

REPORT
ON THE
BASIN OF MOOSE RIVER
AND
ADJACENT COUNTRY
BELONGING TO THE
PROVINCE OF ONTARIO.

By E. B. BORRON, Esq.,
Superintending Magistrate.

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COLLINGWOOD, October 1, 1890.

Hon. O. MOWAT,
Attorney-General, etc., etc.,
Toronto.

SIR,—I have the honour to transmit herewith my report for last year, on the northerly part of the Province.

In it the result of the explorations for lignite coal, carried out under instruction from the Honourable the Commissioner of Crown Lands, and my opinion in reference thereto, as well as to other minerals in the territory are given at considerable length.

I have also quoted largely from former reports, information on other subjects, which (now that the boundary question has been happily settled) may possess a new and greatly increased interest for many, while some of these subjects it is desirable to bring again under the notice of the Government.

I have the honor to be,

Sir,

Your most obedient servant,

E. B. BORRON,
Stipendiary Magistrate.

REPORT OF
E. B. BORRON,
STIPENDIARY MAGISTRATE,
ON
THE BASIN OF MOOSE RIVER
AND ADJACENT COUNTRY BELONGING TO THE
PROVINCE OF ONTARIO.

The claim of the Province to this territory—so long and obstinately contested—having been fully established, many persons who have heretofore taken little interest in it will now probably be anxious to learn all they can in reference to the extent, resources and value of the country.

This desire may, in the opinion of the writer, be most fully satisfied by embodying in the present report the principal facts and opinions contained in previous reports by himself and others, no longer accessible to the public generally, together with such additional information and suggestions as recent explorations may enable him to afford, or which the confirmation of the title of the Province may now appear to demand.

BOUNDARIES AND AREA.

The boundaries of the territory which forms the subject of this report may be briefly described as follows: Commencing at a point on the height of land where a line running due north from the head of lake Temiscaming intersects the dividing ridge or water parting, it follows this watershed in a west north-westerly direction to a point near the head of lake St. Joseph. The distance between these two points is about 500 miles in a straight line, but probably not less than 650 miles if the watershed or "divide" itself be followed. This forms the whole of the southern and for the most part the western boundary also of this territory. From the point last mentioned lake St. Joseph and the Albany river constitute the northern and to a limited extent the western boundary. The distance from the head of lake St. Joseph to Albany Factory at the mouth of the river is about 400 miles-direct, or say 475 miles, roughly estimated, by the river. From Albany Factory the coast of James' Bay is followed to a point where a line produced due north from the place of beginning will strike James' Bay. This coast line completes the northern and forms to some extent the eastern boundary. The length is probably little short of 200 miles, but measured straight from point to point it will not exceed 130 or

140 miles, so far as can be judged from the somewhat imperfect maps we have of the territory. From the last mentioned point (which is expected to fall about midway between Hannah Bay and Rupert's Bay) to the height of land the line will, when surveyed, run due north and south and form with the coast the eastern boundary of the territory. The length of this line will not probably be less than 200 miles, or more than 220 miles.

As regards the area of this northern territory, the form as well as boundaries are so irregular, and the lengths of the lines so uncertain, that it is not possible to estimate it with any near approach to accuracy. I believe, however, that it will turn out to be not less than seventy-five thousand square miles.

On this subject it may be well to quote from a report on "North-western Ontario: Its Boundaries, Resources and Communications," prepared under instructions from the Ontario Government, and printed in 1879. This, as will be seen, was soon after the award of the arbitrators, determining the boundaries, had been made, and which it was then expected would have been final.

In this report will be found on pp. 1, 2 and 3 the following on the subject of the boundaries, etc. "The question of boundary set at rest by the award, had been the subject of much laborious investigation. The Dominion Government contended that the northern boundary of Ontario was the height of land forming the watershed of the St. Lawrence and great lakes, and skirting, at a distance varying from fifteen to fifty miles, the northern shores of lakes Superior and Nepigon. The western boundary, it was contended was to be ascertained by a line drawn due north from the confluence of the Ohio and Mississippi rivers, and which was found to be in longitude $89^{\circ} 9' 27''$ west. Such a line would have intersected Thunder bay, divided the existing settlement on its shores, alienated from Ontario a large district, including the village of Prince Arthur's Landing, the population gathering round Fort William, the site of the projected terminus of the Canadian Pacific railway, and the townships of Blake, Crooks, Pardee, Paiponge, Oliver, Neebing and McIntyre, already under Ontario jurisdiction, and left within the Province only a narrow strip north of the lakes and south of the height of land. Opinions were divided as to the rights of the Province beyond the boundaries contended for in behalf of the Dominion, but it will probably be found that the decision of the arbitrators is, on the whole, consistent with equity, convenience, and public policy. The award declares that the following are and shall be the boundaries of the Province of Ontario, namely:— "Commencing at a point on the southern shore of Hudson Bay, commonly called James' Bay, where a line produced due north from the head of lake Temiscamingue would strike the said south shore, thence along the said south shore westerly to the mouth of the Albany river, thence up the middle of the said Albany river, and of the lakes thereon to the source of the said river, at the head of lake St. Joseph, thence by the nearest line to the easterly end of Lac Seul, being the head waters of the English river, thence westerly through the middle of Lac Seul and the said English river to a point where the same will be intersected by a true meridional line drawn northerly from the international monument placed to mark the most north-westerly angle of the Lake-of-the-Woods by the recent Boundary Commission, and thence due south following the said meridional line to the said international monument, thence southerly and easterly following upon the international boundary line between the British possessions and the United States of America into lake Superior. But, if a true meridional line drawn northerly from the said international boundary at the said most north-westerly angle of the Lake-of-the-Woods shall be found to pass to the west of where the English river empties into the Winnipeg river, then and in such case the northerly boundary of Ontario shall continue down the middle of the said English river to where the same empties into the Winnipeg river, and shall continue thence in a line drawn due west from the confluence of the said English river with the said Winnipeg river until the same will intersect the meridian above described and thence due south following the said meridional line to the said international monument, thence southerly and easterly following upon the international boundary line between the British possessions and the United States of America into lake Superior.

"The district included within these boundaries is of equal if not of greater area than the whole of the rest of Ontario, exclusive of the lakes Ontario, Superior, Huron and Erie. Omitting those lakes, the Province within the limits embraced in the proposition of the Dominion, contained about 64,000,000 acres, or 100,000 square miles of territory. From the Quebec boundary line—from lake Temiscamingue to James' Bay—to the Lake-of-the-Woods, the distance cannot be much less than seven hundred miles; while, measured from north to south, the new territory covers a breadth of country varying from over three hundred to one hundred miles. The Province of Ontario will consequently, in future, possess an area of fully 200,000 square miles. This is 80,000 square miles greater than the area of the United Kingdom; only 12,000 square miles less than the whole German Empire; only 2,000 square miles less than France, and equal to the combined areas of Holland, Portugal, United Italy, Switzerland, and Belgium. The awarded territory alone possesses an area greater by 20,000 square miles than the group of countries just named, excepting Italy.*"

The height of land on which this water parting is situated is not, as many naturally suppose, a chain of mountains with sharp, well-defined ridges, dividing the waters which flow south from those flowing towards the north. It is really a table land or plateau, the elevation of which varies from eight or nine hundred to sixteen or seventeen hundred feet above the level of the sea, and averages probably about twelve hundred feet. The width of this plateau in a northerly direction is nearly a hundred miles in some places; and including that portion lying to the south of the water parting or divide will average, I think, as much as seventy miles.

The length, in a direct line from the point before referred to as lying due north of lake Temiscaming, to the head of lake St. Joseph, being about five hundred miles, it follows that the area of the plateau included between these two points is not less than 35,000 square miles. The water parting or "divide" is generally nearer to the southern than to the northern edge of this height of land plateau, and the probability is that two-thirds of it are situated on the northern slope or side, and included in the territory which is the more immediate subject of this report.

TOPOGRAPHY.

To render more intelligible the description of the leading physical features of this vast territory, it has been represented in former reports as naturally divided into three tolerably well-defined belts or zones, namely:—

1st. The southerly or height of land plateau. A table land chiefly remarkable for the number of its fresh water lakes.

2nd. The intermediate plateau or belt. Notable for the falls and rapids in all the rivers by which it is crossed in their course from the height of land plateau to James' Bay.

3rd. The northerly or coast belt. A plain or flat country, largely overspread with 'muskegs' or peat-mosses; almost treeless excepting near the rivers, and extending from the foot of the last great falls or rapids on the northern edge of the intermediate belt to the coast of James Bay.

The fundamental rocks in the two first divisions are Laurentian and Huronian, and in the last, stratified or flat rocks belonging to the Devonian, Silurian or Cambrian systems.

In quoting from former reports on this territory it may be that some of the views and opinions expressed in the earlier reports have been modified or changed in subsequent ones. Such discrepancies as are observed, and appear of sufficient importance, will be specially noticed. Others, however, will doubtless pass unobserved. In all which cases the later expressions of opinion, being founded on a larger knowledge and experience of the territory, will be entitled to the greatest weight.

* * Mr. Devine, Deputy Surveyor-General of Ontario, gives 97,000 square miles as a rough approximate estimate of the area of the awarded territory. Other authorities, however, consider 120,000 to 140,000 square miles to be its probable extent."

In the first report I had the honor to submit on this territory was embodied such information as I had been able to gather on a hurried trip going to Moose factory, during three months of a sojourn there, and on a still more hurried return trip back again to lake Huron.

The route followed when going may be said to have commenced at the mouth of the French river. Ascending this river to lake Nipissing and crossing the height of land between that lake and the Ottawa valley we struck the head waters of the Mattawa and descended that stream until we came to the Ottawa river. Here the route, which had heretofore been for the most part easterly, turned northward up the Ottawa river and through lake Temiscamingue to the head thereof. At this point the country rises abruptly, and on again entering and ascending the river no fewer than fifteen portages occur in about as many miles. These are known to voyageurs as "The Quinzes," and in this stretch the upward course is easterly. Above the last of these rapids Lac des Quinzes was entered, and we may be said to have now reached the southern edge of the Height of Land plateau. While the main Ottawa river—the source of which is upwards of 200 miles to the east—flows into the eastern arm of this lake, our route took us up the northern arm, and thence through a chain of lakes for some fifty miles or more in a northerly direction to the water parting or Height of Land portage. Crossing this we struck a chain of lakes in which the Abittibi river takes its rise. Passing through these lakes and connecting stretches of river, still in a northerly direction, the route led us out into lake Abittibi near its eastern extremity. Thence it pursues a westerly course through the Upper and Lower Abittibi lakes, and down the main Abittibi river to the junction of Black river, a distance of at least 50 miles in a direct line, and of 75 miles by the canoe route. Below this junction the Abittibi river, which we still continued to follow, maintains, with the exception of one westerly bend of some ten miles in length immediately above the junction of Frederick House river, a northerly course to where it joins the main Moose river. From this point the Moose river was descended about seventeen miles to Moose Factory. Moose Factory is situated upon an island at the mouth of the river, and is the principal fur-trading post and depot of the Hon. Hudson's Bay Company in this department.

Returning, I took what is known as "the Michipicoten route." On this route the Moose River and its north-west branch, the Missinaibi River, are ascended to the Height of Land portage, between Crooked Lake, the source of the Missinaibi, and Mattagaming or Dog Lake, the source of Michipicoten River. Crossing over this portage the route passes through the lake just referred to and down Michipicoten River to Lake Superior. There near its outlet the Hon. Hudson Bay Company have another establishment known as Michipicoten, or Michipicoten Post, from which to Sault Ste. Marie the distance is about 120 miles by water.

EXTRACTS FROM REPORT OF 1879 REGARDING THE HEIGHT OF LAND PLATEAU, ETC.

In this Report, printed by order of the Legislative Assembly in 1880, the leading physical features of the country as they appeared to me at that time are described as follows :—

"The southern boundary of this territory, generally known as the "Height of Land," is not a continuous chain of mountains, but rather of the nature of a plateau of moderate elevation and considerable breadth. The height varies from nine hundred to seventeen hundred feet above the level of the sea. The lowest point is, I think, where it is crossed by the canoe route to Moose Factory *via* Temiscaming and Lake Abittibi. The breadth of this plateau is exceedingly variable, but I should say that it would average fifty or sixty miles, if not more. The geological formation is Laurentian and Huronian, but for the most part Laurentian. It abounds, so far as I am able to judge, with lakes, marshes and rocky ridges. These ridges are of no great elevation, and rarely continuous for any considerable distance. Here and there isolated hills may be seen rising above the common level to a height apparently of five or six hundred feet, but these are not numerous.

"Many of the lakes on this plateau, which extends a great distance both east and west of this territory, are of considerable size. Among others, Lac Seul, Lakes St. Joseph, Nipigon, Long, Missinaibi, Mistassinnie and Abittibi may be specially mentioned. So numerous, indeed, are the lakes on this height of land, that it is my impression that it would be quite possible, with a canoe, to voyage or travel on the lakes and their connecting streams on this plateau from Lake Winnipeg to Hamilton Inlet on the coast of Labrador, without approaching either the great lakes on the south or Hudson's Bay on the north. Nor would any very long portages, I think, be necessary. When we consider that the two points named are separated by some forty degrees of longitude, and distant about one thousand eight hundred miles from each other, some faint idea may be formed of this "region of lakes," and of the enormous volume of fresh water stored up, so to speak, on this height of land.

"In the lakes on this plateau almost all the rivers, whether flowing north or south, would appear to have their origin. Six of these, namely: the Albany, Moose, Abittibi, Harricanaw, Rupert's and East Main, having their sources on this plateau nearly a thousand miles apart, converge to such a degree that they pour their waters into the southern extremity of James' Bay, within a comparatively short distance of each other. If, at or around a point in the neighbourhood of Charlton Island, a circle could be described, the mouths of all these rivers would fall within a radius of little more than sixty miles. This territory may be truly said, therefore, to be a portion of the basin of Hudson's Bay.

"Of the rivers just named, the Albany, Moose, Abittibi and Harricanaw flow wholly or in part through this territory.

"The shores of James' Bay, from the eastern boundary to the Albany river, are low and flat, and the bay is exceedingly shallow. I have been informed that no soundings of any considerable depth can be had even in the Hudson's Bay itself.

"The Albany river is the largest river in the territory. All are navigable for boats capable of carrying five or six tons for a considerable distance from the coast. The Abittibi is ascended, with some difficulty, about seventy miles; the South Moose or Mattagami, ninety miles; the North Moose or Missinaibi, one hundred and twenty-five miles; and the Albany river is said to be navigable in like manner from James' Bay to Martin's Falls, a distance of about two hundred and fifty miles. These facts indicate the existence of a belt or zone of unbroken country extending, from the coast of James' Bay, far into the interior. The breadth of this belt would appear to increase from the eastern boundary of this territory, where it is probably not more than fifty or sixty miles in width, to Martin's Falls, on the western boundary, where it would appear to be upwards of two hundred. The geological formation or rock underlying the whole of this section of the country is most likely fossiliferous limestone of the Devonian Age.

"Intervening between this flat region and the plateau on the height of land previously described, is a belt of country characterized by the number of rapids and falls met with on all the rivers by which it is intersected. These rapids and falls are occasioned by low ridges of Huronian and Laurentian rock, which cross the rivers, and through which they have in some instances cut, and in others are still engaged cutting deep channels for themselves. The prodigious amount of work performed is manifested, not only by the depth and length of the chasms already excavated, but by thousands of boulders thickly strewn along the beds and on the banks of these rivers from where they leave the height of land to James' Bay. These boulders, mostly of Laurentian rock, are of all sizes, some of them being at least fifty tons in weight.*

"This belt of country, judging from what is seen on the Abittibi and Moose rivers, varies from about seventy to eighty miles in width.

"Thus this territory is naturally divided into three tolerably well defined belts or zones.

"1st. The plateau on the height of land, remarkable for its lakes;

"2nd. The intermediate belt, or "steppes," remarkable for its rapids and falls;

* Subsequent examination has convinced the writer that most of these boulders have come from the north and are of glacial origin.

"3rd. The flat or level country, extending from the coast of James' Bay southerly to where the "steppes" of the second or intermediate belt begin.

"I did not see a single mountain, or even what I would consider a hill, in the whole of the two last sections of this territory. If there be any such I think that they will be found near the eastern boundary.

"Another feature is the slight depth to which the rivers have worn out channels for themselves below the general surface of the country, unlike those in our North-West Territories, the beds of which are described as frequently two or three hundred feet below the general surface of the prairies. This is owing, doubtless, to the greater hardness of the underlying strata in this territory, but is to be regretted as being, on the whole, unfavourable to good natural drainage. The Moose and Albany rivers are greatly swollen on the melting of the snow in spring; and the occurrence of what are called "ice-jams" at that period may cause the waters to rise much above their ordinary level. Both Moose Factory and the Post at Albany are liable to suffer from inundations at this particular time, but at no other.

"The principal settlement in the territory is at Moose Factory.

"Moose Factory is situated upon an island in the estuary formed by the Abittibi and Moose rivers. Although these rivers become one stream some seventeen or eighteen miles above Moose Factory, the waters do not appear to mingle, those of the Abittibi keeping on the eastern and those of the Moose on the Western side until both are lost in James' Bay. Moose Island is nearly two miles in length and from one-half to three-quarters of a mile in breadth and the area may be about a thousand acres. It is almost perfectly level or flat and elevated from fifteen to twenty feet above low water mark. The river at this point is upwards of two miles in width.

"The settlement is on the south-east side of the island and occupies a strip of land on the bank of the river about three-quarters of a mile in length. On this, stationed at intervals to lessen the risk of total destruction by fire, are the offices, houses, stores, warehouses, mechanics' shops, and some twenty-five or thirty cottages for the servants of the Hudson's Bay Company. They are all good, substantial wooden buildings. There is a neat little Episcopal Church, a parsonage and small school-house. These, with forty or fifty tents usually to be seen here during summer, present altogether a rather pleasing appearance. The population is about 450 souls in the summer, but not more than 150 in the winter season."

EXTRACTS FROM REPORT OF 1880 REGARDING THE COAST OF JAMES' BAY.

My second report (printed in 1881) gave the results of my explorations in 1880. These were chiefly confined to the third belt or great plain on the coast of James' Bay. In the course of these explorations, as will be seen in the Diary or Narrative appended thereto, the writer discovered and was, he thinks, the first to note the existence of inexhaustible beds of peat, which, in the form of "mosses" or "bogs," over-spread the greater part of this flat country.

The following remarks are quoted from p. viii. *et sequentia* of this report:—

"The traveller visiting Moose Factory for the first time, following the usual routes, and seeing only so much of the country as may be visible from his seat in a canoe, is almost certain to form too favourable an opinion of the character and resources of the territory north of the Height of Land. The fertility of the soil, the size and healthiness of the timber, and the luxuriance of the native grasses, as seen in many places on the banks of the rivers, inevitably tend to the belief that this is the general character of at least the adjacent land. A more thorough examination of the region thus travelled through has convinced me that the quantity of arable land fit for settlement is not nearly so great as I had supposed it to be. Those who have read the preceding narratives of my explorations this season cannot fail to have perceived that the fertile appearance of the land on the immediate banks of the rivers is very delusive and misleading. Over and over again it must have been noticed that on going inland at those points where on

the banks of the rivers the soil and timber presented the most promising appearance, we found that the ground became wetter and wetter, that sphagnum moss covered the surface to a greater and greater depth, and that generally in less than half a mile we came to where peat had been formed; that as these peat-mosses increased in depth, first the poplar, aspen and birch would give place to spruce, and to what is called in this country juniper or tamarack; and secondly, these last would diminish in size until they were little more than mere shrubs thinly scattered over the widespreading surface. Nor were these trees healthy wherever the peat had attained to any considerable thickness. On the contrary they were not only stunted but scrubby, and frequently dead. They were draped, too, with a species of parasitic hair-moss of a gray or black colour, which hung in long dishevelled tresses from the dead and dying branches, and imparted to the whole scene a most dismal and funereal appearance.

“The expeditions I made from Moose Factory—first up the Jig-a-wa river into the heart of the region lying between the Moose and Albany rivers, and secondly up the Abittibi river to New Post, through the region lying on the eastern side of Moose river, as well as my explorations along the coast of James' Bay are conclusive, I think, as to the vast extent of these peat-mosses, if not their almost universal prevalence in the flat belt of country bordering on the southern extremity of James' Bay.

“As a consequence of this, the areas available or fit for agriculture or stock-raising, are less than I had anticipated. Deducting the land overspread by peat-mosses, that which is swampy or marshy, and that again, which although possessed of a good soil, is liable to be flooded, and a comparatively small amount of good arable land fit for settlement will, I fear, remain.

“The cause of this is owing partly to the climate and partly to the soil, but chiefly to the physical conformation of the country. The coldness and humidity of the climate favour the growth of the deadly sphagnum or bog-moss, the constant decay and reproduction of which produces peat, the beds of which increase yearly in depth or thickness, until all the higher forms of vegetable life succumb. No matter how rich the now, buried soil may have been, or the magnificence of the forests it may once have borne, or the description of timber, whether spruce, pine, birch or poplar, of which those forests may have been composed, the giants of the forest perish in the struggle for existence with an apparently insignificant plant and their remains are entombed in the peat along with the soil which gave them birth. The vestiges of former forests are frequently, I might say generally, found in the peat-mosses of the mother country and northern Europe, and I have no doubt that when our peat-beds come to be worked similar remains will be found in them.

“The climate, however, would not of itself sufficiently account for this general prevalence of peat-mosses. The wetness of the land is another, and perhaps the most important factor, for moisture specially favours the growth of the sphagnum, which generates, so to speak, the peat.

“The soil in this zone or belt is either clay or underlaid by clay at no great depth. When nearly level or flat, as it is in this case, experience proves that such land is always wet.

“Again, the conformation of the country is not such as to afford good natural drainage. Had the character of the country been “rolling” or “hilly,” or even mountainous, the proportion of dry arable land would undoubtedly have been greater and that of the peat-mosses much less. But this portion of the basin of the Hudson's Bay is essentially a plain, as much so indeed as any part of the western prairies, the principal difference consisting in the fact of the one being covered with sphagnum and peat-mosses, the other with grass and vegetable mould.

“If the climate north of the Height of Land had been as dry, and the summer heat as great as on the western plains, I am inclined to think that we might have had in our territory very extensive prairies. Even if the sphagnum or bog-moss were as vigorous, which it would not be under such circumstances, and supposing it to have got a pretty strong hold of the soil, the occurrence of fires during the hot and dry seasons would most

likely destroy it and so liberate the soil and permit the grass to grow again. Still, in all probability, peat-mosses would have overspread the wetter portions of the territory.

"This plain emerges from beneath the waters of James' Bay and stretches to the south with a gentle and seemingly regular inclination, which I think is rarely less than three or more than five feet in a mile. The plain becomes much wider towards its southern boundary than it is on the coast. I have not seen the western side of this plain, but consider that its width, one hundred miles from James' Bay, must be at least double what it is on the coast. The increased width is chiefly in a south-westerly direction.

"The southern boundary or margin of this plain is constituted by ridges of metamorphic rock, on approaching which the Devonian strata, which underlie the plain, crop out, and the country rises some three or four hundred feet, generally in less than twenty miles. This rise commences at the Otters' Rapid on the Abitibi river, at the Grand Rapid on the Mattagami or South Moose, at the Long Portage on the Missinaibi or North Moose river, and at or about Martin's Falls, I believe, on the Albany river.

"Judging from what I have seen of this great plain, I should say that at least three-fourths of all the loose material or soil overlying the Devonian limestone consisted of clay. The clay is of various kinds, differing in colour, composition and probably origin, and often there may be more or less sand or gravel not only mixed with the upper clays but resting on them, but the far greater portion of both soil and sub-soil is undoubtedly clay. In some places, however, there are heavy banks—ridges and beds of sand—but these always, I think, repose on clay. These superficial deposits are, in some places, not less than one hundred feet in thickness.*

"Through these over-lying deposits of clay, the rivers descending from the Height of Land have worn or cut out channels. These channels or river courses are not, properly speaking, valleys, but wide and shallow troughs, rarely more than one hundred feet below the general surface. These troughs are in many places very much wider than necessary to carry off the water, even in the spring when, owing to the rapid thawing of the snow which has fallen and accumulated on the ground during the winter season, the quantity of water is vastly increased.

"The tendency of these bottoms is to become wider, owing to the wearing action of the waters of the rivers on the clay banks, one or other of which it is generally undermining and carrying away.

"It is probable that the course of the rivers and their depth below the general surface are determined, the first by the dip of the underlying limestone, and the second by the depth or thickness of the overlying clay. Those portions of these river bottoms which are elevated more or less above the ordinary summer level of the water, possess generally a good alluvial soil, but are low-lying and frequently swampy. They are mostly covered with a growth of timber of some sort, its description being determined by climate, soil, wetness and other like conditions. I saw little or no peat on these bottoms. My impression is, that wherever the land is inundated by the spring freshets, the alluvium or mud brought down and deposited by the water, either destroys the sphagnum moss or so fertilizes the ground as to favour the growth of a higher order of plants.

"The depth of the main rivers below the adjacent surface of the country, being thus inconsiderable, it necessarily follows that their tributaries, although numerous, are short and generally insignificant. The only exception would seem to be in respect of those tributaries which have their sources also on the Height of Land, and pursuing their course northward as independent rivers, fall, as it were, accidentally into the larger rivers, owing to a general convergence of all the rivers as they approach James' Bay.

"The smaller tributaries, if followed up, will be found almost invariably to have their origin in the peat-mosses, from under which the water, unable to sink into the underlying clay, is oozing or springing out everywhere parallel to and at only a short distance from the larger rivers. Thus it would appear that while there may be a fringe along the banks of the large rivers and their principal tributaries more or less drained

* Two hundred feet in some places.

and fertile, by far the greater portion of this great plain has no natural drainage what ever in the proper sense of the term. That this plain is in general sufficiently elevated above the rivers and water-courses to admit of artificial drainage is unquestionable, and that vast areas of land will be reclaimed and rendered fertile by the ingenuity and labour of man at some future day, I have not the shadow of a doubt.

"The reclamation of peat-mosses or peat-bogs, however, is a slow and costly operation, and has been in some instances a far from profitable enterprise even in the mother country, with all the advantages of abundant capital, cheap labour and the best of markets for the produce of such land as might be reclaimed. There are hundreds of thousands, if not millions, of acres of such peat-mosses or bogs still unreclaimed in Ireland and Scotland. Even in the very heart of Lancashire, one of the wealthiest and most populous counties of England, there was when I was a boy a moss called Chat-moss, which covered some twelve square miles, and the reclamation of which, if entirely completed, can only have been completed quite recently. I have reason to know somewhat of the difficulty of reclaiming such peat-mosses, for the late Mr. Roscoe, of Liverpool, and my father were among the first to engage extensively in the operation of reclaiming Chat-moss, an undertaking in which both spent a great deal of money and which was continued by my father many years after Mr. Roscoe's death. Knowing this, I must confess to a feeling of disappointment, when time after time on penetrating inland I came to these interminable, dismal looking peat-mosses, where I had hoped to find at least prairie-like pasture, if not good arable land.

"Situated to the south of this flat belt or region, and intermediate between it and the plateau on the Height of Land, is the belt of country which in last year's report was called the "steppes" or belt remarkable for its rapids and falls. In this zone or belt, so far as I have yet had an opportunity of seeing it, I believe there is a much larger proportion of arable land fit for settlement than in that which I have explored this season. From the Long Portage to Greenhill Portage on the Moose and Michipicoten route, and from the Otters' Portage to Iroquois Falls on the Abittibi, there is in the aggregate, I have no doubt, a large quantity of land fit for cultivation, and which will be settled upon so soon as the country is opened up and markets rendered accessible. I am inclined to think, however, that even in this belt there is no inconsiderable quantity of land over-spread with swamps and peat-mosses, more particularly on the east side of the Abittibi, in which direction I should not be surprised to find that the peat-mosses extended almost unbroken from Hannah Bay on the coast to near Lake Abittibi.

"In thus modifying my views in reference to the fitness of this territory for agricultural, and more especially pastoral, pursuits, I hardly feel it necessary to make any apology or excuse. In last year's report I distinctly stated (p. 15) as follows: 'From personal observation I can only speak of the country on the routes over which I have travelled, namely, that by the Upper Ottawa, Abittibi lake and Abittibi river, when going to Moose Factory, and that by the Moose and Michipicoten rivers on my return. Even on these routes it was, from the nature of the country, impossible to see much more than the banks of the rivers and shores of the lakes, excepting at the portages, the camping places and at the posts of the Hudson's Bay Company. My present opinions are, therefore, given with some degree of reserve and should not be regarded as altogether final or conclusive.'

"Again, in giving a short description of the topography of the territory I said, p. 9, 'Another feature is the slight depth to which the rivers have worn out channels for themselves below the general surface of the country, unlike those in our north-west territories, the beds of which are described as frequently two or three hundred feet below the general surface of the prairies. This is owing doubtless to the greater hardness of the underlying strata in this northern territory, but is to be regretted as being on the whole unfavourable to good natural drainage.' I can only say that I am sorry that my fears, rather than my hopes, have been realized by the result of this year's explorations.

"The uniformly unsatisfactory results of my excursions inland became very discouraging, and recorded daily, sometimes almost hourly as they are in the narratives of my expeditions, the constant recurrence of the same features described in the same

language, must, I am quite aware, render it nearly as monotonous for those whose duty it may be to read, as it has been mine to see and record.

"My object has been to obtain and convey a good general idea of the leading features of a large territory, rather than spend the limited time and means at my disposal in an exhaustive examination of a small section only of the country. It was impossible therefore to make long excursions back from the rivers, even if the nature of the country did not forbid it. Whenever therefore the failure of the timber, the depth of the peat, and wetness and bogginess of the surface convinced me that I had beyond doubt come to a peat-moss, I at once returned, without fruitlessly attempting to explore a bog, covering possibly hundreds of square miles of surface, and in many places not firm enough to support my weight."

EXPLORATIONS IN 1881.

In the year 1881 my canoe voyage or journey to the north commenced at the mouth of the Michipicoten river, but that route to Moose Factory was only followed about one hundred miles. At a point about ten miles from the Hudson Bay Company's Post at the north end of Lake Missinaibi, we struck eastward to Flying Post on the Ahkuckootish or Ground Hog river, and from thence to Mattawagamingue (sometimes called Mattawakumma) Post on a lake of that name, situated still further eastward. The Matagami, or South Branch as it is sometimes called, issues from this lake, and down it and the main Moose river we descended for some two hundred and seventy miles to Moose Factory.

Returning, the coast of James' Bay (which, it is hardly necessary to say, is a part of Hudson's Bay) was followed from Moose Factory, at the mouth of Moose river, to Albany Factory, at the mouth of Albany river, or a distance of nearly one hundred miles. From thence our course lay up the Albany river to Martin's Falls Post, and from Martin's Falls to Osnaburgh House, another Hudson Bay Company's Post at the lower end of Lake St. Joseph and distant about four hundred and twenty-five miles from the coast. From Osnaburgh to the head of Lake St. Joseph is roughly estimated at about fifty miles. At this point the route crosses the Height of Land and leaves this territory. We followed it, however, as far as the Hudson Bay Company's Post on Lac Seul, or Lonely lake. From thence we struck southward to the C.P.R. near Wabigoon lake.

Here our canoe voyage terminated. It began at Michipicoten on the 26th of June and ended on the 1st of October.

Roughly estimated the distance traversed was one thousand two hundred and seventy-five miles, in the course of which one hundred and forty-three portages, varying in length from a few yards only to four miles, had to be made.

Observations relative to the geology, geography, soil, timber, minerals, etc., of the country passed through are recorded daily in the narrative of this voyage appended to the report for that year and printed by order of the Legislative Assembly in 1882. To this report, covering as it does some eighty pages, I must refer for details.

In regard to the physical features, and more especially the quality of the land and nature of the soil, between the Missinaibi, or north branch of Moose river, and the Matagami, or south branch of the Moose river, I prefer to quote the opinion of Mr. O. H. Gamsby, engineer in charge of a party sent out to explore a line for the C.P.R., commencing a little above Split-rock Portage, on the Missinaibi, and running eastward to the Matagami river.

This line crossed the country not a very great distance north of the canoe route over which I hurriedly passed, and is situated for the most part in the intermediate belt or plateau of this territory. As a survey such as that made by Mr. Gamsby and his assistants afforded them much better opportunities of obtaining information and forming reliable opinions in regard of the character of the country and the soil, I give his report in reference thereto in full.

“Under the head, “Report on Survey from Moose river, running eastward, to Lake Matagami,” Mr. Gamsby reports as follows :

“OTTAWA, December 13th, 1880.

“SIR,—I have the honor to report that, in conformity with your instructions of July 3rd, requesting me to proceed to Moose river, the eastern end of my exploration of last winter, and continue a compass line eastward to a junction line with Mr. Austin, who was proceeding west from Sturgeon river, I left Collingwood on the 8th July, and after experiencing some difficulty in procuring means of transport up the Michipicoten river, we reached our initial point on the 27th of the same month, and commenced operations, in accordance with those instructions, by running a compass line from the point above referred to in a general south-east course, carefully noting the courses and chaining the distances and obtaining such other information as the limited time at our disposal permitted. We reached the one hundred and sixteenth mile of the exploration on the 9th October ult. Having arranged with Mr. Austin to make the connection between our lines and otherwise complete the exploration, I started on my return, following and traversing the canoe route between Matagami and Flying Post. This route is at some considerable distance south of the explored line, and its traverse enables us to lay down a number of lakes in our plan, the position of which will very materially affect the projected location of a railway line. It will facilitate the description of the soil, timber and general character of the country explored, to divide it into several sections, as naturally divided by the larger streams flowing through it.

Section 1—Lies between the Moose and Kapaskasi rivers and covers a distance of thirty-two miles along the line of exploration.

Section 2—Lies between the Kapaskasi and Nestodjastona rivers, a distance of twenty-two miles.

Section 3—Lies between the Nestodjastona and Ground Hog rivers, a distance of some sixteen miles.

Section 4—Lies between Ground Hog and Matagami rivers, a distance of forty-four miles.

In each of these sections the soil and general characteristics are different, the surface of the ground varying from lightly undulating to high ridges and broken, the soil varying from the clay and clay-loam of the first section to the light sand of the fourth.

Section 1.—This section, of thirty-two miles in length and probably from thirty to sixty miles in width, from north to south, is lightly undulating, with gradual rise eastward. The soil is clayey-loam, or greyish mud mixed with vegetable mould. It is identical with the soil in the vicinity of the Hudson's Bay Post called New Brunswick House, where the agent informed me that fine crops of coarse grains and roots were grown during the past season. Fully seventy per cent. of the soil of this section may be classed as very good. The remaining thirty per cent. is composed of inferior lands, gravel ridges and muskeg. Timber (birch, poplar, cedar, spruce and tamarac) is found in abundance, and in many localities of large size; the cedars are particularly fine. The other varieties will furnish large quantities of fuel when required.

Section 2.—This section, of twenty-two miles in length, is apparently of less width than section one. Broken and high ridges occur on which granite rock crops out. The clay and marl soil occurs only in belts, and is replaced by sandy loam mixed with boulders. Probably fifty per cent. of the soil of this section would rank as good. The remaining portion, although not worthless, would be classed as inferior. A large portion of this section has been burned over; timber will be found only in the swamps on those portions. In the unburned portions a moderate quantity of white pine of fair size is found, mixed with the varieties prevailing on section one. No muskeg of any size occurs in this section.

Section 3.—This section, of about sixteen miles, has a fair proportion of clay soil, extending from the Nestodjastona river, about four miles in a south-easterly direction, to

the Pishganagee river. From the latter river to the end of the section the soil becomes sandy, with boulders, and although classed as inferior, I found fine crops of barley growing at the Hudson Bay Company's Flying Post on Ground Hog lake. The barley was stored at the time of my first visit, viz., September 15th. The potato vines had been touched with frost about that time, but were not killed till later on in the season. The timber of this section is very similar to that of section one, except that red pine takes the place of the spruce. Considerable quantities of red and white pine of good size are found throughout the whole of this section.

"Section 4.—This section lies between the Ground Hog and Matagami rivers, a distance of forty-four miles along the explored line. It is much higher and more broken than the other sections. Considerable rock is met with on the higher ridges and around the lake shores. The soil is sandy loam and boulders, and may be classed as inferior. Barley and oats of an inferior quality were grown at the Hudson's Bay Post on Matagami lake. I think the poor quality of grain was owing to poor cultivation and the exhausted condition of the soil rather than to any natural sterility. There is a great abundance of red pine growing on this section. It is tall, straight and sound, varying from four to fourteen inches in diameter; probably not up to the standard of lumber for exportation but of great value for local and domestic uses. The numerous lakes and streams will afford an easy means of moving the raw material to points where water power may be found for its manufacture. Means of transportation being furnished, there will spring up a large and increasing trade in the products of the forests between this section of the country and the prairies of the North-West. In considering the adaptability of this country for railway construction it will be necessary to divide it into two sections.

"Section I.—From Moose river to Ground Hog river, a distance of seventy miles, a good alignment may be obtained in the immediate vicinity of the explored line. No exceptionally sharp curves will be required. The gradients for the most part will be light; any gradient heavier than one foot per 100 feet will be short, and, I think, need not exceed 1.25 feet per 100 feet or 66 feet per mile. The work I should classify as light to medium, with very little solid rock.

"Section II.—From Ground Hog river to the Matagami river, a distance of forty-four miles, will require a careful examination with levels to determine the best location. If possible, the line should be placed further south than the explored line, in order to reach the south-west branch of the Matagami river, down the valley of which a good line may be found. Sharper curves and heavier gradients will be required on this section. The work will rank from medium to heavy, with some solid rock. The muskegs are not of a serious character and are of small extent. As we cross seven distinct branches of the Moose river, considerable bridging will be required, but by careful selection of crossings I think that not more than two spans of 100 feet each will be required over any of the streams.

"All of which is respectfully submitted.

"I have the honor to be, Sir,
"Your most obedient servant,

"C. H. GAMSBY,
"Engineer in Charge.

"To COLLINGWOOD SCHREIBER,
"Engineer in Chief."

In the narrative appended to my report and in an entry made on the 18th of July, (when at Matawagaminbue Post and on the point of resuming my voyage down the Matagami river to Moose Factory) will be found the following observation, p. 33:

"The size, position and geology of this and other lakes, as also of the rivers on the route from Mattawagaminque to Moose Factory, have been so fully and carefully ascertained and described by Dr. Bell, of the Geological Survey, (who passed over this ground

in 1875) that I shall, in the narrative of this part of my journey, omit much on the subject of distances, bearings and also of the geology of the country which I have hitherto, at the risk of being tedious, thought it advisable to give. I have, where necessary, therefore, made use of Dr. Bell's more careful and accurate measurements and observations on these points."

Dr. Bell states that the distance from the Hudson Bay Company's Post to the outlet is sixteen and a half miles and the extreme length of the lake (Matagami) about twenty-six miles. The distance from the outlet to the first fall in the river he estimates at five or six miles. This fall is about forty-five feet, and the portage, which is on the west side and called "The Fishing Portage," is about a mile in length. A mile and a half below this the river opens out into Lake Kenogamissee, said to be twenty-two miles long. Almost immediately below where the river issues from this lake there is a series of rapids and falls, and a portage called "Wa-wia-ton," about three-quarters of a mile in length.

