,

for which the name *arcticus*, applied by Richardson to the animal inhabiting the main area of the Barren Grounds between Great Bear lake and Hudson bay, may be used. It is reasonably certain that within this latter area but one species is represented."

One of the recent explorers, Mr. J. B. Tyrrell, and his brother, Mr. J. W. Tyrrell, give us perhaps the most complete first-hand information as to the caribou. In notes of the fauna of the country lying between the eastern part of Athabaska lake and Churchill river, explored in the summer of 1892, J. B. Tyrrell says:—"The Barren Grounds caribou. . . . . comes south in winter to the south end of Reindeer

lake and the upper portion of Mudjatik and Foster rivers. It travels north in spring to the Barren Grounds, but a very few animals are occasionally left behind, one having been shot in July near the north end of Cree lake."

Fort Fond du Lac (east end of Lake Athabaska) is stated by Mr. Tyrrell in the same report to be "on one of the principal lines of travel of the Barren Ground caribou, in their regular migrations north and south."

In the report of his expedition down the Dubawnt valley and Chesterfield inlet in 1893, Mr. Tyrrell mentions that his party first saw caribou (he calls them *Rangifer Grœnlandicus*) on July 28 on Barlow lake, "and on July 29, we met a vast herd of Barren Ground caribou collected on a good feeding ground on the eastern shore of Carey lake."

Mr. Tyrrell gives the following details:—"Four miles below Barlow lake, the river Dubawnt enters the south end of Carey lake, so called in honour of the Reverend Doctor Carey of St. John, N.B. After paddling up the lake for five miles, directing our course towards a high point with a large boulder on its summit, afterwards called Cairn point, we saw

An Immense Herd of Caribou

(*Rangifer Grœnlandicus*) moving along the east shore. We at once paddled towards the land, and found the deer standing on low wet grassy land near the water, at the foot of a long stony slope.

"The following extract from my daily journal, with the photographs in the front of the report, will give a fairly clear idea of the number of deer seen:—

"July 30.—Yesterday was the first clear warm day that we have had for a long time, but to day is also

clear and warm, with a gentle breeze blowing from the west. We spent the day skinning and cutting up the fattest of the bucks we killed yesterday. Our camp is a hundred yards from the lake, near the edge of a bog, with a scattered grove of larch and black spruce just behind us. All day the caribou have been around us in vast numbers, many thousands being collected together in single herds. One herd collected in the hill behind our camp, and another remained for hours in the wet bog on the point in front of us. The little fawns were running about everywhere, often coming up to within a yard or two of us, uttering their sharp grunts as they stood and looked up at us, or as they turned and ran back to the does. About noon a large herd had collected on the sides and summit of the hill behind us. Taking the small hand camera with which we were supplied, we walked quietly among them. As we approached to within a few yards of the dense herd, it opened to let us in, and then formed a circle round us, so that we were able to stand for a couple of hours and watch the deer as they stood in the light breeze or rubbed slowly past each other to keep off the black flies. The bucks, with their beautiful branching antlers, kept well in the background. We obtained a number of photographs, which show the animals in many positions; later in the afternoon a herd of bucks trotted up to us, and stood at about forty yards distance. This was a most beautiful sight, for their horns are now full grown, though still soft at the tips, but unfortunately we had not the camera with us. We did not shoot any to-day."

In his paper before the British Association in 1897 Mr. Tyrrell said that this herd at Carey lake must have contained between one and

TWO HUNDRED THOUSAND HEAD OF CARIBOU.

They were migrating southward towards the edge of the woods, where they would spend the winter.



An Indian Dance Lodge.

Mr. J. W. Tyrrell, who was with his brother upon this occasion, in his book "Through the Sub-Arctics of Canada", speaks of the caribou seen at Carey lake as forming "many great bands literally covering the country over wide areas. The valleys and hillsides for miles appeared to be moving masses of caribou. To estimate their numbers would be impossible. They could only be reckoned in acres or square miles. We walked to and fro through the herd of caribou, causing little more alarm than one would by walking through a herd of cattle in the field."

Near the head of Dubawnt lake the Tyrrells, in August, noticed scattered bands of deer, also two or three wolves and a wolverine.

In 1894, when Mr. J. B. Tyrrell's party was descending Kazan river, they first fell in with the

Barren Lands caribou on the west side of Ennadai lake about latitude 61°, on August 14. Mr. Tyrrell in his report says the deer were travelling southward in large numbers. The country was open and treeless, and the deer were rather difficult to approach, but twelve were shot and cut up, and their meat was spread out to dry in the sun and wind."

Mr. J. W. Tyrrell mentions seeing some caribou and many signs of them during his exploration of Hanbury and Thelon rivers in 1900. "While descending Hanbury river, to the eastward of Great Slave lake, during the early part of July, only an occasional straggling caribou was met. On July 23, however, on the Thelon, he observed a large band moving southward. In his report Mr. Tyrrell states: —"The Thelon was evidently frequented on both sides by numbers of caribou, as their tracks were everywhere to be seen, though few of the deer were met with, until the lower stretches of the river were reached, their migration having preceded us."

Back relates that on July 15, 1834, while his party was descending Backs river, at Beechey lake the swampy prairies, "which near the cascades might be called plains," were "all thickly inhabited by deer." Back calls the caribou "*Cervus tarandus*" (Linn).

Mr. David T. Hanbury found large bands of caribou, comprising adults of both sexes and their young, proceeding southward along Hanbury river about the last of July.

Migration of the Caribou.

Writing of the migratory habits of the caribou, Mr. Hanbury states:—"There is no doubt that caribou migrate. They go south in large herds in autumn, and

north in spring. They cross the country east of Great Slave lake, round Artillery lake, and some distance east of it. They do not appear on the main Ark-i-linik river, but between Aberdeen and Schultz lakes they pass with some regularity. The migration takes place on such a large scale, and over such a wide tract of country, that it has been assumed that all caribou migrate; the fact seems to be that the majority of animals remain in the north throughout the year. I have myself shot caribou in winter along the west coast of Hudson bay, and inland from the bay; along the north and south coasts of Chesterfield inlet; in the country north of the head of the inlet as far as Garry lake on Backs river, and along Backs river. I have also killed them to the north and south of Baker, Aberdeen and Schultz lakes in winter, and I know others who have killed them in winter in the country about Wager river and Repulse bay. On the Arctic coast, at White Bear point, and on Kent peninsula, and at other places which will be mentioned later, caribou are always to be found during the winter. Thus, I think it may be held as proved that very great numbers of caribou do not migrate."

Mr. Hanbury, in another part of his book, mentions that on October 26, 1901, he hunted caribou near Baker lake, west of Chesterfield inlet. He writes:—"On looking out I could see deer in thousands away to the west. They seemed like small black stones in the distance, but with the glass their movements could be distinctly seen."

Mr. Hanbury announces that he was informed by the Eskimo of Ogden bay that caribou are found on Kent peninsula, at Cape Barrow, and near the coast of Victoria Land, throughout the winter, but that none remained during that season between Cape

Barrow and the Coppermine or near Ogden bay.

Mr. Warburton Pike (See p. 19) in his book "The Barren Grounds of Northern Canada" makes frequent and interesting references to the caribou. He mentions that during his journey northward into the Barren Grounds from the eastern part of Great Slave lake, in the autumn of 1889, caribou were first met with on Lake Camsell, about seventy miles north of Great Slave lake, on September 15. The animals were then on their way south, and many were seen during the remainder of September as the party travelled northward.

Description of a Migration.

Mr. Pike encamped for the winter on the south shore of Mackay lake and while there witnessed the migration southward, which he thus describes: —"Scattered bands of caribou were almost always in sight from the top of the ridge behind the camp, and increased in numbers until the morning of October 20, when little Baptiste, who had gone for firewood, woke us up before daylight with the cry of 'La Foule! La Foule!' and even on the ledge we could hear the curious clatter made by a band of travelling caribou. La Foule had really come and during its passage of six days I was able to realize what an extraordinary number of these animals still roam in the Barren Ground. From the ridge we had a splendid view of the migration; all the south side of Mackay lake was alive with moving beasts, while the ice seemed to be dotted all over with black islands, and still away on the north shore, with the aid of the glasses, we could see them coming like regiments on the march. In every direction we could hear the grunting noise that the caribou always make when travelling; the snow

was broken into broad roads, and I found it useless to try to estimate the number that passed within a few miles of our encampment. We were just on the western edge of their passage, and afterwards heard that a band of Dogribs, hunting some forty miles to the west, were at this very time in the last straits of starvation, only saving their lives by a hasty retreat into the woods, where they were lucky enough to kill sufficient meat to stave off disaster. . . . . The caribou, as is usually the case when they are in large numbers, were very tame, and on several occasions I found myself right in the middle of a band with a splendid chance to pick out any that seemed in good condition. . . . . This passage of the caribou is the most remarkable thing that I have ever seen in the course of many expeditions among the big game of America. The buffalo were for the most part killed out before my time, but, notwithstanding all the tall stories that are told of their numbers, I cannot believe that the herds on the prairie ever surpassed in size 'La Foule' of the caribou."

