

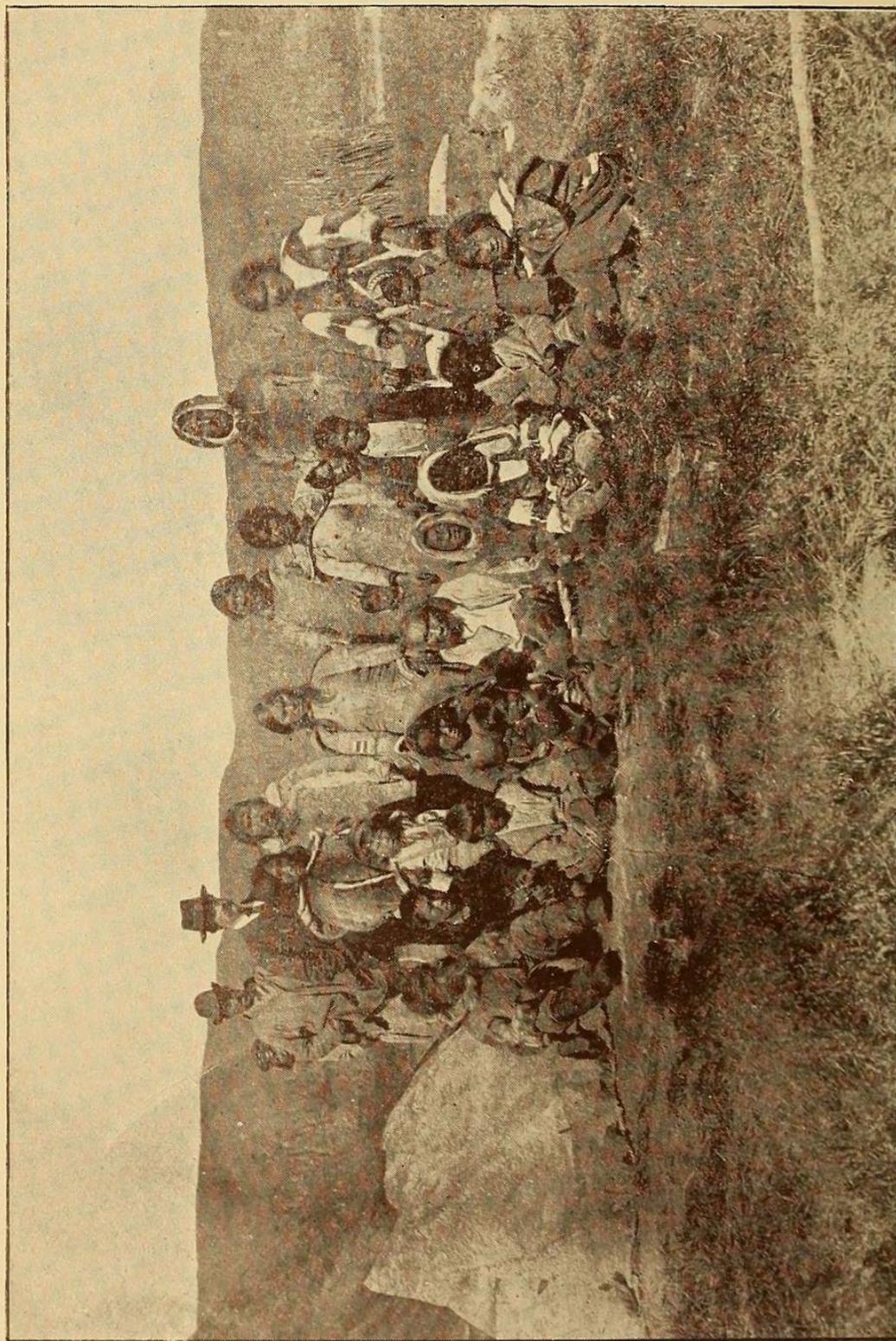


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A. P. LOW, PHOTO., 1888.

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Group of Esquimaux, from East Coast of Hudson Bay; taken at Little Whale River, H. B. Post.

GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA  
ALFRED R. C. SELWYN, C.M.G., LL.D., F.R.S., DIRECTOR.