Dr. Bell calculates a descent (from barometric readings) in the river at this point of one hundred and seventeen feet. The distance from the foot of Kenogamissee lake to Moose Factory is estimated at $216\frac{1}{2}$ miles, in which eighteen portages are necessary in addition to the two above mentioned. Of these the Long Portage is the last, the remaining ninety miles or so to the sea being free from obstructions other than occasional rapids. The Long Portage was found to be about four miles in length, while the first and third portages above it measured respectively three-quarters of a mile and one mile and a quarter. The total fall between the extremities of the Long Portage (according to the reading of Dr. Bell's barometer) amounted to one hundred and ninety feet, and that of the three next portages above, one hundred and ninety-five feet, which with forty feet added for intervening spaces, would give a total descent of four hundred and twenty-five feet in ten miles.

"The river receives (says Dr. Bell) three considerable branches from the west, and two from the east, the largest of which are the Kai-bush-kasing from the west at twenty-two miles above the foot of the Long Portage, and Ka-ko-zhiskh (Ground-hog) river, from the same side, at about five miles higher up.

Below the Long Portage the largest branches are the Missinaibi on the west side at thirty-nine and a half miles, or forty-six miles above Moose Factory, and the Abittibi from the east at seventeen miles above the same post."

As regards the surface of the country through which the Mattagami river flows, Dr. Bell says: "Between the Height of Land and the rapid descent in approaching the Long Portage the Mattagami flows through a Huronian and Laurentian plateau, having probably an average elevation of one thousand two hundred feet above the sea. The general aspect of the surface is of an undulating character, but the inequalities do not often exceed one or two hundred feet. More or less rock usually crops out in the hills and ridges, while the intervals, if not occupied by swamps or lakes, have a sandy or gravelly sub-soil underlaid by bouldery earth or clay, and having more or less vegetable loam on the surface.

"From the foot of the Long Portage to the sea the river flows through a level region underlaid by flat-lying unaltered rocks. In this interval the banks, which are not often high, are composed, with few exceptions, of gravelly and bouldery earth and clay. The land immediately above the banks of the river is dry, and supports a second growth of popular and white birch, with some coniferous trees, but at a short distance back it was always found to be swampy and covered with small black spruces and tamaracs growing in a deep layer of sphagnum moss. The islands and the main land about the mouth of river consist of alluvial earth well suited for cultivation."

The general impression left on my mind by what I had seen of the territory to this time was as follows:—

EXTRACTS FROM OWN REPORT FOR 1881.

"In the explorations which I have made in this territory during the last two seasons, the main object has been to obtain reliable information as to the value and resources of the

country. The narrative of this year's work which accompanies the present Report records daily the principal events as they occurred, and the leading features of the country as they were presented to me. However tedious and uninteresting it may be, I am persuaded that a perusal of the narrative will afford a better idea of the character of the country than can be obtained from any formal Report it will be in my power to make.

I may say generally, that in all relating to the flat country bordering on James' Bay, my explorations this year go to confirm the statement made in last year's Report. The land in this flat country, at all available for agricultural or pastoral purposes, may be comprised in three classes.

The first class consists of a belt from quarter of a mile to three or four miles in depth, on the shores of James' bay, extending unbroken, save by occasional points and reefs, from the eastern boundary of the province, as fixed by the arbitrators, to Albany river, the western boundary—a distance, following the line of the coast, of at least one hundred and fifty miles. This belt is chiefly valuable for its fine pasture, and the great quantity of marsh hay that it is capable of affording. When this part of the territory is opened up, no doubt considerable numbers of cattle may be raised here.

In the second class I include all the low-lying bottoms, points and islands of alluvial soil, found at intervals on the rivers in the territory. This land is good, but generally more or less flooded in the spring. Few spots are so high as to be out of danger at that time, should the ice become jammed and dam back the water—by no means an uncommon occurrence. It would, however, make fine meadows for either hay or pasture, and such of it as would allow seed to be sown before the season was too far advanced, would grow good crops of all the grains and roots that are suited to the climate. The area of this alluvial land must in the aggregate be very considerable, but it is so scattered that it is only rarely that enough can be found in one block to form a large settlement."

"The third class of land comprises a narrow strip extending along the margin of the rivers, sometimes only on one side, but more generally on each side. It is composed partly of the sloping banks leading up from the rivers or river bottoms to the level of the great plain above, and partly of the plain or plateau itself. The depth or width of this strip is determined by the wetness or dryness of the soil, and the length of time which has elapsed since the last fire; for although the peat and moss may have been destroyed and driven back, as it were, a short distance, they ultimately become so wet that they defy even the fire, and no sooner is it over than they again, it seems to me, begin to advance with the view of retrieving their lost ground. This is the fringe or strip of good land so often alluded to in the narrative of my explorations, and beyond which I invariably came to Sphagnum moss or peat, generally both. The soil on the sloping banks, and some times on the top of the bank, appears to be gravelly or even sandy. This is, I think, alluvial, and has been deposited by the rivers when their beds were more nearly on a level with the plain above. Be this as it may, the subsoil, if not the soil, of this great plain is almost entirely clay. Even at points where a good deal of sand was seen in the banks, the peat, at from half a mile to a mile back, nearly always rested on clay. This clay contains a considerable percentage of lime, and is really a marl. It may be doubtful if this clay would of itself constitute an easily worked or very fertile soil, but incorporated with a sufficient thickness of vegetable mould, or even of peat and peat ashes, a good, useful and lasting wheat soil would, I think, be obtained. The extreme narrowness of this strip or belt—rarely exceeding half a mile, and often not more than a quarter of a mile—detracts much from its value. I am of opinion however, that very extensive areas in the rear of this belt are frequently but lightly covered with peat, of say from one to six feet in thickness. Now, the height of these plains above the rivers, varying from twenty or thirty to upwards of a hundred feet, is amply sufficient, taken along with its general northerly slope of some three feet per mile, to admit of a complete and admirable system of artificial drainage being extensively carried out at very moderate cost. Thus drained, the sphagnum moss and peat would become sufficiently dry during the summer to burn, and if not the first year, by repeating the process would ultimately be completely destroyed; the ashes and a portion of the peat itself might finally with advantage be incorporated with the clay subsoil. It is quite

within the range of possibility that many thousand square miles of this peat-covered territory may be reclaimed, and that with such beneficial results in respect of the climate that it is also possible luxuriant crops of wheat and other grain may yet flourish on these vast plains, where at present nothing but sphagnum moss appears to thrive. In support of my opinion, that, preceded by drainage, much, if not all of the peat, where not too thick, can be got rid of by burning, I may mention that in some places on the banks of the Albany river, over which bush fires had passed, I observed that peat and sphagnum moss, which must have been at least two feet in thickness, had been reduced to ashes, and the ground left in such a condition as would have admitted of its being very easily cleared up and cultivated. This was due partly to the dryness of the summer and partly to the fact that the areas in question were naturally better drained than usual, owing to the proximity of the river and one or more ravines by which they were partly surrounded. The consequence was that the peat had been reduced to such a state of comparative dryness, that once ignited, it went on burning until the whole was completely consumed. I attribute the existence of the narrow strip of fertile land on the banks of the rivers entirely to this cause. But for the fires which, at longer or shorter intervals, sweep along the banks of the rivers, destroying the sphagnum moss and peat which may have accumulated in the meantime, these strips, like the great plains beyond, of which they form a part, would infallibly have been seized hold of by this extraordinary plant. If the peat mosses of this region reposed in basins or depressions in the underlying strata which deepened as we advanced from the river bank towards the centre, the difficulty and expense of draining and reclaiming them would be greatly increased. I am of opinion, however, that, save the general declivity towards James' Bay, the surface of the underlying clay is level or nearly so, and that the increasing thickness of the peat as we go back is really due to a rise in the surface of the peat moss itself from the circumference or edge towards the centre. While the obvious boundary of this flat or level clay country is James' Bay on the north, that on the south is not determined with any approach to certainty. It has been supposed to extend southward to the Long Portages on the Missinaibi and Mattagami branches of Moose River, distant respectively about one hundred and thirty and eighty-five miles from Moose Factory, and to be co-extensive or nearly so with the area occupied by the underlying Devonian strata. The Laurentian rocks are very conspicuous in the gorges and channels of the river at and above these portages. On the Mattagami river the water descends over these rocks with a fall of not less than four hundred and twenty-five feet in ten miles, according to the measurement of Dr. Bell, while the fall in the Missinaibi branch is nearly three hundred feet in a like distance. One is tempted to imagine that this rocky range, so conspicuous on these routes, extended both eastward and westward of the rivers encircling as it were with a precipitous wall of rock the level clay country, and forming a well-marked and distinct southern boundary. But I doubt after all if such is really the case. Although this somewhat sudden rise in the underlying rock may circumscribe and limit the area occupied by the limestone and other Devonian strata, or even of the blue clay, yet I am satisfied that the drab and light-colored clays found above the blue clay, in the level country below, overspread a great part of the territory above and to the south of this barrier. My impression is that the general surface of the plain commences to rise a considerable distance before the long portages are approached, and excepting where cut through or denuded by the action of the rivers, this supposed rocky margin or rim has no visible existence, but is more or less deeply covered by the clays, sands and gravels of the so-called Drift, or glacial period.* That a very large proportion of the clay and other loose materials found on this upper plateau must have come from the north, and that it has been carried or transported in some mysterious way up hill, partly from the shores of the Hudson Bay, and partly from the lower plateau, admits almost of demonstration. On my way to Moose Factory I found fragments of the Devonian limestone on Kaibushkasing, or Kappuskuska Lake, at least one hundred miles, and also on

*If "the Drift" had *not* been thus deposited, or if we could imagine it removed, the fundamental Palaeozoic strata of this northerly or coast belt would, I believe, be found to be bounded on the south by Huronian and Laurentian rocks, forming "a rim" four or five hundred feet in height, and rising to one thousand five hundred or more feet on the Height of Land.—E. B. B.

Kenogamisssee Lake, about one hundred and fifty miles from the Grand Rapid, on the Mattagami River, the nearest known point at which that rock is found *in situ*; and what is still more remarkable, not less than eight or nine hundred feet above it. Again, when ascending the Albany River from James' Bay, I found pieces of this limestone continuously, from where it crops out some eight miles below Martin's Falls, to Osnaburgh House, on Lake St. Joseph, about two hundred and twenty miles distant from and not less than six or seven hundred feet higher than Martin's Falls. From Lake St. Joseph, on the north side of the Height of Land, I found bits of the limestone and silicified fossils from what I believe to be the same formation, to Lac Seul, or Lonely Lake, on the south side of the Height of Land, another hundred miles distant. And lastly, I traced them (although now very scarce) as far as Lake Minnetakie, some thirty or forty miles south of Lac Seul. These fragments and fossils of the Devonian limestone were almost always associated with the drab and light grey-colored clays before mentioned, and sometimes with sand or gravel. Accompanying the fossiliferous limestone throughout, I observed, too, a very peculiar and easily recognized variety of quartzite which I have never met with "in place" anywhere, and believe to have come from the east main coast of Hudson's Bay, probably little short of one thousand miles distant from Lake Minnetakie, where I got my last specimens. Thus there is, I think, sufficient evidence to prove that more or less of the materials composing the clays, sands and gravel now found on the second plateau, on the Height of Land, and for many miles south of the Height of Land, have been furnished by and transported from the far distant shores of Hudson's Bay.

"The territory included in what may be called the second plateau (although that below it is really a plain) commences at the somewhat sudden rise before referred to as taking place in the general surface of the plain, at or about the Long Portages on the Abittibi, Mattagami, and Missinaibi Rivers. This rise is not so marked on the Albany River; and while I am safe in placing the boundary not less than ten or fifteen miles above Martin's Falls, it may be considerably more. Nor is its southern limit—namely, where the plateau ends, and that known as the Height of Land begins—at all regular or well defined. So far as I have been able to form any opinion on the subject, I should place it on the east, about the lower end of Lake Abittibi, and at or about the lower end of Lake Miminiska, on our western boundary.

"Intermediate between these 'Green-hill Portages' on the Missinaibi River, Flying Post, and the lower end of Lake Kenogamisssee may be mentioned as situated, in my opinion, on or about the southern limits of this plateau. The height of this plateau above the level of the sea (or James' Bay) ranges from six or seven hundred feet at its lower or northern edge, to from eight hundred and fifty to one thousand feet at the upper or southern edge.

"No part of this zone or belt is underlaid, so far as I know, by Devonian limestone or any other rock of that formation. Where seen in place, the rock is exclusively Huronian and Laurentian. It is rarely found projecting or rising up above the general surface, even in this plateau, and although often exposed to view both on the rivers and lakes, it is almost always in consequence of the denudation or removal of the overlying clay by the water of such rivers and lakes.

"As Dr. Bell very justly remarks, the surface, even on the Height of Land, is almost always covered with loose material of some kind. On this second plateau the loose material still consists of drab or light-colored clays, overlaid occasionally by gravel or sand. In these clays, as already remarked, pieces of limestone from the Devonian strata to the north may almost always be found, decreasing, however, in size and number as we recede from James' Bay and ascend towards the Height of Land. I am of opinion that careful analysis and microscopic examinations of the gravels, sands and clays found on or about the Height of Land would probably throw some light on their origin.

"In the second plateau anything deserving of the name of mountains or hills are rarely met with. The rock, in all probability, had been pretty well planed down by the ice before the clays, sands and gravels were deposited, or at least allowed finally to rest on this plateau. Still, the inequalities in the underlying Huronian and Laurentian rocks are

sufficient to impart, occasionally, somewhat of a rolling or ridgy character to the surface. Denudation has been carried out more extensively by the rivers in this plateau than in the lower plain, and the alluvial or bottom lands are greater in proportion to the whole. Lakes, too, are occasionally met with in the southern part of this zone or belt, which have originated, it seems to me, not so much in any deep natural depressions as the removal of the loose surface material by the rivers flowing through them, and of which these lakes are often mere expansions.* While, however, there is in the aggregate a large quantity of arable land, such as may be seen at New Brunswick and at Flying Post, and a very much larger area still of land that would form fine pastures and meadows, I am, notwithstanding, strongly of the opinion that muskegs or peat mosses and swamps overspread the greater part of this belt or plateau also. This is more particularly the case as regards the lower or northern part.

“Of the third plateau, or that which may be said to constitute the Height of Land, I shall say little. As we approach it from the north, the outline of the country becomes bolder and more rugged; the underlying Laurentian rocks appear more frequently above the surface, forming low ridges or dome-shaped knolls. Viewed from the north they rarely present the appearance of a mountain range, although broken ridges and isolated hills may be seen, from two to three hundred feet in height. Only on the Height of Land, near the head waters of the Abittibi, have I ever seen what might be fairly entitled to be called mountains. These were seemingly five or six hundred feet in height, and, separated as they were from each other by huge gaps, looked like the last remaining portions of an extensive and continuous range, the greater part of which had been overthrown and carried bodily away by the overpowering force and pressure of the ice from the north. The hollows between these low rocky ridges are very frequently occupied by lakes, marshes and swamps. Sometimes these last recovered with a growth of alder, willow, tamarac or grass. Beaver meadows are not uncommon, and wild rice is now and again met with in some of these lakes. The soil on the ridges is generally sandy or gravelly—rarely clay, so far as my experience goes; although on the Height of Land Portage, on the Abittibi route, clay is found at both ends of the portage. This soil, generally light and sometimes stony, is usually dry and warm, and although a small proportion of it only may be suitable for grain-growing, yet nearly all of it will afford more or less pasture. Peat mosses or muskegs are even to be found on and to the south of the Height of Land, but the area occupied by peat-mosses is relatively small compared with that which is covered with timber.”

The succeeding year (1882), I ascended the Mississaga river on the north shore of Lake Huron, and crossing the height of land at its source, struck the head waters of the Ahkukootish or Ground-hog river, which was descended to its junction with the Mattagami river. This last was followed to its junction with the Missinaibi, and from that point, the united water, thereafter known as the Moose river—bore us to Moose Factory on the coast of James' Bay. On my return, I ascended the Mattagami branch of the Moose to its source, and crossing the watershed struck the head waters of the East branch of Spanish river, which we descended until within a short distance of Whitefish Lake, to which a portage was made and Whitefish river thereafter followed to Lake Huron. These routes, very rarely travelled by other than Indian hunters, took me through a considerable extent of territory on both sides of the water parting about which comparatively little was then known. In my report for that year, printed by Order of the Legislative Assembly in 1883, and which will be referred to under this and other heads, the following will be found on p. 7 *et sequentia*.

EXTRACTS FROM REPORT FOR 1882.

“The leading physical features of the territory claimed by Ontario have been already so fully described in former reports, that little remains to be said on that subject.

“Since my last report, however, the Report of Progress of the Geological survey for 1879-80 has come to hand. In it there is an interesting description of Hudson's Bay,

*This is most conspicuous in regard to some of the lakes on the Albany River.

and the regions lying adjacent thereto, by Dr. Bell, assistant Director of the Survey, than whom no one is better informed on the subject, having explored in an open boat no inconsiderable portion of the bay, as well as crossed it from York Factory to Hudson's Straits, in the Honourable Hudson Bay Company's ship. I have, therefore, much pleasure in quoting from the report in question, p. 27. C. *et seq.*, where under the head "General account of Hudson's Bay."* Dr. Bell says: "In the popular mind Hudson's Bay is apt to be associated with the Polar regions; yet no part of it comes within the Arctic Circle, and the latitude of the southern extremity is south of London. Few people have any adequate conception of the extent of this great Canadian sea. Including its southern prolongation, James' Bay, it measures about one thousand miles in length, and is more than six hundred miles in width, in the northern part. Its total area is in the neighbourhood of five hundred thousand square miles, or upwards of half that of the Mediterranean. It is enclosed by the land on all sides, except the north-east, where it communicates by different channels with the outer ocean. The principal or best known of these is Hudson's Strait, which is about five hundred miles in length, and has an average width of about one hundred miles.

"Hudson's Bay, which might have been more appropriately called Hudson's Sea, is the central basin of the drainage of North America. The limits of this basin extend to the centre of the Labrador peninsula, or some five hundred miles inland, on the east side, and to the Rocky Mountains, or a distance of one thousand three hundred miles, on the west. The Winnipeg basin constitutes a sort of out-lier of the region more immediately under notice, since the waters drain into it from the north, south, east and west, and discharge themselves by one great trunk, the Nelson River, into Hudson's Bay. The southern-most part of this basin, namely, the sources of the Red River, extends down nearly to latitude 45°. The head waters of the southern rivers of James Bay are not far to the north of Lake Huron, while one of the branches of the Albany rises within twenty-five miles of the north shore of Lake Superior. Including the Winnipeg system, the basin of Hudson's Bay has a width of about two thousand one hundred miles from east to west, and a length of about one thousand five hundred miles from north to south, and its dimensions approach the enormous area of three million square miles. Over a great part of this region there is a temperate climate, and although the soil of much of it is comparatively barren, yet large tracts are very fertile. The numerous rivers and lakes of the first class, embraced within these limits, will prove of great value in the settlement of the country. Both the bay and strait are remarkably free from rocks and shoals, which might interfere with their free navigation. The groups of islands near the east side of the bay are surrounded by deep water, and a wide channel leads up the centre of James Bay. Fortunately the main body of the great bay, which is the portion which may hereafter be frequented by shipping, is entirely without shoals, reefs or islands. The depth is very uniform over most of the bay, and nowhere does it present any great irregularities. It averages about seventy fathoms throughout, deepening to one hundred and upwards in approaching the outlet of Hudson's Straits, while in the strait itself the soundings along the centre vary from about one hundred to upwards of three hundred fathoms. The bottom appears to consist almost everywhere of boulder-clay and mud. Near the shores a stiff clay, affording good holding ground for anchors, is almost invariably met with on both sides.

"James' Bay begins at Cape Jones, on the east side, and Cape Henrietta Maria on the west, and runs south about three hundred and fifty miles, with an average breadth of one hundred and fifty miles. The east side of Hudson's Bay, including the southern prolongation is known as the Eastmain coast. Between Cape Jones and Cape Dufferin, on the Portland promontory, and again in approaching Cape Wolstenholme, at the termination of this coast, the land is high and bold, some points attaining an elevation of nearly two thousand feet above the sea. The country on the south-west side of the main bay, as well as that lying to the west of James' Bay, is low and generally level, with shallow water extending a long distance out from shore. Both sides of Hudson Strait are high and rocky, but the northern is less precipitous than the southern.

* Now that the Province has secured a frontage on its shores, everything relating to this vast inland sea, and its resources becomes of special interest and importance.—E. B. B.

"Of the numerous rivers which run into Hudson's Bay from all sides, about thirty are of considerable magnitude. All those which enter upon the Eastmain coast appear to flow in a uniform course directly west, or parallel to one another, and as the height of land in the centre of the Labrador peninsula is furthest inland towards the south, the rivers which fall into the southern part of this coast are the largest, and the remainder become progressively smaller as we go north. Numerous streams converge to the head of James' Bay from all points southward of an east and west line passing through its southern extremity. The Moose, about a mile wide, is the principal of these. On the western side, the Albany and the Churchill Rivers are the longest, but the Nelson, with a course of only about four hundred miles, discharges the greatest body of water into the sea. Indeed this huge artery of the Winnipeg system of waters may be considered as one of the greatest rivers of the world. Few of the rivers of Hudson's Bay afford uninterrupted navigation for large vessels to any great distance from the coast. During the season of high water shallow draft steamers might ascend the Moose and two of its branches for upwards of one hundred miles. Hayes River and two of its branches might also apparently be navigated by such craft in the spring, to points about one hundred and forty miles inland, and the Albany for nearly two hundred and fifty miles; while larger steamers might ascend the Nelson for seventy or eighty miles from the open sea. The Nelson is the only muddy water river entering Hudson's Bay.* Most of the others have a slightly brownish tinge, but their waters are perfectly wholesome, and contain only very small quantities of foreign matter. The Churchill which is the second largest river of Hudson's Bay, is a beautiful clear water stream, somewhat larger than the Rhine. It is remarkable for having at its mouth a splendid harbour, with deep water and every natural advantage for the purpose of modern commerce.

"The only harbours on the west side of Hudson's Bay are those formed by the mouths of rivers, but none of them, with the exception of Churchill Harbour, can be entered by vessels drawing more than ten or eleven feet, and only at high water even by these. The Nelson may form an exception to this. Most of its estuary becomes dry at low tide, but a channel runs through it near the centre, as far as the head of tide-water. I sounded this channel in a number of places in 1878-79 and '80, and although an average depth of about two fathoms at low water was found, continuous soundings throughout might have shown interruptions or shallower water in some places. As stated in previous reports, there is a section at the head of tide, or between the tidal portion and the regular inland channel of the river, in which not more than ten feet of water were found. This may extend for about two miles, above which an apparent continuous channel, with a depth of about twenty feet, according to our soundings, extends to the lowest limestone rapid, which is the first break in the navigable part, and is between forty and fifty miles from the head of tide, or from seventy or eighty miles from the open sea. If the section referred to were deepened, steamers coming in from sea might enter this part of the river and find perfect shelter, or even proceed up the stream to any point below the rapid referred to. In continuation of the channel running down the estuary, a 'lead' of deeper water extends out into the bay, and forms the 'North River,' or 'York Roads,' with excellent anchorage. The Churchill, unlike all the other rivers, has a deep, rocky and comparatively narrow mouth, which can be entered with ease and safety by the largest ships at all stages of the tide. On the point at the west side of the entrance of the harbour stands the old 'Fort Prince of Wales,' which is probably the largest ruin in North America. Although occupying a commanding position, and mounting about forty large guns, it was surrendered without firing a shot, to the French Admiral La Perouse, who destroyed it in 1772. The ruins of this large fort are shown in the accompanying woodcuts, taken from photographs. Along the west coast the rise and fall at spring tides amount to about eleven or twelve feet, on an average, and is pretty uniform, diminishing somewhat towards the south. It is greatest at the mouth of the Nelson River, where it amounts to about fifteen feet. The tides are lower all along the east side of the bay. In Hudson's Strait there is a very good tide, according to the report we have received of Acting Staff Commander J. G. Boulton's reconnaissance during the past summer. Geologically, the basin of Hudson's Bay, excluding the western or Winnipeg division, lies

* The water of Abittibi river is also very muddy.—E. B. B.

within the great Laurentian area of the Dominion. Cambro-silurian rocks, resting almost horizontally upon these, form an irregular border along the south-western side of the bay; and in the valleys of some of the rivers they extend inland from one to two hundred miles. To the south and west of James' Bay Cambro-silurian are overlaid by Devonian rocks, which here occupy a considerable area. The long chains of islands which fringe the east coast for nearly three hundred miles to the northward of Cape Jones, and also the main land in the vicinity of Richmond Gulf, are composed of bedded volcanic and almost unaltered sedimentary rocks, resembling the Nepigon series of the Lake Superior region, which may be of Lower Cambrian age. On the western side of the bay, from Churchill northward, quartzites and other rocks, which may also belong to the Cambrian system, appear to be largely developed. Valuable minerals may be looked for on this coast. The extensive level region around the south-western side of the bay, is overspread with a great sheet of boulder clay, which is generally covered by the modified drift. The rocks of the outlying or Winnipeg division of the basin comprise an extensive series ranging from the Laurentian to the Tertiary."

That portion of the coast of James' Bay which forms the frontage of the territory claimed by us, is low and shallow. From the eastern boundary to the western, with a frontage of more than one hundred and fifty miles, there are no harbours for vessels drawing more than ten feet of water. Vessels, however, drawing ten feet or under, can enter and ascend both Moose and Albany Rivers, as far as the factories, when the tide is at its height.

All the sailing craft employed at Moose Factory and I think, also those at Albany, even to schooners of ninety or one hundred tons burden must, at the approach of winter be hauled up out of the water on to the banks some twenty feet at least above the river, to escape damage, if not positive destruction when the ice breaks up in the spring.

The only deep and safe harbour that I know of, is at the north-eastern extremity of Charlton Island, some sixty or seventy miles from Moose Factory, and nearly north of where our eastern boundary is supposed to be. This was described in my second report.

From James' Bay the land rises slowly towards the south at the rate of about three feet in a mile, as we ascend Moose River and its branches, until we approach what are known as "the long portages," distant from eighty to a hundred and twenty miles from Moose Factory, where the inclination increases considerably. This belt is a vast plain, the far greater portion of which is covered with what the natives call muskego or muskegs, but known to us as peat-bogs or mosses.

Underlying the peat, clay is almost invariably found wherever the bottom can be reached. This clay, as seen on the points of poles thrust down into it, is a bluish gray colour. As seen in the banks of the ravines and rivers it is a light gray, sometimes a drab colour. The latter is more common in the second belt or zone above the long portages, and with stones of older rocks generally contains fragments of fossiliferous limestone from the Devonian beds to the north. The other clay also frequently contains boulders and stones of Laurentian, Huronian and Trap rocks. Both are calcareous, and therefore what may be called marls.

Below these in the lower or coast belt or zone of this territory a tough blue or slate coloured clay is sometimes met with. It often contains marine shells, but very few stones or boulders. Lime enters so largely into its composition, that if only sufficiently indurated, it might be fairly classed as a limestone. Sand in the form of mounds and ridges is also occasionally met with, but more generally it appears in a layer or stratum of no great thickness in the banks of the rivers, resting on the clays. The underlying rock in the lower belt is rarely seen, but where exposed is generally found to be Devonian limestone. No hills whatever occur in this lower belt, and the timber is confined to narrow strips along the water-courses, and to islands in the larger rivers.

Referring to the country* lying between the Abitibi River on the east, and the Missinaibi River on the west, although there is a sudden rise of from three or four hundred and fifty feet in twenty miles at the long portages, and although too, there is a

* This is the centre or intermediate belt.

great deal of rock exposed in the bottom and banks of the rivers, still very little rock is met with elsewhere, being for the most part deeply covered by the clays of the boulder or drift formation.

The country, however, continues to be too dead or flat, and notwithstanding a perceptible tendency to assume the form of low ridges here and there, as we advance, the natural drainage is insufficient, and peat mosses still overspread large tracts of what would otherwise be good land. No decided change in the character of the surface takes place until we approach the 49th parallel. North of this the surface is not only flat, but there are few if any lakes. South, however, of this parallel, the country becomes gradually broken and uneven, rising into ridges from one to two hundred feet in height, and in the intervals between these we have frequent lakes, sometimes swamps, at others marshes, and not unfrequently areas of good arable land. Rock is often met with, but generally confined to the banks of the rivers, and the shores of the lakes.

As we advance towards the south, not only does the country become more broken, until at least one-third of the surface is covered with lakes, but there is a change also in the composition and character of the loose material overlying the rock. The clays or rather clay marls already referred to, give place to sand and gravel. There is a very marked increase too, in the number of boulders, and while there are always some of these erratic stones whose peculiar appearance or mineral composition, enables us to recognize them as natives of the far distant Eastmain coast, by far the greater number, although brought also from the north, have not come nearly so far. Many of them, indeed, have been manufactured, so to speak, almost on the spot, out of material of the ridges of Laurentian or Huronian rock (whichever it may be) lying immediately or at no great distance to the north of where they now rest.

The character of the loose material on the surface, the rounded and "hog-backed" shape of the hills and ridges, the deep channels and gorges extending for miles in a northerly and southerly direction, quarried by no visible hand or agency out of the hardest of rock, the polished surface in some places, and the numerous parallel and deep scratches in others, afford strong if not absolutely convincing proof to my mind of tremendous erosion. The same evidence confronts us everywhere, not only north of the Height of Land, but over it, and down the southern slope to our great lakes, the very existence of which is in my humble opinion largely if not entirely due to the same mysterious power.

The only agent known to me, that would seem at all adequate to account for the phenomenon in question, is ice. Not ice in the form of icebergs, and impelled only by the feeble force of the winds or even ocean currents, but a solid sheet of ice moving as water does, and as glaciers are known to be capable of doing. The sheet of ice, too, must have been several thousand feet in thickness. Mr. George Dawson, F.G.S., in his able and interesting Report on the Geological Resources of the Region in the vicinity of the 49th Parallel, tells us "that Laurentian and Quartzite erratics were found in abundance to the height of over four thousand feet," on the three Buttes or Sweet-grass hills at the foot of the Rocky Mountains. As the Height of Land north of Lakes Huron and Superior will not I believe average more than thirteen or fourteen hundred feet above the level of the sea, it is evident that such a sheet of ice if continuous or equally thick, must have covered the Height of Land not less probably than two thousand feet. The great difficulty is to find the power or force which has been sufficient to set and keep in motion (however slow) this prodigious body of ice. That the erosive agent has moved from the north towards the south the rocks themselves afford silent but convincing testimony. That the propelling power has been so mighty as to have been almost irresistible is equally certain. The hypothesis which appears to me most fully to meet all the requirements of the phenomena in question is, that during the long ages of intense cold, known as the glacial epoch, what has been called a "Polar Ice-cap" formed at the North Pole which, constantly increasing in thickness, ultimately attained such a vast height that by the sheer force of gravity alone the ice at length began to spread and move in a southerly direction, or from the Pole towards the Equator, overpowering every resistance that the inequalities of the surface even when composed of solid rock could oppose. But whatever

the agency may have been, that an inconceivably great quantity of rock has been moved so to speak from Nature's quarries in the north, crushed and ground by her mills into gravels, sands and clays, transported hundreds of miles to the south, and then spread out, forming immense stores of the raw material for soil in regions more favourable probably to animal and vegetable life than that from which the rock was taken, cannot admit of a doubt. These are facts which no thoughtful observer who has visited the territory in which these vast operations have been carried on, can question, however uncertain he may be as to instrumentalities by which the work has been accomplished. Further speculation on this subject would be out of place here, but those who may desire it will find much interesting information in two articles by Dr. L. P. Gratacap, entitled "The Ice Age" in the "Popular Science Monthly" for January, 1878, and November, 1878.

From the 49th Parallel southward to the Height of Land the country, although more broken, is better drained, and much more generally timbered than the flat plains to the north. The timber too is more valuable, as red and white pine are now found growing, more particularly on the higher and drier ridges. A great number of the lakes afford striking illustrations of what has taken place in respect of some already, and of a change which all without exception are undergoing, namely drainage, or filling up and conversion into dry land. This conversion is taking place most rapidly in respect of those lakes through which the larger rivers flow and is brought about in two ways. In the first place these rivers bring down vast quantities of sediment which, settling in the lake basins, gradually fills them up. And in the second place the rivers are in many instances clearly seen to be cutting through and destroying the natural bank, reef or other barrier at the outlet or lower end of these lakes, thus permanently lowering, if not draining off the water altogether. The steps in this process are, the conversion of the lake into a marsh, of the marsh into a swamp, of the swamp into dry land. It is a process, which when complete, simple as it may appear, has elsewhere produced no inconsiderable proportion of the finest land in the world, and is doing a like good work here for posterity."

CLIMATE.—"The climate of this territory in respect of temperature is one of extremes. The winters are cold—the temperature falling sometimes as low as forty degrees below zero of Fahrenheit's thermometer, and occasionally rising to ninety degrees in the summer even down on the coast. Last year it was on one occasion ninety-four degrees in the shade at Albany Factory and ninety-two degrees at Moose Factory. The mean temperature of the summer at Moose Factory is about sixty degrees, varying two or three degrees above or below that average in different years.

We have unfortunately no record of the temperature at any of the inland posts, with the exception of Martin's Falls on the Albany River, and this Post, although more than two hundred miles up the river, is still north of Moose Factory. The Meteorological Service, the head office of which is in the City of Toronto, has collected and is still obtaining most valuable and interesting information relating to the climate of almost every part of the Dominion. There are two stations in connection with this service on James' Bay—one of which is at Moose Factory and the other at Albany. Observations have been made for a short time at Martin's Falls, but are now I believe discontinued. These stations are, however, in the extreme northern part of the territory we claim, and in which we are naturally most deeply interested. There are no stations in the central or southern divisions, and consequently we have no reliable scientific data to guide us. The means at the disposal of the service are doubtless too limited to allow of its Director establishing and maintaining stations everywhere at once, but I think it is very desirable to have some reliable information in reference to the climate of the central and upper or southern parts of the basin of the Moose River—embracing as it does some thirty or forty thousand square miles of territory.

Dr. Bell is of opinion that the climate improves as we proceed northwards from the Height of Land to Moose Factory, the lower elevation of the coast, and other favourable influences, more than compensating as he believes for the difference of latitude. The season, however, that Dr. Bell made his dangerous but remarkably successful exploration of the East-Main coast, was I think an unusually fine one, and hence it is possible that Dr.

Bell formed a somewhat too high opinion of the climate on the coast, although it is undoubtedly far superior to what popular belief has generally supposed it to be. I myself consider that in many very important respects, the climate of the central and southern divisions of the territory is better than that on or near the coast.

The only place in the territory where any reliable observations have been made in regard to the quantity of rain, is at Moose Factory, on the coast. The rain-fall *there* forms no criterion on which to form a safe judgment as to what it may be in the whole territory, more particularly in the southern high-lands. From my own observations and enquiries, I feel safe in saying that, without being too wet, there is amply sufficient rain and dew to support the most luxuriant vegetation. At Moose Factory the rain-fall in 1878 amounted to twenty inches, and of snow to fifty-nine inches, making the total precipitation of melted snow and rain 26.86 inches, for that year. The number of days on which rain fell was eighty-four. These were distributed as follows: January 1 day, February 0, March 1, April 6, May 11, June 9, July 12, August 7, September 19, October 14, November 3, and December 1 day. At Moose Factory, while there is quite enough of rain during the summer months, the rainfall is, I think, somewhat excessive in the months of August and September. Possibly this may be confined to the coast. The quantity of snow is much less than that which falls in the Province of Quebec, being not as much as half that at the city of Quebec itself. Nor is the snow-fall at Moose Factory nearly as heavy as at Gravenhurst, Parry Sound, and other places on the north shore of Lake Huron. The healthiness of the climate is unquestionable."

In the year 1883, the route taken when going north to Moose Factory was by steamer to Red Rock, Lake Superior, thence by canoe up the Nipigon River to Lake Nipigon, thence to Longlake House at the north end of the lake of that name, thence down the Kenogami River to its junction with the Albany River, thence down the last mentioned river to Albany Factory, thence along the coast of James Bay to Moose Factory.

Returning, what is known as the Michipicoten route was followed back to Lake Superior.

EXTRACTS FROM REPORT FOR 1883.

The physical features of the country traversed between Lake Nipigon and Long Lake differ in no respect worthy of special notice, from those presented by all that portion of the Height of Land plateau south of, and near to the water parting, and in some instances for many miles on both sides of it. These leading features may be described in few words as consisting of numerous lakes and swamps, the banks and dividing ridges of which are usually low in the northern but higher and more rocky in the southerly portion of this plateau. These lakes are generally shallow, and run north and south, or in other words their longer axis point northward and southward, or from that to north-east and south-west.

The soil of what may be called the dry land is for the most part sandy, gravelly or encumbered with boulders. On the lower portions, however, clay and clay-marl are not unfrequently met with, sometimes underlying the sand and at others forming the surface. The proportion of arable land however within twenty miles, on either side the water parting, is very small, as compared with the whole area included in this belt, the length of which, from the head waters of the Ottawa and Abitibi on the east, to those of English River and Albany River on the west, is, as already stated, not less than five hundred miles in a straight line. The fundamental rock is Laurentian or Huronian. The area occupied by bare rock is very limited even in that part of the plateau south of the watershed, and still less in that lying to the north.

The Canadian Pacific Railway from Biscotasing Station on the east, to White River station on the west, a stretch of nearly two hundred miles, passes through what may be considered about the poorest part of this Height of Land plateau.

Dr. Bell with a strong party visited and carefully examined Long Lake and the

adjacent country in 1870, full details of which exploration will be found in the Report of the Progress of the Geological Survey for 1870-71. He gives the following description of Kenogami or Long Lake, viz :

“The southern extremity of Kenogami or Long Lake is about twenty-two miles due north of Jackfish Bay, opposite the Slate Islands, the Height of Land between the waters of Lake Superior and those flowing into Hudson's Bay, being about one mile south of this point or twenty-one miles north of Lake Superior. Long Lake for the first eight and a half miles, runs nearly due north. The breadth in this part varies from two to forty chains, and averages about twenty. From this point to the outlet its course runs nearly straight, bearing N. 30° E. (ast.) ; so that its general bearing, from one extremity to the other, is about N.N.E. The average breadth of the main section, forty-six miles in length, found by taking the mean of fifteen measurements, at equal distances, is 104 chains, or a little over a mile and a quarter. Following the axis of the lake, the whole length will therefore be fifty-four and a-half miles, while in a straight line between extreme points it is fifty-two miles. As already stated, the shore line measures 192 miles, exclusive of islands. The following are the principal streams which enter Long Lake :—

“1. Hanes River, on the west side, at eight and a quarter miles from the southern extremity.

“2. Ka-we-sa-qua-ga-ma, or Paint River, which enters the same side from the south-westward at two miles north of Beatty's line.

“3. Ka-muck-a-ti-wa-ga, or Black-water River, which enters the same side from the north-westward, three miles north of Beatty's line.

“4. Kinonge, or Pike River, also on the west side, eight miles from the outlet.

“5. Making-Ground River, on the east side, one and a quarter miles from the outlet.

“The valley of Black River, and the southern part of Long Lake, form one continuous depression running due north and south. Its sides are lined with long moraines, composed of well rounded boulders. Numerous ponds lie amongst these in the lower levels. Black River takes its rise in a chain of these ponds, connected together by short links of sluggish water ; the northernmost pond being only a little over a mile south of Long Lake. This route can be followed in small, light canoes to Lake Superior, but is never attempted by larger ones on account of difficulties in the navigation of Black River. The country around the southern part of Long Lake is rugged and mountainous with very little covering of any kind upon the hard gneiss rocks. What appeared to be the highest of these hills, lies a distance of two and a half miles west of the extremity of the lake, and is, by barometrical measurement, 540 feet over the level. Going northward the hills become gradually lower, until about half way down the lake (or at thirty miles on the west side, and twenty-four on the east, from the outlet), the country has assumed a comparatively level aspect, with an occasional hill from fifty to one hundred feet high.