No Danger of Starvation.

On his way north, the following spring, Mr. Pike first fell in with the caribou in June. In his book, "The Barren Grounds of Northern Canada", referring to this event, Mr. Pike states:—"From this time, all through the summer, till we again reached Great Slave lake late in August, we had no difficulty about provisions; although there was many a time when we could not say where we might find our next meal, something always turned up, and we were never a single day without eating during the whole day. I really believe it is a mistake to try to carry enough food for a summer's work in the Barren Grounds, as

the difficulty of transport is so great, and after the caribou are once found there is no danger of starvation.

"We were now travelling with the bull caribou, which had just left the thick woods, and made easy marches from lake to lake in a northeast direction; the weather became cold again for the last time, and June 7 was like a bad winter's day with a strong north wind and snowstorms. Then the summer came suddenly, and on June 11 we were obliged to camp on a high gravel ridge to await *le grand dégel*, which rendered travelling impossible, till the deep water had run off the ice."

When descending Lockhart river on his way from Artillery lake to Great Slave lake, on his way back to civilization, Mr. Pike remarked "caribou walking the ridges and swimming the lakes in every direction."

A Migration Near Artillery Lake.

Inspector Pelletier, Royal Northwest Mounted Police, in the report of his patrol from Great Slave lake to Hudson bay, makes special reference to the numbers of caribou, then migrating southward, seen during the passage of his party from the eastern end of Great Slave lake, to Thelon river. He writes:—"As we were approaching the portage from Burr to Toura lake we sighted a large herd of deer coming out behind the grove of trees. This was the first we had seen. They were mostly does, but a few young bulls were scattered amongst them. We killed a small one which proved a great addition to our larder. They were not much frightened by us although they kept at a distance. They were in sight all the while we were portaging. From Burr lake to Artillery lake we were practically surrounded by deer. We camped for

the night of July 21 at the fifteen yards portage north of Toura lake and during the night deer kept passing to and fro close to our tents in large numbers. On July 22 near the foot of Artillery lake we saw thousands and thousands of deer, mostly bulls, coming over the ridge behind our camp, making for the water and crossing where it was no more than half a mile wide. Gradually the ridges on each shore and the traverse itself were alive with them. It was a wonderful sight seen late at night.

"At the south end of Artillery lake countless deer were seen; the bucks and does seemed to belong to separate herds. They were crossing and recrossing at that point where the lake is quite narrow, ranging from a quarter mile to one and a half miles in width. For a distance of about two or three miles the hills were covered with them and the water was bridged in two or three different places at a time. This might appear to be exaggerated; I would never have believed there were so many deer in the north, only now that I have seen them, I must. The natives we met at that place told us what we had seen was not the main herd but part of it, that the main body was a few miles up the lake on the west shore; they had just been there in their canoes the previous day. If what we had seen was not the main herd I wondered how large the main herd could be.

Caribou Along the Thelon.

"Deer were seen in good numbers along Sifton lake, near Timber rapids, and at Timber rapids; they also were sighted in other places. At the high sand ridge, about twelve miles below Sifton lake, a large herd was feeding on an island. At the lower end of Timber rapids the stream scatters and gets shallow,

full of boulders, and while winding around little channels a herd of deer was crossing, we could not possibly stop without getting into some mix up. Luckily the deer sighted us and heard us (we were making all the noise we could to frighten them). They rushed through, leaving our little channel open. We could have touched them with the paddle, they were so near. We grazed one rock, and that was due to our attention being diverted by the deer.

"No game was seen on the Hanbury but a deer or two at the upper end. Innumerable paths beaten by them were very distinct all the way, but we saw no fresh tracks denoting recent passage."

Writing of Thelon river itself, the Inspector states in his report:—"At the lower end deer are very numerous at certain times of the year. At their favourite traverses or crossings the ground is netted with deep, well-defined deer trails. We saw only one deer on the whole of the Thelon. I am told by natives that deer in the fall and spring are seen by the thousands on their migrations north and south."

West of Chesterfield Inlet.

As to the series of lakes through which the waters of the Thelon and Dubawnt are discharged into Chesterfield inlet, Inspector Pelletier reports:—"From Beverly lake down to Hudson bay deer were met almost daily, but not in large herds. Most were seen along the lower end of Schultz lake, Schultz river rapids and along Baker lake. At Beverly lake we met a camp of Eskimos, a few men and women. They were well provided with everything in the line of arms, ammunition, clothing and necessaries of life. At the foot of Baker lake is another camp of natives, numbering about twenty-five. They were well

stocked with everything, killing a good number of deer, and laying in a stock of meat and deerskin for the winter."

A few notes from journals or reports of other travellers as to the distribution and migration of this remarkable animal are instructive. During Anderson and Stewart's journey down Backs river in the summer of 1855 caribou were found to be numerous about Clinton-Colden and Aylmer lakes, and the species was observed on Adelaide peninsula in the far north.

In the summer and autumn of 1879 the party of Frederick Schwatka, searching for relics of Sir John Franklin, found large numbers of caribou on King William island and on the lower part of Backs river.

Fourteen Days in Passing.

Frank Russell, who passed the winter of 1893-94 at Fort Rae on the north arm of Great Slave lake, says, concerning the Barren Ground caribou:—"A few years ago they were often killed from the buildings and throughout the winter might be found near the post. In 1877 an unbroken line of caribou crossed the frozen lake near the fort. They were fourteen days in passing and in such a mass that in the words of an eye witness 'daylight could not be seen through the column'. They were now seldom seen within several miles of Rae." During the winter he spent there only one small band crossed the lake towards the west.

Mr. W. J. McLean states that in 1899 the caribou arrived in the neighbourhood of old Fort Reliance, at the extreme east end of Great Slave lake, on August 12.

Doctor J. M. Bell states that on his trip eastward

along the north shore of Great Bear lake, in 1900, he first met with caribou sixty miles west of Fort Confidence late in July, and later found them fairly numerous between Fort Confidence and the lower Coppermine.

Actual Value of the Caribou.

As to the actual value of the caribou to the country, Mr. J. B. Tyrrell stated in his paper before the British Association:—"Their flesh is excellent eating, and the animals will doubtless furnish an important food-supply for explorers and pioneers in that country. Whether they can be tamed, and thus brought permanently into the service of man or whether they must disappear like most of the other denizens of the wilderness, remains to be seen; but even if they should be doomed to disappear, it seems quite possible that they might be replaced by tame reindeer from Lapland who would feed in summer on the vast grassy plains, and in winter would take kindly to a diet of Canadian lichens."

Mr. J. W. Tyrrell considers the Barren Ground caribou "is the same as the reindeer of Lapland." He states in his book "Through the Sub-Arctics of Canada":—"As a source of venison it cannot be excelled, especially in the autumn season, when it is in prime condition. During September and October the males are rolling fat, and as food their flesh is then equal to the finest beef. Of all the meats I have ever tasted certainly reindeer tongues takes the first place for daintiness and delicacy of flavour."

Captain Back, writing in 1835, stated of the reindeer or caribou:—"It furnishes food and clothing to the Dogrib and Copper Indians, the Chipewyans, the Swamp or Coast Crees, and to the Esquimaux,

but none of the American tribes have domesticated it like the Laplanders. Every part of the animal is eaten, even to the contents of its stomach, and the half-dried tongue when roasted is perhaps the greatest delicacy that the fur countries afford. Reindeer meat, when in the best condition, is not only superior to that of the moose deer and bison, but, in my opinion, it surpasses the best mutton or English-fed venison."

Mr. Ernest Thompson Seton, lecturing on his trip to the Barren Lands in 1906, stated while in the region of perpetual day or night, his party had a caribou at hand whenever they wanted one for a meal. When they pitched tents near trail, the shaggy animals loped along during the night and tripped over the guy-ropes.

"Cutting in half the estimates of explorers who went before me, and making a most conservative estimate there are not less than

Thirty Millions of These Caribou

letting the wind blow through their whiskers in that northern country," said the lecturer. "There is absolutely no destructive war on them, and no possibility of their destruction. When the great northland is opened up, it will be for Canadians to decide what is to be done with those animals, and how is that beautiful country to be opened up? Some say that the reindeer will be the medium, but I hold that it will be the yak, which roams through the north of China. This animal is strong and sturdy, can bear the heaviest burdens, and can stand any extreme of climate."

The Experiment in Alaska.

In view of the suggestions that have been made as to the domestication of the Barren Lands caribou, and recalling the fact that through the agency of Doctor Grenfell of Labrador, Lapland reindeer have been recently (1912) sent out to the Athabaska region as an experiment, the following paragraph from the "Christian Herald" of a recent date is interesting: "It is only a few years since the United States Government, as an experiment which it was hoped would help the Eskimos and Indians of northern Alaska, imported a few score reindeer from Norway, with a number of Lapps skilled in their care. Subsequently other reindeer were brought from the opposite coast of Asia, and although it was known that the particular form of moss or lichen on which these animals live, and which flourishes under the snow, was abundant within the American Arctic circle, the attempt to introduce reindeer was regarded by a majority of our citizens as being quite as wild and visionary as was the purchase of Alaska by Secretary Seward in 1867.