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REPORT  
ON EXPLORATIONS IN  
JAMES' BAY  
AND  
COUNTRY EAST OF HUDSON BAY,  
DRAINED BY THE  
BIG, GREAT WHALE AND CLEARWATER RIVERS.

BY  
A. P. LOW, B.A.P.Sc.



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TO ALFRED R. C. SELWYN, C.M.G., LL.D., F.R.S.,

*Director of the Geological and Natural History Survey of Canada.*

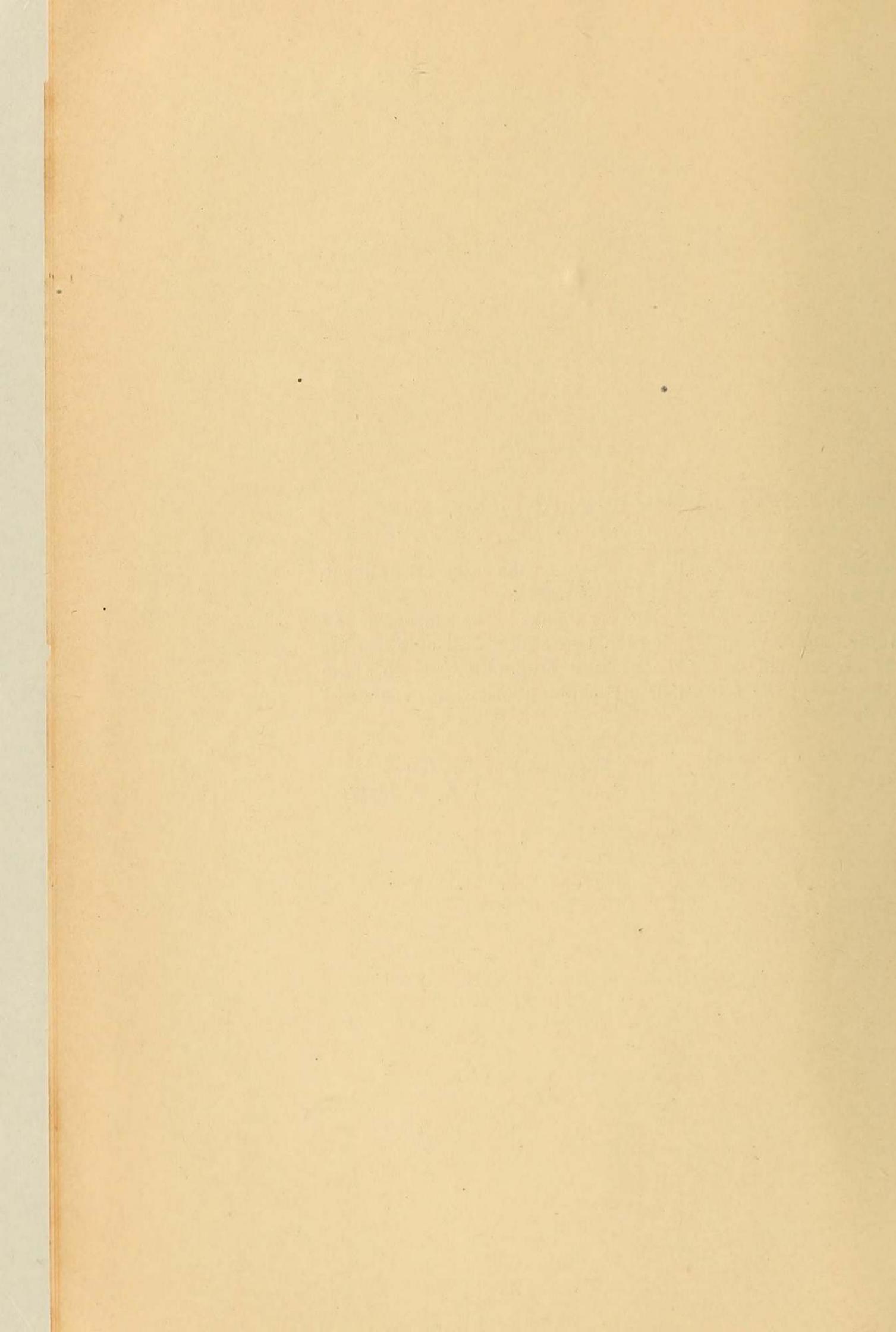
SIR,—I beg to submit herewith my report on the explorations about Hudson Bay during the seasons of 1887 and 1888.