“The line run last summer by Mr. Walter Beatty, P.L.S., south-easterly from Lake Nipigon intersects the west shore of Long Lake at fifteen and a-half miles from its southern extremity, or twenty miles north of Herrick's line. The latitude of this point, from the mean of several observations both of the sun and pole star, I found to be 49° 22' 30". Around the southern part of Long Lake, and as far north as Beatty's line, the prevailing rock consists of the common variety of gneiss, with the usual W.S.W. strike. But from this point to within eighteen miles of the outlet, a very coarse, light reddish grey granite prevails. It is composed of whitish quartz and very large crystals of light coloured feldspar, with occasional flakes of mica. At the above distance the tender gray mica-schists, similar to those of McKay's Lake (and also cut by the same kind of granite-veins), begin and continue for about two miles down the shore. Near the termination of the two miles referred to, finely grained, highly fissile mica-schists make their appearance, and are almost continuously exposed for about eleven miles along the east side, and for about the same distance (or to the Kin-onge River) on the west side. They stand nearly on edge all along, the strike gradually changing from about N.W. on the southern to S.W. on the northern side of the above breadth. The prevailing colour is dark greyish-green, but some considerable bands are yellowish-grey and olive-coloured, with a talcoid

aspect. The north-eastern strike of the northern limit of this mica-schist formation continues to the Making Ground river, which it intersects at about two miles in a straight line from its mouth. In one place on the east side of this narrow part of the lake ordinary gneiss running S. 70° W., and dipping northward at an angle of 45°, is seen below the fine green mica-chist. A small island in the same neighbourhood is composed of a rock resembling the imperfect grey gneiss of Hollow-rock Lake and other localities already mentioned. It runs S. 70° W., is hard, fine grained, grey, silicious and somewhat micaceous, and contains numerous small patches and short cross veins of white quartz. Northward from the limit of the greenish mica-schists just described, the shores and islands of Long Lake are occupied by a massive, reddish-grey, rather coarse-grained syenite, composed of translucent quartz, white and red feldspar, and dark green hornblende, with a little black mica. The same rock continues to be exposed in the hills on either side of the English river, as far down as the first portage."

Dr. Bell gives the following description, p. 341 *et seq.*, of the country lying to the north-west of Long Lake, and in the northerly part of this Height of Land plateau, viz.—

"The Manitou-namaig river enters the Kenogami River at six miles in a straight line from the outlet of Long Lake. Canoe navigation is interrupted by a rapid close to the mouth, around which there is a portage, on the north side, of twenty-six chains. The upward course of the river is north 57° west (Mag), four miles to the lake of the same name, the river in this distance being broken by a few rapids, with boulders, which, however, do not necessitate portages. This lake has the form of the letter "L" reversed. The lower portion, which is about six miles in length, with a breadth varying from three to 110 chains, runs north-west; while the upper portion, which is said to be over twelve miles long, runs south-west, and varies from twenty to about 100 chains in width. The upward continuation of the river leaves the northern extremity of the lake at the angle formed by the two stretches described. Following this, through a sluggish stream, at the end of half a mile we come to Round Lake, about two miles long. The course of the river above Round Lake is about west, for five and a-half miles; entering Arm Lake, one mile in diameter, at the distance of about a mile from Round Lake, and terminating in a shallow lagoon, half a mile wide, above which the main river turns south-westward, and was not explored any further. The above stretch consists of dead water, with the exception of a slight chute a short distance above Arm Lake, but this is passed without portaging. A very crooked stream, called Mink Brook, enters the river half a mile below the lagoon. Following up this, at about two and a quarter miles in a straight line, we came to Muddy Lake, which is two and a half miles long, and one mile wide. Only one slight chute occurs in the course of Mink Brook, and even here a portage is unnecessary. At a bay on the west side of Muddy Lake a portage three quarters of a mile long, runs south-westward to Springwater Lake. From the northern extremity of Muddy Lake a still-water brook, half a mile long, led us to a pond called Head Lake. From Head Lake a portage trail runs north-westward a mile and a quarter, mostly over swampy ground, to the lower part of Fleming's Lake, on the Ka-wa-kash-ka-ga-ma river, another branch of the Albany. Fleming's Lake (so named after the chief engineer of the Intercolonial railway) runs N.E. and S.W., and is five and a half miles long, by one mile and a half wide, with the exception of a narrow part in the middle. The outlet at the north-east extremity breaks through a ridge of boulders, producing a rapid, but below this the river is smooth to Ka-wa-kash-ka-ga-ma Lake which lies about a mile and a half to the north, and is three miles long by two wide. The river discharges from the north-west angle of this lake and flows smoothly in a westward course for a considerable distance. At two miles below the lake a portage trail three quarters of a mile long, runs from the river northward to a beautiful sheet of water called Wa-wong Lake; which discharges into it by a small brook, in the same neighbourhood. Wa-wong Lake is of a very irregular form, but its general outline will probably measure six miles from east to west, by three from north to south. According to the sketch maps, and descriptions which we received from the Indians, the Ka-wa-kash-ka-ga-ma river, after flowing a considerable distance westward, turns northward, passing through two lakes, and finally runs eastward to the Kenogami. This great bend in the river sweeps round Os-kan-a-ga or Bare-Bones Lake, which

is said to be one day's journey by canoe (or about twenty-five miles) in length. Below the lakes just mentioned the river is called Pe-geon-kai-geon, after the lowermost of the two lakes. This route is sometimes used by the Indians in coming from the Albany to Long Lake House, the amount of portaging being less than in following the Kenogami river the whole distance. A few miles below the trail to Wa-wong Lake, a branch, which the Indians follow going to Lake Nipigon, is said to enter the Ka-wa-kash-ka-ga-ma river from the southward. The upward continuation of the river is found at the south-western extremity of Fleming's Lake. Spring-water Lake lies about a mile and a half south of this part of the river, into which it discharges by a small stream, and measures three and a half miles in length, in a north-easterly direction. Six other lakes, connected with the same water, are found at short distances south-west of Fleming's Lake. One of these is over three and another over two miles in length. Following up the main river, at about nine miles in a straight line south-west of Fleming's Lake, we enter Mountain Lake, which has the same general bearings, and is three and a half miles in length. A rapid about a mile above Mountain Lake, interrupts canoe navigation for the first time in the thirty-one miles of this river and its chain of lakes which we examined; while below the point reached by us, opposite Wa-wong Lake, the Indians informed us that no portage occurred for a long distance. The whole country explored in connection with the Manitou-namiga and Ka-wa-kash-ka-ga-ma river, is comparatively level. Here and there a gneissoid hill is seen rising one or two hundred feet above the general surface. The most remarkable is Granite Mountain, on the south side of Mountain Lake, which is composed of granite or massive gneiss, and has an elevation of about two hundred feet over the lake. This region is overspread with a fine yellowish sand, beneath which a considerable thickness of gravel is found in some places, and, underlying all, a light-coloured clay is occasionally seen. The sand and gravel are largely developed around Wa-wong and Fleming's Lakes, whose banks are from fifty to one hundred and fifty feet in height, the shores consisting of smooth, curving sandy beaches. Back from these lakes the surface of the country is rolling, and the soil generally of a light sandy and gravelly character. The wood consists of white birch, aspen, tamarac, spruce, balsam, fir, white cedar, and the banksian pine, or "cypress," many of the trees being large enough to be of value for timber. A country similar to the one just described is reported to extend in the neighbourhood of the Height of Land westward to Lake Nipigon, and eastward to New Brunswick House, on Moose river. As illustrating the general level nature of a portion of this region, I may refer to the fact that we did not find it necessary to make a single portage in going all the way from the English river to Head Lake, except the short one already mentioned at the mouth of the Manitou-namig river; while the outline of the country on either side of this river and the lakes was usually low and level. As already stated, no portage occurs along the Ka-wa-kash-ka-ga-ma river in the part examined (about thirty-one miles), or for some distance further down. The rocks met with in the country explored north-west of Long Lake House consists of Laurentian gneiss, with some black mica-schists. The general strike is west south-westerly, the same as throughout the extensive regions already referred to."

The first, second and third rapids or falls of sufficient magnitude to require portages, on the Kenogami River, occur about three, eight and eleven miles respectively from Long Lake. Its bearing for the first ten miles is northerly, turning however to east north-east a little above the third portage; a course which with some unimportant deviations it maintains to the eighteenth or last portage.

The Height of Land plateau is here almost crossed in a N.N.E. and S.S.W. direction, by a fine navigable stretch of water. The edge of this plateau on the Lake Superior side is not more than eighteen miles from Jackfish Bay on the north shore of that lake, and four miles from the southern extremity of Long Lake. The edge of the plateau on the north side is at or about the third portage, on the Kenogami river, above referred to. This makes the whole width of the plateau in a N.N.E. direction, about sixty-seven miles, of which fifty-five miles are covered by Long Lake and the first navigable stretch of the Kenogami river. The actual "water-parting" or "divide," is about a mile only south of Long Lake, hence at this point that part of the plateau lying north thereof is about 64 miles, and that south, only 3 miles in width.

At the third portage, what I have called "the central or intermediate belt" of this territory, begins. This belt is characterised by numerous falls and rapids in all the rivers by which it is intersected or crossed.

In the next stretch therefore, of about forty miles, no fewer than fifteen portages and demi-charges are met with. If Dr. Bell's estimates of the levels of Long Lake and of Pine Lake and Pembina Island on the Kenogami River be correct, the descent from the upper edge of this belt at or about the third portage, to the lower edge, at or about the eighteenth or last portage, cannot be less than 400 feet—or ten feet per mile. As there is I believe a corresponding descent or slope in the surface of the adjacent country, there can hardly be a doubt that the land in this intermediate belt is better drained, and therefore drier than in most other parts of the territory.

The width however of this belt, is considerably less than it is at any other part I have seen, being only about 40 miles, and that on the general course of the river which appears to be diagonal rather than straight across it.

On the other hand, the width of the coast belt or plain, is greater here than in any other part of this territory. Measured due north from the eighteenth portage, where it may be said to begin, to the coast, it is not less than 350 miles, and by the Kenogami and Albany Rivers about 250 miles. The palæozoic or fundamental stratified rocks of this great Hudson Bay basin, approach also much nearer to Lake Superior here, than at any other point known to me. If the late Mr. Herrick, P.L.S., was not mistaken in thinking that he had seen (as he is reported to have said) fossiliferous limestone "in situ" near the first portage on Pic River, the distance between these rocks, both presumably palæozoic, the one north and the other south of the height of land, will be little more than seventy-five miles. I have myself seen pieces of such limestone at the portage referred to, so large and angular as to justify the impression that it may possibly be "in place" at some point not very far distant. If not, these pieces must have been transported from the north, over the height of land as many other smaller and more rounded pieces of limestone undoubtedly have. Indeed on the bank of Long Lake itself I found two large pieces of fossiliferous limestone, which had beyond question been brought from the north, one of which was not less than twenty pounds in weight. Long Lake, it will be remembered, lies on the height of land plateau, and is, according to Dr. Bell's estimate, 1,066 feet above the level of the sea, and about 460 feet above Lake Superior.

It may be mentioned incidentally here, that Long Lake on this route, Crooked Lake on the Michipicoten route, and Matawagogig on that by Abitibi, are I think the least elevated portions of the great height of land plateau east of Lake Winnipeg and Nelson River. And that if there had existed any barrier at or near the outlet of Lake Superior, 500 feet in height, the waters of that lake would, I believe, have run northward into Hudson's Bay. On the other hand, supposing during the glacial epoch, Hudson's straits to have been closed or obstructed, the ice would possibly have moved southward over the height of land plateau to a greater depth, if not with greater speed, at these lower points than elsewhere. At, or indeed a little above the eighteenth portage, the Kenogami River enters the northerly or coast belt of this territory. This is described as being "a plain or flat country, largely overspread with muskegs or peat mosses, almost treeless except near the rivers, and extending from the foot of the last great falls or rapids, the northern edge of the intermediate or central belt, to the coast of James' Bay."

From this point to the Hudson Bay Companies post at Mamattawa, sixty miles, and from thence to its junction with the Albany River, about the same distance, the Kenogami River flows through this coast belt, as does also the Albany River itself, from thence to Albany factory. From "the forks" or junction of the Kenogami and Albany to James' Bay is roughly estimated at 130 miles, making the total distance from the eighteenth portage to the coast, about 250 miles, in which long stretch no falls or rapids occur to interrupt canoe navigation, or even that of larger craft at some seasons of the year. The other branch of the Albany is navigable in like manner to Martin Falls, about 80 miles above "the forks."

The more common physical features of this great plain or coast belt have been already sufficiently described in the preceding pages. It is unnecessary therefore to say more, as anything of special interest or importance will be given under other heads.

EXPLORATIONS IN 1884.

In 1884 my attention was devoted almost exclusively to a more particular and careful examination of the route from Lake Superior to James' Bay *via* Long Lake. The special object had in view was thus explained in the report for that year, p. 7. "In the report which I had the honour to submit of my explorations in this territory last year (1883), I called the attention of the Government to the importance of an early opening up and development of its agricultural, timber, mineral, and other resources, should the award of the arbitrators be confirmed."

"I had formed a very favourable opinion of what is known as 'the Long Lake route' to James' bay, on my somewhat hurried trip over the greater part of it last year.

Although late in the season, and at a period when the water in the rivers is usually low, I was alike pleased and surprised to find that from a point some fifty miles only north of Long Lake, to James' Bay, a distance of 250 miles, the navigation of the Kenogami and Albany Rivers was perfectly uninterrupted. Knowing that nearly all these northern rivers rise from ten to twenty feet in the spring above their summer level, I felt more than sanguine that this entire stretch would be found navigable by steamers of light draught, for at least six weeks after the breaking up of the ice. Having obtained the sanction of the Government I determined to examine this route more carefully, and if possible at an earlier period in the season, and should my expectations in reference to the navigable stretches be realized, it was further my intention to have explored for, and selected the best and shortest lines for the roads it would be necessary to make, in order to render the route complete."

This exploration was accordingly proceeded with during the summer, and the results, in some respects disappointing, were embodied in my report for that year, and printed in 1885.

The award of the arbitrators defining the northern boundary of the province, having been set aside by the decision of Her Majesty's Privy Council in 1884, it seemed advisable thereafter to confine my explorations to the height of land plateau, and to the intermediate or central belt, until the claim of the province to the northerly or coast belt (rendered somewhat doubtful by that decision) should have been established in the courts of law, or admitted by the Dominion Government.

Consequently the summer of 1885 was devoted to an examination of the country lying north of Lake Missinaibi and included between the Missinaibi River on the west, and Kapuskasing River on the east. In this tract, partly on the height of land plateau, and partly in the central belt, I expected to find some of the best land in the territory.

As this report has not been printed, and as it relates to a portion of the territory of more than usual importance and interest, it is now proposed to give it almost "*in extenso*" so far as it relates to the more important subjects dealt with in the present one.

TOPOGRAPHY.

EXTRACTS FROM REPORT FOR 1885.

If by some convulsion of nature, the present outlet of Lake Superior had been closed, most people imagine that its waters would have found vent at some point on the south shore. The least elevated portion of the rim of the Lake Superior basin has generally been supposed to be situated at or near the south-western extremity of the lake. Distinguished geologists have even speculated on the consequences which might have ensued from the pouring out of its waters into the valley of the Mississippi. If, however, the lowest part of the watershed on the south side be as I believe, 600 feet above the present level of the lake, the popular notion on this subject is entirely wrong. The water of Lake Superior, if thus forced to find another outlet, would flow northward into Hudson's Bay, not southward

into the Gulf of Mexico. The water-shed between Dog Lake and Crooked Lake at the source of the Michipicoten River, is only about 430 feet above Lake Superior, and between the sources of Pic and Black Rivers, and Long Lake it is only a few feet more. Indeed, nearly the whole distance (150 miles) between Dog Lake and Lake Nipigon, the water-shed on the north or Canadian side is considerably lower than the least elevated portion of the water-shed on the south or United States side.

I have before had occasion to remark, that the height of land on which the water-shed, between our great Lakes Huron and Superior and Hudson's Bay is situated, does not consist, as some may suppose, of an elevated range of mountains, or even a sharp, well-defined ridge, on either side of which brooks and streams of water descend rapidly in opposite directions. It is really an extensive, and by no means very elevated tableland or plateau. Rough and broken it certainly is with low ridges and hills, interspersed with numerous lakes, especially the southern portion of the plateau, or that part lying nearest to the great lakes. But the elevation of the one, and the depressions occupied by the other, are inconsiderable. The water-shed is usually much nearer to the southern edge or boundary of this plateau than the northern, and the rivers from the point at which they leave the plateau, until they enter Lake Superior, are much shorter and descend more rapidly than those which flow northward into James' Bay. These features are very noticeable in this section of the country.

Ascending Michipicoten River from Lake Superior, about forty miles brings us to the little Stony Portage and Lake Mattagami. In this short distance the fall is not less than 420 feet. From this, the southern edge of the plateau, to the water-parting between Dog Lake and Crooked Lake is about 15 miles, and the difference of level very trifling. For although connected by a somewhat contracted channel, Mattagami and Dog Lakes are to all intents and purposes one lake. In the spring of the year, when the water in all the lakes and rivers is high, there is very little difference of level between Dog Lake and Crooked Lake, and even in summer, the difference does not amount to more than five feet. Now from the water-shed, northward to the northern extremity of Lake Missinaibi, the descent is only about 15 feet, and distance 30 miles. From this point, to what I take to be the northern edge of the height of land plateau, at the foot of the lower swampy ground, is another 25 miles following the bends of the river, but only about 15 miles in a straight line. The fall in this stretch is roughly estimated at from 45 to 50 feet. Thus the whole width of the plateau in a north-easterly direction, or nearly at right angles to the bearing of the water-shed, is 60 miles. Of this 45 miles lie to the north and 15 miles to the south of the water-shed. The difference of level between the two extremities is estimated at 55 feet. The descent southward from the watershed to Stony Portage being, say 10 feet, and northward from the same point to the foot of the swampy ground, being 65 feet. North of the foot of the swampy ground we find rapids and falls in quick succession, until we cross St. Paul's Portage, and arrive at the foot of "Thundering Waterfalls." This stretch, 18 miles in length by the river, is not more than 10 miles in a straight line, and the descent is roughly estimated at 144 feet.

Below this point the Missinaibi River flows, for the most part, through a low, flat country for 25 miles, or until it reaches "the Two Portages." In a straight line this stretch is about 20 miles in length, and the bearing is nearly north. There are several short rapids, but none where portages are necessary, until we come to the point mentioned, which is two and a-half miles below the junction of Brunswick River.

In this stretch the current is generally moderate and water deep. The total fall, inclusive of the rapids referred to, does not exceed 20 feet. About three miles below Thundering Waterfalls, a river seemingly $1\frac{1}{2}$ or 2 chains in width falls in on the west side. This is called Pazhushkootai on Dr. Bell's map. Another two miles further, and the portage to Brunswick Lake takes off on the same side, and five miles below that we come to the Opazatika Portage on the east side. It is obvious therefore, that the River Missinaibi at and below this point, has Brunswick Lake on the west, and Opazatika Lake on the east side.

On the Kapuskasing River, again, at and above the sixth portage, there is a fall in the river of 168 feet in about eight miles. This fall corresponds so closely with that which occurs in Missinaibi River (144 feet) between the lower swampy ground and Thundering Waterfalls, that I am led to believe both descend, either to a lower plateau or steppe; or to the bed of a large and partially drained lake or lakes which at one time covered a wide extent of country, and probably included both Brunswick and Opazatika Lakes. This lake may have stretched considerably to the eastward of the Kapuskasing River, but it is not probable that it extended far west of Brunswick Lake, for the surface seems higher in that direction, and the Indians say that there is comparatively little muskeg or swamp in the country lying to the west of Brunswick Lake.

Another noticeable feature as we descend northward is, that the hills which at or near the water-shed, rise to a height of three, four, and in some instances five hundred feet above the level of the plateau, fall off so rapidly in number and elevation that before the northern limit of the plateau is reached, a hill or ridge over 150 feet in height is rarely to be seen. On the other hand the lakes which cover such a great area on the Height-of-Land Plateau, decrease in number, size and depth as we approach its northern limit; and this is the more remarkable the further north we go. In Lake Opazatika for instance, the water was nowhere more than 42 feet in depth where tried by us, and I doubt if Brunswick Lake is very much deeper. On Grassy-Point Lake, still further north, we obtained no soundings which showed more than from 10 to 20 feet, but in the spring the water is doubtless somewhat deeper.

While ice jams are of frequent occurrence in the lower stretches of all the rivers which flow into James Bay, I have not met with many very decided indications of these phenomena in this part of the territory. There is no doubt, however, that all the rivers and streams are, more or less, liable to occasional obstruction by ice, drift-wood or land slides in the spring; and in view of such possibilities, settlers should be careful to select sites for their dwelling houses where they will be in no danger whatever from the floods thus occasioned.

CHARACTER OF THE LAND.

In that part of the Height-of-Land Plateau, lying to the south of the outlet of Lake Missinaibi, but a small portion of the land is arable.

It must not, however, be assumed that it is therefore worthless. For, though unfit for the growth of grain, or even root crops, much of it will afford tolerable good pasture, and almost all of it is suitable for the growth of forest trees of more or less importance and value. Even the areas occupied by lakes, marshes and swamps must sooner or later become valuable. As was pointed out in my report for 1883-4, p. 64, the lakes on this plateau, under intelligent methods of fish culture, may, in the near future, be made to yield food equal in value, acre for acre, to that which can be realized from the arable land. The swamps, too, can be drained, and will then become arable, and large areas, both of marsh and muskeg, can be reclaimed, and made available either for cultivation, pasture or the growth of timber.

In the northern part of this plateau, from the outlet of Lake Missinaibi to the foot of the lower swampy ground, there is, I think, a larger proportion of good land. The swamps are still numerous and extensive, but the lakes occupy a smaller area, and there is less rocky and stony ground. This belt is about fifteen miles in width, in a northerly direction, and extends from the Missinaibi River eastward to the Kapuskasing River. So far as my explorations enable me to form a judgment I consider that one-fourth of part of this belt may be arable, and a still larger proportion of the land suitable for pasture.

Between the northern limit of the Height-of-Land plateau, and that immediately below it, (which we may call the intermediate or central plateau), a narrow strip or belt of some ten or fifteen miles in width occurs which differs in some respects from both, and cannot properly, therefore, be classed with either. In passing through this strip or belt, which commences at the foot of the lower swampy ground and terminates at the

foot of the Thundering Water Falls ; the Missinaibi River, as stated elsewhere, descends not less than 144 feet, and the Kapuskasing River some 32 miles to the eastward, in passing through, what I conceive to be the same belt, descends about 168 feet. Though perhaps somewhat less sudden, there is, I believe, a corresponding dip or descent northward in the general surface of the ground. If this fall takes place in ten miles it would amount to fourteen and a half feet per mile in the one case, and nearly seventeen feet per mile in the other. Now the descent in the Height-of-Land plateau above being only one and a half foot per mile, and in the central plateau below about three feet per mile, it is obvious that even if the descent in this intermediate belt be no more than twelve feet per mile, it is eight times that of the Height-of-Land plateau, and four times that of the central plateau below. From this great difference in the slope it follows that the natural drainage should be exceptionally good, and that the proportion of arable land should be exceptionally great in this strip or belt.

This inference is justified by the facts, so far as known to us, and these facts in turn serve to explain the difference of opinion between Mr. Gamsby and myself in regard to the quantity of arable land in the adjacent plateau. The engineers and explorers of the Canadian Pacific Railway Company, under the guidance of Indians evidently well acquainted with the topographical features of the country, have, apparently, run their most northerly exploratory line almost entirely within this belt, from the point where it crosses the Missinaibi River eastward to the Kapuskasing River. Hence Mr. Gamsby has been led to state in his report "that in the section between the Missinaibi and Kapuskasing Rivers, thirty two miles in length, and probably from thirty to sixty miles in width from north to south, *fully seventy per cent. of the soil may be classed as very good,*" an estimate which appears to me too high.

It was this favourable estimate of Mr. Gamsby, made doubtless in perfect good faith, and founded on what he saw and heard of the country in the immediate vicinity of the line, which led me to hope that we should find here one of the finest and most extensive tracts of arable land in the territory. And to place this matter beyond doubt, and to be able to advise the Government as to the best mode of opening up to settlement a tract so valuable, were the principal objects of my explorations this season.

I have already given my opinion in reference to the character of the country lying to the south, and will now proceed to describe to the best of my ability, the character of the land and soil in the great central plateau lying immediately to the north of this belt. As was stated in the narrative of our explorations, with which this report is prefaced, the point where Mr. Gamsby's line crosses the Kapuskasing River is about seven miles below the outlet of Lake Kapuskasing. This is not far from the southern edge or boundary of the intermediate strip or belt, its lower or northern limit being at the foot of the sixth portage. Below the sixth portage we enter upon the central plateau, and the character of the river and of the adjacent land changes materially. The descent in the river does not amount to more than 20 or 25 feet in the next 18 miles that we continued to follow it, and my guide says that for at least 10 miles further there is little or no fall. The current is slow, the water deep, and the immediate and visible banks are low. Bottom land, which is neither very common nor of great extent in the plateau above, and still less so in the intermediate ten mile belt, now spreads out on both sides. These river bottoms, at first, are so far elevated above the river as to be flooded only when the water is at its height during the spring freshet. The soil is a fine sandy loam, and if not suitable for grain, on account of the floods, would grow good root crops, and make fine meadows. The timber is too heavy on these bottoms to admit of the higher banks beyond being seen at any point. I am of opinion, however, that these alluvial flats are bounded by such banks for at least five miles, or until we come to the seventh and last portage. I landed and went back on the west side, about a mile before we came to this portage, and in a few hundred yards came to this bank. It was about 40 feet in height and led up to the plateau. The soil was dry and of a somewhat light and sandy nature, but carried good sized and healthy timber, chiefly spruce, white birch and cedar. Some of the trees being from 50 to 60 inches in circumference. Below the seventh portage the river bottoms become gradually lower, still widening, however, as we advance. At length the

banks begin to be swampy in places, and finally marshy by the time we arrived at Kajeewa-ta River, where the route to Lake Opazitika takes off. My opinion is, that the Plateau, on both sides of the river, has gradually descended until it is very little if at all higher than the immediate bank of the river. This portion of the plateau at any rate has, I feel convinced, at one time been occupied by a lake, which extended westward to and included Lake Opazitika. Where its northern and eastern banks or limits may have been cannot even be conjectured, the country in both directions being so low and flat. My impression is, however, that this lake, while covering a large surface, has been exceedingly shallow, and so full of islands that the dry land may have been nearly equal in extent to that which was submerged. In fact, exhibiting on a larger scale the leading features presented by Lake Opazitika at the present time. This (Opazitika) lake consists of a number of sheets of water, connected with each other by channels, but so crowded with islands that in the summer (when the water is low) it has rather the appearance of being half a dozen small lakes than of a large single lake. As the water is still further drained off by the gradual wearing away of the barriers at its outlet Lake Opazitika will eventually present very much the same features as the country lying between it and the Kapuskasing River now presents. We will find numerous areas of dry land (once islands) surrounded, not by water, but by swamps more or less heavily timbered, and interspersed with marshes and small lakes or ponds.

In crossing over from Kapuskasing River to Lake Opazitika we passed, for the first six miles, through small lakes and marshes and their connecting creeks. Recent fires had burnt off both timber and soil in many places, and left more than the usual proportion of bare rock exposed. Altogether this tract did not present a very inviting appearance. Of the remaining seven miles nearly five consisted of portages over drier areas, which, as above mentioned, I conceive to have been at one time islands. On the first portage (two miles in length) the land, with the exception of a small muskeg about a quarter of a mile wide, is arable and of fairly good quality. The soil is a sandy loam in most places, but under the muskeg it was clay. It bears good sized and healthy mixed timber throughout. I noticed a number of spruce from four to six feet in circumference, and many good sized balsam, birch, aspen, with some few poplar. Bush maple, mountain ash and alder formed the underbush, and wild gooseberries and currants were not unfrequently observed.

On the second portage, which was two and a half miles in length, both soil and timber at the eastern end are good. The soil is a clay loam. The timber consists of aspen, birch, cedar, spruce and balsam of large size. Midway this portage also crosses a muskeg, with sphagnum moss underlaid by peat, and bearing a poor growth of tamarac and spruce. At the west end we again found better soil and larger timber, but neither was as good as at the east end.

Spruce, cedar and tamarac line the banks of the creek and marsh through which the remaining three miles of the route passes before we enter Opazitika Lake.

I had hoped to find Lake Opazitika surrounded by the fertile belt, which Mr. Gamsby had reported as occurring between the Missinaibi and Kapuskasing Rivers, and attaining, as he supposed a width of from 30 to 60 miles, in a north and south direction. Hence I had made it my principal objective point in this season's explorations.

If my expectations had been fully realized, in respect of the fertility and extent of the arable land, it was my intention to have sent one of my canoes back to the Hudson Bay Company's Post at Missinaibi, for a further supply of provisions, and to have remained here making excursions in different directions for at least a month or more. It will be seen, however, from what has already been said on this subject, that when we descend from the higher and drier belt (within which Mr. Gamsby's line is situated) and enter on this lower or central plateau, although the soil may be just as good, so much of the land is swampy or marshy that a comparatively small proportion can be called *arable*.

As viewed from the water the shores of Lake Opazitika, and most of the islands, present a rocky and rather barren appearance, but the very general and healthy growth of aspen-poplar is indicative of a tolerable good soil.

On examination this proved to be generally the case, the bare rock rarely rises far above the high-water level of the lake before it is covered with a good depth of soil. This is usually the light coloured clay, or clay-marl, so common in this territory. In some places a sandy or gravelly loam is found overlying the clay. There are several rocky ridges from one hundred to one hundred and fifty feet in height, and on the top of these limited areas of bare rock are exposed, but the slopes are almost always clothed with timber. These ridges occur only on the north-western and western sides of the lake. I ascended two or three of the highest in the hope of being able to get a view of the surrounding country, but the growth of timber, and the thickness of the foliage would only admit of very partial glimpses being thus obtained.

As stated in the narrative of our explorations, John Driver, one of my party who possessed some practical experience, was left to explore this Opazatika Lake while I descended the Opazatika River to Lake Na-sko-se-wa-kan or Grassy-point Lake. His report is of sufficient interest to justify its insertion, especially as I was able to verify it in many important particulars, and have every reason to believe it quite reliable.

It is in the form of "a diary," giving me an account of his daily work during my absence, and (with a few verbal corrections which do not alter the sense) reads as follows:

July 17. "My first days work was up the Grassy River. This river comes in from the south at the middle of the narrows, between the lower and middle Opazatika Lakes. Its general bearing is north and south. The banks are very low and marshy, with a fine growth of blue joint grass on both sides, from four to five acres in width, and extending six or seven miles up the river. This stretch of the river is from two to three chains in width, with no perceptible current. The water is of a dark-brown colour and quite deep. Two miles up I came to a creek which comes in from the north-east and I followed it, shoving my little canoe through the rushes. In about three-quarters of a mile it brought me to a small lake about a mile in length, with the same fine looking grass on the north side. The timber is mostly tamarac, poplar and spruce. The south side of the lake is bordered with gneiss rock forty or fifty feet high, and this is ribbed with small veins of quartz. I did not notice any minerals in them. I landed here and went back a mile to see the soil. The rock does not go far. At half a mile the ground falls away gradually. The subsoil is a grey loam sixteen to eighteen inches deep, and rests on a bed of calcareous clay. The timber is aspen-poplar and white birch, and some spruce quite large. After getting dinner I came out by the same creek that I went in by and came to the Grassy River again. In about one mile more I came to the upper route to the Kapuskasing River. It looks to me to be much the same as the one we followed. The banks of the river are still low, and there is no perceptible current. Here the river takes a turn to the west, but soon comes back to the south again. One mile more and the ground begins to rise and the current begins to show, as the river gets narrower. Cedar begins to overhang the banks of the river, otherwise the timber is the same as it was at the little lake, and the soil is also the same. One mile and a half further the bank on the west side is about ten to fifteen feet high, and on the east side the ground is low and looks to me to be a swamp or muskeg. For some distance here no rock is met with on the Grassy River. At 2.30 p.m. I came to an obstruction of drift-wood which extended about half a mile up the river, and we could not get over it without carrying our canoe. After examining the soil and timber, which I found to be the same, I turned back here. At a steady speed of about three miles an hour it took us till 6.30 p.m., or three and a half hours, to get back to camp."

July 18. "I started at 6 a.m. on the south-east side of the middle Opazatika from our camp to the point on which the Indian camp is situated, its bearing is 20° east of south, and distance three-quarters of a mile. The depth of water across this stretch is from two to eight fathoms. Then south one mile the shore is sandy and gravelly, with quite a number of fossils. The bank is clay some ten to thirty feet high. Then rounding this point the course is 10° east of south one and a half miles. This is a sandy beach all the way. Then the bearing is west. The beach here is bouldery, with some

small pieces of limestone. The bank is low, from six to ten feet high, and is of a calcareous clay. After rounding a number of small bays and points the bearing is north for about two miles. This west side of the lake is all rock, which I take to be gneiss, with large trap dykes. The gneiss is mostly ribbed with quartz, running in every direction. Most of the boulders I took to be diorite. The timber is chiefly aspen-poplar, white birch, spruce, and a few small red pine. The depth of water is from four to five fathoms in this middle lake, and the number of islands, big and little, is twenty-five. In this portion of the lake the bearing is north-east and south-west, and the length five miles.

July 19th, being Sunday, I moved the camp to the island, south-west one mile from our old camp. July 20th, I started at six a.m., and entered a narrow channel leading to the south-west arm of the lake, called by the Indians, the south end of Opazatika Lake. This channel is about a quarter of a mile in length, and bears south-west. The water is very shallow, not more than from four to six feet deep, when I went through it. I then coasted along the east side, and in half a mile, came to a high rock some 70 or 100 feet in height. This rock is gneiss, with large veins of quartz, bearing generally north and south, and a large trap dyke. I have met with this dyke in several places; its bearing is north and south, and the width about 100 feet; its colour is dark blue. There is no apparent change in the rock for about one mile south, but I could not get ashore in some places. I found some fossils along this shore. At the south end of this arm of the lake I came to another channel half a mile long, and bearing south. "This channel is about four chains wide. I then came to a lake about three-quarters of a mile long and one-quarter of a mile wide. The bearing of this lake is a little west of south. At the south-west end there is a good sized river which my guide George ———, informs me, is called Opazatika River. He further says that the Indian hunters have a way of going to a good sized lake some two or three days travel up this river. As far as I could see the banks seem to be very low and grassy. The bearing from the mouth is south-west as far as I could see up it. I then made my way homeward, coasting the west side. On this side the rock is the same as on the east side, only much higher. All the north-west side or end of this arm the ground is low, with a very healthy looking growth of fine aspen-poplar, white birch and spruce. The soil is of a black loamy nature, from 20 to 24 inches deep, resting on a bed of calcareous clay. The depth of the water is about seven fathoms. This arm is about two and a half miles in length, and one mile in width. The bearing is S.S.E. and N.N.W. I now returned to camp the same way as I came.

July 21st, started at six a.m., going through the east channel to the north arm which the Indians call the North Opazatika. This channel is full of islands, so I took the east route. This east side is rocky. It is gneiss rock and full of felspar. The shore is bouldery, some diorite and some small pieces of limestone. I found quite a number of fossils. The bearing of this channel is N.N.W. one and a half miles, and from fifteen to twenty chains or one-quarter of a mile wide. We then came to two small islands, the first one the Indians call Iroquois Island and the next is Green Island. On the north side of this last is a large vein of felspar ten feet in width. Its course is east and west and it dips south at an angle of 70° . The east side of this arm is all rock, but not more than ten or fifteen feet high, and consisting of felspar with veins of quartz. The beds of gneiss all have the same bearing or strike, namely, E. and W. Along this shore I got lots of fossils and some small pieces chert. The rocks are covered with a good depth of good soil, and the timber is principally aspen-poplar, spruce some white birch and a few red pine. At the north end I went back from the shore about half a mile to a high barren gneiss ridge some 200 feet above the level of the lake. In this rock I saw a large vein of quartz twelve feet wide, and full of white mica. The west side has been run over by fire some ten or twelve years ago. The soil on this side is clay, and seemingly good. The bearing of this arm is ten E. of N. and ten W. of S. It is three miles long by one wide. The depth of the water is from three to four fathoms. I then came through the west channel which runs south-west and north-east. Following this channel I entered the middle lake at a point called Bob's Shanty, and thence turned eastward through the islands to the camp.

July 22nd, I started at seven a.m. to examine the islands, and found them to be well timbered with aspen-poplar, white birch, spruce, cedar and some red pine. These islands

are rocky all around the shore, but on going inland I found them to be covered with good soil and quite level. The most of them have from twenty to thirty acres of good tillable soil on them. One or two contain over 100 acres. In the whole of the lake there are forty-ore islands big and little. Finishing my exploration of the islands I returned to camp and found that you had got back from your trip down the Opazatika River.

I cannot see any reason why this part of the country should not be suitable for farming, as the fine grass growing on the meadow land on the borders of the lakes and rivers shows that the soil is good and rich, and tends to good vegetation. The green and healthy looking growth of timber shows that there is nothing wrong about the climate. The shortness of the season is the only drawback that I can see. An old hunter (Bob, by name) told me that he had planted some potatoes on one of the islands in the middle of the lake (which I call Garden Island) in June, and returning to his hunting ground in the fall he found a good crop and a much larger yield than he expected. This shows that roots would do well, and I have no doubt that the hardy sorts of grain would do well also. As for meadow land or rich pasture for cattle or sheep, there could not be better. In traversing the lakes I was surprised to see the large shoals of fish. My guide George told me that these lakes abound with fish. I got some white fish from an Indian and found them very good. I am told that there is white fish, herring, pickerel, pike and suckers in this lake, and that the Indians catch them with nets all the year around."

Extending along the banks of the River Opazatika from where it issues out of the lowest lake Opazatika, to the junction of Big River, there is an almost unbroken belt of land on each side which is more or less arable. The distance between these points is roughly estimated at about twenty-five miles. North of this junction as far as I went, say about twenty-three miles, the country is so low and swampy that there is very little arable land either contiguous to the river or on the shores of Lake Na-sko-si-wa-kan.

The width of the belt of arable land above referred is very variable, as is also the character of the soil. I believe that it nowhere exceeds six miles including the land on both sides of the river, and is frequently less than one mile in width. The soil on the lower ground is usually clay. On the higher it is sometimes sandy or gravelly, and at other times the light coloured clay above referred to. This clay soil when found on ridges or knolls is not always fertile. It is sometimes so indurated and hard as to be almost impenetrable by the roots of trees or plants. This will be alluded to more fully when I come to treat of the subject under its appropriate head. One of the finest tracts of land I saw is situated a little above the second portage, which occurs after the river issues from the lowest lake. From a little pond at this part I went back in a north-westerly direction fully three miles and found undulating land, moderately dry, and a good soil. On the lower ground the subsoil was a clay loam and on the higher a sandy loam. There was more than the usual thickness of leaf mould on these subsoils. The present forest trees consist chiefly of aspen and canoe birch, with some balsam and spruce. None of these trees, however, exceed three feet in circumference. It would appear that the former forest had been destroyed by bush fires and that the present timber had not as yet had time to attain its full growth. The original forest has evidently contained many fine cedar, for great trunks six and eight feet in circumference may still be seen rotting on the ground.

John Driver, who made an excursion inland, on the opposite side of the river, reported that he also found a belt upwards of a mile in width of good land. The land on the eastern side of the river is on the whole, however, lower, and the arable belt narrower than on the west. But in both directions we always came at last to muskegs or swamps.