"The few score reindeer have grown to twenty-seven thousand three hundred and twenty five distributed in forty-two herds. More than one-half, or fourteen thousand nine hundred and ninety-three, is owned by natives who before the advent of the reindeer were in a state of the most wretched poverty. Of the remainder three thousand seven hundred and thirty are owned by the United States, four thousand one hundred and ninety-four by missions and four thousand four hundred and seven by Lapps. The total income of the Eskimos from the reindeer industry during the last year reported was twenty-four thousand six hundred and thirty-six dollars."

Future Supply of Cheese, Meat and Leather.

A newspaper despatch is authority for the statements that the first shipment of reindeer meat has been shipped from Alaska to Seattle, and that the gentleman in charge of the reindeer in Alaska for the United States government says that in a quarter of a century there will be three million beef reindeer in Alaska, and that they will thrive and multiply and fatten on the Arctic vegetation where even a goat could not live. Their flesh, he asserts, is more palatable than either beef or mutton.

In view of the success of this experiment in Alaska it is predicted that in the far north of America, as in the far north of Europe, the reindeer will be the principal domestic animal, supplying the people not only of the northland itself, but of more southerly latitudes, with cheese, and meat, and leather.

The Musk-Ox.

Mr. J. B. Tyrrell is authority for the statement that besides the caribou, musk-oxen (*Ovibos moschatus*) are the only other large herbivorous animals that live in the open plains of the north, and they scorn the shelter of the forest even in winter, their long shaggy coat of hair furnishing sufficient protection against the severest gales. Mr. Tyrrell in his report of his explorations along Dubawnt and Kazan rivers states that the habitat of the musk-ox seems to be confined to that country north of the portion of Dubawnt river between Dubawnt lake and Hudson bay. None were seen in the course of either of the two expeditions mentioned, but Eskimos met with at the head of Chesterfield inlet had a number

of fresh skins. The Eskimos on Kazan river reported to Mr. Tyrrell that there were no musk-oxen in their neighbourhood.

Mr. E. A. Preble states in his report:—"This famous ruminant within historic times ranged over the entire extent of the Barren Grounds, from the mouth of the Mackenzie to Churchill. It has now become extirpated over large areas at the eastern and western extremities of this range, but still exists in great numbers in the less accessible parts of its habitat."

Captain Back records on July 13, 1834, while descending the river which now bears his name, he noticed two or three hundred deer, and, apart from them, herds of musk-oxen were either grazing or sleeping on its western banks, which there (above Beechey lake) looked green and swampy, and were all more or less cloven by inconsiderable ravines, with a clayey surface. Back mentions that his party killed a musk-ox on Montreal island, off the mouth of Backs river, August 3, 1834. While ascending that river on his return trip, on September 1, Back near Lake Pelly noticed a herd of musk-oxen and a few straggling deer quietly feeding on the sand-hills, "and many of the white, brown, and laughing geese were flying about, and seemed to be collecting for their southerly migration."

THE MEAT OF THE MUSK-OX.

Back states that the musk-ox "feeds, like the reindeer, chiefly on lichens, and the meat of a well-fed cow is agreeably tasty and juicy, but that of a lean cow and of the bull is strongly impregnated with a disagreeable musky flavour, so as to be palatable only to a very hungry man."

In his evidence before the select committee of the Senate in 1888, Hon. William Christie, formerly Inspecting Chief Factor of the Hudson's Bay Company, stated that the company at that time got a few—a very few—musk-ox hides at Churchill and Fort Rae. This animal kept pretty well in the open country along the Arctic coast. Witness was four years at Churchill, and was asked by a friend to get a musk-ox robe for him, and was two or three years before he obtained it.

Hon. Frank Oliver informed the same committee that Mr. Murdoch McLeod, a retired Hudson's Bay Company's official, told him that a musk-ox bull which he helped to kill weighed fourteen hundred pounds, dressed, and the robe measured fifteen feet from nose to rump. The musk-oxen were found generally in bands of ten to forty. Some winters they were more scarce than others, which could not be explained.

Mr. D. T. Hanbury, writing of the original exploration by him of Thelon and Hanbury rivers, states:—"After ascending the main Ark-i-linik (Thelon) river for about thirty-five miles, musk-ox tracks commenced to get very numerous. The muddy shores in places were so ploughed up with their tracks as to give the idea that a drove of cattle had passed along." In this vicinity the explorer saw several herds of musk-oxen.

A Musk-Ox Preserve.

In another place in his book "Sport and Travel in the Northland of Canada", Mr. Hanbury writes:—"On the main Ark-i-linik (Thelon) river there is a stretch of country about eighty miles in length into which no human being enters. The Eskimos do not hunt so far

west, and Yellow Knives and Dog Ribs from Slave lake do not go so far east. To penetrate this country in the dead of winter would be simply to court starvation. Then the deer have all departed, and to depend on finding musk-oxen at the end of the journey would be risky indeed. Thus there remains the spot in this Great Barren Northland which is sacred to the musk-ox. Here the animals remain in their primeval state, exhibiting no fear, only curiosity. I approached several herds within thirty yards, photographed them at my leisure, moving them round as I wished, and then retired, leaving them still stupidly staring at me as if in wonder. When the deer were not procurable a musk-ox was killed. The height of a large bull which I killed in 1896 at a spot about fifty miles farther north was fifty-five inches; horns twenty-seven inches."

A Midnight Musk-Ox Hunt.

In the official report of his exploratory trip from Great Slave lake to Chesterfield inlet via Thelon river in 1900 Mr. J. W. Tyrrell states that his party first encountered musk-oxen among the lakes in the vicinity of the height of land between the basin of Great Slave lake, and that of the Thelon. He thus refers to this event:—"Whilst sailing northward into Sifton lake we encountered a gale, which drove us ashore at the focus of the four arms. Thus finding a little leisure time thrust upon us, Mr. Fairchild and I, providing ourselves with compasses and field glasses, made an exploratory tramp of a few miles. The season had now advanced to June 27, and at such time in our latitude (63° 44′), we had no darkness, although the sun dipped below the horizon for a short time. The hours of night were, therefore, as

suitable for travel as those of day, and hence it was ten p.m. when, scanning the valleys and hillsides with my powerful stereoscopic field glasses, I observed a band of musk-oxen feeding a mile or two to the northward. Fifteen of them were counted in all, and this with genuine surprise, as we had not expected to see any of these animals for some time to come. They were none the less welcome, for our camp was much in need of fresh meat, and stimulated by this knowledge we procured two rifles from camp and set off in one of the canoes with two Indians, on a midnight hunt. The lake had now become quite calm, and the northern sky a glow of lurid light, making the scene a most enchanting picture, such as can only be seen within the shadow of the Arctic. For three miles our light canoe glided over the glassy surface of the lake in perfect silence, excepting for the faint rippling of the water against its sides, until when near the shore there suddenly appeared over the adjoining ridge the huge black forms of nine musk-oxen."

Musk-Oxen in Thelon Valley.

The following paragraph from Mr. Tyrrell's report is also interesting under this head:—"As we glided quickly and quietly down Thelon river, one of the most interesting features met with was the occurrence of numerous bands of musk-oxen feeding upon the luxuriant grass or sleeping on the river bank. Attempts were made to obtain photographs of some of these noble brutes, but such were not very successful for two reasons; first, because of the wariness of the animals, and second, because of the weariness of the photographers.

"It was observed that when bands of cows with

their young were met with, they were usually very timid and fled at first approach of danger, but in the case of straggling bulls, which were frequently seen, they were much more fearless and allowed us to approach as closely as prudence and their defiant attitudes would permit. On one occasion, when Mr. Fairchild climbed the river bank in order to photograph a fine specimen, he had no sooner snapped his camera and turned his back, than the brute charged and followed him to the bank. He was at once covered by our rifles, but as Fairchild stepped safely into the canoe, no shots were fired. Indeed day after day we passed numbers of musk-oxen, without molesting them in any way except by trying to photograph them. A notable fact in regard to the musk-oxen was that every one seen was on the north side of the Thelon, or on islands on the river. On one occasion when three musk-oxen were met with on an island they immediately plunged into the water and swam rapidly to the north shore, after gaining which they could be seen galloping across the plains for miles."

In his report Mr. J. W. Tyrrell classes the herds of musk-oxen as among the resources of the country "which are of great value to Canada." He adds:—"For the preservation of the musk-oxen—which may be so easily slaughtered—and are already rapidly diminishing in numbers, I would suggest that the territory between Thelon and Backs rivers, be set apart by the Government as a game preserve."

Appearance of the Musk-Ox.