At the same time I desire to tender my thanks to the officers of the Hudson Bay Company, met during the two seasons, all of whom extended to myself and party the greatest hospitality, and to whose kindly assistance the success of my explorations was, in a great measure, due.

I remain, Sir,

Your obedient servant,

A. P. LOW.



REPORT  
ON EXPLORATIONS IN  
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1887 AND 1888.

By A. P. LOW, B. AP. SC.

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The present report is the result of two short season's work, among the islands of James Bay in 1887, and upon the Big, Great Whale, and Clearwater rivers flowing into Hudson Bay on its east side in 1888. Owing to the shortness of the season suitable for investigation in these parts, and to the length of time required to reach and return from the field of work, only six weeks were spent in actual exploration each year, and consequently only a small area of this vast region could be explored.

Mr. J. M. Macoun acted as assistant and botanical collector, and performed his duties in all respects satisfactorily.

In 1887, a large fishing boat was procured at Collingwood, transported by rail to Missinaibie station on the Canada Pacific Railway and from there taken by the Missinaibie branch down the Moose River to its mouth. The low state of the water in the river, and the number of portages over which the boat had to be hauled occasioned considerable delay in reaching Moose Factory. Leaving Moose River, the party crossed to Charleton Island, the position of which has been fixed for longitude with chronometers by the captains of the Hudson Bay Company's ships, who have wintered there in past years. Subsequently Danby, Cary, Strutton, Little Charleton, Tiders, Solomon's Temple, Weston, Twins, Spencer, Walter, Emily, Grey Goose, Bear and Agoomski Islands were examined. Paced surveys were made around the shores of the greater number of these, as well as numerous examin-

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ations inland, and their positions were fixed by latitude observations and meridional bearings taken with solar attachment to the transit instrument.

In 1888, a track survey was made up the Big River for two hundred miles, thence crossing the head-waters of Bishop Roggan River, the head of the south branch of Great Whale River was reached and the river descended to its mouth. On this survey the courses were taken with a prismatic compass, and the distances estimated by time, the rate of travel of the canoe being previously determined. Daily observations for latitude were taken as a check on the survey, also frequent observations to determine the variation of the compass.

After finishing the above, a survey was made from the mouth of Clearwater River on Richmond Gulf, for sixty miles, to the outlet of Clearwater Lake, the courses were taken with a prismatic compass and the distance with a Rochon micrometer, frequent observations for latitude and variation of the compass were also made.

Mr. C. H. Macnutt, B. Ap. Sc., who had been with me the previous year was appointed assistant, and proved highly competent for the position.

The surveys of the two seasons have since been mapped on a scale of eight miles to one inch, and form a roughly accurate map of the regions explored; they are at present awaiting further explorations on the east side of Hudson Bay before being published.

#### PREVIOUS EXPLORATIONS AND DISCOVERIES.

It is deemed advisable to preface this report by the following short account of the discoveries, explorations, and other points of historical interest in connection with Hudson Bay up to the present date.

Hudson's Voyage, 1610.

1610.—Henry Hudson, in command of a ship fitted out by some wealthy English merchants, on his third unsuccessful attempt to find a north-west passage to the South Sea, had the good fortune to sail through the strait and enter the bay which has ever since borne his name. Sailing along the east coast to the southward until he had land on either side of him, he explored the bottom of the bay and as the season was now late, resolved to winter in a bay full of islands on the east side to the south of lat.  $53^{\circ}$  N. After passing a winter of great hardship, due to the cold, scurvy, and want of food, in the spring he started to return, when his crew mutinied, put Hudson, his son and seven seamen into an open boat and left them to the mercy of the waves and savages; nothing after was heard of the party, the ship with great difficulty reached the coast of Ireland with about one-half of the remainder of the crew, the rest having perished in a fight with natives in the straits and quarrels aboard the ship.