On the portages (about three miles in length) between Lake Opazatika and the Missinaibi River, the land is mostly dry, and, if not arable, would if cleared and laid down to grass, afford excellent pasture. I think, however, from the healthiness, size and character of the timber that much of the land on the first or most easterly portage may be fairly classed as arable; notwithstanding that the soil is somewhat light and sandy on the higher and drier portion. The second portage strikes the Missinaibi River about ten miles below Thundering Water Falls. Between this and the junction of Brunswick River (about twelve and a half miles lower down) we

made several excursions inland on the east side, with the intention of ascertaining the nature of the country lying between the Missinaibi River and Opazatika Lake and River.

Although we selected what we thought the most likely points, we only partially succeeded in our object. After ascending and crossing a low ridge, the soil on which was dry and fertile, the land fell away or descended towards the east, and in less than a mile from the river we always came either to swamp or muskeg. In these muskegs the walking was so bad that we were unable to penetrate anywhere further than about four miles. Thus, whether we tried to penetrate eastward from the Missinaibi River or westward from Opazatika Lake and River, the result was that our further advance was stopped by muskegs. It would appear from this that with the exception of a somewhat limited belt of arable land on the eastern or Opazatika side, and a similar but much narrower belt on the western or Missinaibi side, the intermediate country is either swampy or muskeg. In these muskegs and swamps we met occasionally with more elevated spots which were drier, and bore a larger and better growth of timber. These must, I imagine, have been islands in the lake which once, in all probability, overspread this part of the country.

Above or to the south of Opazatika Portage the banks increase in height and the land becomes drier on the east side as we ascend the river until we arrive at Thundering Water Falls. The soil is in some places, however, seemingly light and sandy. But I have no doubt that there is a much larger proportion of arable land in this stretch than in that below the Opazatika Portage.

On the west side of Missinaibi River from Thundering Water Falls to the south end of Brunswick Lake there is also, I believe, a considerable portion of dry, and more or less arable land. From that to the junction of Brunswick River there is a tract of low lying land, most of which is doubtless flooded for a short time in the spring, and some of it is probably at other seasons. But there is, notwithstanding, I am persuaded, a large proportion of this land which has a good soil, and will be valuable for hay and pasture, if not also, for root and grain crops.

In that portion of the central plateau which I have examined this season, I do not think we should be safe in assuming that more than one-third part is arable in any reasonable sense of the term.

All the Indians agree in saying that west and south-west of Brunswick lake and river, there is a large tract of country in which there are very few muskegs, and where the aspen is the principal forest tree. It would be desirable in my opinion to have this section examined. I think it might be done without much difficulty or expense very early in the season when all the rivers and creeks are more or less navigable. If any considerable body of arable land should be found there, it could be opened up for settlement as easily, if not more so than that which is the subject of this report.

NATURE AND ORIGIN OF THE SOIL.

In the preceding description of the land reference has been made in very general terms, only, to the composition of the soil. I shall therefore, under this head, enter more fully into this important branch of the subject. Notwithstanding the extent of the surface overspread by lakes, marshes, swamps and peat mosses, we have seen that there still remains in this central plateau a very large quantity of dry land, and also, that this land supports a more or less vigorous growth of trees and shrubs. These facts alone, however, will not enable the Government to form any reliable opinion as to the value of the country from an agricultural point of view.

Every pioneer knows, that the description, size and healthiness of the natural forest afford, presumptive evidence at least, as to the character of the soil as well as of the climate. But there are few settlers in the western parts of our Province, who do not also know that whole groves and forests of Canada's favorite tree, the sugar maple, may be found growing, and that vigorously, on land that is not really arable. Or at all events on land which can only be rendered fit for cultivation at a cost, for the removal of

boulders and stones, that would in all probability, reclaim and render arable an equal area of swamp or muskeg. So far as my experience goes, the sugar maple, the black birch and the elm, are found in only a very few places north of the watershed. The oak and the beech I have never met with.

The deciduous or leaf-bearing trees on which we are compelled to rely, as affording any indications of a favourable nature, are the aspen and the white birch. Of these, the aspen is I think, the better guide, although greatly inferior to and less reliable than the maple. The aspen may be found not only on land that is too stony, but on soils so thin as to be barely if at all arable. A few inches of leaf mould on a stiff clay, or even a poorish sandy or gravelly soil, if neither too wet or too dry, is all that it would seem to require. Again, on what appears to the eye at least, exactly the same soil and under precisely the same circumstances, we may find on one area, a growth consisting almost entirely of aspen, and on another entirely of spruce. The explanation of this, is I believe, to be found in the fact, that spruce will grow on any soil in this territory, with the exception of the dry and light sandy soils, and that in a sort of rotation, it occupies the better class of soils, alternately with the aspen.

The *rotation* here alluded to, is I imagine, from the appearance of the forests, somewhat of the following nature. First course, aspen with some spruce, canoe birch and balsam. Second, spruce with some birch and balsam. Third, spruce, with ground more or less foul with rotting timber, the remains of the aspen, birch and balsam, and ultimately becoming damp, cold and sour with an increasing thickness of sphagnum and other mosses. Fourth, bush-fire, which burns up the remaining spruce and rubbish, destroys the moss, neutralises the sourness of the soil with the alkali of the ashes, and allows the earth again to receive light and heat and air. This soon leads to a new and healthy growth of aspen, etc. But if fire should not come, thus to redeem the soil, the sphagnum moss will obtain full and complete victory over the spruce, and convert what may have been fine arable land into peat mosses or muskegs. If the land is of a level nature with a clay soil or subsoil, it would seem to me, that in this climate nothing but the intervention of fire or of man can prevent this degradation of the soil, if it may be so termed, taking place. I shall not endeavour to explain, how it is, that in this struggle, as it may be called, for the possession of the ground, the spruce prevails over the aspen, only in turn, to be vanquished by a green moss which spreads as a carpet over the earth. My object here is simply to point out, that although the existence of fine healthy aspen may be, and perhaps generally is, an indication of a tolerable good soil—its absence, on the other hand, does not entitle us to infer that the soil is on that account worthless.

Some geologists and farmers attach too much importance, I think, to the nature and composition of the underlying or bed rock. It is quite true, that in many parts of the world, the origin of the soil is such that its fertility depends almost entirely on the character of the rock immediately below it. But to this rule there are very large exceptions, especially in this country. I am persuaded that over the whole of this great central plateau, the character and composition of the bed rock has little more to do with the fertility or otherwise of the soil, than has the underlying rock at the mouth of the Mississippi to do with the fertility of the rich soil of the deltas there formed and forming.

The origin of those soils which partake of the mineral character and composition of the rocks on which they rest, is so well described by an able and judicious writer (Professor Johnson), that it may not be out of place to quote his remarks on this subject.*

“ If we dig down through the soil and subsoil to a sufficient depth, we always come sooner or later to the solid rock. In many places the rock actually reaches the surface, or rises in cliffs, hills or ridges far above it. The surface (or crust) of our globe, therefore, consists everywhere of a more or less solid mass of rock overlaid by a covering, generally thin, of loose materials. The upper or outer part of these loose materials forms the soil.

“ The geologist has travelled over great part of the earth's surface, has examined the nature of the rocks which everywhere repose beneath the soil, and has found them to be

*Elements of Agricultural Chemistry and Geology, pp. 65, 66, 67.

very unlike in appearance, in hardness and in composition—in different countries and districts. In some places he has met with a sandstone, in other places a limestone, in others a slate or hardened rock or clay. But a careful comparison of all the kinds of rock he has observed, has led him to the general conclusion that they are all either sandstones, limestones, or clays of different degrees of hardness, or a mixture in different proportions of two or more of these kinds of matter.

“When the loose covering of earth is removed from the surface of any of these rocks, and this surface is left exposed, summer and winter, to the action of the winds and rains and frosts, it may be seen gradually to crumble away. Such is the case even with many of those which, on account of their greater hardness, are employed as building stones, and which, in the walls of houses are kept generally dry, how much more with such as are less hard or lie beneath a covering of moist earth, and are continually exposed to the action of water. The natural crumbling of a naked rock thus gradually covers it with loose materials in which seeds fix themselves and vegetate, and which eventually form a soil. The soil thus produced partakes necessarily of the chemical character and composition of the rock on which it rests, and to the crumbling of which it owes its origin. If the rock be a sandstone, the soil is sandy—if a claystone, it is more or less stiff clay—if a limestone, it is more or less calcareous—and if the rock consist of any peculiar mixture of those three substances, a similar mixture is observed in the earthy matter into which it has crumbled.

“Led by this observation, the geologist, after comparing the rocks of different countries with one and other, compared next the soils of various districts with the rocks on which they immediately rest. The general result of this comparison has been, that in almost every country the soils have as close a resemblance to the rocks beneath them as the loose earth derived from the crumbling of a rock before our eyes bears to the rock of which it lately formed a part. The conclusion, therefore, is irresistible, that soils, generally speaking, have been formed by the crumbling or decay of the solid rocks—that there was a time when these rocks were naked and without any covering of loose materials—and that the accumulation of soil has been the slow result of the natural degradation or wearing away of the solid crust of the globe.”

Further on, however, at page 88, Professor Johnson cautions his readers in reference to the more common exceptions to this intimate relation between the fertility of the soil and the composition of the bed rock as follows: “It is necessary to guard the reader against disappointment when he proceeds to examine the relations which exist between the soils and the rocks on which they lie, or to infer the quality of the soil from the known nature of the rock on which it rests, in conformity with what has been above laid down—by explaining another class of geological appearances which present themselves not only in our own country but in almost every other part of the globe.

“The unlearned reader of the preceding section and chapter may say—I know excellent land resting upon the granites, fine turnip soils on the Oxford or London clays, tracts of fertile fields on the coal measures, and poor gravelly farms on the boasted new red sandstone, I have no faith in the theory—I can have none in theories which are so obviously contradicted by natural appearances. Such, it is to be feared, is the hasty mode of reasoning among too many locally excellent practical men—familiar it may be with many useful and important facts, but untaught to look through and beyond isolated facts to the principles on which they depend.

“Every one who has lived long on the more exposed shores of our island, has seen, that when the weather is dry and the sea winds blow strong, the sands of the beach are carried inland and spread over the soil, sometimes to a considerable distance from the coast. In some countries this sand-drift takes place to a very great extent, travels over a great stretch of country, and gradually swallows up large tracts of fertile land. Again, most people are familiar with the fact, that during periods of long continued rain, when the rivers are flooded and overflow their banks, they not unfrequently bear with them loads of sand and gravel, which they carry far and wide, and strew at intervals over the surface soil.

“ So the annual overflowings of the Nile, the Ganges, the Mississippi, and the river of the Amazons, gradually deposit accumulations of soil over surfaces of great extent—and so also the bottoms of most lakes are covered with thick beds of sand, gravel and clay which have been conveyed into them from the higher grounds by the rivers through which they are fed. Over the bottom of the sea, also, the ruins of the land are spread—torn by the waves from the crumbling shore, or carried down from great distances by the rivers which lose themselves in the sea—and form beds of mud, or banks of sand and gravel of great extent, which cover and conceal the rocks on which they lie.

“ To these and similar agencies, a large portion of the existing dry land of the globe has been, and is still exposed. Hence, in many places, the rocks and the soils naturally derived from them are buried beneath accumulated heaps or layers of sand, gravel and clay, which have been brought from a greater or less distance, and which have not unfrequently been derived from rocks of a totally different kind from those of the districts in which they are now found. On these accumulations of transported materials a soil is produced which often has no relation in its characters to the rocks which cover the country, and the nature of which soils, therefore, a familiar acquaintance with the rocks on which they immediately rest would not enable us to predict.”

Now, although no direct mention is here made of the agency by means of which this prodigious mass of loose material has been transported, Professor Johnston shews so plainly what has occurred in this territory, that it may be described almost in the very words employed by him. The rocks mostly gneiss are buried, as he says, beneath accumulated heaps or layers of sand, gravel and clay which have been brought from a greater or less distance, and derived from rocks of a totally different kind from those of the plateau, on which these transported materials are now found reposing. And we are therefore warranted in coming to the conclusion, that on these accumulations of transported materials the soil produced has no relation whatever in its character or composition to the rocks which are “ *in situ* ” on the plateau itself. This loose or transported material has unquestionably been brought from the north. Some of it has come from the shores of Hudson’s Bay.

The far greater portion of it, however, has been furnished by the Silurian and Devonian strata underlying the great plain, which stretches southward and westward from the coast, to within a short distance of the northern edge of this central plateau, and from which it is separated by an intermediate belt similar to that which has been already described as intervening between the height-of-land plateau, and the central plateau.

These stratified and comparatively soft rocks have not only been torn from their beds and transported a great distance; but have been, for the most part, ground to an impalpable powder. I have, in former reports, expressed my firm belief, that the agent by which this has been accomplished is undoubtedly *ice*, which, in a sheet probably several thousand feet in thickness has moved southward, very slowly it may be, but with irresistible force. This has occurred during what geologists call the glacial epoch, era or period and the transported material is known under the name of drift or boulder formation. The earthy matter of the soils on the central plateau is composed almost entirely of this transported material or drift, as is that of the soil on the height-of-land plateau, with this difference, namely, that whereas the “ drift ” of the former has been furnished almost entirely by the Silurian and Devonian strata to the north, that found on the height-of-land plateau, is composed in part only of this material and of an equal or larger proportion of material derived from the Laurentian and Huronian rocks. It may be that this has come from the Laurentian rocks which underlie the central plateau, and in a lesser degree from those *in situ* on the height-of-land plateau itself. The drift of the central plateau has been deposited chiefly in the form of light grey or drab coloured clays. These contain such a large proportion of lime, that they may be properly termed marls or calcareous-clays. The drift sands are usually somewhat fine and soft and might sometimes be called loamy. They are generally of a light yellowish or reddish colour. Occasionally these sands are highly calcareous, and they are then very fine and soft and of a white or very light grey colour. The gravels on this Central Plateau

almost invariably contain pieces of limestone, chert and sandstone, which can be identified as coming from the Devonian and Silurian strata to the north. These pieces, which are found on the height-of-land plateau also, increase both in number and size as we cross these plateaux going northward and they frequently contain characteristic fossils. Drift-boulders are not, I think, nearly so numerous on the Central as on the height-of-land plateau.

If the soils on both these plateaux had derived their inorganic or earthy material entirely from the decomposition of the Laurentian and Huronian rocks on which they rest, they would doubtless have been thin, poor and barren as such soils usually are. Some of the important elements of all good soils, more particularly lime, would in all probability have been deficient if not entirely wanting. Hence, the great importance I attach to the fact, that nearly all the earthy matters of the soil on this central plateau and a considerable proportion of the like constituents in the soil of the height-of-land plateau, have been supplied by the stratified limestone and other rocks lying to the north and afford abundance of lime, silica, alumina, magnesia, oxide-of-iron and other substances, more or less necessary in all good soils. This observation applies not only to the soils on and beyond the height-of-land, but to the soils on the north shores of Lakes Superior and Huron, which have, I believe, derived no inconsiderable proportion of their calcareous matter and probably other important elements from the same source.

The stratification of these drift deposits is very imperfect, and altogether unlike that which has been effected by water, whether it be on the banks of rivers or in lake basins. In the order of super-position, where such exist, the clays are almost always lowest and found resting on the rock. Where both occur the sand is seen usually overlying the clay; but there are extensive areas in which little but clay or clay marl can be seen, and other smaller tracts where sand or a sandy loam rests immediately on the rock. Thus the character of the soil is variable. As a general rule, however, sandy or sandy loams are found on the higher ridges, and clay or clay loams on the lower ground. I have no doubt that the resulting soil would have been better had the fine earthy materials been more thoroughly and completely mixed together. This is being slowly brought about by the action of the streams and rivers. Hence the river bottoms and those swamps which have once been the beds of lakes will, in my opinion, afford the richest and most fertile land in this territory.

On the higher and undisturbed parts of the plateau, where the drift has not been exposed to the action of rivers or lakes, those soils in which clay greatly preponderates are so stiff that the land may be difficult, I fear, to work. The clay soil sometimes found in such situations is exceedingly hard and dry. Such land, however, may possibly be converted into good pasture. On the other hand the sandy soils are occasionally too light and dry to be fertile.

I noticed very frequently that the clay at and near the surface contained little or no lime, but on digging down from one to two and a half feet it almost invariably became highly calcareous. I was at first inclined to think that they were parts of different strata or beds, for the change was usually quite sudden. There was little difference in the appearance, excepting perhaps that the non-calcareous or surface clay was a little darker or redder and somewhat stiffer than the lower calcareous clay. I afterwards, however, came to the conclusion that the clay had been uniformly calcareous, but has lost its lime at or near the surface. Whether this has been brought about slowly by percolation of water, by the roots of plants and trees, or by some unknown chemical action, I am at a loss to decide, but suspect that the percolation of rain-water, holding in solution more or less potash and other substances—the result of periodical bush fires during many centuries—may at least be one of the causes of this phenomenon.

The quantity of organic matter in the soil is not, I think, very great, especially on the stiff clays and poor sandy areas on the higher and drier sections. This may be partly attributed, I think, to the following causes: As a rule the death of the trees of our forests results from being blown down and uprooted, as it is commonly termed, by the wind. If the sub-soil be of such a nature as to have invited or even allowed the roots to

penetrate to a considerable depth, one effect of wind on such trees must be (by causing them to sway to and fro and strain on their roots) to stir up and loosen the soil for a considerable distance around each tree, thus mixing, it is probable, to some extent the upper vegetable mould with the sub-soil; and when finally these trees are overthrown the roots tear up and overturn large masses of earth, thus incorporating a still further quantity of mould with the earthy matter of the soil below. This continued for hundreds of generations of trees gives the ground periodically a sort of rough trenching which must tend, as it seems to me, greatly to ameliorate and improve the soil. But on stiff clays the roots do not appear to penetrate much below the covering of leaf mould. Thus it happens that when these are overturned no such mingling of the soil takes place. As a consequence of this, when a bush fire occurs the whole of the vegetable mould and other organic matters are burnt up, and little or nothing but the clay sub-soil and a few ashes are left. Whereas in the other case the vegetable mould and organic matter is so mixed up with and protected by the earthy and incombustible material of the sub-soil that much of it is preserved. Hence I conceive it follows that on these indurated and stiff clay soils there is frequently only a thin covering of leaf mould.

There may be and probably are other reasons why the amount of organic matter in the soil is not greater. In other countries various living creatures by their labors and modes of life, greatly assist both in producing and incorporating organic matter with the earthy materials of the soils. All burrowing animals and many insects are of more or less service in this way. Among these the earth-worm is considered in Europe one of the most important. Now, singular as it may appear, the earth-worm, if not entirely absent, is very rarely met with north of the Height-of-Land. Excepting at the Hudson Bay Company's Posts (whither they have been imported) I do not think I have seen a single specimen of the earthworm anywhere between Lake Superior and James' Bay. It may appear absurd to attribute any importance whatever to the influence which creatures, apparently so insignificant and weak, may be capable of exercising, either in the way of adding to or detracting from the depth and fertility of the soil. But on a reference to Dr. Darwin's work "On the formation of Vegetable-Mould through the action of Worms," it will be seen that worms have, as Dr. Darwin says, "played a more important part in the history of the world than most persons would at first suppose."

In previous reports it has been shown that at almost all the Hudson Bay Company's Posts in this territory, both the soil and climate are such as admit of most of our common grains and roots being grown. I may add that I saw this season very good crops of both oats and potatoes at Missinaibi, on the height of land plateau, some thirty miles north of the watershed.

Also on the C. P. R. track near Dog Lake, I saw oats, the seed of which had been accidentally dropped on the gravelly drift soil of the embankments, growing most luxuriantly. Some of the stalks were upwards of five feet in height, and I counted as many as 200 grains on a single stalk. This was on the 2nd of September and the grain was still green but would probably have ripened. Some of that sown at Missinaibi came to full maturity, and all would have done so, had it not been necessary to cut the greater part of it when green for fodder.

The preceding report and what is said elsewhere will enable the reader, it is hoped, to form a tolerably good idea of the leading topographical features of this territory, as well as to some extent of the character of the land and soil in the several belts, into which for convenience it has been divided.

The soil, it will have been observed, is variable; that on the coast belt, with the exception of the river bottoms and islands and a narrow strip on the banks of the rivers, being generally of a peaty character with a subsoil of calcareous clay or "marl."

And that on the height of land plateau, sandy, gravelly or stony, although on the lower grounds the soil, and elsewhere the subsoil, are not unfrequently clay or marl.

It will further have been noted that in my opinion as well as in that of Mr. Gamsby and others, the intermediate or central belt contains a larger proportion of arable land than either of the other two divisions.

In my Report for 1882, p. 10 and 11, an opinion was expressed in regard to the origin of the loose material overlying the rock, and forming both soil and subsoil in the far greater portion of this territory. It was there stated that the evidence was most convincing in support of the hypothesis that almost all of this loose material had been brought from the north and laid down where we now find it, by ice, like that which forms glaciers, but having its source in what has been called a "polar ice cap," instead of in some high mountains or range of mountains, as is the case of the ordinary glaciers.

In order to form an adequate conception, however, of the character of the soil in this territory, and the central belt more particularly, it is important to know somewhat of the mode or manner in which this may have been accomplished.

Assuming then, that during the period known as the "glacial epoch," such an ice-cap as that referred to had formed at and around the north pole, and that this ice-cap had attained such a height that by the sheer force of gravity or pressure from within, a great sheet of ice had been shoved southward down Hudson Bay, and up the ascent or acclivity to, and then over the height of land. And further, supposing that this ice sheet (probably two or three thousand feet in thickness) continued to move for many thousands of years, something like the following effects may not unreasonably be conjectured to have been produced in this territory. In the first place, all the loose material of whatever kind, which then formed the surface, would be at once swept from off the underlying bed-rock, and borne southward, never more to be deposited (in all probability) on that north side the height of land.

This disposed of, the ice with rocks of all shapes and sizes (many hard as adamant) firmly set or imbedded in its substance, would in the next place attack the fundamental or bed-rock. When we consider that the downward pressure due to the weight alone of ice two thousand feet in thickness, would be nearly 800 lbs. on each square inch or 57 tons on each square foot of the bed-rock, some faint idea may be formed of its destructive power. Driven forward with irresistible force, this ponderous sheet of ice, bristling, so to speak, with Laurentian and Huronian rocks, from the north, would play tremendous havoc with the soft shales, sandstones and limestones of the coast belt. That countless millions tons of these Palæozoic rocks have been thus torn from their beds and ground into an impalpable powder is to my mind an absolute certainty. That this destruction has not been complete over the whole Palæozoic region south of Hudson Bay, is doubtless, I think, due, as Dr. Bell has pointed out, to the fact "that the dip of the strata happens to be in about the same direction as that which was taken by this great denuding force."* Passing off the southern or upper edge of the Palæozoic strata, the ice-sheet would then enter upon the central or intermediate belt, with its hard Laurentian and Huronian bed-rocks. From the northern edge of this belt to the southern edge of the height of land plateau, no other than azoic and trap rocks are seen "in situ." Before this glacial period the surface of both this belt and the plateau above must, I think, have been very broken or rough, and during the earlier part of that epoch, in spite of the hardness of the rock, an enormous destruction of it, must have taken place. Much of it was doubtless removed in the form of boulders, much of it in the shape of stones, and more or less of it was reduced to the condition of gravel and sand. Where the rocks, first broken up and reduced to these forms, were transported to and finally deposited, is impossible to say. But having (as I believe) found stones on the north shore of Lake Superior which have been transported from Hudson's Bay by this ice-sheet, it seems probable, at least to me, that some of the loose material manufactured, so to speak, on or beyond the height of land may have been transported in like manner to points considerably south of our great lakes.

But whatever may have been the condition of the surface in this intermediate, or central belt, at the beginning of the glacial epoch, it is certain that most of the inequalities were pretty well planed down before the end of it. Those eminences that have remained, whether in the form of isolated hills or short ridges, rarely rising in the central belt more than one hundred and fifty feet above the general level. They are always

* The Geology of Ontario. p. 50.

rounded off by the ice, and present with very few exceptions a sloping face or side towards the north. This feature is even noticeable on the height of land plateau, where the hills are sometimes as much as five or six hundred feet in height, and fifteen hundred above the present level of James Bay. The advantage, so far as the mountains are concerned, of this particular *form*, is one to which, in all probability, they owe their survival in the prolonged struggle for existence against the almost irresistible attacks of this northern ice. A similar arrangement can be observed in nearly all the boulders which, out of many thousands, have maintained their ground in the beds of rivers against the rush of water and ice to which they are exposed every spring. Many of these rocks and boulders may be seen in the summer when the water is low, and exhibit the appearance of a shoemaker's "last," with the toe invariably pointed up the river. All such stones, however, whatever may be their shape otherwise, must, unless of great size and weight, possess one sloping face, and that must be presented so as to meet the descending sheets of ice, which will glide easily over them. Should by any chance such rocks or boulders get turned the wrong way and present to the stream a perpendicular side or face, the descending masses of ice, butting squarely against them, will knock them over and around until they are either got in the position in which they offer the least resistance, or they are crowded to the side and on to the banks, where the great mass of such stones and boulders may be seen. The same peculiar shape noticeable in the boulders and rocks in the beds of rivers is common in the knolls, hills and ridges of solid rock situated in the old-time bed of this all but resistless ice-stream.

It appears to me that so long as this ponderous sheet of ice was in motion, no deposition of loose material could possibly have taken place in any part of the territory now under consideration. It was only when this motion ceased that deposition in the proper sense of the term, can, I think, be held to have begun. And then it was only the loose material, held in suspension as it were, by that portion of the ice-sheet immediately or almost immediately overlying any particular area, that could be deposited thereupon. Some of this material may have been lost, but I am unable to see how any can have been added, more especially on the height of land plateau, excepting by that slow process of disintegration of the solid rock, which there has not been sufficient to obliterate in many instances the scratches and grooves made by the ice while in motion.

Anything that the rivers and lakes may have accomplished in that respect need hardly be taken into account, for such rocks as we find here are very slowly acted upon by water and as a matter of fact the rivers have unquestionably carried away a great deal more loose material than they have ever made. As an agent whereby the loose material already formed has been re-distributed and modified as well mixed, the waters of our rivers and lakes have doubtless played a most important part, but in the manufacture of the loose material itself, it has been by no means so conspicuous.

Ice on the other hand, does not possess that power, or at least in a very inferior degree.

When the great ice sheet ceased to move it was laden with the spoils of scores of different formations or kinds of rock, brought from Hudson's Bay, the coast belt, and to some extent derived from the belts over which the sheet finally rested. This material would be very different in different places, calcareous in some, sandy in others. In some areas many boulders and in others little but clay. Hence, at the close of the "Glacial Epoch," when the ice thawed and this material was deposited, there was a corresponding difference in the character of the loose material which still largely forms the soil of this territory.

On no other theory is the existence of this loose material, and the position in which it is found, at all intelligible to me.

TIMBER.

Speaking from my own observations, there is not much pine on the central plateau, nor is there a great deal on that portion of the height of land plateau, over which I have passed this season. As stated in previous reports, there are fine tracts of both red

and white pine to be seen on the head waters of all the tributaries of Moose River, lying to the east of Missinaibi River. But on the Missinaibi itself and westward to the Albany River, I have met with only a few groves, chiefly of red pine, and these of no great extent or importance. Such pine as there is will all be needed to supply the local wants of the future settlers in this section.

Red pine is frequently found growing singly or in clumps on the islands and shores of Lake Opazatika, but north of that lake few if any were met with.

Spruce and tamarac may be seen almost everywhere north of the Height of Land. There is no tree however, which possesses in an equal degree the power of adapting itself to all the changes of soil and climate in this northern territory, as the spruce. It is consequently the tree most commonly met with from the moment we cross the height of land until we arrive at the coast of James' Bay. On the rich soil of the sheltered river bottoms, it overtops all the other trees and attains a circumference of from six to eight feet. On the coast and islands of James' Bay it still holds its ground, but is greatly dwarfed, the largest trees on Charlton Island being less than half the size of those just referred to. As is reasonable to suppose, the healthiest and largest trees are found on the best soils and in the most sheltered situations. On poor, shallow soils they are of small size and of little or no value. They will struggle for existence even on the muskegs of which with the tamarac they have a monopoly, but are there so small as to be quite worthless.

In the aggregate, there is an enormous quantity of spruce of useful sizes in this territory. But the larger and more valuable timber is confined principally to the river bottoms.

Tamarac is almost coextensive in its growth with the spruce, but it does not attain the same size nor is it nearly so plentiful, excepting on the muskegs where it like the spruce, is stunted, unhealthy and worthless. It very rarely exceeds four-and-a-half or five feet in circumference anywhere. In some of the swamps there would appear to be a good deal of tamarac large enough for railway ties, telegraph poles, coal-pit props and such like purposes.

Cedar is found on the immediate banks of the rivers in many instances where no other trees seem able to withstand the force of the current and the injuries inflicted by ice and driftwood. In such positions the cedar attains a great thickness at the butt, sometimes as much as ten or twelve feet circumference, but it tapers off so rapidly towards the top that it may not be more than thirty or forty feet in height; nearly the whole strength of such trees would seem to have been expended in the development of the roots and trunk. Good, well-proportioned cedar are, however, met with in many places both on the height-of-land, plateau and central belt.

Though of no great economic importance at present, the spruce, tamarac and cedar of this territory must become more and more valuable as those trees of the pine and other species so eagerly sought after by the lumbermen become exhausted in the older parts of the province.

In view of the many important economical uses to which wood-pulp is being applied it is by no means improbable that the aspen-poplar may ultimately become one of the most valuable forest trees in this territory. Pulp made from the aspen is, I have been informed, superior to that of any other wood for the manufacture of paper, and commands the highest price. The climate is congenial, as is also much of the soil. It is common on the height of land, but it is on the central plateau and the banks of rivers which traverse the great plain still further north that the aspen is most abundant. It is more plentiful indeed than any other forest tree in this territory, with the single exception of the spruce.

MINERALS.

The geological formation of that portion of the central plateau to which my explorations have been confined this season is not so favourable to the production of valuable minerals as expected. But however favorable the rock of the country might be, the area

exposed to view is so exceedingly limited, that such minerals or metallic ores as may be contained will, in all probability, be discovered only when the territory is at least partially settled, and then as it were, by chance.

I found, however, an apparently large body of iron pyrites on Big River, one of the tributaries of the Opazatika River. This from its purity and the amount of sulphur it contains, would be valuable in some places, as great quantities of pyrites are used in the manufacture of sulphuric acid. But this deposit, like the iron ores, china clay, lignite, coal, gypsum, etc., mentioned in former reports, cannot be utilized in any way until our northern boundary is definitely settled, and roads made to open up the territory and develop its various resources.

OPENING UP THE COUNTRY.

The Canadian Pacific Railway, west of Biscotasing, may be said to run on the height of land plateau for upwards of 150 miles. It has been located entirely, however, in the southern portion of the plateau.

The line does not, at any point known to me, approach nearer than thirty-five or forty miles to the fertile belt lying to the north, and to reach this better land it will be necessary of course to cross the intervening belt of poor country. If this had required at the outset the making of branch lines of railway or even long and costly colonization roads, the difficulty and expense would, I fear, have greatly retarded the opening-up and settlement of the territory. Fortunately, however, nature has provided us with the means which will enable us in the first instance at least, to open up and partially develop this territory at a very moderate expense.

I have frequently mentioned in former reports, that the longer axis of most of the lakes on the height of land plateau have a strong northerly bearing, ranging from north-east to north-west. Many of these afford fine, navigable stretches of water, and by utilizing them, we can easily cross this height of land plateau at many of the more important points. Thus Lake Nipigon affords a 70 miles stretch and Long Lake a 52 miles stretch of uninterrupted navigation. And of navigation which may be rendered continuous at a very little expense. Some 30 miles is offered by Lakes Esnogami and Kabinakagami; 25 miles by Wabatongusheen and Oba Lakes, and nearly 35 miles by Dog, Crooked and Missinaibi Lakes. And there are doubtless other lakes situated on or about the headwaters of the Kapuskasing, Ground-hog and Mattagami Rivers, the navigable stretches on which may be expected also greatly to facilitate the opening-up of the territory north of the Canadian Pacific Railway.

The only route which I shall dwell upon at any greater length at present is that by means of which the section explored this season can, I conceive, be most easily opened-up.

From the point where the C. P. R. crosses Dog Lake, to the north end of Lake Missinaibi, the distance, following the bends of the canoe route is about 35 miles, and the navigation is interrupted only at two places. These are the height of land portage between Dog Lake and Crooked Lake, and Missinaibi Portage between Crooked Lake and Lake Missinaibi. The aggregate length of these portages does not exceed one-third of a mile. The difference of level is so trifling and the portages such that the construction of a canal with one lock (which is all that would be required to complete the navigation) could not be very costly. But from a point on the C. P. R. somewhat east of Dog Lake, a road might, I think, be made to the south end of Lake Missinaibi, which would not exceed, I believe, seven miles in length, and from thence to the north end of the lake, about 26 miles, the navigation is perfect.

The navigation of the river Missinaibi is altogether too difficult and broken by rapids to be of any use in opening up the country to settlement. From the north end of Lake Missinaibi therefore, to the foot of the Swampy Ground, where the fertile belt may be said to begin, a road will be necessary. This road which would be about 15 miles in length might be extended northward to Brunswick Lake and to Lake Opazatika, as settlement advanced. Nor would this fifteen-mile stretch of road pass through a country by any means so barren as that which the railway itself traverses. On the contrary, much of it will be found to consist, if not of arable, at all events of good pasture land.

 AGRICULTURAL RESOURCES.

¹⁸⁷⁹In my first report on this territory, then in dispute, a concise account was given of all that could be gathered from the Hudson Bay Company's officer's and other sources on this subject.

EXTRACTS FROM REPORT FOR 1879.

As this report is not accessible to many who may desire information in regard to the agricultural capabilities of this northern territory now that it has become part of the province, it will not be out of place to quote what was there said.

On page 20 *et sequentia*, of the report for 1879-80, the following particulars are given under this head :—

“It is only at the Hudson's Bay Company's trading posts, sometimes called ‘forts’ or ‘houses,’ that any farming has been carried on in this territory, and even at these, to a very limited extent, and in a very primitive and imperfect manner. Moose Factory is situated about seventeen miles below the junction of the Moose and Abittibi rivers, and a short distance only from the coast of James' Bay.

“Albany House is situated about one hundred miles north and somewhat to the west of Moose Factory. Rupert's House is about one hundred miles to the east of Moose Factory. Both Albany and Rupert's House are also quite near to the coast of the bay. These explanations are necessary, in order to understand the evidence of Mr. Gladman, before referred to, as having been, for many years, a Commissioned officer in the service of the Hudson's Bay Company, and stationed at various posts in this department.

“Speaking of the crops grown, not only in the territory under consideration, but at East Main and Fort George, much further north, Mr. Gladman says (I again quote from Mr. Russell's work) :

“‘That at East Main, Old Factory, he raised good potatoes, turnips, and other vegetables. East Main is sixty miles north of Rupert's House. That a large herd of cattle was kept there at that time as a resource in case of the Company's ships wintering in the bay, an abundant supply of hay being made in the salt marshes on the shores of the bay ; that vetches grow wild on the point of the river, and abundance of strawberries and currants.’

“He says ‘that at Big River, a hundred and eighty miles north of Rupert's River, potatoes and other vegetables are grown. That at Rupert's House the soil is much better and the station more sheltered than East Main Factory, or Big River, and more favourable for garden cultivation.’ Rupert's House is a little to the east of the boundary of this territory.

“Speaking of Moose Factory, where he resided fifteen years, Mr. Gladman says : ‘Its soil and climate are good, that he raised potatoes and other vegetables there in great abundance, that barley ripened well, and that horned cattle, sheep and pigs, were kept there.’ He adds ; ‘that the soil and climate of Albany, which is a hundred miles further north, does not differ much from Moose, that it is well sheltered, and that the extensive marshes on the coast furnish abundant fodder for domestic cattle.’ He also says, ‘that the soil around the posts of Henly, Martin's Falls, Osnaburg, and Lac Seul, is of a quality that enables the servants of the Company to raise fair crops of potatoes.’

“At New Brunswick House, about one hundred and forty miles south of Moose Factory, Mr. Gladman says, to repeat a quotation already given, that ‘the soil is very good, that excellent potatoes are raised there, also every description of vegetables. Oats ripened well and made good oatmeal, ground with a hand-mill. Wheat was afterwards tried, as he was informed, with good success.’

“Dr. Bell, of the Geological Survey of Canada, in his report on an exploration in 1875, between James' Bay and Lakes Superior and Huron, writes as follows :—

“‘Farming and gardening has been successfully carried on by the officers of the Hudson's Bay Co. at their posts at Lakes Mattagami and Missiniabi. At the latter, Mr.

John McIntyre, now at Fort William, has informed me that he found spring wheat to ripen well. At Moose Factory, although the soil is a cold wet clay with a level undrained surface, farm and garden produce in considerable variety are raised every year. Among other crops harvested in 1874 were 1,700 bushels of good potatoes. Oats, barley, beans, peas, turnips, beets, carrots, cabbage, onions, tomatoes, etc., are grown without any more care than is required in other parts of Canada, and I was informed that some wheat which had got accidentally sown one year was found to ripen, but no experiments, as far as I could learn, have ever been made to ascertain whether this cereal might be regularly cultivated or not. Upwards of eighty head of cattle are kept at Moose Factory, besides horses, sheep and pigs.

“An old man at the Hudson’s Bay Company’s Post, on Lake Abittibi, and many years a resident in that district, in answer to my inquiries on this subject, stated as follows:—

“That all root crops and grains grow well. That in one instance from three-quarters of a bushel of wheat sown, twenty-one bushels were obtained, and that one keg of barley gave a return of thirty kegs. That oats grew well, and also buckwheat. That he has known summer frosts injure the potatoes on several occasions, but that generally a large and excellent crop may be depended upon where the soil is suitable. That there was abundance of rain at Abittibi during the growing season, and that when otherwise, it was compensated for by heavy dews at night, so heavy that unless a wind be stirring, the leaves and grass are not dry before ten o’clock in the forenoon.

“It is only right to mention, however, that the gentleman in charge of the post does not corroborate all these statements, but on the contrary, assured me that on two occasions within his experience, oats had failed to ripen. I have been told also by the Hudson’s Bay Company’s officers and servants at Moose Factory, that oats have failed to come to maturity there; that barley is an uncertain crop, and that even potatoes are liable to be cut down by the frost before they are fully ripe. That these crops occasionally fail is doubtless true, but it would be exceedingly difficult to find any part of the world where the grain and root crops do not sometimes fail. However fine the climate or rich the soil, every intelligent farmer knows that a little too much heat or cold, drought or rain, or the grasshopper, potato-bug, weevil, and such like creatures frequently blast his hopes in reference to one or other of his crops. If mankind, however, had on this account been deterred from reclaiming the earth, and from sowing and planting in the hope of obtaining a return in due season, this continent would still have been a wilderness and its inhabitants in a state of barbarism.

“My own residence in the territory has been too short to allow of my speaking authoritatively on the subject of the crops that can or cannot be advantageously cultivated. I have, however, quoted the evidence of those who have had ampler opportunities and longer experience, and are therefore better able to judge of the capabilities of the territory. I shall, however, give the results of my own observations during the limited period spent in the country, and the conclusions I have arrived at in regard to several of the more important crops grown, or which I think might be successfully cultivated.