In his interesting volume "Through the Sub-Arctics of Canada," Mr. Tyrrell writes:—

"The musk-oxen are claimed as relatives both by

the sheep and ox families, though they perhaps more properly represent a distinct family by themselves.

"In general appearance they may be said to somewhat resemble a huge brown, horned sheep, but in size and weight they much more nearly resemble the ox, or better still, the buffalo, the monarch of the prairies a generation ago.

"Like the buffalo, the musk-ox (*Ovibos moschatus*) is gregarious in its habits, but where the former existed in thousands the latter is found only in tens—a band of twenty or thirty being as many as are commonly found together. The above comparison of numbers may also be taken as approximately representing the whole existing musk-ox family as compared with that of the buffalo in his palmy days.

"In prehistoric times, as shown by the exhumed remains, the musk-ox occupied a very wide area of the earth's surface, both in Europe, Asia and America, but now his range is limited to the northern parts of Canada and Greenland. From personal observation I have found the southern boundary of the musk-ox habitat to-day to be Hudson strait and bay, Chesterfield inlet, Thelon river, Clinton-Colden and Aylmer lakes; whereas in the time of Samuel Hearne, one hundred and fifty years ago, we have his assertion that musk-oxen frequented the vicinity of Churchill, four hundred miles south of their present haunts.

"It is no doubt a fact, not only have the musk-oxen been driven farther and farther from the haunts of men, but that their numbers have been correspondingly reduced from year to year by natives who have long pursued a policy of systematic slaughter in quest of the princely robes so much in demand by the fur-traders."

MUSK-OX ROBES STACKED LIKE HAY.

"The musk-ox is one of the noblest and most valuable animals of the northern shore of Hudson bay and adjacent territory. It is found in very considerable numbers and affords most luxurious robes. I have seen musk-ox robes stacked by the Eskimos like hay-cocks, along the shore of Chesterfield inlet, awaiting the opportunity to market them."

On Thelon river, from the junction of the Hanbury down for over half its length or about one hundred and fifty miles, Inspector Pelletier, during his long patrol already several times referred to, saw innumerable tracks of musk-ox, some fairly fresh and on both banks. In his official report the Inspector states:—

"On August 9 (the day after the descent of Thelon river was begun), we sighted our first musk-ox. He was on a small island, lying down asleep, and looked very much like a large overturned sod until suddenly he rose and we were astonished at his size. I had always heard a musk-ox was not a large animal. This one we saw was a large bull of not very great height —perhaps, I would judge, about thirteen hands, but of immense size and weight; he would have scaled very close to fifteen hundred pounds. The long hair was coming down nearly to the ground, and when he decided to run away the fur on him was of such thickness and length that it waved up and down at every gallop as the wings of a bird flying. A few miles farther down about noon we sighted another musk-ox. He was on the north shore, sleeping on the top of a grassy bank. We made much noise to attract his attention. He suddenly rose, and looked straight at us. While doing so I took a snapshot of him. I was

hurrying another exposure in place when all at once he turned right about and disappeared over the bank. He was a large animal, but not so large as the first one. We were on the lookout for more, but saw none that day. We sighted one musk-ox on the morning of August 10. It was the third and last we saw. We saw innumerable tracks though, and at certain times of the year large herds must frequent the shores of this river."

The Moose and Fur-bearing Animals.

The moose (*Alces Americanus*) being a woodland animal, is not found in the interior of the Barren Lands, but it is found in places in the sparsely timbered margins of the country and in the narrow wooded strips and points which extend from the forested areas along the rivers and lakes well into the treeless plains. Mr. J. W. Tyrrell states that during his party's exploration of the upper Thelon in the summer of 1900, on two occasions moose antlers were found embedded in the sand of the river banks. Hanbury states that moose are found in Thelon river, below its junction with the Hanbury, and mentions seeing numerous fresh tracks and places where the animals had browsed on the willows. In August, 1902, while descending Dease river, northeast of Great Bear lake, he found tracks along its banks.

Inspector Pelletier, speaking in his official report of the game along the Hanbury and Thelon, states: —"There is good fur to be had in winter besides musk-ox, such as foxes, wolves, wolverines, brown bears, and perhaps mink and marten. . . . Many wolves were seen at the foot of Ford falls (on the Hanbury). Five were in a pack."

Mr. J. B. Tyrrell in his paper before the British

Association at Toronto stated:—"The white wolf and the wolverine are the two most common predatory animals in the interior, while the white bear and white fox are common in places along the coast."

Mr. J. W. Tyrrell ("Through the Sub-Arctics of Canada") states:—"Black and red as well as white foxes are also commonly found in the country north of the timber line. I have seen and handled a single black foxskin which realized for its owner the sum of one thousand six hundred dollars."

The Polar Bear.

As to the polar bear, which is found all along the shores of Hudson bay, and the northern coast, Mr. Tyrrell ("Through the Sub-Arctics of Canada") states:—"In the animal world the polar bear is admittedly the monarch of the north. He is the bear of bears, being described by all Arctic travellers as possessing enormous strength and great voracity. Of the score of polars whose more or less intimate acquaintance I have had occasion to make, I have seen at least two whose tracks in the snow measured fifteen by eighteen inches, whose length measures over nine feet, and whose slain carcases tipped the steelyard at from fifteen to sixteen hundred pounds."

In the same volume Mr. Tyrrell states:—"Of feathered game there is a great abundance, particularly of waterfowl, the most important of which are:—Brant, Hutchins and snowy geese; northern, American and king eiders; squaw ducks, swans, loons, nurres, guillemots and many other sea fowls. In many places I have seen geese in such numbers that they could be killed by hundreds with sticks. Ptarmigan, also, are found in great numbers in many places in the open country. They are

commonly caught by the natives with nets, and form a staple article of food."

Where the Wild Geese Nest.

Mr. J. W. Tyrrell mentions that two young broods of geese were seen on Dubawnt lake on August 15, 1893. He adds:—"It is commonly said that the breeding place of the wild goose has never been discovered, but here, at any rate, was the breeding place of these."

In the official report of his trip in 1900, Mr. Tyrrell states:—"Many broods of geese were observed on the low grassy banks of the Thelon. They were of a small grey species, with black necks and heads and white bands around the latter. Later in the season great numbers of moulting geese were met with, and thirty or forty of them were knocked over with sticks for supplying our kettles.

"Ducks and ptarmigan were also met with, though not in great numbers, whilst the spruce woods were enlivened by the songs of singing birds, notably American robins."

Hearne (p. 170) thus refers to the feathered game in Coppermine river region:—"When at the sea-side (at the mouth of Coppermine river), besides seeing many seals on the ice, I also observed several flocks of sea-fowl flying about the shores, such as gulls, blackheads, loons, old wives, ha-ha-wies, geese, Arctic gulls, and willicks. In the adjacent ponds also were some swans and geese in a moulting state, and in the marshes some curlews and plover; plenty of hawkes-eyes (i.e., the green plover), and some yellow-legs; also several other small birds that visit these northern parts in the spring to breed and moult, and which doubtless return southward as the

fall advances. My reason for this conjecture is founded on a certain knowledge that all these birds migrate in Hudson bay, and it is but reasonable to think that they are less capable of withstanding the rigour of such a long and cold winter as they must necessarily experience in a country which is so many degrees within the Arctic circle, as that is where I now (July 1771) saw them."

Flight of the Waterfowl.

Back mentions the fact that while at Artillery lake on September 5, 1833, "impending storms were threatened by the cackling of hundreds of geese, which at an immense height were winging their flight to the southward. Ranged according to their families, the grey, or bustard, the white and the laughing geese came past in quick succession, vying in swiftness, as if anxious to escape from the wintry horrors of the north."

Speaking of his exploration of Thelon and Hanbury rivers, Mr. Hanbury ("Sport and Travel in the Northland of Canada"), referring to feathered game along the route, states:—"Ptarmigan are very numerous in the willow beds all along the river. Excellent sport might be had by any one with time and ammunition to spare. On a journey small game is not interfered with unless other meat and fish give out. The ptarmigan were very handsome at this time of year (summer). But for a few white feathers in the wings, they might easily have been mistaken for grouse, the colour, flight and call (both in the early morning and when flushed) exactly resembling that of the red grouse. The young birds were strong on the wing, fully forward as grouse in the north of Scotland about the middle of August."

Inspector Pelletier states that when he descended the Thelon waterfowl were seen only on Baker lake, and then only a few, while on the other lakes and rivers none were seen. Ptarmigan were fairly plentiful in places all along the lower stretch from Schultz lake down.

Inexhaustible Supplies of Fish.

The resources of the Barren Lands in the way of fish are tremendous. We know that the salt, tidal waters which lave the eastern and northern shores of this huge area teem with fish and that the same can be truthfully said of the lakes and rivers which have been explored and are indicated on the map. We also know that the country is dotted with innumerable lakes and drained by many rivers and streams which have never been visited by white men, and which consequently find no places on any map. And these too contain fish.