1611.—Sir Thomas Button was sent out to discover the north-west passage from the bay, and if possible to succour Hudson and his comrades. He crossed the bay to the northward and explored the western part as far south as the Nelson River, which he named after his mate. He wintered in the mouth of this river and called the land New Wales and the western part of the bay Button's Bay. Sir Thomas Button, 1611.

1619.—Jens Munk, a Dane, entered Hudson Bay and visited Thornfield Inlet. Jens Monk, 1619.

1631.—\* Capts. Lucas Fox and Thomas James were sent out on the old quest of the north-west passage, the former being fitted out by London merchants, the latter by those of Bristol. Before leaving they were presented to the King, who gave them letters for the Emperor of Japan. Fox confined himself to the northern parts, going as far south only as Cape Henrietta Maria, and then returning home. James, after meeting Fox, near Cape Henrietta Maria, sailed southward along the west coast, thoroughly examined it, and after several narrow escapes from shipwreck through grounding on shoals, ran his ship aground on Charleton Island and wintered there. He gives a woeful tale of the hardships endured, caused by the intense cold, want of food and scurvy. He states that the cold was so intense that it froze solid, wine, sack, oil, vinegar, and even brandy; that the cook soaked his salt meat in a copper kettle close to the fire to prevent it from freezing, the side near the fire was found to be quite warm while the opposite side was frozen an inch thick, this would prove that the climate is either much milder at present during the winter, or that James was given to exaggeration, most probably the latter. Thinking that the ship was beyond repair, in the spring he built a pinnace, but when the ice cleared it was found that the ship had not suffered much damage, after repairing it he returned home. Fox and James, 1631.  
Intense cold.

The entire western coast having now been explored, the impossibility of a north-west passage from it was settled, and no further voyages of discovery in that direction were undertaken.

1656.—The French† claim that Jean Bourdon was the first of that nationality who visited Hudson Bay, having sailed from Quebec by the Labrador coast and Hudson straits. That he made an alliance with the natives, and they hearing of a strange nation in their neighborhood, sent to Quebec, in 1661, to begin trade, and to desire that a missionary be sent to them. That in 1663 the Governor sent one Couture, who proceeded to the bay and erected a cross on an eminence and set up the French arms engraven in copper, taking possession of these countries for the 1656—First visit of the French.

\* Forster's voyages made in the north.

† De la Poterie, Histoire de la Nouvelle France.

King of France.\* This account has since been disproved, and it would appear that Jean Bourdon never entered Hudson Bay.†

DeGroisselier  
and Radisson  
reach Hudson  
Bay from Lake  
Winnipeg.

The next expedition sent to Hudson Bay was for purposes of trade with the natives. According to Oldmixon ‡ two Frenchmen, Messrs. de Groisselier and Radisson, while trading with the Indians at Lake Assimponals (Winnipeg) learned from them that it was possible to proceed by land to the bottom of the bay where the English had not visited. They desired the savages to conduct them thither which they did, they then returned to Quebec where they tried to persuade some merchants to send a ship under their command to the bay to engage in trade with the Indians; being unsuccessful they proceeded to Paris, hoping for a more favorable hearing at Court, but after presenting several memorials and spending a great deal of money and time, they were answered as they had been at Quebec. The English Ambassador hearing their proposals, imagined he should do his country good service in engaging them to serve the English who had already pretences to the bay, so he persuaded them to go to London where they met with a favorable reception from Prince Rupert and seven other wealthy men and merchants who, in 1668, fitted out the Nonsuch Ketch under command of Zachariah Gillam, a New England Captain. Accompanied by De Groisselier and Radisson, he passed through the straits and thence southward to lat. 51° N., where in the Nemiscow River, afterwards called the Rupert, he held friendly intercourse with the natives, built a rough fort called Charles Fort, wintered there and returned safely the following year.

Building of  
Fort Charles on  
the Rupert.

Charter to  
Hudson Bay  
Company, 1670.