“*Potatoes.*—I saw potatoes growing at Hudson’s Bay Company’s post on Abittibi Lake, at New Post on the Abittibi River, about one hundred miles from James’ Bay, and at Moose Factory itself, and from my own observations and inquiries, am convinced that large crops of excellent potatoes may be grown in this territory, and that the crop is as unfailing as in any other part of Ontario I am acquainted with. In 1874 the quantity of potatoes raised at Moose Factory was, according to Dr. Bell, 1,700 bushels. Last year (1878) the crop from the Company’s farm was, I believe, about 1,200 bushels, over and above what the servants of the Company raised from small plots of ground which they are permitted to cultivate. The yield would appear to be from two to three hundred bushels per acre. In some instances I was told they had been raised for upwards of fourteen successive years without manure, on the same ground. When we consider that the nutriment afforded by 250 bushels of potatoes is about twice as much as that yielded by an acre of wheat in the most favoured sections of Ontario, the importance of the potato as an article of food in this new territory must be obvious to all.

"*Barley*.—In the quotations cited from the evidence of Mr. Gladman and others, barley is said to ripen well, not only at Lake Abittibi and New Brunswick, in the southern portion of this territory, but also at Moose Factory in the more northerly and exposed portion.

"By the officers at Moose Factory barley was spoken of to me doubtfully, and as a crop, the ripening of which was attended with a good deal of uncertainty. More or less barley, however, is generally sown at Moose, from which I would infer that it usually came to maturity. Two small patches only were sown this year. One of these was just ready for cutting when I left on the 19th of September. The grain was large and plump, and the yield good. The other patch, which was very foul with weeds, was backward, and hardly likely, I think, to ripen.

"Without knowing the mode of cultivation or the nature of the seed, etc., nothing reliable can be inferred from such a limited experience. The past summer, too, has been like that in Great Britain, exceptionally cold and wet at Moose Factory; but with good cultivation and suitable seed, barley should come to maturity at Moose Factory in seasons no warmer even than the last.

"Mr. H. Stephens, F.R.S., one of the highest authorities in England, in his work, 'The Farmer's Guide,' in which he was assisted by Professor Norton of the United States, remarks as follows on the subject (Vol. I, page 448):

"'Barley is cultivated further north than any of the other grains; fields of it are seen growing in the northern extremity of the Orkney Islands and in Shetland (lat. 61° N.), and even at the Faro Islands (lat. 61° to 62° 15' N). Iceland (63° 30' to 66° N.) does not produce it, although an industrious population have made every exertion to acquire some species of cerealia.'

"'In Western Lapland the limit of barley is under 70°, near Cape North, the northern extremity of Europe. In Russia on the shores of the White Sea, it is between the parallels of 67° and 68° on the western side, and about 66° on the eastern side beyond Archangel. In Central Siberia it is between latitude 58° and 59°.'

"Now this territory which has been awarded to Ontario, and which it is proposed to include in the District of Nipissing, is situated between the 48th and 52nd parallels. At 69½ miles to a degree, the most northerly part of this district, therefore, is 9°, or 625½ miles south of the Shetland Islands, where fields of barley are, according to Mr. Stephens, 'seen growing'; it is 18° or 1,251 miles south of the limit of the growth of barley in Lapland; it is from 14° to 16°, or from 973 to 1,112 miles south of the same limit on the shores of the White Sea, Russia; and it is 6° 30', or 451¾ miles, south of the latitude to which barley is cultivated even in *Central Siberia*. Of course, it is perfectly well known that the climate is much milder in Europe than in corresponding latitudes on this continent; but I am not aware that this holds good as regards Siberia; at all events, to the extent necessary to account for the extraordinary inferiority which the assumption that the limit of the growth barley is south of this territory, would indicate. On the contrary, I am persuaded that the presumption is entirely the other way, namely, that there is no part of this territory where, under a proper system of cultivation, barley may not be grown.

"There is another way in which the same conclusion is reached. Mr. Stephens, in the work just referred to, further says:—

"'A mean temperature of 46° 4' during the summer seems to be, for our continent, the only indispensable condition for the cultivation of barley. In the islands of the Atlantic Ocean a summer temperature of three or four degrees higher appears to be necessary for its success. Iceland, indeed, where this grain cannot be cultivated, presents in its southern districts at Reikavik a mean temperature of 37° 4' for the year—24° for the winter, and 49° 4' for the summer. It appears that here considerable rains are the means of preventing the cultivation of cerealia. Thus the limit of barley in the countries where the cultivation is of the most importance varies between 46° 4' and 49° of mean temperature during the summer.'

"Now the mean summer temperature at Moose Factory last year was 62° 3', and even this year was about 57°, or nearly ten degrees higher than that which is sufficient to bring barley to maturity.

"In view of these facts, and of the evidence of Mr. Gladman and others on this point, it is my opinion that barley may be regarded as a fairly reliable crop in this territory.

"*Oats*.—No Scotchman, and few Canadians will under-rate the value and importance of the oat whether as food for men or horses. It is cultivated both in Europe and in Asia, in latitudes far north of this territory. That oats have been grown with more or less success at New Brunswick and Abitibi posts in the southern portion of the territory is satisfactorily proved. How far north of these posts a good crop can be depended upon, I have no means of ascertaining, but think it probable that the hardier descriptions of oat may be grown in three-fourths of this territory, at least.

"*Wheat*.—I was told that wheat had been successfully grown at the Hudson's Bay Company's post, on Lake Abitibi. Mr. Gladman stated in his evidence that 'he was informed that wheat had been tried with good success at Brunswick House.' Dr. Bell says that Mr. John McIntyre, now of Fort William, informed him 'that he found spring wheat to ripen well at Missinaibi.' Dr. Bell was also informed 'that some wheat which had got accidentally sown one year, was found to ripen, at Moose Factory. Mr. McIntyre told me, if I am not mistaken, that it was at 'New Brunswick' that he succeeded in growing wheat, and I rather think Dr. Bell unintentionally errs in saying it was at Missinaibi. Both posts, however, are in the territory, and not above sixty miles distant from each other. In order to grow wheat, a mean summer temperature of not less than 57° is said to be necessary. In Russia, Norway and Sweden, it would appear according to Mr. Stephens, that a mean summer temperature of from 59° to 61° is required for the growth of wheat. This does not exceed the temperature which will, in my opinion, be found to prevail in the southern and central portion of this territory. But whether wheat can be grown with sufficient certainty, to make it a desirable crop, can only be determined by experience.

"*Root Crops*.—With the exception of potatoes, and perhaps turnips, none of the roots have, I expect, been cultivated as field crops. Of potatoes, I have already spoken at length. Swedish turnips have been successfully grown at New Post, on the Abitibi River. In the gardens, carrots, turnips, beets and parsnips are planted, and I am told grow fairly in ordinary years. I noticed at Abitibi post, carrots going to seed, which had been left in the ground all winter, seemingly uninjured by the frost.

"*Other Vegetables*.—Cabbages, cauliflowers, peas, windsor beans, kidney beans, onions, radishes and lettuce are planted or sown in the garden at Moose Factory. They are sown and planted I presume in the expectation that they will come to maturity.

"Mr. Gladman says: 'that he raised potatoes and other vegetables in great abundance.' Dr. Bell says, 'that beans, peas, turnips, beets, carrots, cabbages, onions, tomatoes, etc., are grown without any more care than is required in other parts of Canada.' My experience will not warrant me in saying so much, but as stated before, this summer has been an exceptionally cold and wet summer at Moose. Most of the crops were therefore late, and below an average. The first green peas were brought to the table about the last week in August, and the crop was poor. Cauliflowers were ready to cut the first week in September, and were of good size and quality. Windsor beans of a rather small variety, were ready to use about the same time, and a very luxuriant and healthy crop. Kidney beans were a little later, but growing tolerably well. Turnips and cabbages had both failed, the former having been destroyed by the 'fly' and the latter by the cut-worm. Of onions (potato) and lettuce, the crops were very good. Many of the crops appear to suffer from being grown too long upon the same ground, thereby encouraging the multiplication and increase of their natural enemies, such as the cut-worm, turnip beetle or fly, carrot worm, etc. This is not the fault of either the soil or the climate, but of the cultivation. The Colorado potato-bug has not yet reached Moose Factory, or any of the posts, I believe, on Hudson's Bay. They were numerous, however, at the Hudson's Bay Company's post at Lake Temiscaming, and have reached, I was informed, the height of land.

"*Fruit*.—Currant bushes are exceedingly healthy and prolific at Moose Factory, particularly the red currant, the crop of which exceeded, I think, any that I have ever seen elsewhere. Both strawberries, raspberries and blue-berries are found growing wild

and the two former might, I have no doubt, be easily cultivated to any extent. Rhubarb thrives well, and is of excellent quality. I am not aware if any of our other common fruits have been grown, or attempted to be grown, at Moose Factory. I did not see any other than those mentioned. I have no doubt, however, that other varieties of fruit might be successfully cultivated.

"*Grasses.*—I did not observe any grasses sown or cultivated for fodder. At Abittibi, however, I saw abundance of white clover in the pastures, and found both white clover and timothy on many of the portages between Abittibi and Moose Factory, where the seed had been accidentally sown in the first instance. The timothy in some spots was nearly four feet in height, with large healthy looking heads. This is important as proving that this valuable fodder plant is adapted to the climate of this territory.

"*Flowers.*—I did not pay much attention to the flowers, but most of those found wild about Lake Nipissing appeared to grow along the rivers or in the woods in this territory—the wild rose in particular seemed to bloom everywhere. I observed the sweet-william, carnation pansy, and other flowers in the gardens.

"*Weeds.*—I met with a number of weeds that were familiar to me elsewhere, and which appeared to have become thoroughly acclimated at Abittibi Post and Moose Factory. Among them I may mention :—The nettle, thistle, burdock, hemlock, lambs-quarter and chick-weed. The healthy and vigorous growth of these weeds may be of some interest to the botanist, as indicating to him the fitness of the climate and soil for the production of more useful plants. If, without the active co-operation of man, and to some extent in spite of him, these weeds have become so thoroughly adapted to the climate and soil of this territory as to grow luxuriantly, mature their seed, withstand the frost and cold of winter, and reproduce their kind year after year in greater and greater profusion, it must surely be within our power, by a proper study of those laws of nature by which this has been accomplished, by an intelligent selection of suitable plants and seeds, and by skilful cultivation, to turn to good account every acre of arable land in this territory, and make it produce abundance of wholesome food for the comfortable subsistence of a large population.

"*Cattle.*—Horned cattle are kept at all the Hudson's Bay Company's principal trading posts, but more particularly at Moose Factory, Albany and East Main. At Moose they usually have a herd of from sixty to eighty head, besides sheep, horses and pigs, all of which appear to thrive admirably. At Albany, also, horned cattle do very well, but horses, it is said, do not live long there. This may be owing to some local cause, operating within a limited area, and capable of being obviated by a little skill and attention. Hay can be obtained in great abundance from the salt-marshes at the estuaries of the rivers. Owing to the tides, and consequent partial overflowing of the marshes, the grass cannot be dried on the spot. It is cut and brought in the green state to Moose Factory, a distance of not less than ten miles. There it is carried two or three hundred yards, and spread over fields which have either been in pasture, or the grass of which has been cut and made into hay, earlier in the season. This involves a great deal of labour, and with so much good land around Moose Factory, I think timothy grass could be grown on the spot, and with the improved implements now in use, made into hay, for much less than this marsh-hay costs. The hay obtained, however, from the salt-marshes must be very nutritive, for the cattle, and even horses, I am told, get nothing but this hay during the winter, and are kept in good order and condition. To parties having stock in the immediate vicinity of these marshes, they might be exceedingly valuable, furnishing as they do an unfailing and inexhaustible supply of grass and hay. I hardly entertain a doubt, that at some future, and probably not very remote period, vast numbers of cattle and horses will be reared in this territory, and form one of its most valuable and important resources. To the Province of Ontario, this territory may become immensely valuable, as furnishing 'a breeding ground' for horned cattle, which, when of sufficient age, may be driven or otherwise transported south, to be fattened in the older portions of the province, for the English market. Or with direct communication by steamer, *via* Hudson's Bay, and Hudson's Straits; they could be sent to England direct, and the process of fattening completed, on the rich pastures, of the mother country. That cattle raised in

the basin of the Hudson's Bay would be far more healthy and more thrifty, in England, than those of the western and south-western States, does not admit of a doubt in my mind; for the climate of this territory in the summer season, more closely resembles that of the north of England or Scotland than any other part of this continent I have ever lived in. When we consider the extent of this territory, equal to that of England and Wales the humidity of the summer season, the abundance of good water everywhere, the ample supply of timber for buildings, for fences, for fuel and for shelter, the luxuriant growth of the grasses, the healthiness of the climate both for man and beast, the perfect safety of life and property, and its proximity to England, the advantages possessed by this territory greatly overbalance, in my opinion, the one disadvantage of a winter a little longer but not more severe than the most favoured parts of our north-west territory. The land as seen along the rivers, although well timbered, will not be difficult to clear, and the natives speak of extensive plains in the interior, the value of which for pastoral purposes, I have not yet been able to ascertain.*

EXTRACTS FROM REPORT FOR 1882.

"Again in my report for 1882-83 further information is given on this subject, and although some of the views and opinions then held and expressed may be rather too sanguine, they are on the whole approximately correct, and may for the reasons just given be repeated here.

Under this head, on page 13 *et seq.*, the following occurs:—"It is only at the fur trading posts of the Honourable Hudson's Bay Company that any attempt has been made to cultivate the soil. A few of the Indians on the Mattagami River, who trade at Matawagamingue Post, are now trying to grow potatoes, and I trust that they may so far succeed as to induce others to follow their example.

The officers of the company know very little about farming as a general rule. Their lives from the time they were little more than boys, have been spent in the country and devoted to the fur trade. The consequence is that the farming at the inland posts is of a rather primitive and unscientific description, and confined chiefly to the growth of the potato as a field crop. At the larger posts on the coast, particularly Moose Factory where a number of old countrymen are employed, they understand how to grow the potato, and cultivate it well and successfully. But even at Moose very little attention is paid to drainage, and none whatever to the importance of a judicious course, or rotation of crops. The wonder to me is that the land so treated continues to yield any crop at all.

Where the agricultural operations have been so very limited, all that can be said on the subject of the crops that have been grown in the territory has been given in former reports. Having now, however, visited every post but two in the territory, and traversed it in various directions, it may be expected that I should give the general conclusions at which I have arrived on a subject of so much consequence. This I shall do, even if it be necessary to support my opinions by an appeal to some facts which have been already recorded in former reports. Commencing with the cereals, we will take that first which is usually regarded as of the greatest importance and value:—

"*Wheat.*—I am strongly of the opinion that wheat may be successfully grown where the soil is suitable in all that part of this territory lying to the south of the fiftieth parallel of latitude. This opinion is founded on the belief that there is no other part of the world south of that latitude where this grain has not or can not be grown; that the mean temperature of the summer in the territory south of that parallel is amply sufficient to ripen or bring wheat to maturity; and finally, that there are good grounds for believing that wheat has actually been grown at Abitibi House, Flying post, New Brunswick, on or about the forty-ninth parallel, and certainly at Lac Scul, or Lonely lake, between the fiftieth and fifty-first parallel. More than this: I was told on the very best authority

* This expectation was disappointed—my exploration in 1880, and subsequently—showing that the arable land seen on the river banks does not extend far inland, but that the coast belt here referred to, is mostly covered by muskegs or peat mosses. E.B.B.

that Indian corn, a more delicate plant than wheat, came to maturity last year at Osnaburgh House, on Lake St. Joseph, and north of the fifty-first parallel. Even at Moose factory, in about the same latitude as Osnaburgh and situated on the coast, Dr. Bell tells us that he was informed that a few grains of wheat accidentally dropped, grew and came to maturity. There is hardly any evidence on the other side, certainly none entitled to much weight, and the probabilities are all in favor of the assumption that within the limits stated wheat may be successfully cultivated.

Barley.—The hardier varieties of this grain can be grown further north than any other of the so called cereals. In Scotland it grows on the Orkney Islands and in Shetland as far north as the sixty-first parallel. In western Lapland the limit is about the seventieth parallel. In Russia it is cultivated on the shores of the White Sea, everywhere south of sixty-six degrees on the eastern side, and of sixty-seven degrees on the western side. In central Siberia the northern limit of the growth of barley is between latitudes fifty-eight and fifty-nine. These facts are quoted on the authority of Mr. H. Stephens, F.R.S., author of "The Book of the Farm," "The Farmer's Guide," and other standard works on agriculture, both in England and America. Mr. Stephens further states "that a mean temperature during the summer of $46^{\circ} 4'$ seems to be all that is necessary in Europe for the cultivation of barley, but that in the islands of the Atlantic a temperature three or four degrees higher appears to be necessary for its success.

"The territory awarded to our Province north of the Height of Land is situated between the forty-eighth and fifty-second parallels of latitude, or from four hundred to seven hundred miles south of where barley is cultivated even in Siberia. Again, the mean summer temperature at Moose Factory, in the extreme northern part of the territory, varies from fifty-eight to sixty-two degrees, and is probably higher in the central and southern portions. This is at all events ten degrees higher than the temperature, which according to Mr. Stephens, "*is the only indispensable condition for the cultivation of barley.*" I have seen barley growing at Rupert's House and at Moose Factory on the coast, and at Flying Post and Matawagamingue in the southern part of the territory. I have been told on what I consider good authority, that it has also been grown at New Post, at Abitibi House, at New Brunswick, and at Long Lake House. Thus the evidence is conclusive not only as to the perfect adaptation of the climate, but to the fact that this grain has been actually cultivated in the northern, central and southern divisions of the territory. All that even the most incredulous can contend for, is that the crop is poor or that it sometimes fails to ripen perfectly. Now as regards the latter statement, I have no doubt that in the extreme northern part of the territory, bordering on the coast, it may fail in exceptionally wet and cold summers to come to perfect maturity. But this will not apply to the vast territory to the south, where barley will prove, in my opinion, a good and perfectly reliable crop. Nor do I think it would fail to ripen at Moose Factory or even Albany, if sufficient attention were paid to the drainage of the land, to the selection of the seed, to the time of sowing, and to a proper course or rotation of crops. If the crop be poor (and it is by no means always so) it is in all probability owing to poor farming rather than anything that is wanting either in the soil or the climate.

Oats.—This useful grain should grow wherever wheat will grow. Indeed its growth is practicable in Scotland, Ireland and other countries where wheat will not succeed. My own belief is, that the hardier varieties of the oat may certainly be cultivated in the greater part of the territory. I have not seen it growing, however, at any of the posts I have visited. I have been told that oats have been sowed at Abitibi House, at New Brunswick, and even at Moose Factory, and came to maturity; but other parties again said that the crop frequently proved a failure. This, however, may have arisen from the causes alluded to under the head of "barley."

Rye.—In Germany, Austria and Hungary, and other countries, rye is extensively grown, and forms the principal bread-stuff of a very large proportion of the population. Its cultivation does not extend, it is said, so far north as that of barley, but it grows in regions too cold for wheat, and on soils too poor and sandy for any other grain. Its ripening, in the opinion of some writers, can also be more confidently reckoned upon in cold

regions, than that of any other grain. I have neither seen rye growing, nor have I ever heard of any attempt to grow it in this territory. I am convinced, however, that at Matawagamingue in the southern part of this territory, and in the sandy areas on both sides the Height of Land, this important grain can and will be cultivated with very great advantage.

“Peas and Beans.—These, which are called legumenes or leguminous plants, produce seeds much richer in nitrogen or flesh-forming material, than the grains—wheat, oats, barley, maize, rye, etc., called cereals. They form an aliment of great value, and are extensively grown in many parts of the world, where they are used as food by man and domestic animals.

“The Windsor bean and Kidney-bean are generally relished when young and green. A small variety of bean commonly known as the “Horse bean” is extensively cultivated in Great Britain, where it is highly valued in combination with oats as a provender for horses. The kidney-bean when fully ripe, is a wholesome and very nutritive aliment, highly esteemed in this country and elsewhere, especially by the working classes, and commonly known under the name of haricot or white beans. I have not seen either peas or beans cultivated as field crops in any part of the territory. They are common, however, in the gardens even on the coast. At Moose Factory peas, kidney-beans and a small variety of the broad or Windsor bean seem to be unfailing crops. They grow well and I have no doubt in ordinary seasons will ripen their seed. They are used, however, chiefly, if not entirely, in the green state.

“The beans appear to succeed better and to be more prolific than the peas, which are not always so good. I have been surprised at the invariable excellence of the crops of both kinds of beans at Moose Factory. Nor have I ever seen a better crop of Dwarf-kidney beans than was growing at Matawagamingue when I was there last August (20th). The bean was of a brown colour, and a little larger than the white haricot. Mr. Rae told me that they came to maturity and were quite equal to the white bean.

“The vetch, a variety of the pea family, grows wild everywhere, but nowhere is it anything like so abundant as on the coast of James’ Bay. So plentiful are they on the more sandy parts of the old beaches that I have sometimes thought that the Indians would do well to harvest a lot of them for use, at a pinch during the winter. With a little judicious selection and cultivation this vetch might become of great service in a country, to the climate and soil of which it is so thoroughly adapted.

“*Potato.*—There is probably no food plant that is likely to be of more importance to the inhabitants, present or future, of this territory, than the potato. There is none the cultivation of which has been so thoroughly successful in every part. The admirable fitness both of soil and climate for its growth has been established beyond dispute. No one who has seen the crops at Moose Factory, Rupert’s House, New Post and Matawagamingue, can entertain any doubt on this point. Whether viewed in reference to size, quantity or quality, the crops at Moose Factory, and Matawagamingue this year would compare favorably with those in the best potato growing districts in Ontario. They keep all winter in common root-houses, and are sweet and good until the following crop is fit for use. Peaty soil is particularly well suited to the growth of potatoes. As stated elsewhere, there are millions of acres of peat-mosses in this territory, very extensive areas of which can be easily reclaimed, and when this country is settled and means of transport provided, it is within the range of possibility, if not probable, that hundreds of thousands of tons of potatoes may be grown and sent south to supply the wants of the people in the cities of Ontario and the northern states of the Union.

“*Other Roots.*—If in the near or more remote future, the breeding of cattle and dairy husbandry be likely to form important resources of this territory, as is by no means improbable, then the fitness of the soil and climate for the growth of root crops is of the greatest consequence. Among these the turnip is entitled to a place in the front rank. I have seen small patches of turnips, usually Swedish, at most of the Company’s posts in the territory and believe that on suitable soils, proper culture would ensure large crops of excellent bulbs. The carrot, beet and parsnip can also be grown, but like the turnip have only hitherto been cultivated as garden crops. I know no reason why they should not one and all succeed in the field also.

" *Green Vegetables*.—Cabbage, spinach, lettuce, mustard, cress and radishes are grown without any difficulty. The cauliflower, so tender, as I thought, in respect of frost, appears to be one of the surest crops at Moose Factory, and is sometimes ready for the table as early as the first of August. Potato-onions also grow well, but the season is too short to grow onions of any size from the seed. The cut-worm is the great enemy of the gardener at Moose Factory, as it is in many other parts of Canada, and if the cabbage and cauliflower plants were not well looked after and protected, few would be left.

" *Fruit*.—The only fruit that appears to be cultivated in the garden are the red and black current and the raspberry. The red current is remarkably prolific. Rhubarb also grows well. Other small fruit, such as the strawberry and gooseberry might, I am persuaded, be raised with little trouble, for they are found growing wild in many places, and perhaps nowhere more plentiful, or of finer quality than on the coast. With these we have the wild raspberry, a diminutive variety of blackberry, which grows only a single berry on each plant, and a very small kind of cranberry. The huckle-berry or blue-berry is found in great profusion from the long-portages to the Height of Land. Indeed it may be said to abound from the coast of Hudson's Bay to the shores of Lake Huron and Superior. It was nowhere in greater profusion or of finer quality than on the Height of Land itself. The berries gathered from one measured square yard as an experiment filled a large pint cup, * At the same rate, an acre would produce two thousand four hundred quarts of this wholesome fruit. Even allowing that the berries were exceptionally plentiful on the spot in question, it is not the less true that could the quantity of fruit which grows in the country lying between Lakes Huron and Superior and the fiftieth parallel be approximately estimated it would appear simply incredible to those who have not seen the country during the berry season. It would dwarf into comparative insignificance, in my opinion, all the other fruits put together. Without any rich or strong flavour, it is a pleasant, refreshing and exceedingly wholesome fruit and may, I think, be eaten in almost any quantity without danger. The natives are very fond of them, and even gather and dry the berries for use after the season is over. But all that man can use is as a drop in the bucket; the almost unreduced bulk of the fruit forms a bountiful provision of Nature for her other creatures. To the beasts of the field and the fowls of the air, and every creeping thing, these millions of bushels of fruit thus left over are as food; to some, perhaps only an agreeable luxury, to all doubtless a source of delight of which we can form no adequate conception. To none of all these, perhaps, it is a greater blessing than to the ant, that diligent and brave little pioneer who precedes man and earth-worms alike by centuries, in the important work of ameliorating and preparing the crude soil for the support of higher orders of vegetable and animal life. That an omnivorous animal like the bear should eat, or even subsist for a time on these berries seems quite natural, but when we find among its consumers carnivorous animals such as the fox, the marten and the fisher, and such birds as ravens, woodpeckers and ducks, one cannot help feeling more or less surprised.

"The only other wild fruit that I shall notice is also a variety of Whortleberry. This is a bush or tree not very unlike the wild cherry in appearance. North of the Height of Land it attains a height in some places of ten or twelve feet, but is generally about six feet. The fruit grows singly, not in bunches or clusters on the tree. It is of an oblong or pear shape, larger than the blue-berry, but smaller than the grape. When ripe it is of a purple or blue colour. It is sweeter and has more flavour than the huckle-berry, and is preferred by the natives to it. It too is found all the way from James' Bay to Lake Huron, but nowhere did I see it in greater perfection than on the Mattagami River. The fruit is not only pleasant and wholesome, but the juice would, I am persuaded, make an excellent wine, and the tree is worthy of cultivation and of a place in our orchards or gardens.

"The high-bush Cranberry and the Hazlenut are also met with in many parts of this territory, but in travelling south I did not observe any nut trees until I came to Little Long Portage on the Mattagami River, nearly a hundred miles from James' Bay.

* This profusion of blue-berries does not extend to all this territory, but is limited to the rocky and sandy districts. E.B.B.

"So soon as the Canadian Pacific Railway is extended through this territory, the gathering of these wild fruits will afford the natives a lucrative employment, as it does now to many of those on the north shore of the Georgian Bay. Nor to the great mass of the inhabitants of our cities will an overflowing abundance of such wholesome fruits as this territory affords in unlimited quantities, be otherwise than agreeable, the dearness of those cultivated fruits which can be exported to foreign countries placing them to a great extent out of the reach of the families of workmen.

"Nor is there anything unreasonable in the supposition that a country possessed of a climate which enables the uncultivated soil to produce spontaneously such a variety and abundance of wild fruits, may be capable of doing a great deal more with man's powerful aid and assistance.

"No attempt has been made yet, so far as I know, anywhere in this territory, to grow apples, plums, or cherries. I am inclined to think, however, that these and other highly prized fruits might succeed in the southern, higher, and drier parts of the territory. I should be much more hopeful of their doing so than on the north shore of Lake Superior.

"On the south side of the Height of Land, and coming down in some places to within a few miles of Lake Huron, the country like that for a considerable distance north is full of lakes. These are not generally very deep, one result of which is that the water heated by the sun's rays becomes much warmer throughout than the water of lakes Huron and Superior. I found the temperature of the water of Lake Monabing at the surface 70° Fah., and at fifty feet in depth it was still not less than 62°. I am of opinion, therefore, that orchards planted on islands or on the warm, dry ridges of bouldry or gravelly soil, lying between such lakes or even to the south of them, would not be likely to suffer from summer frosts, the chief, if not the only obstacle to the growth of many valuable fruits. I saw on Whitefish Lake, Indian corn planted in just such a locality as that I refer to, and this circumstance, which I have noticed elsewhere, goes far to convince me that the climate of a wide belt of territory on both sides the Height of Land, between Lake Huron and James' Bay, is so tempered and modified by the warm waters of the numerous small and shallow lakes, which cover probably one-third of the country, as to admit of the cultivation of many of our most valuable kinds of fruit.

"*Grasses.*—Whatever doubt may remain in the minds of any as to the agricultural value of the country north of the Height of Land in respect of its grain-growing capabilities, there can be none in regard to its fitness to produce the more important roots and grasses. From the height of land northward to the coast of James' Bay nothing on the north Shore of Lake Huron or Superior can exceed the luxuriance of the native grasses. These, however, are limited to beaver meadows, alluvial lands along the banks of the rivers, marshes in vicinity of the lakes, and to a broad belt on the southern coast of James' Bay; where covered with forest, bush or peat mosses, little grass is to be seen.

"I have not met with a field of cultivated grass in the whole territory. At those posts of the Hudson Bay Company where cattle are kept, they obtain their hay either from the marshes bordering upon the inland lakes or from the salt marshes on the coast. Some however, of our cultivated grass-seeds have been sown in former times at several of the posts, possibly with the view, rather to improve the pasture, than for hay. Be this as it may, white clover is to be seen at almost all the posts, and red clover, sown some fifteen years ago at least, is still common in the fields at Flying Post. Timothy likewise grows admirably in this territory, being quite able, like the red clover, not only to endure the cold of the winter, but to mature its seed, as is proved by its being still found on portages where the first seeds were accidentally dropped many years ago. These facts though meagre, are important, enabling us, as they do, to form at least some idea of the fitness of this territory for pastoral pursuits.

"*Cattle.*—With one doubtful exception not only man, but all the domestic animals usually kept by him enjoy excellent health in this territory. The only exception is the horse, and the only place Albany Factory. Several horses having died unaccountably at this post, the Company have not made any further attempt to keep them there. The cause, whatever it may be, can hardly be the climate, as that differs but little from Moose Factory, where the horses are remarkably healthy.

"Cows and oxen are kept at all the principal posts, and I have invariably found them wherever I have been, healthy and in fine condition, pretty good evidence of the salubrity of the climate and excellence of the pasture. At Moose Factory, where some sixty head at least are constantly kept, a certain number are slaughtered every fall, and are quite fat although then taken straight from the grass. The cows yield a large quantity of good milk.

"*Sheep.*—There is a small flock of sheep also at Moose Factory. They appear to be of a common and not very large breed. It is necessary to house them at night and watch them during the day, to protect them from dogs, of which numbers are kept by the Indians. They seem to thrive pretty well notwithstanding, and are, so far as I know, subject to no particular disease.

"*Hogs.*—A few pigs, seemingly well-bred, are kept. They are allowed during the summer to run at large on an island opposite the Post, and what they can gather for themselves is supplemented with potatoes and waste from the kitchens. They are thus maintained in good health and growing condition, but cannot be fed up fit to kill without grain or meal in the fall, which is, I presume, given to them, for the home-cured hams are exceedingly fine.

"*Poultry.*—It is impossible to keep poultry at or near any of the fur-trading posts unless they are enclosed in a well-fenced yard. The Indian dogs, unbroken and half-starved, would worry and devour any fowls that were suffered to run at large. But for this the common barn-door fowl might be reared and kept with great advantage. The turkey would do well also with full liberty to range about during summer.

"The vast numbers of wild-fowl which migrate to and spend the summer months in this territory affords sufficient proof of its fitness for geese and ducks, both of which might no doubt be easily bred and reared.

"In conclusion under this head, the agricultural resources of this territory are, as will now have been seen, various and by no means unimportant. The climate has been shown to be such :—

- "That we have good reason to believe wheat, oats, barley, and rye, as also peas and beans can be successfully cultivated.
- "That excellent crops of potatoes and turnips can be grown in any part of the territory, and that other roots such as the carrot, beet and parsnip will in all probability succeed.
- "The cauliflower, cabbage, and all the common vegetables raised in the northern part of Ontario can be likewise grown at Moose Factory and at other posts south thereof.
- "That the cultivated grasses, red clover and timothy, grow luxuriantly, mature their seed and survive the winter.
- "That wild fruits of various kinds, and valuable of themselves, are spontaneously produced in great quantities, warranting the inference that cultivated varieties may be successfully and profitably grown in the territory.
- "That live stock, horses, cows, sheep, pigs and poultry thrive remarkably well in every part of the territory where introduced, with the exception of Albany Factory, at which the horses alone for some unknown reason have not lived.

"The soil, as might be expected in a territory so large, is variable, ranging from clay loams at or near the coast, to light, sandy or gravelly loams towards the Height of Land, and in some sections very extensive peat-mosses. These peat-mosses are confined chiefly to the territory lying to the north of the forty-ninth parallel. The southern limit, however, of the peat-moss region, is I believe very considerably north of the forty-ninth, if not even of the fiftieth parallel, west of the Missinaibi Branch of Moose River. These peat-mosses repose on clay marls, and although not immediately available for cultivation, I have hardly a doubt vast tracts will be eventually reclaimed and converted into good arable land.

“Along the banks of the rivers, even in this northern belt, there is a strip of good land. The islands and river bottoms have a rich alluvial soil. Above the junction of the Mattagami and Ahkuckootish Rivers this alluvial or bottom land is still more extensive than below the Long Portage, and much of it that is probably flooded for a week or two in the early spring might be turned to very good account as meadows or otherwise, there being no danger whatever of flooding after the subsidence of the spring freshet, caused by the melting of the snow. As we approach the Height of Land and the country becomes more broken, the dry ridges will afford fine pasture, while portions of the lower slopes where not too stony, and the river bottoms may be cultivated. The swamps, if drained, would frequently make excellent land, and the marshes will always be more or less valuable for grass and hay.”

EXPERIMENTAL FARMS.

The following, which is taken from my report for 1884, pp. 24 and 25, is of such importance, in my humble opinion, as to justify me in again bringing the subject to which it refers under the notice of the Government.

“In all the reports which I have had the honour to submit in reference to this territory, I have expressed the opinion, that, while the climate in by far the greater portion of it, will admit of the growth of all the more important roots and grain crops, the soil and other conditions are better suited to the breeding of store cattle, and to dairy husbandry. See report for 1879-80, page 20-25, and report for 1882-83, pp. 13, *et seq.*

“To engage successfully in these latter branches of farming it is not imperatively necessary that colonization or other roads should be made to each man's door. Store cattle can be driven many miles over a country, which, if not already passable, can be rendered so with very little labour. The expense of driving cattle sixty or seventy miles to the nearest railway station or steamboat landing is trifling; nor would the transport of really good butter a like distance, over winter roads, be a very serious obstacle to the success of dairy farming if the country and the climate were otherwise favourable. It is a very different matter when the marketable produce of a country is grain or roots, even if that grain be wheat. Of this we have already sufficient evidence in the experience of settlers in the west and northwest.

“If a portion of the money heretofore spent in promoting emigration were expended in placing beyond doubt the fitness of our northern territory for the growth of grain and root crops, and its particular adaptability for the raising of cattle and the making of cheese and butter, such an expenditure could not, in my opinion, fail to be, in the highest degree, beneficial.

“With this object in view, I would respectfully suggest the establishment, at suitable points, of experimental farms, in this territory.

“The object sought to be obtained is not of the nature of “model farming,” nor is it the raising of large crops. That which we really want to find out is, what kind of crops can be raised in different parts of this territory? And further, in regard to those crops that will grow, which are best adapted to the soil and climate? or in other words, the most thrifty and productive. It is of vital importance, as bearing on the value of this territory and the manner in which it should be opened up and developed, that the Government should know from actual experiment whether wheat, barley, oats, rye, peas, beans, vetches, etc., will grow and come to maturity. As regards wheat again, whether fall wheat is or is not a reliable crop in a territory like this, where the ground is covered with a mantle of snow the entire winter? That potatoes will grow well from the Height of Land to the very coast of James' Bay, has been sufficiently proved at the Hudson Bay Company's Posts. But there are other roots of no little importance, such as the carrot, turnip, beet, parsnip, in respect of which it would be desirable to have further information. Again, as bearing on the suitability and value of the country for stock-raising, and for dairy farming, it would certainly be well to know, from actual experiment, what grasses will grow in the territory, such as red and white clover, timothy, rye grass, etc., including

not only those valuable for fodder, but for pasture also. It would be interesting also to know whether the cultivation of flax, hemp, and hops might be expected to be successful. And some of the smaller fruits even might be worthy of notice.

"All this, it appears to me, might be ascertained by carefully conducted experiments on ten acres of land or less, and in a period of four or five years at the most. The results might not be quite as satisfactory or reliable as those obtained by farming in the large way, but would nevertheless, I think, be exceedingly valuable to the Government and people of this province.

"The Government would then have not merely opinions and reports, but reliable facts on which to base its policy in regard to the opening up and development of the territory. It would then know what kind or class of settlers would be almost, if not quite certain, to make a fair living and comfortable homes in the territory, and these and no other should be encouraged to go there. The success and contentment of the first pioneers is the best advertisement of, and the surest way to people this or any other territory.

"It may be feared that these "experimental farms" will be too costly, but most of the operations would, in reality, more nearly resemble those of the market gardener than of the farmer. No expensive buildings need be erected, and those absolutely required might be constructed of logs, which can be procured on the spot. I believe these farms, if judiciously located and properly handled, would be self-sustaining after the second year, and that no part of the capital invested need be lost. And further, that under any circumstances the expense will be altogether trifling as compared with the importance and value of the results.

MINERAL RESOURCES.

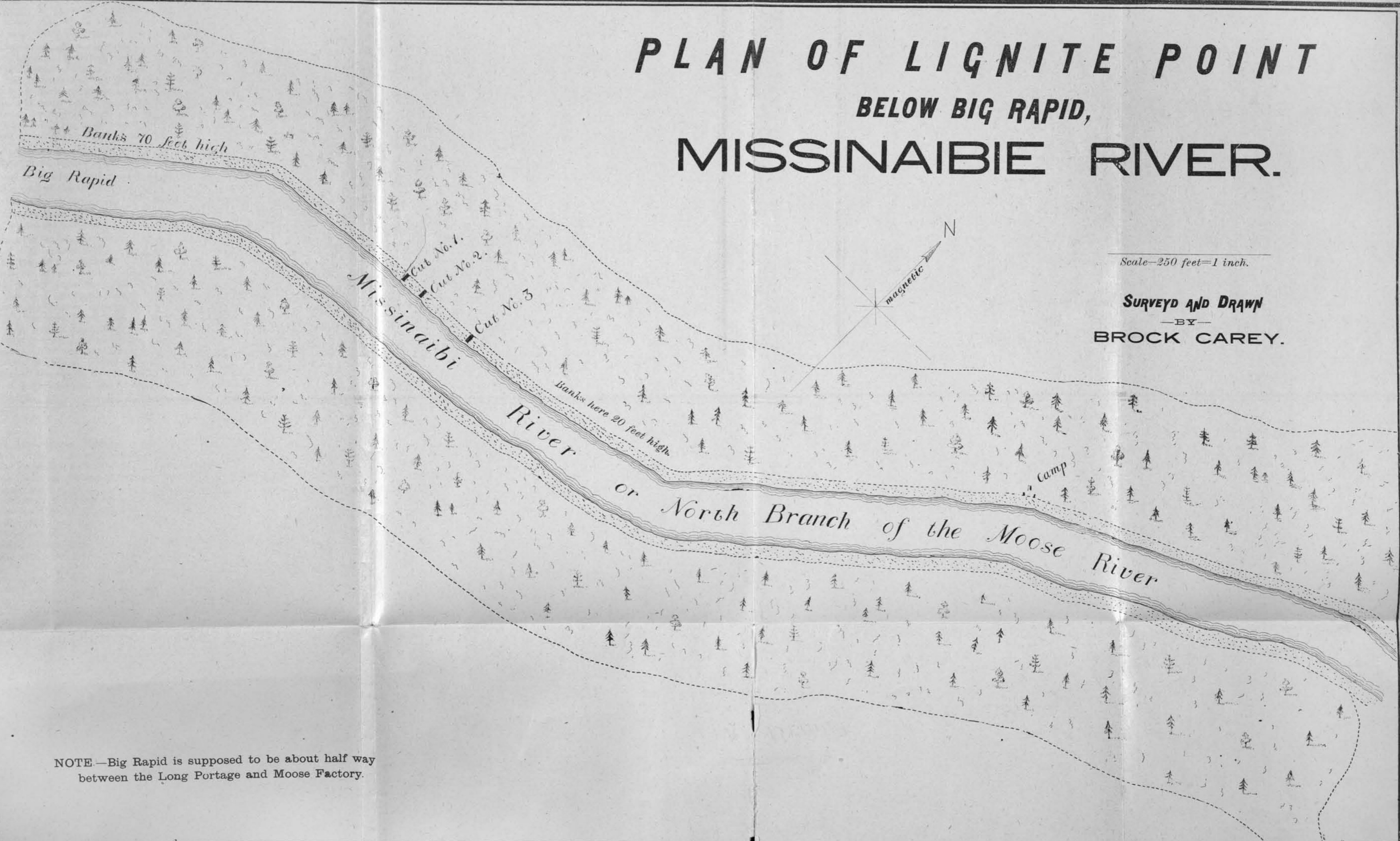
In this northern portion of Ontario, the fundamental rock is so generally concealed from view by the overlying drift, that it does not, for that reason, afford a very promising field for the explorer in search of those metallic ores, or other minerals commonly found in veins. In the banks of the rivers and on the shores of the lakes and islands the rock is occasionally exposed, having been denuded by the action of the water. But in the rivers such exposures are chiefly met with at rapids and falls. In the intervening stretches although there may be a great deal of loose rock and many boulders and an occasional reef, very little rock is met with in situ. On the lakes again, it is principally on exposed points and islands that rock is found, rarely in bays, and even when met with in such positions, whether on lake or river, the bare rock will not often be found to extend far inland.