Hearne's journal contains many references to the fish supply of the region he travelled through in 1771 between Churchill, the mouth of the Coppermine, Great Slave lake, and Lake Athabaska. One of the pioneer explorer's fish stories is particularly interesting. At pages 158, 159 and 160 of his book he relates that his party, in retreating up the Coppermine after the brutal massacre by his Indians of the Eskimos at Bloody falls (as he called the spot after the massacre), saw an old woman, almost blind, "sitting by the side of the water, killing salmon, which lay at the foot of the fall as thick as a shoal of herrings." Hearne proceeds:—"It may appear strange, that a person supposed to be almost blind should be employed in the business of fishing, and particularly with any degree of success, but when the

multitude of fish is taken into account the wonder will cease. Indeed they were so numerous at the foot of the fall, that when a light pole, armed with a few spikes, which was the instrument which the old woman used, was put under water, and hauled up with a jerk, it was scarcely possible to miss them. Some of my Indians tried the method, for curiosity, with the old woman's staff, and seldom got less than two at a jerk, sometimes three or four. Those fish, though very fine, and beautifully red, are but small, seldom weighing more (as near as I could judge) than six or seven pounds, and in general much less. Their numbers at this place were almost incredible, perhaps equal to any thing that is related of the salmon in Kamschatka, or any other part of the world. It does not appear that the Eskimos have any other method of catching the fish unless it be by spears and darts, for no appearance of nets was discovered either at their tents, or on any part of the shore. This is the case with all the Eskimos on the west side of Hudson bay; spearing in summer and angling in winter are the only methods they have yet devised to catch fish, though at times their whole dependence for support is on that article."

Captain Back mentions having observed grayling rising to flies at the outlet of Pelly lake on Backs river, July 15, 1834. Back also mentions that while descending Backs river in July, 1883, his party met a party of Eskimos who were camped at the foot of a fall below Pelly lake, where they had come to get a supply of fish. Thousands of whitefish and small trout, caught in the eddy below the fall, lay about, split, and exposed to dry on the rocks.

Back's party caught an inconnu (which he calls *Salmo Mackenzii*) with a number of other fish in the eastern arm of Great Slave lake August 14, 1833.

The Arctic Salmon.

Before the Senate committee of 1888, Mr. Christie, Chief Inspector of the Hudson's Bay Company, stated that salmon were found in large numbers on the Churchill, as soon as the ice cleared out of the river, about the middle of July. They entered the river and went out of it with the tide. They did not run up the river to spawn. He thought these salmon quite as large as those he had seen in Scotland.

Mr. A. P. Low, Director of the Geological Survey of Canada, examined before the Senate committee of 1907, stated that in the far northern waters there are no true salmon, but there is the Arctic salmon, which is found along the east side of Hudson bay from Cape Jones, and on the west side, north of the mouth of Churchill river. These are in many places very abundant and are caught freely in the summer time when they are out in the sea. They go into the sea about July and return to the rivers and lakes again some time in September. They are only out there about two months. This Arctic salmon is an excellent fish, beautifully coloured, a very fine salmon colour, and it is not so rich a fish as the Atlantic salmon. It resembles the western salmon more than it does the eastern or Atlantic salmon. The salmon fishery on Hudson bay would no doubt have commercial value were there an outlet to a market. The whitefish of Hudson bay is a very fine flavoured fish.

The portion of Hudson bay in the vicinity of Southampton island is where the whale fishing is done. Formerly it extended to Marble island.

In reply to various questions, Mr. Low said he had no knowledge of herring or mackerel going into Hudson bay, but there are some cod there. He had

taken them up near Cape Fullerton and along that coast, but they have not been found very plentiful yet.

In the report of his explorations in 1893 and 1894, Mr. J. B. Tyrrell says:—"It is probable that some of the true salmon ascend the inlets and streams west of the northern part of Hudson bay, but the fact was not definitely determined." Before the select committee of the Senate in 1907 he stated he did not know what fish there are along the shores of Hudson bay. "The Eskimos report that there are salmon and other fish there, but I did not see them myself."

Plenty of Salmon Running.

Mr. Hanbury, speaking of his trip across country from Chesterfield inlet to the Arctic, reported "plenty of salmon running" in the northern rivers in June.

Mr. J. W. Tyrrell ("Through the Sub-Arctics of Canada") states:—"Salmon of the very finest quality are found in abundance both in Hudson bay and strait. I have several times procured them from Eskimos and can testify as to their superior quality." Mr. Tyrrell does not state whether any of these salmon were caught on the west side of the bay.

We find the following interesting paragraphs as to the fish along the Arctic coast in "Sport and Travel in Northern Canada" (Hanbury):—"On May 29, after travelling about ten miles, I obtained an observation for latitude which gave 68° 25′ north. Three miles more brought us to the east coast of Kent peninsula, or rather to a small inlet of the coast, where several Huskies were fishing with their copper fish-hooks through holes in the ice. In the evening they brought me seven of the fish they had caught, which proved

to be codling, the same in appearance and size as those we have found around the coast of Great Britain. I was surprised to see these fish, for the Hudson bay Huskies had always denied the existence of any sort of cod in Hudson bay. The Arctic Husky name for these codling was u-wuk, and they were reported to be very plentiful along the coast at this time of year."

According to Doctor Richardson:—"Trout of various kinds and of large size inhabit the rivers that fall into Arctic sea, and on the coast near the mouth of Coppermine river, a species closely resembling the sea-trout of England was abundant in the shallows."

Fish in the Dubawnt and The Kazan.

Mr. J. B. Tyrrell in the report of his exploratory trips down Dubawnt and Kazan rivers in 1893 and 1894 states:—"Fish seemed to be everywhere abundant in the lakes and streams though very few were caught. The lake trout (*Cristivomer namaycush*) and whitefish (*Coregonus clupeiformis*) appeared to be the most abundant and valuable food fishes, the latter being especially abundant in Dubawnt lake. Pike (*Esox lucius*) and one or more species of suckers were also seen.

Mr. Tyrrell states in his evidence before the Senate committee of 1907 that as far north as Dubawnt lake (63° north latitude) the whitefish and trout were plentiful in all the streams. Mr. Tyrrell caught them in Dubawnt lake. Farther northwards he did not catch any. There are great quantities of fish. The fact is there are all the fish the lakes will hold—they are as full as the water can supply food for them.

While Mr. Tyrrell's party was descending

Dubawnt river in August, 1894, they made a big haul of trout and whitefish below Markham lake; according to Mr. J. B. Tyrrell ("Through the Sub-Arctics of Canada"):—"The whitefish ranged from six to ten pounds in weight; the trout went up to twenty-five pounds."

In his paper before the British Association Mr. J. W. Tyrrell stated:—"Whitefish and lake trout are plentiful in the lakes and streams; but as yet very little is known about the character and distribution of the denizens of most of the water stretches."

Fish Plentiful in the Thelon.

Mr. Hanbury in describing his exploration of the Ark-i-linik (Thelon and Hanbury rivers) states:—"Fish were plentiful all along the Ark-i-linik; in fact, I never saw such a grand river for fish. Trout, whitefish, and toolabies (very similar to whitefish) abound, and large numbers can be taken with nets of from three to four and one-half inch mesh. There are few rivers equal to the Ark-i-linik for food fishes."

All travellers agree that there are large numbers of fish in the eastern arm of Great Slave lake and in the lakes between that sheet of water and the Thelon. Mr. J. W. Tyrrell in the report of his trip in 1900 states:—"The resources of Artillery lake and vicinity, outside of any mineral wealth it may possess, lie in its fisheries, its furs and meat supplies. In regard to the fisheries, I can testify that its deep, cold waters abound with the finest specimens of lake trout as well as whitefish, pike and carp. At one place in about fifteen minutes, with a single spoon hook, one of my men pulled out eighteen fine trout, some of which were brought to camp, strung on a pole and photographed by me. Some of these fish

were from sixteen to twenty pounds in weight. In regard to the fish of Artillery lake, I was told

A Most Astonishing Story

by the Indian "Pierre Fort Smith" and his companion. They affirm that they have frequently seen fish of from twenty to thirty feet long in the water, and described them as being of black colour, with long slender horns or feelers. They say they have never killed one of them—being afraid of them—but that they are frequently seen in the deep waters when crossing the lake. When I smiled at their story with some expression of doubt, they became very indignant and with one accord stoutly declared every word of it to be true. I offered them 'one hundred skins' if they would capture or kill one of these fish for me, but they only said they could not do so; they were too big, and they were afraid of them."

In the report of his patrol from Great Slave lake to Chesterfield inlet, Inspector Pelletier gives us the following notes on fish and game along his route: —"We saw no game along the lake (Great Slave lake) such as deer, bears, etc., no water fowls, partridges or ptarmigan. Fish, on the contrary, are very plentiful. Large lake trout weighing up to twenty-five pounds take well to the troll, but this trout is not a game fish, and is very coarse food. The smaller trout are better in every way. Whitefish is abundant, and of splendid quality. We saw no 'Inconnus', the season being too early."

Artillery Lake Teems With Trout.

Artillery lake teems with trout, some of large size,

and at the foot of the rapids on “Kasba river trout are taken by the troll, some weighing eighteen and twenty pounds. There must be larger ones but we did not secure any.

“At the foot of every rapid on upper Hanbury river trout and grayling can be caught. Some trout are very large, over twenty-five pounds. The best eating are the small ones about two pounds, the flesh of which is very red. They do not rise to the fly, but catch the spoon very well. The ordinary maskinonge pattern proved the most successful.”

As to Thelon river, the Inspector states:—“Fish are abundant. Anywhere where nets are set whitefish of splendid quality are caught.” As to the long reach of lakes above Chesterfield inlet he says:—“Fish are plentiful in all the lakes. On Baker lake we saw some very large trout jumping near the mouth of a small river emptying into the lake.”

The Indians and the few white travellers who have been there report a plentiful supply of fine fish in all the large lakes north of Great Slave lake and about the headwaters of Backs river, which used to be known as Great Fish river on account of the large fish caught in its waters. Mr. Warburton Pike was at Aylmer lake in June 1890 and writes in his book (“The Barren Grounds of Northern Canada”):—“At the head of every bay a stream ran into the lake, and the open water at its mouth was always a sure find for trout; forty or fifty large fish were often caught in a day with a hook and line at these places, and, as we could always kill caribou, even the dogs were getting fat in this land of plenty.”

We have this testimony from Hanbury (“Sport and Travel in the Northland of Canada”) as to the fish life of the lakes still farther north and on the height of land dividing the Coppermine watershed

from that of Great Bear lake:—"We all regretted leaving Teshi-er-pi or Dismal lake. It certainly did not appear 'dismal' to us, but quite the reverse. I do not remember ever having come across a lake where fish were so numerous. Large trout, some of which ran up to twenty-five pounds, could be seen swimming in the clear water as we paddled along. The tollabies we caught averaged nearer five pounds than four, and as before remarked, were most excellent eating. Arctic trout were numberless."

BIBLIOGRAPHY.

The reader of the preceding pages will have observed, from the variety of publications from which quotations have been made, that the literature relating to the far northlands of Canada is considerable—quite extensive in fact. Below is a partial list of written authorities consulted in the preparation of this book. It does not pretend to be a complete bibliography of the country by any means, many publications which were carefully read through not being mentioned because they do not throw any direct light upon the natural resources of the region, being merely books of adventure, or publications relating wholly to those topographical features of the country which are clearly indicated in present-day maps. The following list includes works from which enquirers for additional knowledge of the country are likely to obtain serviceable information.

ADAM, G. MERCER.—"The Canadian Northwest, its History and its Troubles."—Rose Publishing Co., Toronto, 1885.

AMI, H. H., D.Sc., F.G.S., F.R.S.C.—"Resources of the Country between Quebec and Winnipeg, along the line of the G.T.P. Ry."—(Sessional paper 143), King's Printer, Ottawa, 1903.

ANDERSON, JAMES.—"Extracts from Chief-Factor James Anderson's Arctic Journal."—Journ. Roy. Geog. Soc., Vol. XXVII, pp. 321-328, 1857.

ARMSTRONG, JOHN.—Report of the Preliminary Surveys for a Proposed Railway to Hudson bay, (Sessional paper No. 20 d., 1910). King's Printer, Ottawa.

BACK, CAPTAIN GEORGE, R.N.—"Narrative of the Arctic Land Expedition to the mouth of the Great Fish River, and along the shores of the Arctic Ocean, in the years 1833, 1834, 1835," by Captain Back, R. N., Commander of the Expedition. Zoological Appendix by John Richardson. London and Philadelphia, 1836.

BELL, JAMES MACINTOSH, M.A.—"Report on the Topography and Geology of Great Bear lake and of a chain of lakes and streams thence to Great Slave lake." Part C., Annual Report, Vol. XII, Geological Survey of Canada, King's Printer, Ottawa, 1901.

BELL, ROBERT, I.S.O., M.D., C.M., D.Sc., LL.D., F.R.S. —Reports in the Annual report of the Geological Survey of Canada particularly from 1877 to 1908. King's Printer, Ottawa.

BELL, DR. ROBT., I.S.O., etc.—Special reports in Geol. Survey Reports 1877-78, 1882-84 and 1885.

BELL, DR. ROBT., I.S.O., etc.—Reports on Hudson bay and some of the lakes and rivers lying west of it.

Report Progress Geological Survey of Canada, 1879-80, pp. 10-113-C. Queen's Printer, Ottawa, 1881.

BELL, DR. ROBT., I.S.O., etc.—"The Geology of the Hudson's Bay and Strait," in the report of the Hudson's Bay Expedition, 1885. Department of Marine, Ottawa.

BELL, DR. ROBERT, I.S.O., etc.—"Geology and Economic Minerals of Hudson's Bay and Northern Canada," (abstract) in Trans. Royal Soc. Can., vol. ii, sect. iv., p. 241, Ottawa.

BELL, DR. ROBERT, I.S.O., etc.—"Report on an Exploration of Portions of the Attawapiskat and Albany rivers, Lonely lake to James' bay." Part G., Annual Report Geol. Survey, 1886. Dawson Bros., Montreal, 1887.

BERNIER, CAPTAIN J. E.—"Report on the Dominion of Canada Government Expedition to the Arctic Islands and Hudson Strait on Board the D.G.S. 'Arctic.'" Ottawa, Government Printing Bureau, 1910.

BOULTON, MAJOR C. A.—"Reminiscences of the Northwest Rebellions." Grip Printing and Publishing Co., Toronto, 1886.

BROWN, HON. C.P.—"Report of the Select Committee of the Legislative Assembly of the Province of Manitoba appointed to Procure Evidence as to the Practicability of the Establishment of a System of Communication with the Province via Hudson Bay". Printed by order of the Legislative Assembly. Winnipeg, 1884.

BRYMNER, DOUGLAS—"Reports on Canadian Archives for 1888 and 1890," Notes E. and C., respectively. Queen's Printer, Ottawa.

BUTLER, CAPTAIN W. F., F.R.G.S.—"The Great Lone Land; a Narrative of Travel and Adventure in the

Northwest of America." London, 1872.

CHAMBERS, CAPTAIN E. J.—"The Book of Canada." Montreal and Toronto, 1905.

CHAMBERS, CAPTAIN E. J.—"The Royal Northwest Mounted Police. (A Corps History)" The Mortimer Press, Montreal and Ottawa, 1906.

CHAMBERS, CAPTAIN E. J.—"Canada's Fertile Northland." Containing the evidence heard before the Select Committee of the Senate of Canada of 1906-07 and the report based thereon. Ottawa, Government Printing Bureau. 1907. Several later editions. The last under the title "The New Northwest."

CHAMBERS, CAPTAIN E. J.—"The Great Mackenzie Basin." A Summary of the Reports of the Schultz Committees of the Senate of Canada (1887-88) and of the evidence heard before said Committees." Ottawa, Government Printing Bureau, 1908.

COUES, ELLIOTT.—"New Light on the Early History of the Greater Northwest. The Manuscript Journals of Alexander Henry, Fur Trader of the Northwest Company and of David Thompson, Official Geographer and Explorer of the same Company, 1799-1814," in three volumes. Francis P. Harper, New York, 1897.

CREAN, FRANK J. P., C.E., F.R.G.S.—"The New Northwest. Report of Exploration." Government Printing Bureau, Ottawa, 1908. Second edition, 1909.

DAWSON, G. M., D.S., F.G.S., F.R.S.C., etc.—"Notes to accompany a Geological Map of the Northern portion of the Dominion of Canada, East of the Rocky Mountains," Queen's Printer, Ottawa, 1887.

DAWSON, G. M., F.G.S., etc.—Numerous reports in

the annual reports of the Geological Survey of Canada. King's Printer, Ottawa.

DAWSON, G. M., D.S., F.G.S., etc.—"On some of the larger unexplored regions of Canada." Paper contributed to the Ottawa Field Naturalists' Club.

DEPARTMENT OF THE INTERIOR—"Annual Reports," more particularly 1884, 1888, 1889, 1892 (Sessional paper No. 13, Vol. VII,) 1900-01 (Sessional paper No. 25, Part III, Appendix 26 to Surveyor General's report), 1903 (Summary of the Reports on Peace river). King's Printer, Government Printing Bureau, Ottawa.

DICKSON, J. R., B.S.A., M.S.F.—"Report on Timber Conditions, etc., along the proposed route of the Hudson Bay Railway." Forestry Branch—Bulletin No. 17. Government Printing Bureau, Ottawa, 1911.

DOBBS, ARTHUR—"Account of the Situation, Climate and Trade of the Countries adjoining to Hudson's Bay, etc." London, 1744.

DODDS, JAMES—"The Hudson's Bay Company, its Position and Prospects." London, 1866.

DOWLING, D. B., B. Ap. Sc.—"Report on the Country in the vicinity of Red Lake and Part of the Basin of Berens River, Keewatin." Part F., Annual Report (Vol. VII), Geological Survey of Canada. Queen's Printer, Ottawa, 1896.