Nor is the rock itself, either on the height of land plateau, or central belt or plateau, generally of the kind most likely to contain rich veins of the more useful metals, the fundamental rock being generally Laurentian. There are, however, important areas where it is Huronian, and it is these more especially which should claim the attention of the prospector. Ores of iron, copper and lead have already been found in several localities, in promising, if not paying quantity. Iron pyrites, mica and other minerals of more or less economic importance have been met with, and it is quite within the range of *possibility*, if not *probability*, that as the country is rendered accessible, systematic exploration may be rewarded by the discovery of the precious metals.

In the northern division or coast belt of this territory, the fundamental rocks are stratified or flat-lying. They belong to the great palæozoic division of the geologists, and consist of limestones, sandstones and shales, differing greatly from each other in appearance and composition, and when fossiliferous, as many of these beds are, each group is characterised by the presence of particular fossils absent in other groups.

For an explanation of the terms usually employed by geologists, and for a description of the rocks in this part of the Province, I must refer to the excellent little work of Dr.

PLAN OF LIGNITE POINT BELOW BIG RAPID, MISSINAIBIE RIVER.



Scale—250 feet=1 inch.

SURVEYD AND DRAWN
—BY—
BROCK CAREY.

NOTE.—Big Rapid is supposed to be about half way between the Long Portage and Moose Factory.

Bell of the Geological survey of Canada, entitled "The Geology of Ontario with special reference to Economic Minerals," recently published, as supplying, in a popular and concise form, information which cannot fail to be useful to intelligent explorers and miners, as well as to others interested in the mineral resources of the Province.

This plain or coast belt is completely covered to a greater or less depth with the loose material called drift; deposited for the most part, as has already been explained, by ice. On or near the coast of James Bay, the drift or other loose material rarely, I think, exceeds forty feet in thickness. It gradually increases, however, as we recede from the coast, and is as much as two hundred feet in some places at or near the southern edge of the belt, and rarely less than one hundred feet in depth. From this it may be inferred that the underlying flat rocks are very seldom to be seen. So true is this, that I am satisfied I am within the mark when I say that not one-quarter of a per cent., or one four-hundredth part of this belt is bare rock.

In no place where these palæozoic strata have been laid bare, have I ever seen a well defined vein of any kind, metalliferous or otherwise.

Nevertheless I consider the southern edge or belt of this palæozoic plain as, by far, the most valuable part of this territory, in regard of its mineral resources.

They consist, so far as discovered, of lignite or brown coal, iron ore, kaolin or china clay, potters' clay, the finest of sand for glass-making, gypsum, fire-clay and brown and yellow ochres, nor are there wanting, indications at least, of both petroleum and gas.

I shall endeavor to describe these minerals in detail, each under its separate head, and will first quote from my report for the year 1879, as follows:— "Two-thirds of the country passed through on my journey to and from Moose Factory consists of Laurentian and Huronian rocks, the former greatly predominating. So far as my experience goes, they have produced few mines of the more useful metals that have proved rich and productive for any considerable length of time. On Lake Temiscaming (east or Quebec side) a location was pointed out to me where galena or lead ore had been found, and which presented a rather showy appearance. I found quite a large vein of magnetic iron ore on the Rocky Portage, one of the uppermost of fifteen portages, which occur in a distance of not more than ten miles after leaving Lake Temiscaming. The ore, however, did not seem to be rich. This also is on the Quebec side of the boundary. Descending the Abitibi River, the rock is not often visible, excepting at the rapids and on the portages, and neither at these places, nor on the shores of Lake Abitibi, did I observe any minerals or metallic ores of much value or importance.

GYPSUM.

Returning from Moose Factory, a fine bed of gypsum, known to the natives as the "White Rocks," is seen in the banks of the main Moose River, about thirty-five miles above Moose Factory. This bed of gypsum was carefully examined by Dr. Bell, of the Geological Survey of Canada, in 1875, and is described by him in the Report of Progress for that year as follows:—"Leaving the Grand Rapids (Dr. Bell was going to Moose Factory *via* the Matagami or South Moose), no rock *in situ* was observed until arriving at the White or Gypsum Banks on the main Moose River. They occur on both sides of the river, and begin at thirty-eight miles above Moose Factory. The bank on the south-east side runs for about two miles; that on the opposite side about half that distance. The gypsum consists of a bed of the ordinary hydrous saccharoidal variety, running along each side of the river, and raising to a height of not more than ten feet above low water mark. It is mostly of a light bluish-grey color, with some whitish portions colored or mottled with yellow and other colors. The white variety, suitable for making stucco, was not observed in sufficient quantity to be of economic value. This bed is overlaid, on both sides of the river, by a layer of mixed gypsum and bluish-drab marl, also about ten feet thick. The gypsum is in the form of lumps, many of which consist of transparent, colourless selenite cleaving into thin laminae. A gypsum

bank, similar to the last, runs along the south-east side of the river, between four and five miles below the extremity of the higher one on the same side." This bed of gypsum can be easily and cheaply worked, and it will no doubt become valuable as a fertilizer and for other purposes when the country is opened up and settled.

LIGNITE.

On the north branch of the Moose River, sometimes called the Missinaibi River, and about one hundred miles from Moose Factory, we came to Coal Brook or creek, where the existence of brown coal or lignite would appear to have been long known to the Hudson's Bay Company's officers and servants. I found a tolerably good specimen on the sand bed at the junction of the brook and main river. I did not see the lignite *in situ*, being unable to ascend the brook in search of it. A day or two before arriving at that point, the weather had become very cold and frosty, and as the voyageurs who accompanied me had to return to Moose Factory after taking me to Michipicoten, they were very anxious to push on with all speed, fearful that the smaller lakes on the height of land might freeze before their return and thus expose them to a great deal of hardship, if not danger. This circumstance prevented my giving as much time and attention, not only to the minerals, but to other resources, as I should, under other circumstances, have gladly bestowed on them. Dr. Bell, however, who examined this and other beds of lignite in 1877, thus describes them in the geological report for that year, p. 4C. "The existence of lignite on the Missinaibi (North Moose) River, was referred to in my report for 1875, page 326. During the past season I found it *in situ* in several places on this river, between the Long Portage and its junction with the Mattagami. The first or highest of these was in the west bank of Coal Brook, three-quarters of a mile from its mouth, Coal Brook is a small discharge or channel which leaves the main river opposite the head of the fourth or River-side Portage, and rejoins it five and a half miles below Round Bay at the foot of Hell Gates. This bed of lignite is about three feet thick, and is underlaid by soft sticky blue clay and overlaid by about seventy feet of drift clay or till, full of small pebbles and passing into gravel towards the top. Much of the lignite retains a distinct woody nature, some of the imbedded trunks are two feet in diameter. When dry, it makes a good fuel, but contains a little iron pyrites. On the south-east side of the river, at nineteen miles below Coal Brook, or two miles above Woodpecker Island, a horizontal seam of lignite was found in a bank of 'till' 125 feet high. It is from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet thick, and is made up principally of sticks and rushes. Below the lignite are 80 feet of yellow-weathering grey clay, and above it 45 feet of blue clay. Both varieties of clay are full of pebbles, and they also hold some striated boulders of Laurentian gneiss, Huronian schist, and unaltered Devonian limestone. At three miles below Woodpecker Island, or nine miles above the mouth of Opazatika (Poplar) River, another bed of lignite occurs in the bank upon the same side. It is 6 feet thick, but diminishes to the eastward, and is of a shaly character, being made up of laminae of moss and sticks. Immediately below the lignite is a layer 1 foot thick, of irregularly mingled clay and spots of impure lignite. Next below this are 40 feet of unstratified drift, full of small pebbles, under which are a few feet of stratified yellowish sand and gravel. Resting upon the lignite are 5 feet of hard lead-colored clay with seams and spots of a yellow color, and layers of red grey, drab and buff. Above all and forming the top of the bank, 65 feet high, are 10 feet of hard drab clay with striated pebbles, and small boulders holding rather large valves of *Saxicava rugosa*, *Macoma calcarea* (*Tellina proxima*), and *Mya truncata*. Small seams of lignite were seen in two places in the bank on the same side at, and again half a mile below the foot of a rapid which occurs about six miles above the Opazatika. In the interval, between one and two miles above this stream, the whole bed of the river appears to be underlaid by lignite. When sounded with a heavy pole it has an elastic feel, and gives off large volumes of gas, which may also be seen at any time bubbling up spontaneously here and there all along this part of the river. This phenomenon has been observed by the Indians from time immemorial, and the locality has received the name of the 'Bubbling Water.' A box of specimens of the lignites of the above localities was brought to Montreal for examination."

"No analysis of the specimens of lignite collected by Dr. Bell in 1877, has yet been made, so far as I know. A specimen, however, obtained from the Moose River by Dr. Bell, in 1875, was examined by Mr. Hoffman, and gave the following results (Geological Report, 1875-76, page 422):—

	Slow Coking.	Fast Coking.
Fixed carbon	45.82	44.03
Volatile combustible matter	39.60	41.39
Water	11.74	11.74
Ash	2.84	2.84
	100.00	100.00
Ratio of volatile to fixed combustible	1:1.16	1:1.06

This specimen of lignite was thoroughly air-dried. Mr. Hoffman observes in reference to it:—"This lignite is very similar in composition to those from the Souris Valley, collected and examined by Mr. G. M. Dawson, as also to those from the Dirt Hills and Woody Mountains (North-west Territory), collected by Mr. Bell."

Although looked at hurriedly in passing, I had never had it in my power at all carefully to examine these lignite beds until last year. In addition to the places on the Missinaibi, described by Dr. Bell, I had in the course of my own explorations found lignite "in situ," both on the Mattagami and Abittibi branches of Moose river.

But having neither tools nor men, or indeed permission to use them, in the work of opening up and testing these or other mineral deposits, nothing more was done than simply to report the existence and apparent size of the beds. Nor would it have been prudent to do more until the boundaries of the province were finally determined.

Last summer however, by the desire of the Honorable the Commissioner of Crown Lands, I took with me, when going to Moose factory, such tools and men as would, I expected, enable me to examine these beds of lignite more thoroughly, and to form a more decided opinion as to their economic value and importance.

Owing to unavoidable delays arising from circumstances which could not be foreseen, but more particularly to sickness among the Indians at Missinaibi, and the difficulty—amounting almost to impossibility—of obtaining voyageurs or guides, either there or at Moose factory, much valuable time was lost. The results obtained however if not entirely satisfactory, are to say the least encouraging.

Seeing that it would be impossible during one short season to test or even examine carefully the lignite-beds on all the rivers mentioned, I determined to restrict our operations to those on the Missinaibi branch of the Moose River. We accordingly proceeded straight to Moose Factory where it was necessary to get some tools made and to procure more men, both of which were indispensable. This done we commenced to re-ascend the river on the 15th of July with the intention of examining the several out-crops of the beds of lignite as we came to them, beginning with the lowest at Big Rapids, about half way between Moose Factory and the Long Portage, and ending at Coal Brook, some eight miles below Long Portage. The distance between these two points, by the river, is nearly 60 miles. Judging from what I had previously seen, I expected to find the lignite at Coal Brook in greater quantities, if not of better quality, than at any other place on the river.

On the 18th of July we reached Big Rapids. The lignite at this point was discovered by one of my voyageurs in 1880 and was thus referred to in the report for that year, p. 12. "Emichoo, my bowsman, brought me a piece of lignite which he had found in the bank of the river a short distance above our camp, and about midway up the rapids. I went to examine the place and found it was seemingly a regular bed situated about 18 feet below the top of the bank and between 2 and 3 feet in thickness. It was traceable a little above the edge of the water for about 25 or 30 fathoms in length. Its strike would appear to be east and west nearly, and its dip very slightly toward the north. Immediately above the lignite there is a stratum of about 4 feet in thickness of sandy

clay and pebbles. This was overlaid by 6 feet of shingle composed mostly of pieces of limestone, slightly held or agglomerated together. Above this again there was 6 or 8 feet of sand and sandy loam.

To be workable, I think the stratum forming the roof of the coal would require to be firmer (more compact) than where it is seen at the out-crop, but as it dips north, and the ground rises somewhat in that direction, the roof would most likely become firmer as it took cover, or got deeper below the surface."

The out-crop of this bed of lignite at the time above referred to—almost on a level with the water of the river—was this year (a month later in the season) from 3 to 6 feet above it. During the spring freshet, I have no doubt that it is entirely under water. No time was lost in setting John Cullis—a practical miner—with one of the voyageurs, to drive in on the bed from the river, while another party was sent to bore down with our "prospecting auger" at a point on the river bottom, some distance inland from, and a little higher than the immediate bank of the river.

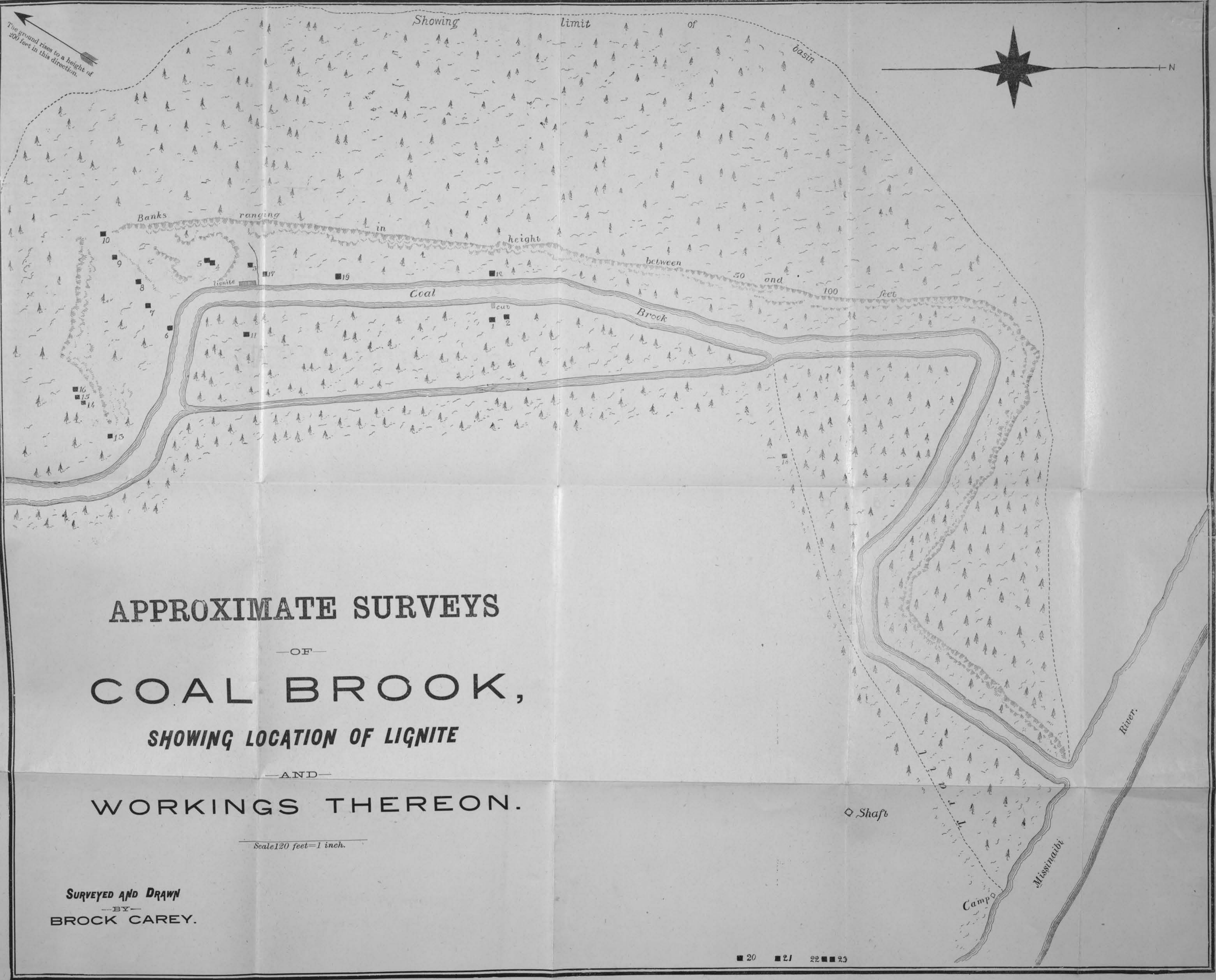
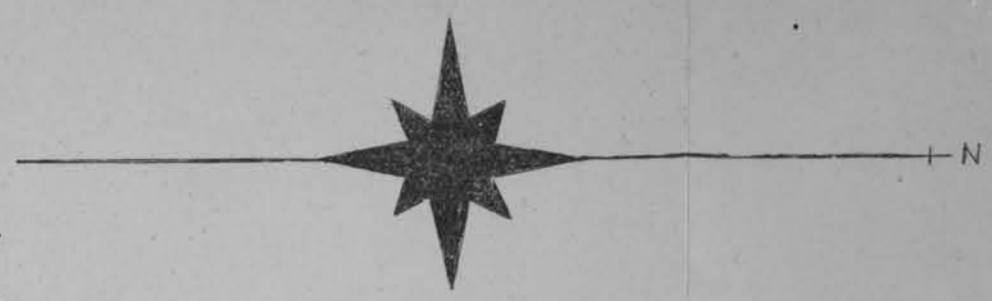
It may be proper to mention here that this prospecting auger was obtained from the Peirce Well-Sinking & Oil-Well Supply Company of New York. As everything had to be taken in canoes and carried on the men's backs over numerous portages, I selected this auger, after some inquiry, as being, in my opinion, lighter and more portable, and on the whole better suited to our purpose, than any other. It bored a hole $4\frac{1}{2}$ inches in diameter. The rods made from malleable iron gas-tubing, and $1\frac{1}{8}$ inches in diameter, were in 5 feet lengths and could be easily handled. These screwed together by means of thimbles, and length by length could be added as the hole deepened. We took with us a sufficient number of these, to enable us to sink fifty feet in depth, where necessary, and the nature of the material to be bored through would admit. The auger was turned or worked like a common wood auger. The cross-head for this purpose could not be obtained from New York without occasioning delay. With the kind permission however of the officer in charge at Moose factory, the blacksmiths there designed and made one for us which could be attached or screwed on to any part of the rods, and answered the purpose very well. The necessity we were under of drawing up the auger every nine or ten inches in order to clean out "the pod," immediately above "the bit," and which was accomplished by means of block and tackle, took up a great deal of time, especially when the hole had attained such a depth as to require the putting up of a triangle. As a substitute for the triangle, we frequently took advantage of an inclined or over-hanging tree, if one could be found at or near where we wished to bore. Up this tree one of the Indians would climb with a small axe stuck in his belt, and clearing away such limbs as might be in the way, fasten the upper block 30, 40 or 50 feet above the ground. This was very convenient and expeditious where suitable trees—and such as could be climbed without serious risk to the man's neck or limbs—were handy. We should have found a pair of the climbers or spurs such as are employed by those men whose business it is to ascend telegraph and electric light poles, exceedingly useful.

Such an auger as that here referred to would I was quite aware be utterly worthless for boring through rock, but I did not expect to meet with any beds of solid rock, overlying the lignite in this territory, nor did we do so in any of the holes put down this season. In drift or loose material, moderately dry, and comparatively free from stones, whether of sand or clay, or an admixture of the two, it answered all that could be expected of such a tool. But in coarse gravel or drift containing many boulders or stones, it was all but useless.

On the river bottom at the Big rapids we found after repeated attempts that it was impossible to bore down to the bed of lignite with the auger. About 17 feet was the greatest depth attained. In this and other holes, the auger came upon stones of such size that we had to desist for fear of breaking it.

Three or four cuts were however made into the bank from the river. These are shown upon the plan or survey of this point, as also in the photograph which accompany this report.

The ground rises to a height of 200 feet in this direction.



APPROXIMATE SURVEYS
—OF—
COAL BROOK,
SHOWING LOCATION OF LIQNITE
—AND—
WORKINGS THEREON.

Scale 120 feet = 1 inch.

SURVEYED AND DRAWN
—BY—
BROCK CAREY.

■ 20 ■ 21 22 ■ 23

In the first cut the lignite proved to be about 2 feet only in thickness with sand, both above and below. The strike of the bed was apparently east and west with a very slight northerly dip. The quality of the lignite was not satisfactory, the wood or trunks of trees, of which it was principally composed, being imperfectly mineralized, and a good deal mixed with sand. The bank of the river at this point was seemingly 20 feet in height. The uppermost 10 feet consisted of sand, below which there was a stratum of gravel and stones of variable thickness, and under this lying both above and below the lignite, a pure light colored sand.

In the second cut the lignite was in three distinct bands. The first or lowest rested on sand and was 1 foot 5 inches in thickness. Above this was a stratum of sand 1 foot thick. Then another band of lignite 7 inches in thickness, and above that a second layer of sand 2 feet. Resting on this was a third band of lignite 8 inches thick. Above all these was about 3 feet of mixed sand and clay, followed in upward or ascending order by 6 feet of gravel and stones in an argillaceous sand, and at the top about 8 feet of sand.

In the third opening we found about 4 feet of mixed lignite coal and sand under cover of loose material, all apparently alluvial, such as that overlying the lignite in the second opening or cut.

The quality of this coal is not such as will, in my opinion, justify the expectation that it can be profitably mined and transported overland to distant markets in southern Ontario, to be there employed as fuel. It is no sooner taken out of the ground and exposed to the air, than drying, it begins to fall to pieces. Nothing however can be positively asserted on this point, where, as in this case, the coal is obtained so near the out-crop and at such a trifling depth.

Between this Big Rapid and Coal Brook several places are mentioned by Dr. Bell where lignite is met with in the banks of the Missinaibi River. Some of these beds I saw, others I could not find. They were possibly hidden from view by recent land slides which are very common on the south-east side of the river about where Dr. Bell saw these beds. Such as came under my notice did not seem to merit trial, in view of the limited time at my disposal and the more promising appearance of the bed at Coal Brook.

On our arrival at "Bubbling Water," however, a few miles above the junction of the Opazatika River, a point where a considerable volume of natural gas continually rises up to the surface, and which Dr. Bell attributed to the presence of lignite in the bottom of the river. I thought it would be desirable to remain a day or two and ascertain if possible whether Dr. Bell's conjecture was well founded or not.

We first tried to put down two holes, close to the west bank of the river, and opposite to where the bubbles of gas appeared to rise in the greatest abundance. At the depth of 5 feet, however, stones or boulders were met with in both, which prevented us from sinking deeper. We then tried about twenty yards from the bank, but there also met with like impediments at a depth of 15 feet. We then went back about 50 yards into the bush and tried again. At this place which was $8\frac{1}{2}$ feet above the level of the water of the river, we succeeded in boring down 27 feet, or about $18\frac{1}{2}$ feet below the level of the water, and 13 or 14 feet below that of the bottom of the river. Neither lignite nor gas were struck in any of these holes. The problem therefore as to the origin of this gas remains unsolved. In order to do this, it will be necessary most likely to bore to a much greater depth than was reached by us.

Coal Brook.—The position of this brook has been described in the preceding extract from Dr. Bell's report for 1877-78, and is also shown on the geological map of the Basin of Moose River. While this brook is, as Dr. Bell says, "a small discharge or channel which leaves the main river (Missinaibi) opposite the head of the fourth or river-side portage," it is also an independent stream. It is only, I suspect, during the spring freshets that much if any of the water of the main river flows through this channel, but from the appearance of the banks I should judge that there was at that time a very large quantity.

The bed of lignite described by Dr. Bell occurs on the west side of Coal Brook about half a mile above the junction. It appears in one place, but for a few yards in length only above the level of the water. A very little work however satisfied us that the

greater part of the bed was situated below the water level, and that we should on that account be unable to drive on it. The bank above the lignite is composed of drift, clay and sand, with some stones, and rises rapidly to a height of 100 feet. At a comparatively short distance to the south-west the ground is 150 or 200 feet, if not more, above the level of the brook, and the adjacent Missinaibi River. Indeed I am strongly of the opinion that the thickness or depth of the drift material overlying the bed rock, is greater here than in almost any other part of the territory.

On the opposite or east side of the brook the ground is lower and the brook a little above or to the south of the exposure of lignite referred to, turns or doubles back to such an extent as to form an island.

Our first attempt to bore down to the coal, which we were hopeful would underlie the whole of this low ground, was made on this island. It is marked No. 1 on the accompanying plan. This hole was put down $8\frac{1}{2}$ feet. When coming to gravel and stones, it had to be abandoned.

No. 2 was started at a point a few yards distant from No. 1. Here we got down $21\frac{1}{2}$ feet below the surface. The first 3 feet were sandy, passing gradually into drab colored clay with some gravel, and so continuing until at about 12 feet a bed of black carbonaceous clay was struck. This clay, with more or less lignite interbedded or mixed, continued for 5 feet. Below this, however, we came to a stratum of mixed sand, gravel and stones, which could not be penetrated with our auger.

We then crossed to the west side of the brook, and selecting a point on the bank about 21 feet above the water, almost immediately in the rear of where the principal exposure of lignite occurs, hole No. 3 was started. In this No. 3 hole, 20 feet of light bluish gray calcareous clay (drift) containing a few pebbles, was first passed through. A bed of black carbonaceous clay and lignite was then struck and proved to be 18 feet 10 inches in thickness. Interstratified with, but not included in the thickness of the above, were three bands of light grey, drab and variegated clay, either destitute of, or containing very little lime. The aggregate thickness of these was 3 feet. Below the black clay (or possibly shale) and lignite, we bored through $8\frac{1}{2}$ feet of grey, drab, reddish and variegated clays, destitute like that above mentioned of lime or nearly so. And I am inclined to think a good fire clay.

Having bored this hole as deep as our rods would allow, we had of course to stop. In No. 4, the next hole, we were stopped by a stone at the depth of 5 feet. And in hole No. 5 by quicksand, having struck a spring of water at the depth of 8 feet. In No. 6, however, we were more fortunate. This hole was started like the three preceding ones, on the west side of the brook, but close to the edge of the water and only about 18 inches above it. It was somewhat further up the river than the place where the lignite appears in the bank as described by Dr. Bell. The coal could be seen, however, in the bottom of the brook in front of where we commenced to bore. The first 4 or 5 feet the auger passed through drab and variegated clay, slightly calcareous. Then followed 7 feet of lignite and black carbonaceous clay. Below this 2 feet of drab clay, followed by another stratum of black clay and lignite, 1 foot in thickness. Then 3 feet more of drab and variegated clay, succeeded by about 3 feet of sand and clay mixed. Underlying this there was a bed of lignite coal 2 feet in thickness. Then followed 2 feet of mixed sand and gravel, succeeded by 1 foot of variegated clay. We then, greatly to my surprise, struck a bed of fine white clay, into which we bored for 9 feet, when coming down on a stone with the auger we were unable to sink deeper. The total depth of this hole was 35 feet. Of which about 10 feet were lignite and black carbonaceous clay, 11 feet drab and variegated clay, 5 feet grey argillaceous sand, and 9 feet were white clay.

This white clay is an interesting deposit. I have sent a sample of it to Ottawa for examination, but have no reply as yet. I hope, however, to receive it in time to be appended to this report.

The last hole having attained a depth of about 33 feet below the level of the water of Coal Brook, it was now my intention to bore a series of holes, in ascending order up the hill, and in a south-westerly direction. These were to be so arranged that the bottom

of each hole would be as low or on the same level as the mouth or top of the one which had preceded it. Thus, although unable with the tools we had to take in the whole from top to bottom with one hole, we should be almost certain to find them if any beds of lignite coal were situated higher than the brook, and cropped out anywhere in the face of the hill above.

With this view the next or seventh hole was started about 20 feet above the level of No. 6.

Hole No. 7, we had only bored 5 feet 10 inches when we struck a bed of lignite coal, and black carbonaceous clay $2\frac{1}{2}$ feet in thickness. Above this seam or bed, the drift clay was calcareous, below the coal we found drab colored and variegated clays, which were smooth, unctuous and compact, and like the black carbonaceous clays contained no lime. After penetrating 10 feet 2 inches deeper our auger passed through a second seam of lignite and black clay 1 foot 7 inches in thickness. This was followed by drab clay about 4 feet in thickness. At this point another (the third) small seam of lignite and black clay was met with about 9 inches in thickness. Below this we had drab clay 2 feet 5 inches thick. Then another (making the fourth) bed of lignite and black clay, and 7 feet 2 inches in thickness. Under this lignite bed we struck an indurated clay, variegated in color at first, but gradually becoming white in another 2 feet. We were now down nearly 37 feet in all, the bottom of this hole being 17 feet below the level of the mouth of No. 6 hole, and about 15 feet below the brook. Here we stopped, the hardness of this bed of white clay being such as not only to render our progress slow, but endanger our auger. The aggregate thickness of the four seams of lignite coal thus bored through was 12 feet.

Hole No. 8, this hole was started 22 feet higher up the hill than last, and was bored to a depth of 23 feet, thus going down about a foot under the level of the mouth of that immediately below. The uppermost 12 feet passed through was a calcareous sand with sufficient clay to render it plastic. The color at first yellowish, becoming grey or light drab in depth. Below this, 5 feet of calcareous clay, then 2 feet of variegated clay (not calcareous), followed by 1 foot of lignite, and ending with 2 feet of mixed sand, clay and gravel.

The next hole of this series, No. 9, was started 24 feet above the last. We were only able to bore 17 feet at this place on account of stones. It left a gap of 7 feet between the top of the one and top of the other untested. The nature of the ground passed through, being a fine grey calcareous sand similar to that in hole below, satisfied me that there was no lignite bed in this intervening space.

Another hole, No. 10, was commenced 16 feet higher up than the last, and sunk to that depth in calcareous sand as before, nothing worthy of notice being met with.

A recent land-slide had left an almost vertical face or bank rising from the level of the last hole to the top of the ridge which is at this point a little over 100 feet above Coal Brook. If there had been any beds of lignite or other material of economic value, we should have seen them in the face of this bank. It was composed with the exception of one or two thin and almost horizontal strata of clay, entirely of a very fine light yellowish colored calcareous sand. The clay-bands were not more than 3 or 4 inches thick, but interesting as showing, that this portion of the great drift deposit had been slightly at all events modified since it was first deposited.

The ground on the top of the bank or ridge now reached is level, or rather falls away for a short distance, after which the surface again rises in a south-westerly direction to at least 200 feet in height. But the character of the surface material, and other circumstances did not appear such as called for further boring operations in that direction as our tools would not reach down to where the lignite beds already mentioned will be found should they extend from Coal Brook southward and westward under this high land. I see no reason why these beds should not extend to a considerable distance beneath this high ground, and if so I should confidently expect the coal to be of much better quality than any yet obtained on this river.

I now again turned my attention to the low ground or river bottom, lying on the east side of Coal Brook, being anxious to ascertain if the bed of lignite partially exposed in the bank and penetrated by the third, sixth and seventh holes bored as well as the underlying white clay extended beneath this low ground.

We selected a spot on the east side, and immediately opposite to the third hole, and also where the lignite crops out on the west bank.

This hole, No. 11, and others, will be found marked on the plan. We only managed to bore down, however, about 9 feet when we struck large stones and were unable to go deeper. Down to this point the auger passed through coarse sand with some gravel and small stones all alluvial or deposited by the river.

Twelve other holes were started, ten of which were situated on this flat bottom land. In no instance did we succeed in boring to a greater depth than $13\frac{1}{2}$ feet. Near the surface the material was generally sandy, with more or less gravel and occasionally stones. But at or about the depth mentioned the stones became so numerous that the holes had to be abandoned.

Finally, John Cullis and one of my Indian voyageurs commenced to sink a pit. The soil at first a sandy loam, soon became a pure river sand. At 10 feet in depth it became necessary "to timber" their shaft, which was done as well as the means at their disposal would permit. Two or three feet deeper, however, they came to gravel and stones forming at one time (as I think) the bed or bottom of the river. From this a considerable quantity of water rose, keeping two men pretty busy draining it with an extemporised apparatus consisting of a pork barrel, rope and pulley. Cullis tried hard to get down through this stratum of gravel and stones, but in vain, the flow of water rapidly undermined the sand above, and the ends of the timber losing their support, the shaft seemed likely to crush or run together. It was already, when after a short absence, I came to see it much twisted, and dreading the possibility, even of an accident, which if it occurred might be serious. I ordered him to desist. Our intention had been (could we have got through this old river bed) to have then bored down with our auger, from and below the bottom of the shaft. In view of the quantity of water and of the insufficiency of the means at our disposal to deal with it, we made no further attempt to sink in this manner. Nevertheless, it is only by actual mining operations of this nature-sinking pits and driving levels, drifts or galleries, that the quality of this lignite coal, and even its workable character and extent can be fully and satisfactorily ascertained.

Of the remaining holes bored, only No. 19 merits special notice, being one of those in which coal was struck. In this hole lignite was met with at a depth of 4 feet, which continued to $5\frac{1}{2}$ feet. This was followed by clay, which continued to $11\frac{1}{2}$ feet. From which point to $30\frac{1}{2}$ feet in depth, alternate bands of lignite, black, reddish and drab clays were passed through, all probably parts of one bed 19 feet or thereabout in thickness. Below this variegated, white and drab colored clays, were bored through in the next 10 feet, the hole ending at $40\frac{1}{2}$ feet in depth in white sand.

Hole No. 12, was put down $16\frac{1}{2}$ feet with great difficulty in a very hard and tough grey calcareous clay, containing small stones and pebbles. This is, in my opinion, an unstratified drift deposit, underlying most, if not all, the sands, gravels and clays previously mentioned, and forming, I suspect, "the rim," if not the bottom, also, of the trough or basin in which the lignite coal and its associated clays are situated. I was very sorry that we could not test that point by boring deeper here. But to have persisted longer would have ruined our auger. Although the results obtained are in some important respects satisfactory, there are some points left doubtful, which I should have been glad to have seen cleared up.

The lignite and its associated clays, which in "coal-measures" of greater age would be black shales, are found in much thicker beds than I expected. They vary, as will have been seen, from 1 or 2 feet to 19 feet in thickness. What proportion the coal bears to the shale in these beds, owing to the mixed condition in which the auger brought up the material of the different bands passed through, is left more doubtful than I could have wished, and only to be determined by a very considerable number of analyses of carefully

taken samples. As a matter of opinion, and judging from the appearance of what was brought up by the auger, I should say that in the deepest and apparently thickest beds, not less than 6 feet or probably more than 9 feet may be lignite coal.

The establishment of the fact that these beds underlie at all events the greater part of the drift or glacial deposits, is I think important in relation to the extent or area occupied by the lignite. Taken in connection with the existence of lignite on the Mattagami River under very similar circumstances, I am of opinion that there is probably a continuous belt of lignite-bearing country between these two points, which are about fifty miles apart. And that it may extend a considerable distance west of the Missinaibi and east of the Mattagami. This bed of lignite was discovered by the writer when ascending the Mattagami River on his return from Moose Factory in 1882, a few miles below the Long Portage. I have no data to guide me in forming a reliable opinion as to the width of this belt should it prove continuous between the points named, but I hardly think it will be less than ten or more than twenty miles.

I may observe in conclusion under this head, that even if the quality of the lignite in this territory should not be such as to warrant the expectation that it will ever successfully compete with, or supersede the use in Southern Ontario, of coal from the United States or Maritime Provinces, it will certainly be of great value and importance to the future inhabitants of the territory itself, inclusive of those on the height-of-land plateau.

There is, however, a very important purpose, other than that of fuel, which it may serve, and in connection with which it may prove of greater value than common coal. Lignite is, I believe, found to be of great importance in the most recent and successful mode of treating sewage. If it be found that by this method health is promoted, and at the same time some of the elements of the sewage, most valuable to the farmer can be preserved, and utilized in restoring fertility to the soil, a demand may arise for an almost unlimited amount of this lignite, at prices far beyond those of ordinary coal. I have heard that the lignite hitherto employed for this purpose is actually imported from Europe, but hardly believe that there can be any necessity for so doing unless it be much scarcer on this continent than I had any idea was the case. I have not had any opportunity of seeing this new method of treating sewage in operation, or of making myself thoroughly acquainted with the process and its results, but throw out this suggestion, as one at least of the possibilities of the future which may render the lignite-coal found in this part of Ontario of importance and value.

Kaolin or China Clay.—This important and rare clay was discovered by the writer on his trip to Moose Factory in 1880. And is described in his report for that year, as follows:—The further discovery of kaolin or china clay on the Missinaibi branch of the Moose River will, I trust, also prove of some importance.

I have submitted a sample of this clay, taken haphazard from the bank as I passed, to Professor H. H. Croft, well known in this city, and from him I have received the following report:—

“Clay from the north, left by Mr. Borron:

“The clay is only air dried, and contains about five per cent. of moisture, more accurately 5.15. In mass it is not quite white, but when finely ground becomes nearly so. (See specimen No. 1.) When ground and washed or suspended in water in the usual manner of preparing clay, the faint coloration remained. (No. 2) There was a very slight remnant of sand or gritty matters, sand presumably. No remnants of shells could be detected under the microscope. Acted on by acids, it showed only a very small, almost imperceptible effervescence, hence, but little carbonate of lime; a trace of that salt was detected and an infinitesimal trace of magnesia. The whole amount extracted from the clay by acid was 1.5 (1½) per cent. of which the most was alumina.

“I have not thought it necessary to make an accurate quantitative analysis, as I am informed that the sample was simply fished out of the river without care, and that probably, a much cleaner specimen could be obtained. When burnt the original clay

does not darken to any extent, showing the absence of any organic matter. It acquires when so treated, a faint pink tinge, and the same after having been treated with acid, hence, a very small quantity of iron oxide in some form. The clay seems to me to be such that after proper grinding, washing, etc., it would be nearly, if not quite, equal to the Cornish clay used in the manufacture of English porcelain. Allow me to add that I do not compare this clay with that of Dresden (Méissen) in Germany or Sèvres in France.