DOWLING, D. B., B. Ap. Sc.—"Report on an Exploration of Ekwan river, Sutton Mill lakes and part of the West Coast of James' Bay." (Annual Report Geol. Sur. of Canada, 1901, Part F., Vol. XIV, New Series). King's Printer, Ottawa.

DOWLING, D. B.—"Report on the Geology of the West Shore and Islands of Lake Winnipeg." (Geol. Survey report for 1898, Vol. XI). Government Printing Bureau, Ottawa, 1901.

DOWLING, D. B.—"Report on the East Shore of Lake Winnipeg and Adjacent Parts of Manitoba and Keewatin. From notes and Surveys by J. B. Tyrrell." (Geol. Survey report for 1898, Vol. XI). Government Printing Bureau, Ottawa, 1901.

DOWLING, D. B.—"Report on Geological Explorations in Athabaska, Saskatchewan and Keewatin Districts." Part F. F., Annual Report (Vol. XIII), Geological Survey of Canada, King's Printer, Ottawa, 1902.

DOWLING, D. B.—"Report on an Exploration of Ekwan River and Sutton Mill Lakes and Part of the West Coast of James' bay." Part F., Annual Report (Vol. XIV), Geological Survey of Canada, King's Printer, Ottawa, 1904.

FRANKLIN, CAPTAIN JOHN, R.N., F.R.S.—"Narrative of a Journey on the shores of the Polar Sea, in the years 1819-20-21 and -22." Zoological Appendix; Mammals and Birds, by Joseph Sabine; Notice of the fishes, Botanical Appendix, by John Richardson. London, 1823.

FRANKLIN, CAPTAIN JOHN, R.N., F.R.S., etc. —"Narrative of a Second Expedition to the Shores of the Polar Sea in the years 1825, 1826 and 1827." London, 1828.

FISHER, HON. SYDNEY—"Some Economic Aspects of Agriculture in Canada." Address before the Canadian Club, Ottawa, Jan. 22, 1910.

GEOLOGICAL SURVEY OF CANADA—"Annual Reports," more particularly the following: 1872, 1878, 1879, 1880, 1884, 1886 (Part R), 1888 (Vol. XI, part A), 1890-91 (Vol. V., part D), 1894 (Vol. VII, part A), 1896 (Vol. IX, part F), 1897 (Vol. X, part A), 1900 (Vol. XIII), 1901 (Vol. VIII, part D). King's Printer, Government Printing Bureau, Ottawa.

GRANT, GEORGE M.—"Ocean to Ocean, Sandford Fleming's Expedition through Canada in 1872. Being a diary kept during a journey from the Atlantic to the Pacific with the Expedition of the Engineer-in-Chief of the Canadian Pacific and Intercolonial Railways." London, 1877, and Belford Bros., Toronto.

HANBURY, DAVID T.—"Sport and Travel in the Northland of Canada." New York, The Macmillan Company. London, Edward Arnold. 1904.

HARMON, DANIEL WILLIAMS—"A Journal of voyage and travel in the Interior of North America. Between the 47th and 58th Degrees of N. Lat. extending from Montreal nearly to the Pacific, a distance of about 5,000 miles. Including an account of the principal occurrences during a residence of nineteen years in different parts of the country." By Daniel Williams Harmon, a partner in the Northwest Company. With introduction and Map. Andover, 1820.

HARRISON, ALFRED H.—"In Search of a Polar Continent." London, 1908.

HEARNE, SAMUEL—"A Journey from Prince of Wales Fort in Hudson's Bay to the Northern Ocean. Undertaken by Order of the Hudson's Bay Company for the discovery of Copper Mines, a North West Passage, etc., in the years of 1769, 1770, 1771 and 1772." London, 1795. Dublin, 1796. London, 1807.

HECTOR, JAMES, M.D.—"Physical Features of the Central part of British North America," in Edinburgh "New Philosophical Journal," 1866.

HEER, PROF. O.—"On the Miocene Plants discovered on the Mackenzie River," Proc. Royal Soc., London, Vol. XXX, 1880.

HENRY, ALEXANDER—"Travels and Adventures in

Canada and the Indian Territories." New York, 1809.

HIND, HENRY YOULE, M.A., F.R.G.S.—(Professor of Chemistry and Geology in the University of Trinity College, Toronto, in charge of the Assiniboine and Saskatchewan Expedition.) —"Narrative of the Canadian Red River Exploring Expedition of 1857, and of the Assiniboine and Saskatchewan exploring Expedition of 1857." In two Volumes. London, 1860.

HOOPER, W. H.—"Ten Months among the Tents of the Tuski, with incidents of an Arctic Boat Expedition in search of Sir John Franklin as far as the Mackenzie river, and Cape Bathurst." London, 1853.

HORETZKY, CHARLES—"Canada on the Pacific." Montreal, 1874.

ISBISTER, A. K.—"Some Account of Peel River, North America." Journ. Royal Geol. Soc., London, Vol. XV. 1845.

ISBISTER, A. K.—"On the Geology of the Hudson's Bay Territories and of Portions of the Arctic and Northwest Regions of America", Quart. Journ. Geol. Soc., Vol. XI in Am. Journ. Sci. and Arts. Second series, col. XXI, 1856.

LAUT, AGNES C.—"The End of the Free Land." Canadian Collier's, Jan. 14, 1911.

LOW, A. P., B.Sc., F.R.G.S.—"Preliminary Report on an Exploration of Country between Lake Winnipeg and Hudson Bay." Part F., Annual Report Geol. Survey, 1886. Dawson Brothers, Montreal, 1887.

LOW, A. P., B.Sc., F.R.G.S.—"The Cruise of the Neptune," Dominion Government Expedition to Hudson bay and the Arctic Islands on Board the D.G.S. "Neptune," 1903-1904. Ottawa,

Government Printing Bureau, 1906.

MACBETH, REV. R. G., M.A.—"The Making of the Canadian West." Wm. Briggs, Toronto, 1905.

MACKRAY, REV. ROBERT.—"Life of Robert Mackray, D.D., LL.D., D.C.L., Archbishop of Rupert's Land, Primate of All Canada, etc., etc." The Macmillan Company of Canada, Ltd, Toronto, 1909.

MACKENZIE, ALEXANDER.—"Voyages from Montreal, on the River St. Lawrence, through the Continent of North America, to the Frozen and Pacific Oceans; in the years 1789 and 1793. With a preliminary account of the rise, progress and present state of the Fur Trade of that country." London, 1801.

MACOUN, PROF. JOHN, M.A.—"Report of Professor Macoun, Botanist to the Expedition," addressed to Alfred R. C. Selwyn. (Accompanying a report by Selwyn entitled "Report on Exploration in British Columbia"). Report Progress Geological Survey of Canada, 1875-76, pp. 110-232. Montreal, 1877.

MACOUN, PROF. JOHN, M.A.—"Manitoba and the Great Northwest." London, 1882.

MACOUN, PROF. JOHN, M.A., F.R.S.C.—"The Forests of Canada and their Distribution." 1895.

MAIR, CHARLES.—"Through the Mackenzie Basin, a Narrative of the Athabaska and Peace river Treaty Expedition of 1899." Simpkin, Marshall, Hamilton, Kent & Co., Limited, Toronto, 1908.

MCCONNELL, R. G., B.A.—"Report on explorations in the Mackenzie Basin." (Part D, Annual Report, Vol. IV, Geol. Survey of Canada, 1888-89). Queen's Printer, Ottawa.

MCCONNELL, R. G., B.A.—"Report on a Portion of the District of Athabaska, Comprising the Country Between Peace river and Athabaska river, North of Lesser Slave lake." (Appendix D. to annual

report of the Geological Survey of Canada, 1890-1891). Ottawa.

MCINNES, WM.—"Report on a Part of the Northwest Territories Drained by the Winisk and Attawapiskat Rivers." Geol. Survey Report No. 1008. Government Printing Bureau, Ottawa, 1910.

MCKENNA, J. A. J.—"The Hudson Bay Route; A Compilation of Facts with Conclusions." Government Printing Bureau, Ottawa, 1908.

MCLEOD, MALCOLM.—"Peace River. A canoe voyage from Hudson's Bay to Pacific. By the late Sir George Simpson, Governor Hudson's Bay Company in 1828. Journal of the late Chief Factor, Archibald McDonald (Hudson's Bay Company) who accompanied him." Edited, with Notes, by Malcolm McLeod, Barrister, etc. Ottawa, Published by J. Durie and Son. Montreal, Dawson Brothers. Toronto, Adam Stevinson and Company. 1872.

MEEK, F. B. (Chicago Academy of Sciences). —"Remarks on the Geology of the Mackenzie river, with Figures and Descriptions of Fossils from the Region, in the Museum of the Smithsonian Institution, etc." Chicago, 1868.

MILTON AND CHEADLE, (Viscount Milton, M.P., and W. B. Cheadle, M.A., M.D.). "The Northwest Passage by Land; a Narrative of an Expedition from the Atlantic to the Pacific." London, 1864.

M'LEAN, JOHN.—"Notes of a Twenty-five years' Service in the Hudson's Bay Territory." Two vols. London, 1849.

MORGAN, HENRY J.—"Sketches of Celebrated Canadians and Persons connected with Canada from the Earliest Period in the History of the Province Down to the Present Time." Hunter,

Rose & Co., London, 1862.

MULVANEY, DR. CHARLES P.—"The History of the Northwest Rebellion of 1885." A. H. Hovey & Co., Toronto, 1886.

NATURAL HISTORY SOCIETY OF MONTREAL. —"Canadian Record of Science." Various volumes, particularly that of 1890, (Vol. IV). Montreal, 1891.

OGILVIE, WILLIAM, D.L.S.—"Exploratory Survey of Part of the Lewes, Tat-On-Duc, Porcupine, Bell, Trout, Peel, and Mackenzie rivers, 1887-1888." Report of the Department of the Interior, 1890. Sessional Papers, Vol. 11, 4th session of the 6th parliament. Queen's Printer, Ottawa.

OGILVIE, WILLIAM, D.L.S.—"Report on the Peace river and Tributaries, in 1891." Annual report of the Department of the Interior for the Year 1892. Sessional Papers 1893, Vol. VIII. Queen's Printer, Ottawa.

PAGET, AMELIA M.—"The People of the Plains." Toronto, William Briggs, 1909.

PALLISER, CAPTAIN R. A.—"Exploration—British North America. The Journals, Detailed Reports, and Observances Relative to the Exploration by Captain Palliser, of That Portion of British North America which in latitude lies between the British Boundary Line and Height of Land or Watershed of the Northern or Frozen Ocean Respectively. And in Longitude, between the western shore of Lake Superior and the Pacific Ocean, during the years 1857, 1858, 1859 and 1860." Presented to both Houses of Parliament by Command of Her Majesty, May 19th, 1863. London, Printed by George Edward Eyre and William Spottiswoode. Printers to the Queen's Most Excellent Majesty, for Her Majesty's Stationery Office.

PETITOT, REV. EMILE.—"Géographie de l'Athabaska-Mackenzie et des Grands Lacs du Bassin Artique, par l'Abbé E. Petitot." Bulletin de la Société de Géographie, Paris, tome X, 1875.

PETITOT, REV. E.—"Autour du Grand Lac des Esclaves." Paris, 1891.

PETITOT, REV. E.—"Explorations de la Région du Grand Lac des Ours, etc." Paris, 1893.

PIKE, WARBURTON.—"The Barren Grounds of Northern Canada." London, Macmillan and Co., 1892.

PREBLE, EDWARD A., (U. S. Department of Agriculture, Bureau of Biological Survey.) —"North American Fauna, No. 27. A Biological investigation of the Athabaska-Mackenzie Region." Prepared under the Direction of Dr. C. Hart Merriam, Chief of Bureau of Biological Survey. Washingston, U. S. A., Government Printing Office, Oct. 26, 1908.

RAE, DR. JOHN.—"Narrative of an Expedition to the Shores of the Arctic Sea in 1846-47." London, 1850.

RAE, DR. JOHN.—"Journey from Great Bear Lake to Wollaston Lake, and Explorations along the South and East coast of Victoria Land." Journals of the Royal Geog. Soc., Vol. XXII, pp. 73 to 82. 1852.

RAE, DR. JOHN.—"Recent Explorations along the South and East Coast of Victoria Land." Journ. Roy. Geog. Soc., Vol. XXII, pp. 82-96. Being Dr. Rea's official report to the Hudson's Bay Company, communicated by them to the Royal Geographical Society, concerning his expedition by boat from Coppermine River eastward along the Arctic Coast and on the coast of Victoria Land in the summer of 1851.

RATTRAY, J., B.A.—"The Scot in British North

America." Toronto, 1883.

RICHARDSON, SIR JOHN.—"Arctic Searching Expedition, a Journal of a Boat Voyage through Rupert's Land and the Arctic Sea." London, 1851.

ROBSON, JOSEPH.—"An Account of Six Years' Residence in Hudson's Bay from 1733 to 1736, and 1744 to 1747." London, 1752.

ROBSON, W. T. (General Advertising Agent, C. P. Ry.) —"The value of The Tourist Sportsman as a means of Publicity for Undeveloped Country." Montreal, 1910.

ROSS, SIR JOHN.—"A Voyage of Discovery, for the Purpose of Exploring Baffin's Bay, etc." London, 1819. (Geological Appendix by Dr. McCulloch.)

ROYAL NORTHWEST MOUNTED POLICE.—"Annual Reports." King's Printer, Government Printing Bureau, Ottawa.

ROYAL SOCIETY OF CANADA.—"Transactions", particularly Vol. 11, Section IV. Ottawa.

SCHROTER, C.—"Note on the Microscopic Examination of some Fossil Woods from the Mackenzie River," by C. Schroter, Proc. Royal Soc. London, Vol. XXXI, 1881.

SENATE OF CANADA.—"Appendix to the Journals for 1870 (33 Victoria)." Report of Rupert's Land Select Committee. Queen's Printer, Ottawa, 1870.

SENATE OF CANADA.—"Appendices to the Journals for 1887 and 1888." (evidence taken before select committees). "Appendix to the Journals for 1907," (evidence taken before select committee). King's Printer, Ottawa.

SIMPSON, SIR GEORGE.—"Narrative of a Journey Round the World during the years 1841 and 1842." London, 1847.

SIMPSON, THOMAS.—"Narrative of the Discoveries on the North Coast of America; effected by the

officers of the Hudson's Bay Company during the years 1836-39." London, 1843.

STRANGE, LORD.—In the name of this nobleman was presented to the Parliament of Great Britain the "Report from the Committee appointed to inquire into the State and Condition of the Countries Adjoining to Hudson's Bay and the Trade carried on there." London, 1749.

TUTTLE, CHARLES R.—"A Narrative of the Hudson Bay Expedition of 1884." Toronto, 1885.

TYRRELL, JOSEPH BURR, C.E., M.A., F.G.S., etc.—"A Brief Narrative of the Journeys of David Thompson." Proc. Canadian Institute, 1887-88, 3rd series, Vol. VI.

TYRRELL, J. BURR, C.E., F.G.S., etc.—"Report on the Country between Athabaska river and Churchill river, by J. Burr Tyrrell, assisted by D. B. Dowling in 1892, to which is added a survey of the north shore of Lake Athabaska, made in the summer of 1893." Annual report, Geol. Survey, for 1893. King's Printer, Ottawa, 1894.

TYRRELL, J. BURR, C.E., F.G.S., etc.—"Report on the Dubawnt, Kazan and Ferguson rivers and the Northwest Coast of Hudson Bay." Part F., Vol. IX. Reports of the Geological Survey of Canada, 1896. King's Printer, Ottawa, 1897.

TYRRELL, J. BURR, M.A., B.Sc., F.G.S., etc.—"Natural Resources of the Barren Lands." Paper before the British Association, Toronto, 1897. Published in full in the Scottish Geographical Magazine, 1899.

TYRRELL, J. BURR, M.A., B.Sc., F.G.S., etc.—"Report on Explorations in the Northwestern Portion of the District of Saskatchewan and Adjacent Parts of the District of Keewatin." Part F., Annual Report (Vol. XIII), Geological Survey of Canada. King's Printer, Ottawa, 1902.

TYRRELL, JAMES W., D.L.S.—"Exploratory Survey between Great Slave lake and Hudson Bay." Appendix No. 26 to the Report of the Surveyor General. Sessional Papers, 1902, Vol. 10. King's Printer, Ottawa, 1902.

TYRRELL, JAMES W., C.E., D.L.S.—"Across the Sub-Arctics of Canada." William Briggs. Toronto. Last (revised) edition, 1908.

WESTMINSTER REVIEW.—Anonymous Article in July volume, 1867, entitled "The Last Great Monopoly." London.

WHITE, JAMES, F.R.C.S., F.R.G.S., (Secretary of Conservation Commission).—"Place Names of Northern Canada." Ottawa, 1910.

WILSON, ALFRED W. G.—"Report on a Traverse through the Southern Part of the Northwest Territories from Lac Seul to Cat Lake in 1902." Geol. Survey Report No. 1006. Government Printing Bureau, Ottawa, 1910.

YOUNG, R. E., D.L.S.—"Evidence before the Select Standing Committee of Forests, Waterways and Water Powers of the House of Commons." Parliamentary Paper. Government Printing Bureau, Ottawa, 1909.

YOUNG, R. E., D.L.S.—"Evidence on 'Canada's Fertile Northland' before the Select Standing Committee of the House of Commons on Agriculture and Colonization." Parliamentary Paper. Government Printing Bureau, Ottawa, 1909.

YOUNG, R. E., D.L.S—"The New North West." Pamphlet, 1910.

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