"P.S.—I should add that the clay is perfectly plastic and can be moulded as any other kind of good clay."

The manufacture of porcelain or china is confined to a few localities even in Europe, principally because the fine clay called kaolin or china clay is rarely found. Sèvres in France, and Méissen, near Dresden, in Germany, are celebrated for the excellence of their porcelain, the clays at those places being of great purity. In Staffordshire, England, very fine porcelain is also made, and the quantity manufactured greatly exceeds that either of France or Germany. Some idea of the importance of this industry may be formed from the fact that the potteries, as they are called, give employment to 100,000 operatives, only a portion of these, however, are engaged in the manufacture of china or porcelain.

The kaolin or china clay is not obtained on the spot, but brought from Devonshire and Cornwall, principally the latter. The quantity of porcelain clay and china stone taken out in Cornwall and Devonshire twenty years ago, was about eighty-eight thousand tons per annum. I am not aware at what places, if any, on this continent, fine porcelain clay has been found, but think at any rate that it has not been discovered in workable quantity in Canada. I believe there are a few manufactories of china or porcelain in the United States, but how much of the clay is obtained in the country and how much imported, I have no means of ascertaining.

It will be observed that the clay found by me on the Missinaibi branch of the Moose River is considered by Professor Croft, as nearly, if not quite equal, to the Cornish clay used in the manufacture of English porcelain.

Should the deposit be found (as I believe it will be found) extensive, and the quantity large, situated as this clay is, within a few miles of beds of lignite or brown coal, if not also of peat, it cannot fail, I think, to become of importance as soon as the country is opened up."

This kaolin deposit is on the same side of the Missinaibi River as Coal Brook, and about five miles below the junction. Before leaving therefore on my return last year, I devoted a few days to an examination of it.

It shows in irregular patches in the east bank, and very little above the level of the water of the river. These quickly catch the eye of an explorer on account of the singularity and brightness of some of the colours (especially pink and brown) which are imparted to the kaolin in spots, as I suppose by metallic oxides.

The kaolin forms part of an immense bank or mound of beautiful white sand which extends along the river at least a mile, and rises to a height of not less than one hundred feet.

This sand is, in my opinion, a product of the glacial epoch, or in other words is "a drift sand." It was originally, or when in state of rock, probably a very light colored granite, composed of a colorless (translucent) quartz, white felspar and a very small proportion of white mica. Where this rock is *in situ* I am quite unable to conjecture. If it be at some point in the north, as I believe, that point cannot be nearer than one hundred miles, and is probably a much greater distance. Wherever it may be, I am fully persuaded that this material has been quarried, ground, transported and finally "dumped down" where we now find it, by ice. Possibly the felspar in the rock may have been more or less decomposed when it formed a part of the granite rock. But whether or not this felspar is much softer, at any rate, than the other and principal element of the granite

—"quartz"—and my observation leads me to believe that in whatever way or manner the ice sheet has reduced solid rock to the condition of the loose material included under the general name of "drift," "till," "boulder-clay, etc.," that the softer the original rock or mineral the finer the sand or powder to which it has been reduced. Hence, I infer that when this granitic sand was first deposited, the felspar was most likely ground or pulverised to what may be called an "impalpable" powder, while the harder quartz element was only reduced to the state of sand. If therefore the felspar was not decomposed while the original granite rock was *in situ*, this decomposition which has resulted in the production of kaolin or china clay, must have occurred since the glacial period, or for the most part subsequent to its deposition. That this has been the case, I think, in view of the exceedingly fine floury condition to which the felspar had been brought, at least probable.

I was disposed to regard and call this vast deposit "felspathic sand," but the examination, microscopic and otherwise, to which it has been submitted by Dr. Bell and Mr. Hoffman, of the Geological Survey, satisfy me, that although a little of the felspar remains still undecomposed, the far greater portion has already been converted into kaolin.

Such being, as I conceive, the origin of this deposit, it is quite in accordance with this theory, that the kaolin should be found distributed as a fine white powder in the sand, dusting and incrusting as it were, the grains of quartz. And this was found to be the case in every sample taken, even from parts of the bank one hundred feet above the level of the river. As might naturally be expected, however, the percolation of water downwards from the surface on which it has been falling for thousands of years in the form of rain or snow, has carried with it more or less of the fine particles of kaolin to the lower part of the bank. We consequently find that this kaolin clay is far more abundant in the lower part, and most abundant of all at or about the level at which this surface water escapes into the main river, and its tributary brooks, several of which cut through or have their source in this deposit. Hence, wherever springs of water are met with, either on the east bank of the river or in the ravines where this deposit is situated, there we find the china clay in the form of patches or beds of considerable extent.

The quantity of this sand is simply inexhaustible. And it can not only be obtained with the greatest ease, but by a very simple and inexpensive mode of washing (or treatment by water) the kaolin and the quartzose sand can be readily separated.

Both materials are valuable in an economic point of view, the kaolin for the manufacture of china, and the white translucent quartzose sand for the manufacture of glass.

With cheap means of transport I believe both would be largely used in the United States. The kaolin used in the potteries of the United States for the manufacture of china, is, I believe, principally, if not entirely, imported from Europe, probably from England.

With a railway, I am of opinion, it could be supplied of equal quality and at a lower price from this kaolin deposit in the north.

As regards the sand, I have had some experience in glassmaking, and seen the finest sands employed for that purpose both in England and Scotland. I have no hesitation in saying that this Moose River sand is greatly superior to any obtained in either country. And that it will sooner or later be very largely used in the manufacture of the finer descriptions of glass on this continent.

In the Appendix to this report will be found the result of Mr. Hoffman's examination of this kaolin and sand, which has been kindly sent me by Dr. Selwyn, C.M.G., LL.D., Director of the Geological and Natural History Survey.

Iron Ore.—Dr. Bell was also the first to call attention to the deposits of iron ore in this territory, especially to that on the Mattagami branch of Moose river at the foot of the Grand Rapid some eighteen miles or so below the Long Portage. In speaking of this ore Dr. Bell says: "The position of the deposit is on the north-west side of the river, at the

foot of the rapids. It runs along the cliff for a distance of upwards of 300 yards, with an exposed breadth of twenty to twenty-five yards. The highest points rise about fifteen feet above the level of the river. The surface is mottled, reddish-yellow and brown, and has a rough, spongy, or 'lumpy' appearance, like that of a great mass of bog ore. On the surface, and sometimes to a depth of several inches, it is a compact, brown hematite, occasionally in botryoidal crusts, with a radiating columnar structure; but deeper down it is a dark-grey, compact, very finely crystalline spathic ore, apparently of a pure quality. The brown hematite evidently results from the conversion of the carbonate. The former yields, according to the analysis of Mr. Hoffman, 52.42 per cent. of metallic iron, while the latter shows a very small amount of insoluble matter; indeed there is, chemically, little room for impurities, since it gives rise to so rich a brown hematite." I have myself seen this deposit, and am satisfied, that any quantity of this ore can be obtained at a very low rate; and that associated as it is with lignite and peat for fuel, it will unquestionably be mined and smelted on the spot at no very distant day.

I have found the same kind of ore *in situ* on the Oba River, about 20 miles above Mamattawa, and have seen indications of its presence on several other rivers. It is my opinion that it will be found (when wanted) in many places on or near the southern edge of this paleozoic plain or coast-belt in inexhaustible quantity.

Potter's Clay.—The fine white clay found under the lignite beds, at Coal Brook last summer, and into which we bored at one place no less than nine feet, is not in my opinion kaolin although it resembles it in appearance. I take it to be what is commonly called "potter's-clay." If it does not contain too much lime, this clay should make good white earthenware, for which purpose enormous quantities are required. There is seemingly plenty of it at Coal Brook, and doubtless elsewhere in the same belt of country, and the depth at which it is found is so trifling that when the territory is opened, it can be easily and cheaply got should there be a demand for it, at remunerative prices.

Fire-Clay.—Some of the other clays associated with the lignite at Coal Brook, appear as if they might be good fire-clays, and as such useful for many important purposes. In all metallurgical or smelting operations, good fire-clay and fire-bricks are indispensable, and should the smelting of the iron ores in this territory be engaged in at some future day, these fire-clays will be available.

Ochres.—Both brown and yellow ochres as noticed in my report for 1882-83, are met with on the Mattagami river, between the Grand Rapid and Long Portage. They appeared to be of good quality.

Peat.—Although "peat" cannot properly be called "a mineral," where its principal use is as fuel, and seeing that in many countries it is a substitute for coal, I may be permitted to include it (as well as lignite) under this head.

In my Reports for 1880 and 1882 much space was given to this, as I then believed, important product of this territory. I am still of the same opinion, and may repeat what was said on this subject in the last mentioned report, namely:

"In my Report for 1880, p. XI, *et seq.*, the importance to the Province of an abundant supply of cheap fuel was discussed at considerable length. It was shown that wood must, necessarily, become scarcer and dearer; that we are already obliged to import very large quantities of coal, both for domestic use and for manufactures; that the distance from the coal mines of Nova Scotia was such as to afford no reasonable prospect of our being able to obtain coals from that quarter at other than exorbitant prices; that we were, in fact, dependent upon the United States for our supply of one of the most indispensable necessities of life. I might have added that in such a climate as ours, dependence on a foreign power for fuel, places us almost entirely at its mercy.

"It was shown, however, that in the so-called disputed territory there is an almost unlimited supply of fuel, partly in the shape of seams of lignite, or brown coal, but chiefly in the form of great beds of genuine peat.

"I quoted from various authorities, but more particularly from Dr. Sterry Hunt, facts which conclusively prove the importance and value of peat as a fuel, even when it contains as much as forty-five per cent. of water. It was further shown that with cheap transportation by rail or otherwise, charcoal made from compressed peat might be delivered in our cities at prices that would render the inhabitants in a great measure independent of foreign supplies of fuel, at least for domestic purposes.

"In last year's Report, p. 11, I again reverted to this important subject, showing that even at the lowest estimate the heat-giving power of the peat-beds in this territory is so enormous as to be almost incredible, and expressing an opinion, that before another fifty years have elapsed, this bountiful provision of fuel will, by means of electricity or otherwise, be made to contribute in no small measure to the welfare and comfort of the people of this Province. Since I thus wrote, some progress has been made in this direction. Experiments on a large scale are, I believe, being conducted both in Europe and America, the object of which is to substitute electro-magnetic engines for ordinary locomotives on railways. I am not conversant with the details, but as I understand it, the electric fluid is generated or supplied by stationary engines at each end of the line, if short, but at stated intervals if the road is long. The engines that generate the electricity, which in turn propels the train, may themselves be worked by steam or water. These stationary engines too, may be many miles distant, not only from the train and its load, but if desirable, from the railway itself. All, I believe, that is really essential being, that the electricity thus generated shall be conducted without material loss or waste by means of wires or otherwise, from the stationary engine to the electro-magnetic engine which accompanies the train; or the electricity may be stored according to Mr. Faure's method, on the point of being patented and introduced into Canada.

"If this system be at all successful, in an economic point of view, with stationary engines worked by steam, the problem of the utilization of the vast stores of peat and lignite of this territory is, I am persuaded, in a fair way to be solved. The height of land is an extensive plateau, and not a sharply defined ridge. This plateau is full of lakes each giving birth to streams of water which, uniting, soon become rivers. Some of these flow to the north, and others to the south. This plateau is from a thousand to twelve hundred feet above the level of the sea; and from five to seven hundred feet above Lakes Superior and Huron. Hence the rivers for many miles on both sides the height of land offer a succession of rapids and falls. These afford water powers, the equal of which cannot, in my opinion, be found on this continent, if in any other part of the world. The lakes by which the streams and rivers are fed, constitute, in fact, great natural reservoirs, by means of which, a constant and steady supply of water, at all seasons, can be easily ensured. It is obvious, therefore, that if this method of propelling or drawing trains should prove successful, the *motive power* necessary to transport fuel from the north to our very doors would cost literally nothing but the machinery required to apply it to that purpose. Such a reduction in the cost of transportation as this presupposes, would probably enable us to obtain abundant and cheap fuel for generations to come from our own territory."

In conclusion, under this head, I beg to be allowed to offer one suggestion for the consideration of the Government. The mining of lignite—coal, and the getting out of kaolin, potter's clay, and fine sand, etc., is not subject to the risk and uncertainty attendant on most other kinds of mining. These minerals too have already been discovered, and the limits within which they will in all probability be found, pointed out. Under these circumstances, I am strongly of opinion that in the general interest, whatever price the land be sold for, or in whatever quantity, a small royalty if not more than from ten cents per ton on sand to fifty cents per ton on kaolin and the other minerals in proportion, should be insisted upon. It may afford a very large and permanent revenue some day or other, and no one so far as I can see—and I am an old miner—has any more right to complain than has the lumberman at being obliged to pay dues on the pine timber he cuts and sends to market.

THE SOCIAL CONDITION OF THE NATIVES AND OTHERS.

In my first report, the condition of the inhabitants of this northerly part of the Province was described as follows :

“The whole of the vast country over which the Hon. the Hudson’s Bay Company carry on their fur trade is divided into departments, each of which is the size of a good large kingdom in the Old World. This territory is a portion only of that called the Southern Department. Each department is subdivided into districts, with trading posts, called “forts” or “houses” in each. The number of Indians, or at all events the number of hunters, in each district, is known to the officers at the respective posts. But while our portion of the territory includes the whole of some of these districts, it more frequently only takes in parts of them, and hence it is impossible to form other than a very vague estimate of the population. With the very imperfect information before me, I estimate the population, both native and European, of the territory, at from two thousand to two thousand five hundred only, or one inhabitant for every twenty or thirty square miles. But there is still a greater difficulty in determining the race than even the population. After the alliances by marriage and otherwise, which have been going on for two centuries, to draw the line between whites and Indians, with any degree of precision is, in my humble opinion, simply impossible. Quite a large proportion of the natives of the territory, that I have seen, appear to have more or less European blood in their veins.

“To understand the social condition of the natives of this country we must in the first place consider their position in reference to the Hudson’s Bay Company. The charter granted by Charles the Second to the Hudson’s Bay Company, conferred on them “the exclusive right of trade in Hudson’s Bay and its waters, and all the lands and territories on their confines, not possessed by the subjects of any other Christian prince or State.” The monopoly then created has, with the exception of the period during which it was disputed by the North-west Company, existed to the present time, so far as this portion of the territories in question is concerned. It is true that ten years ago, when the whole territory was made over to Canada, the Company’s exclusive right of trade terminated, but owing to the great difficulty and expense of taking supplies of goods and provisions into the territory, by any other route than Hudson’s Straits, the trade is just as completely in the hands of the Company now as it was before.

“We must next take into consideration the change that has taken place in the population and that the natives of to-day are, for the most part, and in many important respects, very different from the natives of this territory two hundred years ago. At that time the natives were all Indians with only the wants of the savage. The furs which he was willing to barter or trade were obtained from animals that he would at any rate have hunted and killed for the sake of the food they afforded him. His wants were few and simple, and the waters and the forest supplied them. His furs were most likely bartered in the outset, for trinkets and baubles of little or no earthly use to him, and he could live just as well without as with them. In course of time, when trinkets became too common, other and more useful articles were necessary to carry on the trade. The natives of the present day are not all Indians—some are altogether, and a considerable portion are, as has been observed elsewhere, more or less of our own race and blood. They have, in the course of two centuries, become dependent on the fur trade not merely for ornaments, or even luxuries, but for the very necessities of life. They have to some extent either inherited or acquired new wants, tastes and feelings. Any intelligent man must see that a monopoly of the trade now is a very different thing from a monopoly in 1670, so far as it affects or may affect the native population. The power thus placed in the hands of the Company’s officers, although negative, so to speak, in its nature, has been almost unlimited, and in a great measure irresponsible. They might if so disposed, refuse to buy from any man the only article the country afforded (furs), possessing any exchangeable value. They could give him as much or as little as they pleased. It was impossible for him to sell his furs elsewhere for there was no one to buy them. They could withhold not merely the luxuries but the necessities of life—flour, pork, tallow, and woollen clothing and blankets having now become

necessaries of life to many of the present generation of natives, and powder, shot, guns, axes and nets, etc., having become equally indispensable to the rudest Indian. These officers could, it appears to me, if prompted to do so by ill-will or other motives, reduce a man and his family to absolute want and misery; and that, too, without so much as breaking the letter of any one of the Ten Commandments or bringing themselves under the lash of the law. Nor would such acts of oppression necessarily be heard of outside of the territory in which they occurred.

"All the commissioned officers being shareholders or participators in the profits, the interest of the Company and that of its chief officers in the fur trade is one and the same. That interest is, as I conceive, to obtain the furs for the smallest price compatible with their being caught at all. The interest of the hunter or trapper is, on the other hand, to obtain the greatest price for his furs that is consistent with the trade being carried on at all. Thus the interest of the hunter or trapper, and that of the Company and its officers are antagonistic in regard to the price of the furs, whether the same be paid for in money or in goods.

"With such diversity of interest, and the power entirely in the hands of the Company and its officers, we can come to no other conclusion than that the power thus possessed has been used to promote the Company's interest as the first and chief, if not the only, consideration.

"The position of the natives of this territory in relation to the Hudson's Bay Company and its officers has, therefore, been for many years and still continues to be, a position of absolute subservience and dependence.

"Such a position, up to a certain point in the civilization of a savage race, may not be an unmitigated evil. There are not wanting those who maintain that it is no evil at any stage, of civilization, provided that the governing and directing power is not only just but mild and paternal. I shall not discuss this question—merely contending that the stage, if there be such, previous to which dependence and subserviency are beneficial even to the subservient race, has now been reached by the natives of this territory, and that its prolongation is altogether undesirable, inasmuch as it is unjust to the natives, impedes their further progress, retards the development and settlement of the country, and is inconsistent with the whole tenor and spirit of our institutions.

"The remedy, and only remedy in my humble opinion, for this state of things is to open up this territory, and that done, the rest may be safely left to the natives themselves, and to the energy, industry and enterprise of the people of Canada.

"In thus putting the relation in which the native population stands to the Hudson's Bay Company in what I conceive to be its true light, nothing has been further from my intention than to lead anyone to suppose that the Company and its officers have made a more selfish and unscrupulous use of their privileges and power than any other company or officers in like circumstances would have done. On the contrary, I sincerely believe that like arbitrary and excessive powers have perhaps never been exercised with greater moderation or more rarely abused by any other company whatever."

"The Indians on or near the Coast of James' Bay belong to the Swampy Cree tribe, and speak a dialect of the Cree language. Those at Abittibi Lake, and on or about the height of land belong, I am told, to the Chippewa tribe, and speak the Ojibbewa language. Those persons of mixed race or blood in this territory, are the offspring of Indian mothers and English, Scotch, or Scandinavian fathers, and subsequent intermarriages. Physically the natives are on the whole a fine race. At Moose Factory the only language spoken, excepting Indian, is English—more or less of which a majority of the natives can understand and many of them speak. The Hudson's Bay Company's trading posts are usually situated near lakes or rivers where fish is more or less plentiful. The natives appear to congregate at posts like Abittibi, and Moose Factory, soon after the ice leaves the rivers, and remain there most of the summer. It is their season for social intercourse, which the young, at least, seem to enjoy. The women and children set out and attend to the fishing nets, while the men either hunt, or find employment voyaging, making hay, and such like work at the posts.

"They generally live in canvas tents during the summer, but prefer the wigwam of birch bark in the winter. The Indian dress or costume, if it can be so called, has been discarded, and our style of dress has been adopted with the exception of boots and shoes, which have not as yet entirely superseded the mocassin.

"They may, and sometimes do, suffer great privations and hardships during the winter, if game (the rabbit especially) should be scarce, or if sickness should prevent them from hunting. But during the summer they are not only sufficiently clothed to protect them from the weather, but so far as I could judge, they had enough to eat, both at Abittibi and Moose Factory. They will, however, eat almost anything, from a bear down to a skunk, a fact of which I have had ocular and other demonstration. To the tender-hearted and humane, sometimes shocked to think of poor creatures being taken and destroyed by thousands and tens of thousands, simply for the sake of their skins or fur, it may be some satisfaction to learn, that in this territory at least, the flesh of the animals thus taken is used as food by the natives. The only people I know of—less fastidious in this matter of food—are the neighbouring Esquimaux, who, I have been informed, will not only feed upon meat in the most disgusting state of decomposition, but do not hesitate, at a pinch, to eat the carcasses of dogs which have died of hydrophobia or have been destroyed because they were mad. To those who do not know that some poisons, which are fatal if introduced into the circulation of the blood directly, are quite harmless when introduced into the stomach or taken with food, this circumstance will doubtless appear incredible. Both the Indians of this territory and the Esquimaux to the north, are naturally flesh eaters, and the dreadful straits to which they are sometimes reduced, when fish and game fail, compel them to make use of anything and everything of the nature of animal food which they can get.

"To such hunting and flesh-eating people, a good market for their skins and furs was and still is, a matter of primary importance. Before traders were attracted to the country, the skins of most of the animals that the natives pursued and killed for food, were doubtless thrown away as useless, or probably consumed with the flesh, after the fur or hair had been singed or burnt off. Even if the early traders gave but few articles of much value or utility in exchange for furs in the first instance, these few were so much clear gain to the Indian. When in course of time, guns, nets, traps, axes, knives and other things of the greatest use and value, were obtainable in exchange for peltries—the fur-trade, if not an unallowed blessing, was a boon to the natives, the importance of which can hardly be conceived.

The long continued and familiar intercourse with our countrymen which the prosecution of this trade for upwards of two centuries has necessitated, must of itself, have exercised an important and favorable influence on the Indians' character, imparting to them as it has done some knowledge of our arts, usages, laws, and customs, and preparing them for a higher social condition.

The Indians of this territory appear to labor willingly whenever they can obtain employment. They work on the farms at the Company's posts, but cultivate nothing whatever for themselves, nor do they keep or breed any domestic animals, with the exception of the dog.

They are fond of flour, having acquired a taste for it, as well as oatmeal. Some twelve hundred barrels of flour, beside biscuit and oatmeal, are brought out from England to Moose Factory by the Company's ship annually. At Abittibi, the Indians numbering about 400 souls consume about 400 bags of flour, or 100 lbs. per head annually. A large quantity of tea is used in proportion to the population, the natives being very fond of strong tea and drinking it at every meal when they can get it. The consumption of tea by the natives at some of the posts, averages five pounds per head per annum.

The tariff, more particularly that part of it which imposes fifty cents custom duty on each barrel of flour imported from England, is not at all popular, nor likely to become so in this country, the people of which are taxed heavily and receive no benefit whatever in return.

I am informed that the Indians in the greater portion of this territory are not divided into bands, nor have they any chiefs. Family ties would appear to form the principal, if not only, bond of union; excepting, perhaps, that weaker one which arises from the circumstance of a number of families trading their furs, and obtaining their supplies, at the same post; where—as mentioned already, they congregate and frequently remain for several months during the summer, to be scattered again as winter approaches. It requires a large extent of country to furnish game and furred animals sufficient for the support of a family, and hence their mode of life does not admit of their living in communities however small, during the winter season.

It is to be hoped that the Dominion Government will neither appoint nor recognize chiefs, in this territory at least. They can be of no use or advantage, that I am aware of, to the other Indians; and will probably (if appointed) be here, as they are in some instances elsewhere, little better than a nuisance.

It should rather be the aim of the Government, in my opinion to abolish all tribal and other divisions founded on differences of race only, than to encourage their growth and perpetuation.

As one step in this direction, the Indians should, I think, be able to obtain their enfranchisement, and to commute their annuities, on much easier terms than any as yet proposed.

The officers and servants of the Hudson's Bay Company in this territory are mostly natives of England and Scotland, principally of the northern Islands and Highlands of Scotland. They usually enter into a formal written engagement to serve for five years, and are brought out in the Company's ships. They get a free passage home at the expiration of their engagement, should they wish to return. Some of these men remain in the Company's service all their lives, others find their way to Manitoba, Lake Superior, or to the Upper Ottawa. The greater number of those who come to Moose factory would appear to return to Scotland when they leave the Company's service. There is no encouragement for any of them to settle in the territory itself; nor, until the country is opened up, do I see very well how they could live if they did so.

RELIGION.—The natives of this territory, are for the most part, I think, nominally Christians; but there are still some who cling to their ancient faith.

Those who profess christianity, belonging almost entirely to the Catholic and Episcopalian Churches. The Indians at Abittibi being almost exclusively Catholics; and those at Moose Factory as exclusively members of the Church of England. At Albany, I have been informed that about two-thirds of the christian population is Catholic, and one-third Protestant.

The Catholic Missionaries at Temiscaming visit the different posts from thence to Albany Fort, during the summer, when, as observed before, the Indians are usually assembled in considerable numbers, at the Hudson's Bay Company's Post. They have as yet, however, no resident priests in the territory but have a church at Abittibi, and one also, if I am not mistaken, at Albany.

The Church of England is more fully organized; This territory forming a portion of the diocese of Moosonee, of which the Right Reverend John Horden is the Bishop. The boundaries of the diocese, I do not exactly know, but it includes all the basin of Hudson's Bay. I am unable also to say how many resident clergymen there may be in the whole of the diocese, but there are four or five at different stations on or near the coast. The Bishop usually resides at Moose Factory, but is at present on duty at York Factory. The people at Moose Factory, both natives and European, are very decorous and regular in their attendance at church, and I was surprised to see the number of Indians who seemed to take pleasure in going to the evening services, which the resident Chaplain the Rev. Mr. Keene, held twice a week or oftener.

The labours of the Missionaries, both Catholic and Protestant, are trying and arduous, involving as they do, frequent long and dangerous journeys either by canoe or on snow-shoes, and much hardship and privation, in order to reach a population so scattered as is

that of this territory. The influence, teaching and example of the Missionaries are undoubtedly good, and calculated to advance the cause of religion and morality. Nor have their labours been by any means fruitless, although not so fruitful as they might and I have no doubt would have been were the Indians more settled in their habits and mode of life.

The Missions have been established and are altogether supported and maintained by the piety and liberality of the English Church Missionary Society, with the countenance and assistance of the Hudson's Bay Company, who at their own cost erected the church and parsonage at Moose Factory.

EDUCATION.—There is a neat little school house at Moose Factory, but no school-master; the people, however willing, being unable to pay the salary, or anything like the salary, that would be necessary to get a competent teacher. It is equally impossible for any excepting the chief officers of the Company to send their children elsewhere for their education. When they do so it is generally to Scotland, or England, sometimes to Red River, or other distant places in Canada. This is a source of great anxiety and distress to some of the residents, and if the Provincial Government could aid and assist in the establishment of a good school at Moose Factory, I do not know of anything that would give more general satisfaction. The people are not in a position there, and cannot be for years to come, to organize themselves into a school district, impose a school tax, and claim the aid of the Government on the usual terms. Such aid, if given at all, must be granted on exceptional grounds.

The Chaplain of Moose Factory devotes as much of his time as he can spare from other duties to teaching the young.

The natives are said to be very quick and ready to learn and are able to read and write their own language in their own character, in an almost incredibly short time.

Crime and the Administration of Justice.—Crimes in respect of property are not of very frequent occurrence. The natives are, on the whole, honest and trustworthy, given, if otherwise, rather to pilfering than to deliberate robbery.

At Moose Factory they appear to be quiet, respectful and well behaved.

The murder of a white man by an Indian is so rare as to be almost unheard of, but murder is too common among themselves.

An Indian who trades at Abitibi Post, is said to have murdered and then eaten his wife and children some fifteen or sixteen years ago. At the same post, more recently, a wretched man, having exhibited some signs of insanity, was knocked on the head and then thrust through a hole in the ice, as being, in the opinion of his friends, the best mode of disposing of him.

Only last winter two young men who traded at an Albany Post had some words as to the division of a deer which had been hunted and killed, I presume, in company, one of them treacherously shot the other, wounding his wife at the same time, and then killing the sister of the murdered man. The murderer has fled from that part of the country, fearing that the father or uncles of his victims will shoot him the first time they can set their eyes on him, as they will, I am told, most likely do.

So far as my information goes, I think I am warranted in saying that, while the Hudson's Bay Company's officers in this territory have been prompt to punish any crime committed against the company's property or servants, they have, as a rule, kept themselves entirely aloof from the disputes, feuds and quarrels of the Indians, whether as individuals, families or bands. They seem to have held that trade, not government, or the administration of justice, was their chief or only function, and to the prosecution of trade have devoted all their energies. The relatives of the wronged or injured have been left to administer justice and to maintain security of life and property among themselves in their own rough way. This policy of non-intervention, and of prompt retribution when necessary, has enabled the Company to plant and maintain its trading posts from the Atlantic to the Pacific, and from the great lakes to the Arctic, wherever it might

be thought most convenient and advantageous for the carrying on of the fur trade—among every band or tribe of Indians however powerful, wild or turbulent—the trading posts of the Hon. Hudson's Bay Company may be found. At these posts are ample stores of all those things which an Indian most needs and most desires; of those things, in fact, most calculated to excite his cupidity. The posts are isolated and lonely, rarely nearer to each other than one hundred miles, and sometimes a far greater distance apart. In charge of the posts we may find perhaps a commissioned officer, a clerk, two or three servants and a few half-breeds or Indians employed about the place—a mere handful in all. And yet these coveted goods and the Company's officers and servants are (judging from the infrequency of any outrage) almost perfectly safe. The policy that has enabled the Hudson's Bay Company to do this may fairly claim to have been a wise policy, nor can the treatment of the natives generally, it is fair to infer, as viewed from the standpoint of the Indians themselves, have been either characterized by bad faith cruelty or injustice.

Forty-seven years ago, (1832-33) one of the few outrages on record occurred at Hannah Bay Post, in this territory, about mid-way between Moose Factory and Rupert's House. The officer in charge, his family and several natives, in all nine persons, were treacherously murdered and the post robbed. In less than three months all the murderers were hunted down, and shot, by parties sent out from Moose Factory. It seems to me that they richly deserved the punishment meted out to them, and the promptitude and vigor with which it was inflicted has doubtless tended to restrain evil disposed natives, all over the territory, from similar acts of treachery, violence and murder, not only as regards the officers, servants and property of the Hon. Hudson's Bay Company, but of others also.

The administration of justice and the preservation of law and order in this territory, being now devolved on the Provincial Government and Legislature, it is proper and becoming that this duty should in future be performed, not only in an effective but in a regular and constitutional manner.

In addition to the steps already taken by the Government in this direction, it is indispensable to the administration of justice in even its simplest forms, and for offences of the simplest nature, that a lock-up, and other such necessary buildings, should be erected at Moose Factory.

At present the nearest gaol is at Sault St. Marie, some four hundred miles distant from Moose Factory, quite inaccessible during the winter, and only to be reached during the summer months at great expense. Provision should also be made for the appointment and payment of at least one constable. The position of Moose Factory, as regards ocean and river navigation, and the fact that it possesses a larger population than any other place in the territory, namely, about four hundred and fifty souls during the summer season, and one hundred and fifty during the winter, point to it as the proper place for such public offices as may be necessary in the meantime.

The claims, however, of the Hudson's Bay Company on the Moose island, and elsewhere in this territory, should be ascertained and settled as soon as possible.

Spirituuous Liquors.—In old times a large quantity of ardent spirits, principally rum, was consumed in the Hudson's Bay Company's territory. It was, I am told, not only given as an allowance, but employed in their trade, and sold both to their servants and the Indians. The use of rum in trade, however, has been discontinued for many years. The reason for so doing I have not heard. Malt liquor was given or sold to the servants, and the officers had an allowance of wine and spirits, until a comparatively recent period. For some time past even this allowance has been cut off, and the servants and officers, as well as the Indians, reduced to a condition of involuntary abstinence.

The prohibition is not quite "total," however, so far as the officers are concerned, these gentlemen being permitted to import from London, by the Company's ship, half a barrel of ale or porter yearly. I apprehend that few, who are not total abstainers, will regard this as an excessive indulgence to men who lead such lives, in such a country and such a climate.

Until the award of the arbitrators (referred to at the beginning of this report) this territory was supposed, by some, to form a portion of Keewatin, or the north-west territories, and subject to the laws which excluded alcoholic liquors from those territories. As an integral part of the Province of Ontario I am not aware of any law to prevent a person from importing, or taking into the country, any quantity or description of liquor he pleases.

We are called upon, therefore, to consider whether in the present state of the population, such free and unrestricted importation of intoxicating liquors is desirable; and if not, what special legislation on this subject may be required. Knowing, as we all do how dangerous many Indians, otherwise quiet and peaceable, become when under the influence of liquor, and how difficult it is to prevent their obtaining liquor when they are able and willing to pay an extravagant price for it, in furs or money. Taking into consideration, also, the remote and isolated position of this territory, and the slender means at our disposal, for the maintenance of law and order, I am quite persuaded that it would be dangerous to permit the unrestricted importation of intoxicating liquors in this territory.

This subject was again taken up in my report for the year 1882, wherein the following remarks in reference to the natives will be found, viz:

"In the first report which I had the honor to submit on this territory, the social condition of the natives was described at considerable length. With trifling and unimportant exceptions, the views and opinions then expressed have been confirmed by subsequent observation and experience. It is unnecessary, therefore, to go over the same ground again.

The population actually resident or domiciled in the territory claimed by Ontario, north of the height of land, cannot be very accurately ascertained, for reasons that need not be explained at length. I am of opinion, however, that the *bona fide* population does not exceed two thousand five hundred.

This is a very small number of inhabitants for a territory, the area of which is equal to that of England and Wales. It is even to be feared that the native population, small as it is, will be further reduced when it has passed through the ordeal that inevitably awaits it when brought into more general intercourse and contact with our race. In addition to those who will fall victims to the intemperate use of alcoholic liquors, several of the diseases, such as smallpox—against which we take special precautions—and others, such as measles—which we easily get over—are very fatal to the Indians; the mortality in the case of measles being almost as great as in smallpox. Last fall and winter measles carried off a very heavy percentage of the natives at Long Lake and Missinaibi posts, both in this territory; but fortunately it did not reach the posts on the coast of James' Bay.

Notwithstanding the smallness of the population, the food question is still by far the most important to the natives of this territory. Like all those who depend solely on hunting or fishing for a living, it is either "a burst or a starve," too often the latter. In most countries it is over population that leads to a deficiency of food and consequent famine. In this territory it arises rather from the great scarcity during the long winter months of those wild animals and birds which are capable of withstanding the cold, and of themselves obtaining food at that season. Among animals, the deer, bear, beaver, muskrat and rabbit are those on which the Indian chiefly relies for food. Of these, the rabbit, muskrat and beaver are, in this territory, by far the most important. When rabbits are plentiful the Indians do not suffer for want of food, although the flesh of the rabbit is not very nutritious. But this animal, really a variety of "hare," is subject to epidemics or diseases, which periodically destroy them almost entirely; and after one of these plagues has passed over the country they are so scarce that every creature that is dependent, either wholly or in any considerable degree, on them for subsistence, suffers accordingly. Thus not only the Indian, but the lynx, fox, fisher, etc., among animals, and the owl among birds, suffer more or less from starvation and hunger when the rabbits fail or become scarce. Rabbits have, unfortunately, been very scarce for several years, and a number of deaths from starvation have occurred among the Indians near the coast. Many more have barely escaped with their lives, and the suffering has no doubt been general and great.

At such seasons I believe the population would almost perish bodily but for the beaver. This interesting animal is of greater value than any other to the native population of this territory. The meat is wholesome and good ; and a full grown beaver, weighing, say forty pounds, affords, after deducting offal, skin and bones, as much probably as twenty-five pounds of actual food, besides the fur, the value of which often exceeds that of all the other furs trapped by the hunter added together. If sufficient numbers were left as a breeding stock, there is food enough in this territory for millions of beaver, but so little regard is paid to this vitally important point, that were it not for the extraordinary sagacity of the creature it must long ere this have been almost exterminated. One of the officers of the Company told me that in the neighborhood of his post there is a small lake or pond, the privilege of trapping in which he had acquired from the Indians, and, with a certain area of the country around, reserved for himself. In this pond lived a single pair of old beaver, which once a year gave birth to four young ones. For four years he had trapped the four young beaver, and the fifth year he had caught three, making in all nineteen beaver in five years from one pair. This was a remarkably good return, especially when we consider that they are entirely self-supporting, both summer and winter. But what I wish to remark more particularly in this connection is, that this gentleman frankly admitted he had been trying the whole time (five years) to catch the old beaver, but in vain; for up to that period their extraordinary sagacity had enabled them to elude the traps to which their inexperienced offspring had regularly fallen victims.

It is not that in the whole territory the quantity of game, in the aggregate, is insufficient to maintain the wretchedly small number of inhabitants ; but that game is so scarce that the hunter, let him cover as much ground as his strength will enable him to do, cannot obtain sufficient day by day, during the winter season, to keep himself and family alive. Neither deer or bear are at all numerous. Some few caribou and moose deer are killed in the central and southern part of the territory ; but they are very scarce, I think, in the flat muskeg region, near the coast. They are much more abundant on the Eastmain coast, and throughout the whole of the Labrador peninsula. The moose deer is only met with on or near the height of land.

Of winged game ptarmigan and grouse, often called partridges, are the only kind which remain in the country during the winter. Sometimes the ptarmigan or white grouse come from the north in considerable numbers, and when they do so are a godsend to the natives ; but they are by no means a reliable source of food. The variety of grouse most frequently met with is what we call the "spruce partridge," although the ruffed grouse or common partridge of southern Ontario is frequently seen in the southern and central region. Both these varieties breed in the territory.

Wild fowl are obtainable in considerable numbers in the spring and fall, especially on or near the coast, but leave for the south before the winter sets in. Pigeons, unaccountably to me, are very scarce in the territory. Nor are small birds of any kind at all numerous, excepting on the coast and islands in the bay.

The fish in the fresh water lakes and rivers are neither so plentiful or good as south of the height of land. In some few places a small kind of sturgeon is caught, and is good of its kind. Pike, however, and suckers are, I should say, the most important as a food supply ; the former, indeed, under the name of jackfish, being in many places all the natives can get during the winter. Some of the lakes contain whitefish and lake trout ; the pickerel or dore is also caught in most of the rivers. These, with a few speckled trout, and in some places a variety of chub, are the principal kinds of fish in the interior of the country. In the estuaries of the large rivers, and in Hudson Bay itself, there are other species ; these, however, have been fully described by Dr. Bell.

On the whole the food supply is precarious and uncertain ; and seasons of plenty bear, I fear, but small proportion to those of scarcity, if not actual dearth.

It was stated in my first report on this territory that the only hope I entertained of relief from this unhappy condition of the natives was in the opening up of the country. I am still of that opinion ; and this is one reason why I am anxious to see the Canadian

Pacific Railway located as far north as the interests of our Province and the Dominion will permit. Even admitting that the natives may not nominally receive a greater money value for their furs than is now paid by the Honourable Hudson Bay Company, all the necessaries of life would cost the Company very much less than they now do, in consequence of the cheapness of transport by rail compared with what it is by canoes. Thus at inland posts, such as Matawagamingue and Flying Post, they could give the Indians twice as much flour, oatmeal, pork, lard, sugar, and such like for their furs as they can possibly afford to do at present. Some of these Indian families (every member of which frequently traps and hunts) catch from two to three hundred dollars worth of furs in the season, and might really live very comfortably if the price of the necessaries of life were only moderate. I am satisfied, too, that as soon as the country is opened up a very little encouragement will induce the natives to turn their attention to the cultivation of the soil and the keeping of cattle.

The Indians, with their families, generally gather at the posts soon after the ice leaves the rivers, bringing the furs they have succeeded in getting during the winter. Most of the able-bodied men are employed from one to three months during the summer, taking the furs to Moose or Albany factories, and bringing back the supplies needed at their own posts. These voyages or trips are usually made in canoes or boats. Sometimes this brigade, as it is called, consists of forty or fifty men. The brigade is accompanied by one or more officers and the white servants, usually Orkneymen, at the posts. The white servants and the natives work together, eat together, and associate together, on equal terms. Even the officers often take part in the conversation, and describe or explain to the Indians, in their own language, matters which they would otherwise know nothing at all about. This association on their voyages and at the posts, continued year after year for several generations has, in my opinion, had a very important influence on the Indians as a means of education. The discipline, the steady labour, the necessity of working together for the attainment of a common object, are all calculated to teach them valuable lessons. They are, too, more or less keenly alive to the approbation or disapprobation of their officers and fellow-voyagers—a powerful incentive to good, and equally strong restraint from evil. Thus there is little or no shirking of a fair share of the labour, whether it be hauling, poling, paddling, or carrying on the portages; but all seem to work together cheerfully, bearing heat and cold, rain or storm, and the incessant attacks of flies, with patience and fortitude. Either this or some other influence makes them generally honest, wonderfully forbearing towards each other in word and act, anything like quarreling being very uncommon. Watching, as I have sometimes done, when several of them were eating out of the same dish, I hardly ever noticed anything which appeared like greediness. On the whole they seem to be actuated by a feeling of fair-play which has not unfrequently excited my admiration. These lessons must have been learnt chiefly, I think, in the canoe and on the voyage; for at the inland posts to which I particularly refer, missionaries have had little opportunity of inculcating the principles of Christian morality. I think they are intelligent and teachable, and have formed a high opinion not only of the progress already made towards civilization, but of their capacity for further improvement; and I sincerely hope and trust that before long the opportunity may be afforded them of materially improving their condition.”

A plea on behalf of the natives of the territory, especially in regard to exemption from Customs duties, on the necessaries of life, was preferred in the following terms, in my report for 1884:

“The social condition of the natives was referred to at some length in my first report, 1879-80, see pp. 31, 32, *et seq.* In this report I stated “that a large proportion of the natives appeared to have more or less European blood in their veins.” A more general knowledge of the population has confirmed this opinion. The European element is almost entirely Scotch, English and Scandinavian. There are very few French, Metis or Half-breeds in the territory. It is almost impossible to tell what number of inhabitants there may be in that portion of the territory north of the height of land, owned by our Province. The Dominion census of 1881 was obtained by enumerating all the families which traded at each of the Hudson Bay Company’s posts, and, as many of

these were situated either on or near the boundary, the population, as thus taken, included Indians from both sides. My own estimate, as given in the report for 1879-80, was 2,500, and leaving out of consideration, "the treaty Indians," many of whom hunt during the winter in the territory north of the height of land. I still think that the population does not exceed that estimate.

In the opinion of some of the Hudson Bay Company's officers, with whom I have conversed on the subject, the native population in this territory is not decreasing, but although I have seen some large families at Albany Factory, and elsewhere, I am persuaded that the natives of the pure Indian race are not only decreasing, but must continue to do so. Disease, famine, and inter-marriage with other races, all combine to that end. Measles, whooping cough, and other epidemics, have carried off a great many within the last four years and as intercourse with the outside world becomes more frequent and general, smallpox and whiskey will each doubtless exact its quota of victims. The Hudson's Bay Company have a medical officer on the staff at Moose Factory, but at no other post in this department.

The mortality which these diseases occasion is greatly aggravated by the want of proper food, sufficient shelter, if not clothing, and of good nursing. A small hospital at Moose Factory is much needed and would save many lives.

A people depending so entirely on game and fish for their subsistence, somewhat improvident in making provision for the future, and with very inadequate means of preserving the surplus of food that may be obtainable at one season to meet the necessities of another, must frequently be reduced to the direst straits when game and fish fail. Indeed, with the exception of those employed as voyageurs and haymakers at the Hudson's Bay Company's post, and who for the time being are well fed, by far the greater proportion of the natives I meet with on my voyages look hungry and half famished. Even at the posts there are many hungry-looking women and children to be seen.

There are few (if any) Indian families, however, in the territory that do not now consume more or less flour, oatmeal, lard and pork, flour more particularly, of which some families will, notwithstanding its high price, use as much as four or five bags yearly.

Warm clothing and blankets are almost indispensable as food during the winter season. The natives no doubt at one time clothed themselves in the bear, beaver, and other skins that are now bartered or sold to the Hudson's Bay Company.

The skins of the rabbit or hare are still to some extent made into garments and blankets. They are not, however, very durable and are only fit for dry cold weather. Now however, the natives have generally come to depend on the Hudson's Bay Company for blankets, capots and other articles of clothing. In fact everything the natives use in the way of food, fleshmeat excepted; everything in the way of clothes, with the exception of mocassins, and every single article they require for other purposes, such as axes, knives, guns, nets or twine, shot, powder, etc., is imported from Great Britain.

It is only since the Hudson's Bay Company sold their exclusive rights of trade, etc., to the Dominion that the natives and other inhabitants of this territory have been burdened with any custom duties. It will be easily understood, therefore, that the present high tariff, increasing as it does the price of all the necessaries of life, is exceedingly grievous to them.

It is the more keenly felt inasmuch as, although the sum of \$100,000* at least has already been collected from them at the port of Moose Factory alone, nothing whatever has been expended by the Dominion Government, whether for public works, postal facilities, support of schools, missions, medical attendance, or in any other form or way calculated to advance their comfort and welfare. In fact their closer connection with the Dominion of Canada, so far from resulting in any benefit to them, has been an unmitigated evil.

I believe that the Bishop of Moosonee (if not others) has made some representation on the subject of the grievances of the native population to the Premier and Minister of the Interior, but no action has been taken in reference thereto, that I know of.

*This prior to 1884.

Entirely isolated and cut off, as the people of this territory are, from all commercial intercourse with other parts of the Dominion, and deriving no benefit whatever from their political connection with the Dominion, it is from every point of view unjust that they should be thus taxed. Heaven knows the natives are poor enough, and suffer enough from insufficient food and clothing; and the exaction of taxes from these people, amounting on an average to at least ten dollars per annum each family, is not only unjustifiable but positively cruel.

The proper remedy for this injustice is to make Moose Factory and York Factory free ports, until connected by railway or otherwise with the rest of the Dominion. It may be objected that such a concession might lead to the smuggling of goods from this territory into other parts of the Dominion, to the injury of the revenue, as was said to have been the case when, (to encourage settlement) the ports in Algoma and Gaspé districts were declared free. There is nothing, however to support such an objection. A glance at the map will satisfy any unprejudiced person that the positions of the ports on Hudson's Bay, and those in Gaspé and Algoma district, are totally different. As regards the first, the ocean freight is so high, and the difficulty and expense of transport inland so enormous, that the idea goods so imported would be smuggled into the settlements on the north shores of Lake Huron or Superior, or even into the north-west, is absurd. Whereas, the running of such "free goods" from Gaspé into Quebec City, or from Sault St. Marie into Collingwood or Owen Sound, was a comparatively easy matter. Thus, while smuggling in the one case might be exceedingly easy and profitable, it would in the other be exceedingly difficult and entail a ruinous loss on the smuggler.

If there be insuperable objections to making these free ports, then unquestionably the amount of the duties thus collected should be expended or returned in such a way and manner as will be most generally advantageous to those by whom the duties have been paid. That these duties have increased the cost of all the necessaries of life to the consumers, in this part of the Dominion at any rate, no one can possibly with the slightest show of reason deny, nor will anyone have the temerity to assert that these customs duties have added anything to the value of the furs which are the only marketable product of the territory.

Nor is it by customs duties alone that the prices of the necessaries of life are rendered so dear. The cost of freight or transport, which greatly adds to the price of everything, is simply enormous in respect of some of the most important articles. For example, flour, lard and pork, if bought either in the United States or in Canada, must be sent first of all to London, then to Moose Factory, and thence inland by canoes or boats from one to three hundred miles.

Again, in view of the possibility of the loss or detention of their ships in Hudson's Straits or Bay, the Company must always keep a two years' supply of the most necessary articles at Moose and York Factories. This locks up a large amount of capital, the interest of which has also to be charged in the price to the consumer.

It is to be hoped, then, that the Dominion government will not delay to take into favorable consideration the peculiar and altogether exceptional position of the natives and others in this territory, and deal fairly, if not liberally with them.

Christian philanthropy, which has done much to promote the spiritual welfare of the natives of this territory, might have done also a great deal to promote their temporal welfare comfort and happiness. The one has been the work of the Church Missionary Society of London, and of the Catholics of Quebec; the other should have been, it seems to me, the special care of the Hudson's Bay Company.

The servants of the company, as distinguished from the hunters and trappers, are engaged for a term of years, at wages varying from twenty to thirty pounds a year, with a ration of food sufficient only for themselves. A few of the mechanics may get more, but the wages do not usually exceed that amount. Many of these are Scotchmen or Scotch half-breeds. As long as they remain unmarried they can live, and even save money. Few, however, do this; the far greater number marry Indian or half-breed women. The single ration, together with what the wife may be able to add by fishing

and hunting, suffices the young couple for a while. But as child after child is born, the annual pittance of wages is drawn upon not only for clothing but for food. At the prices charged (and which it is to some extent necessary to charge) in this territory, the man's wages will not go very far. The quantity of game and fish at or near the trading posts is neither great nor at all times to be procured. And when the families are large and chiefly girls, they are, I fear, very sorely pinched to live. If the father dies, their condition is still more pitiable. There is no employment for women, and as to getting out of the country to seek it elsewhere it is simply impossible. It is a mystery to me how many of them do live. If some scheme could be devised to afford these and other poor women remunerative employment, it would greatly ameliorate and improve their condition.

One suggestion I may be permitted to make, and I do so in the hope that it may commend itself to favourable consideration.

A very large quantity of ready-made clothing is imported for the people in this territory, or for what is known as the Southern Department. The greater part, if not the whole, of this clothing could be, just as well if not better, made by the women at Moose Factory, Albany Factory, and Rupert's House, to whom such employment, at anything like reasonable and fair wages, would be one of the greatest of blessings. By the importation of the materials only, instead of the made up or manufactured articles, a very considerable amount of duty would be saved.

All that is needed to carry out this scheme is an experienced foreman and a sufficient number of sewing-machines. A foreman having a knowledge of cutting and fitting men's clothes, with a wife who had some knowledge of dress-making, would probably be the best combination.

So far from costing anything, I believe this suggestion, if carried out, would save the present importers a considerable sum of money. But even if it should not do so, and be only self-sustaining, the benefits that it could not fail to confer on a number of poor girls and women at the places referred to, should ensure its adoption.

If the natives could be induced to turn their attention to the cultivation of the soil, even if it were confined to the growth of potatoes, they would form an important addition to their supply of food. But peas and beans can be also grown in the greater part of the territory, and as food for the Indians these are not only exceedingly nutritive, but have over most other grains this advantage, that they can be used whole or unground, thus dispensing with the necessity for mills. The land thus cultivated should be on or near the hunting ground of each family, in order that the food produced might be available, where and when, most required. The few simple instructions needed in reference to the choice of the land, and the planting of the seeds, might be very easily imparted at the missions or at the fur-trading posts. If the Government supplied seed for a few years, the cost of which would be very trifling, I am persuaded that the missionaries would willingly undertake to distribute it, and do all in their power to insure the success of any effort to ameliorate the condition of the natives in this or any other way."

No treaties have yet been concluded with the Indians in this territory for the surrender of their claims. To do so with the natives on or near to the coast of James' Bay may perhaps be premature and uncalled for by circumstances. But as regards the Missinaibi and other Indians, whose case I have promised the chiefs of the former band to represent, there can be no reasonable doubt on this subject. The Canadian Pacific Railway for upwards of a hundred miles passes through their hunting grounds, and will unquestionably lead, sooner or later, to the destruction of the larger game, the fur-bearing animals, and to some extent also of the fish, on which they are solely and entirely dependant for a living. These Indians are simply hunters and trappers, and not one in twenty grows even so much as a potato. Thus they have no other resources to fall back upon. The completion of the railway renders their hunting grounds easily accessible at all seasons of the year. Hence it may be expected that white hunters and trappers from other parts of Ontario and from Quebec will pour into

this territory. It is probable also that a large number of Indians belonging to bands south of the height of land, whose own hunting grounds have been depleted of game and fur-bearing animals, will also trespass on the hunting grounds of these northern or height of land Indians. Nor can it be doubted that railway employees, squatters and lumbermen will engage in hunting and trapping for profit or amusement. Thus there are too many and strong grounds for fearing that these poor Indians will soon be deprived, in a great measure, of their only means of subsistence.

It is true that the construction of this railway will materially reduce the price of provisions, but this cannot compensate the Indian for the loss of the furs and of the game which his traps and his gun alone would otherwise have obtained for him. It matters little to him if the price of food and clothing may be lower, if he is unable to get the furs to barter or give in exchange for them.

I shall only add, that, with this single exception, treaties have, I believe, been concluded with every tribe or band of Indians, from Lake Nipissing to the Rocky Mountains through whose hunting grounds the C. P. R. passes, and that all these bands have been for years in the receipt of annuities and presents. A number of years have now elapsed since the line on the height of land plateau was located, and since the Indian Department was aware (or should have been) that it passed through their hunting ground, and no steps have as yet (so far as I know) been taken toward making a treaty, either with this Missinaibi band, or those at Flying Post and Mattawagamingue. Why it is these Indians have been thus neglected, I cannot positively say. It is possible that being neither turbulent or noisy, they may have been simply overlooked. I hope, however, that the matter will be brought to the notice of the Superintendent General of Indian Affairs, and that a treaty will be made, granting to these Indians that measure of justice to which I conceive they are fully entitled.

It may be thought by some that this is a matter in which the Provincial Government has no interest, and with which therefore, it has nothing whatever to do. But those who thus think labor under a mistake. The Provincial Government is charged with the preservation of the peace, and the protection of life and property in this territory. If these Indians become exasperated at the continued neglect of the Dominion Government, they may be tempted to take the law into their own hands, and deal very summarily and severely with trespassers on their hunting grounds. It is hardly to be expected that Indians (however peaceable and well-disposed) will tamely and without protest allow strangers to shoot and trap on hunting grounds, which have been theirs and their forefathers' from time immemorial; taking as it were the very bread out of the mouths of their children. Such a state of matters may lead to deplorable consequences and not only put the Province to a great deal of trouble and expense, but retard settlement and the development of the resources of the territory. Thus it will be seen that the Province of Ontario has a very direct and material interest in the speedy conclusion of a satisfactory treaty with these Indians.

If the Superintendent-General of Indian Affairs should be moved to make such a treaty, the following suggestions are calculated, in my opinion, to promote their welfare, and may not be unworthy of consideration: 1st. Whatever annuity the Department may agree to pay them for the surrender of their rights, that amount (at the outset at all events) should be, I think, paid in kind, and not in money. These Indians have very little idea of the value of money or currency. Their trade has been carried on exclusively with the Hudson's Bay Company, and in that trade no money is used. If paid their annuities in money, they would be easily imposed upon and tempted by unprincipled traders and pedlars to spend it in the purchase of worthless trinkets, shoddy clothing, confectionery and whiskey.

I would respectfully suggest that the annuity should be paid entirely in flour, which is already (with many of these Indians) one of the necessities of life, and will be of still more vital importance when game becomes scarce and difficult to obtain. There is not an Indian family in the territory but will require yearly, a quantity of flour, equivalent in value to the five dollars per head, or whatever sum the annuity agreed upon may

amount to. Food is the Indian's most pressing want, and starvation during the winter season their greatest peril. By all means then, let this annuity be given in the form best calculated to appease their hunger, and to avert this danger of starvation.

At present prices, an Indian family consisting say, of himself, his wife and three children, or five in all, might be expected to receive at least ten bags of good flour annually. With this flour and such game and fish as they might still be able to procure, I think there would be no danger of their starving to death. For such other articles as they might require, they would in future, as now, have to depend on the furs they might be able to catch during the winter. The flour should be delivered to them, at such of the Canadian Pacific Railway stations as they might desire, for it is important that this point should be as convenient to their hunting grounds as possible. As a general rule too, it would be a wise precaution, and one conducive to their welfare, if two-thirds of this flour were given as late in the autumn as possible, say about the middle of September; sufficient time of course being allowed to enable them to return to their hunting grounds before the close of the navigation. The Indian may be pressed with hunger, even in the summer, but it is in the winter season that he starves to death. There may be cases in which an Indian's hunting ground is so remote from the railway, and the canoe route so bad, that it would be a matter of great difficulty if not an impossibility to get so much flour taken over it. In such cases the Indians might be allowed a part of their annuity in lard, the article of food next in importance to flour, and of course much easier to carry than a quantity of flour of equal value. Two important objects, would, I claim, be secured by this mode of payment: 1st, the Indian will get his annuity in articles of the greatest importance to himself and family, if not necessary to their very existence; 2nd, he cannot readily exchange these for anything else less useful, altogether useless or actually pernicious. For instance, a whiskey pedlar (the price of whose liquor may be, say, two and a half dollars a bottle) if paid in silver or in bills might do a very large and profitable business. But if compelled to shoulder a bag of flour for every bottle he sold, it would seriously interfere with the success of his venture, besides greatly increasing the risk of detection and punishment.

There is one other suggestion only which I shall make. Owing to the scarcity of game, and of fur-bearing animals, the Indians north of the height of land cannot possibly live together in any considerable numbers, more especially in the winter season. Each family requires not less than fifty, and frequently as much as one hundred square miles of country to supply fur-bearing animals and game sufficient for its maintenance. If the Indians, therefore, are not to abandon hunting and trapping altogether, they must of necessity reside two-thirds of the year on their hunting grounds. It consequently appears to me, that in this territory at any rate, it will be bad policy to insist on herding the Indians together on what are called reserves. The advantages that are claimed for such a policy elsewhere may, or may not have been realized, but in this territory at all events, I contend that such advantages will be greatly outweighed by the evils such a policy will entail. In any treaty therefore with these Indians, it would be far better, in my opinion, to allow each family to select a homestead on its own hunting-grounds, and dispense with large reserves, which too often retard and keep back the settlement of the country, without securing to the Indians the advantages that are expected.

Small reservations of a thousand acres or so each, might be retained for their use, near the Hudson's Bay Company's Posts, or at other points where they will be most likely to gather to trade their furs, and lay in their supplies. Here they would camp for a short time in the summer, enjoying all the social intercourse they care for. At other seasons they will be on their hunting grounds engaged in hunting and fishing, pursuits thoroughly congenial to their nature and habits. They will thus be not only far more contented and happy, but almost, if not altogether, self-sustaining, and not nearly so troublesome, I believe, as those Indians who are obliged to live the whole year on their reservations."

I have, in the reports just referred to shown that, in my opinion, treaties should have been made several years ago with those bands of Indians in the southern part of this territory, through or near to whose hunting grounds the Canadian Pacific Railway passes. I still remain of that opinion, for the reasons therein given.

If, however, this cannot be done at present, or if it be not expedient under the circumstances to make such treaties, I would respectfully suggest the following as, in my humble opinion, the only course the Government can pursue, which will effectually protect these Indians against the robbery, hardship and injustice of which they complain.

In the first place (if within the power of the Provincial Legislature), a law should be enacted to protect the rights of the natives of this territory, in respect of the game, fish and fur-bearing animals on their hunting grounds. Such a law should strictly prohibit both white men and other Indians from hunting, fishing or trapping on "unsurrendered territory" north of the height of land; or, at all events, without a special license so to do from the proper authority.

In the second place, no unlicensed person or persons, not already authorized, should be allowed to enter into such unsurrendered territory, with the intent to trade with the Indians.

The penalties for a breach of these laws, in addition to fine and imprisonment, should include forfeiture of the guns, traps, nets or other engines used in the capture of, as well as all game, fish and furs found in the possession of the offending parties.

I consider such laws both expedient and just, pending the arrival of the time when it may be advisable to make treaties with the Indians for the surrender of all their claims. And that for the following reasons:

1. The restraints which they will impose on unauthorized parties, are absolutely necessary for the protection of the natives, who are solely dependent on the game, fish and fur-bearing animals for existence. The territory being now partially opened up and rendered accessible, hunters and trappers will be tempted, as already said, to come in and trespass on their hunting grounds. From the absence of serious crimes and otherwise, it may be inferred that these Indians are, as I have elsewhere stated, honest, peaceable and quiet. But, if not prevented, the reckless and unjustifiable destruction of their game and of their fur-bearing animals will leave the poor natives no alternative but to defend their rights or starve. Hence the probability of bloodshed.

2. The men who thus trespass on their hunting grounds, regardless of the "moral," if not legal claims of these non-treaty Indians, are not likely to be in the least concerned as to the means employed, the season of the year, or whether or not a sufficient number of the animals are left to keep up the breed. Hence the speedy destruction of the more valuable fur-bearing animals in all those parts of this territory rendered easily accessible by railways or otherwise must follow.

3. Much of this northerly part of Ontario is possibly better fitted for the growth of forests and the subsistence of fur-bearing animals than for anything else; and the growth of the one is quite compatible with the existence of the other in the same region. Timber of all kinds is becoming scarcer and more valuable as the population of this continent increases. Furs and game, too, of all kinds never fail to find a market at home or abroad at good prices.

Under these circumstances, taken in conjunction with the smallness of the returns now obtained by farmers on other than the richest soils—in the finest climates, and from land most advantageously situated in regard of markets—it may be, perhaps, the best and wisest policy on the part of the Provincial Government to devote no inconsiderable portion of this territory to the growth of timber, and, as a natural consequence, the multiplication of fur-bearing animals and game.

But be this as it may, I am satisfied that under proper regulations, and with the protection suggested, the fur-bearing animals, game and fish in this vast territory will afford employment to, and subsistence for all the native hunters in the country for many years to come.

Why not, then, afford this needful protection and allow them to follow the pursuits to which they are most perfectly adapted by nature and in the exercise of which, they will not only be more successful, but happier than in any other. It is obviously not to

the advantage of the people of this Province—nor of the Dominion for that matter—to be saddled with heavy payments in the shape of Indian annuities before there is any real necessity for it. If therefore the Provincial Legislature, with or without the co-operation of the Federal Government, can reserve to the exclusive use and benefit of these natives the game, fish and fur-bearing animals, they will remain practically in the enjoyment of all that they have ever made any use of—or derived the least benefit from—or in fact of all that has been of value to them.

So long, therefore, as they are protected in the enjoyment of these, their most valuable rights, they will be easily persuaded, I think, to give their consent to our making such use as we see fit, of the timber and the minerals—if not (to a limited extent) of the soil also. For if properly explained, they cannot fail to see that, while there need be no decrease or falling off in the quantity of furs trapped or caught, the value thereof will surely be increased—and the price of everything they require diminished—as the country is opened up and its mining and lumbering resources are developed.

As regards the proposed law or regulation, requiring that parties desirous of trading with the natives in this territory, shall obtain a license so to do, I may observe that, in my opinion, such a law is necessary to prevent the Indians being debauched with intoxicating liquors and cheated, if not robbed, by unprincipled traders. The amount charged for such licenses (which should be renewable annually) is of little consequence; the chief object being to confine this trade to responsible men of good character—men able to give bonds in a good round sum, that alcoholic liquors will not be used in the trade, nor the Indians otherwise defrauded of the value of their furs.

The Honourable Hudson Bay Company have not for many years (much to their credit) employed intoxicating liquors in carrying on their fur trade in this northern territory.

I have reason to believe, however, that such liquors are now being introduced into the territory by other traders. This, if not checked, in some such manner as that suggested, will soon become general, and cannot fail to lead to the usual disastrous consequences.

While enormous sums of money have been spent on the Indians in the west and north-west, I know of absolutely nothing that has been expended on, or anything that has been done for the natives and others in this territory—unless it be to tax them. The total amount received by the Dominion in the shape of customs duties since confederation, on goods imported at Moose Factory, and from dutiable articles—imported at Montreal for Abittibi, Mattagami, Missinaibi and other posts in the southern part of this territory—cannot be less, I am inclined to think, than \$200,000, and possibly a quarter of a million dollars. It is, to say the least, a heartless and cruel thing, to exact such a monstrous sum of money as this, from a people so few in number, and of these, many of them so poor.

If the duties cannot be remitted altogether, some portion at least of this money might be, and should be, refunded.

The way in which this should be done does not rest with me to decide. I may, however, be allowed to point out some things that appear most important to, if not most wanted by, the people of the territory.

Their most pressing needs are, I conceive, (1) better prices for furs, (2) the ability to obtain the conveniences and necessities of life at lower rates, (3) medical attendance, (4) schools, (5) mails, (6) hospital (at Moose) for the sick, (7) religious instruction, (8) protection for life and property.

Having expressed my views on most of these subjects, in former reports, as will be seen by the extracts given—little more remains to be said. As regards the first and second “needs”—reasonable competition, and a reduction in the cost of transport and travel are the proper remedies.

3. On the subject of health and medical attendance, I have already reported to the Provincial Board of Health. Among other things, I suggested that a medical man should be appointed, whose duty it would be to visit the Indians—when gathered together at

the Honourable Hudson Bay Company's posts on or near the height-of-land—as they always are for several months in the summer. A suitable man, one not only possessed of a competent knowledge of his profession, but capable of feeling and taking an interest in his work, and anxious to promote, not merely the health, but welfare and happiness generally of the natives, in short a philanthropist as well as doctor, might prevent, as well as cure, a great deal of suffering and disease, save many lives and do an immense deal of good otherwise.

To provide and pay such a man is, in my opinion, the duty of the Dominion Government. The Hudson Bay Company solely, at their own expense, maintain doctors at Moose Factory and at York.

4. I do not know what the Hudson Bay Company has done to promote education in other parts of the vast territory over which it so long held almost undisputed sway, and from which, it is believed, to have realized in former times at least such enormous profits. In this territory it does not appear to have done much. Even at Moose Factory—the principal trading post and centre of population—where the Company has ruled for two hundred years, and where still everything may be said to be owned by, and every one dependent upon the Company, I am not aware that it has granted or is now granting any aid or assistance, whatever, toward educating the Indian children or even the children of its servants and officers.

It is true that of late years a small school house has been built at Moose Factory and that the Church of England missionaries have devoted as much time as they could well spare, from other duties, to teaching the children both of the Indians and of the Europeans. I am told, however, that during the winter the school house is so cold that the children cannot attend and that it is for the most part closed. And further, that during the summer the missionaries are so much occupied that the hours are both short and irregular. To the Indians, what little education they do receive is of the greatest importance and value, even when confined, as it generally is I believe, to a knowledge of reading and writing in their own language and in their own peculiar character. But the education thus afforded will not enable, even the Indians, to become anything more than hunters, trappers or voyageurs, and falls far below that obtainable by the poorest white children in any other part of the Province.

Such of the Company's officers, as can afford to do so, send away their children to England, Scotland, or to far distant parts of Canada to be educated. It is not only a great expense but necessitates long and painful separation of the parents and children. Those who cannot do this, whether from the largeness of their families or because they occupy less lucrative positions in the service, the officers who have not yet obtained commissions, the clerks, small postmasters or traders, the mechanics and servants, see with anxiety and sorrow their families growing up to manhood and womanhood, either altogether uneducated, or with an education so imperfect as to afford very little hope of their being able to make an honest and comfortable livelihood in any other part of the world. While, on the other hand, if they remain where they are, their prospects are too sad to be contemplated by most parents with other than feelings of the deepest solicitude.

The best and most central point for a school is Moose Factory, and it should be a good school. It can itself furnish, I am told about 100 pupils in the summer and about half that number during the winter. But in addition to these, I have no doubt children would be sent to it, from all the other trading posts in that department.

One male and one female teacher with second class certificates, and a third teacher with a knowledge of the Indian language and written character would probably be enough unless an industrial school for girls were added, as it certainly should be if possible.

The necessary buildings—consisting of school house, master's residence and a boarding-house—should be put up, in my opinion, by the Dominion, as a refund in part of the large sum before referred to, as having been exacted from the people of this territory in the shape of customs duties. The working expenses might be borne jointly by the Indian Department, the Provincial Government, the Hudson Bay Company and the

people themselves. Until the country is more fully opened up than at present and the expenses of transport diminished, the cost of running such a school, as is contemplated, would probably be about three thousand five hundred dollars a year.

Allowing that the Indian Department, the Education Department of the Province, and the Hudson Bay Company, should each be willing to contribute a thousand dollars, it would leave about five hundred dollars to be raised by the parents, a sum, which, poor as they are, I am persuaded they would gladly pay for the inestimable blessing of a good education for their children—such an education as would fit them for any position to which they could reasonably aspire.

I sincerely hope and trust that this matter which I have promised to represent to the Government may receive the favourable consideration of the Hon. Minister of Education.

5. Another of the needs of the inhabitants of this part of the province is a mail, say monthly. At present the people at Moose Factory and on the coast generally only get three mails from Montreal, and one by sea from London, in a year; and these are carried by, and at the expense of the Hudson Bay Company. A monthly mail would be a great boon, especially to those of our own race in this remote part of the Dominion. If these people had votes, and were "represented" as well as "taxed," their wants, I venture to think, would be much more likely to receive that consideration to which they are justly entitled.

As there are two months, one about the close, and the other just before the opening of navigation, during which it would be all but impossible to make the trip either on snow-shoes or in canoes, the number of trips would really be only ten; the cost of which would not exceed, I think, twelve hundred dollars. In view of the fact that the net revenue received from Moose factory alone, by the Dominion Government, amounts to about \$12,000 a year—a refund in this form, of one-tenth part thereof may be properly regarded as a right, rather than a favor.

6. It was also mentioned in a former report that, in my opinion, a small hospital for the sick, at Moose Factory would save many lives, both of natives, and Canadian or Old Countrymen. I retain that opinion, being fully convinced that, of what may be called "untimely" or premature deaths, more occur from the want of proper food and good nursing when sick, than from any other cause. A hospital, if no larger than to admit of ten or twelve cots being made up, would not only save many lives, but alleviate a great deal of suffering. I consider that the cost of putting up and furnishing this hospital should also be borne by the Dominion, and made a charge against the \$200,000 which, as already stated, has been wrung out of the pockets of the poor people of this territory.

Toward the maintenance of the hospital when built and properly furnished, some assistance might be anticipated from the Hon. Hudson's Bay Company. As the company, however, keep and pay the medical officer at Moose, it might not in its corporate capacity, feel inclined to do more. But there are many wealthy and benevolent men who either have been in old times, or may still be connected with this company, some of whom, as well as of the general public, will, I am persuaded, contribute liberally toward the support of such a necessary and excellent institution. The people of the country would doubtless do all they could, and the Provincial Government may be confidently expected to grant at least the assistance afforded to other hospitals.

If therefore the Dominion Government should see fit to put up and furnish the building, the cost of which need not exceed ten thousand dollars, I am convinced that private and public beneficence will amply provide for its maintenance.

It is not merely during the prevalence of some epidemic that a hospital at Moose Factory would be a blessing, nor would its usefulness be confined to that portion alone of the vast territory bordering on Hudson's Bay, which forms part of the province.

The only place between Albany Factory and Whale River on the coast, and between the coast and the height-of-land whereat a doctor is stationed, and where medical advice, surgical assistance, or even suitable medicines can be obtained, is Moose Factory. In

this territory, the area of which greatly exceeds that of all Ontario, south of the height-of-land, the Hon. Hudson Bay Company have nearly twenty fur-trading establishments, variously called "factories," "houses," and "posts." In addition to the natives who trade there, the company have officers, clerks, mechanics and servants at the more important posts, and an officer and servant at even the smallest. These are generally Englishmen or Scotchmen—for the most part married and the fathers of families.

To families thus situated, and even to some of the natives at these isolated posts where it is impossible to obtain proper medical advice or assistance, however urgent the necessity, a hospital at Moose Factory would frequently prove an unspeakable blessing. At these posts, patients suffering from disease or bodily injuries (especially gun-shot wounds) often die, or become invalids or cripples for life, who, if sent to a hospital, might be cured. Many men would not only send their wives or children to such an institution, when necessary, but cheerfully pay for their maintenance while there.

7. I have little to add in regard to the religious condition or wants of the people, in addition to what was said in my first report and in that for 1883, from which last, I beg to quote the following information furnished on this subject by the Right Reverend Dr. Horden, Bishop of Moosonee :

"The Moose mission was commenced by the Wesleyans about the year 1838, who sent to Moose Factory the Rev. G. Barnsley, who laboured nine years at Moose and elsewhere in the country very indefatigably, meeting with considerable success and baptizing a large number, both of Indians and half-castes; he then returned to England and for four years the mission was unoccupied. But Mrs. Miles, wife of the gentleman then in charge of Moose Factory, a woman of great influence among the natives and a sincere Christian, exerted herself in a most praiseworthy manner to keep the natives, in remembrance of the faith they had embraced, constantly exhorting them and organizing prayer-meetings among them. The Wesleyans, then in considerable difficulties and unable to send a successor to Mr. Barnsley, invited the Church Missionary Society to take up the work; this they did, and in 1851 Mr. and Mrs. Horden were sent to Moose under their auspices; in 1852 the mission was visited by Dr. Anderson, the first Bishop of Rupert's Land, who ordained Mr. Horden deacon and priest during his stay. During his Lordship's visit the Rev. E. A. and Mrs. Watkins arrived from England to strengthen the mission, and were sent forward to occupy Fort George on the eastern shore of Hudson's Bay. The bishop visited Moose again in 1855 and 1859, each time expressing the greatest satisfaction at the progress he witnessed. One great cause of advancement was the translation of large portions of the Scriptures into the Indian language, the first of which were printed by Mr. Horden himself at Moose, with a press sent to him by friends in England. These books are all written in a syllabic character, the principle of which is that each letter represents a whole syllable, a consonant and vowel combined; the system is easily acquired and is almost universally known by the natives of the whole Diocese of Moosonee, books being printed in it in the Cree, Ojibbeway, Eskimo, and Chipewayan languages. In the Cree Mr. Horden has translated the New Testament, the Old Testament, lessons for Sundays and holy days throughout the year, the psalter, common prayer book, hymn book, and Bible and gospel history. Into the Ojibbeway have been translated the book of common prayer, St. Matthew's Gospel, Acts of the Apostles, hymn book, and Bible, and gospel history, and several works into the other two languages named.

The mission continued to grow and prosper, extending its influence more and more every year, until it was felt that the time had arrived for combining the missions around the bay into a bishopric, and accordingly Mr. Horden was invited to England in the autumn of 1872, and on December 15th, was consecrated in Westminster Abbey as the first bishop of Moosonee. For the effective working of the immense diocese placed under his charge, the bishop divided it into six districts.

With the exception of the Eskimo in the vicinity of Churchill and northwards, nearly all the natives have been received into the Christian church, and except the Indians of the Abittibi, Waswanepi, Machiskun, and half those connected with Albany who are Romanists, and those of Oxford House, who are Wesleyans, all are in connection with

the Church of England. The clergy, under the bishop, labour most indefatigably and there is not one of them of whom the bishop does not speak in the highest manner. Churches have been erected, a part of them by the Hudson Bay Company, at Moose, Albany, Fort George, Rupert's house, Little Whale River, York, Severn, Trout Lake, Matawakumma, Flying Post, and Churchill, while another is now being built at Mistasinee. Confirmations have been held in the diocese, when it formed part of the diocese of Rupert's Land; the bishop of Moosonee has confirmed at York, Churchill, Severn, Trout Lake, Moose, New Post, Albany, Rupert's House, Eastmain, Fort George and Matawakumma, and has confirmed 697 persons.

The number of communicants at Moose is 105, and in the diocese altogether about 700."

"The following are the districts into which the diocese of Moosonee is divided, with the population and language spoken :

No. 1, Moose, comprising :

	Population.	Languages.	
Moose	395	English.	Cree.
New Post	34	"	Ojibbeway.
Abittibi	380	"	"
	<u>809</u>		

No. 2, Albany, comprising :

Albany	500	English.	Cree.
Henley	60	"	Ojibbeway.
Martin's Falls	300	"	"
Osnaburgh, Cat Lake	440	"	"
	<u>1,300</u>		

No. 3, Rupert's River, comprising ;

Rupert's House	362	English.	Cree.
Eastmain River	103	"	"
Waswanepe	129	"	"
Mistasinee	114	"	"
Machiskun	61	"	"
Nitchekwun	77	"	"
	<u>846</u>		

No. 4, East Main, comprising :

Fort George		English.	Cree.
Great Whale River	310	"	"
Little Whale River	500	"	Esquimaux.
	<u>810</u>		

No. 5, Matawakumma, comprising :

Matawakumma	105	English.	Ojibbeway.
Flying Post	114	"	"
Metachewan	87	"	"
Misenabe, Brunswick	250	"	"
	<u>556</u>		

No. 6, York, comprising :

	Population.	Languages.	
York	330	English.	Cree.
Severn	200	"	"
Oxford House	350	"	Ojibbeway.
Trout Lake	350	"	Esquimaux.
Churchill	350	"	Chipawayan.
	1,586		

In some cases in above table the numbers are but approximate while in others they are exact.

No special mention need be made of timber, the kind and quality of which in this territory have been so frequently described in former reports and incidentally in various parts of this.

There is a good deal of valuable pine in the territory between the Mattagami Post and Flying Post, and southward to the Height of Land.

The other timber, more especially the spruce, tamarac, and aspen poplar, cannot fail to prove immensely valuable, when the supply of pine gives out, if not sooner.

As hinted under another head, it may be worthy of the serious consideration of the Government whether it will not be advisable to devote a very large area of land in this northern part of the province almost entirely to the growth of timber.

Now that this territory has undoubtedly come under the jurisdiction of the Provincial Government, I have every confidence that all needful provision will be made for the preservation of law and order, and to promote the well-being of its inhabitants otherwise.

Respectfully submitted,

E. B. BORRON,
Stipendiary Magistrate.

APPENDIX.

Letter from Dr. A. R. C. Selwyn, C.M.G., LL.D., F.R.S., Director of the Geological and Natural History Survey, giving the result of an examination of Kaolin or China-Clay and of White-sand :

OFFICE OF THE GEOLOGICAL SURVEY, OTTAWA.

DEAR MR. BORRON,

15TH JANUARY, 1890.

I enclose for your information result of an examination I have had made of some specimens Dr. Bell gave me a few days ago, and respecting which he said you desired some information. They are good, and whenever they can be made accessible might be largely utilized for various purposes.

I would like to get good sized specimens for the museum.

Yours sincerely,

E. B. BORRON, ESQ.,
Collingwood.

ALFRED R. C. SELWYN.

OFFICE OF THE GEOLOGICAL SURVEY, OTTAWA.

JANUARY 14th, 1890.

SIR,—The following has reference to the specimens received from Mr. E. B. Borron :

Specimen labelled, "White kaolin from bed in felspathic sand fifty feet above Missinaibi River."

This material forms with water a plastic mass, burns white, may be said to be infusible. It is well adapted for the manufacture of all kinds of refractory ware, *i.e.*, fire brick, lining for grates, crucibles, scorifiers, and the like. If employed for fine ware it would require to undergo a preliminary treatment to free it from the numerous fine scales of mica which it contains.

Specimen labelled, "Felspathic sand, 100 feet above level of Missinaibi River."

This sand consists of grains of colorless quartz, with an occasional grain of undecomposed felspar, and a small amount of intermixed kaolin.

Specimen labelled, "Felspathic sand, 50 feet above Missinaibi River—sifted."

This sand is made up of grains of white translucent quartz, an occasional grain of undecomposed felspar, and a little intermixed kaolin.

I have the honour to be,
Sir,
Yours obediently,

G. C. M. HOFFMAN,

To Dr. A. R. C. SELWYN, C.M.G., F.R.S.,
Director, Geological Natural History Survey of Canada, Ottawa.