Upon the return of Gillam in 1669, Prince Rupert and others applied for a charter to King Charles II. This was granted 2nd May, 1670, in it they are styled the Governor and Company of Adventurers trading from England to Hudson Bay; § “and in consideration of their having at their own cost and charges,” undertaken an expedition to Hudson Bay in the north-east parts of America, for the discovery of a new passage to the South Sea, and for the finding of some trade for furs, minerals and other considerable commodities, and of their having already made by such their undertakings such discoveries as did encourage them to proceed farther in pursuance of the said design, by means whereof there might probably arise great advantage to the King and his Kingdom, absolutely ceded and gave up to the said undertakers the whole trade and commerce of all those creeks, seas, straits, bays, rivers, lakes and sounds, in what latitude soever they might be, which are situated within the entrance of the Hudson Straits, together with

\* Joseph Robson's Hudson Bay, 1752.

† Chas. Bell's Hudson Bay.

‡ Oldmixon's British Empire in America, 1741.

§ Forster's Voyages.

all the countries, lands and territories upon the coasts and confines of the said seas, etc., so that they alone should have the right of trading thither, and whoever should infringe this right, and be found selling or buying within the said boundaries, should be arrested and all his or their merchandizes should become forfeit and confiscated, so that one-half thereof should belong to the King and the other half to the Hudson Bay Company."

1670.—The Company sent out Chas. Bayly, as Governor, to establish a post at Rupert's River in 51° 20' N. Lat. He was accompanied by Groisselier and Radisson and remained in the country. Governor Bayly, 1670.

1673.—Groisselier visited the Nelson, but failing to find any Indians did not remain.

1674.—It being decided that a greater trade could be done with the Indians on the west side of the bay, owing to their remoteness from the French, Mr. Bayly made a voyage in a sloop to that coast, examining the mouths of the Moose and Schatawan or Albany rivers, and passing between the island of Agoonski (called by him Diner's Island) and the mainland, reached Cape Henrietta Maria, entering the mouth of the Equan River on the way. It had been his intention to proceed as far as Port Nelson, but having trouble with his guide he returned from Cape Henrietta Maria. During the same summer he sent a party to explore the Nodway or Frenchmen's River, but they only ascended as far as the first fall, a short distance from the mouth. In the fall there arrived at Fort Charles a Jesuit missionary with letters from the Governor of Quebec; this was Père Charles Albanel, who reached the bay by ascending the Saguenay River to Lake St. John, thence up the Ashouapmouchouan River, across the Height of Land to Mistassini and down the Rupert River, which flows out of that lake. An account of his trip is given in the Relations of the Jesuits.\* As he left Canada in 1672, he had been two years making the trip, having been detained by the Indians, who stripped him of his clothes, so that he had to be clothed by Mr. Bayly, who received him kindly and sent him home in the ship.

Arrival of missionary from Quebec by Lake Mistassini.

1675.—Outposts were established at Hayes Island, in the mouth of the Moose River, and at Albany. A short time after this the head fort was removed to Albany, and a depot established on Charleton Island, where the ship from England discharged her cargo, furs being brought there from the posts, and the next season's outfits returned in sloops. Establishment of posts at Hayes Island and Albany, 1675.

1682.—Three parties reached the mouth of the Nelson River within a short time of each other; the first to arrive was Benjamin Gillan, a son of Capt. Z. Gillan, who had been sent from Boston; fourteen days later came Groisselier and Radisson from Quebec; they having been

\* Relations des Jésuits dans la Nouvelle France, vol. iii.

discharged from the Company's service, returned to France, were pardoned, and sent out to take possession of the Nelson for the French king; shortly after these John Bridgar arrived to build a fort for the Company. All three parties landed, and lived at peace until spring, when Groisselier surprised Gillan and Bridgar, took them prisoners, and afterwards conveyed them to Quebec, in the meanwhile sending the other English in a rotten ship to meet the Company's ship, which they did near Cape Henrietta Maria.

1684.—Quarreling with their employers on their return to Quebec, Radisson and Groisselier again deserted to the English, returned to Port Nelson, and gave it up to the Company.

Mica mine on  
East Maine  
River.

1685.—In this year the Company had forts at Albany, Hayes Island, Rupert, Nelson and Severn; also a small post at a river on the East Main called "Ison-glass" River, where a mine of that mineral had been found, the working of which proved unprofitable.

Capture of the  
forts by the  
French.

1686.—The French in Canada, afraid of losing their inland trade with the Indians, and knowing that James II would allow no affront in this quarter to cause a break between him and Louis IV, resolved, in a time of peace between the two countries, to take possession of the English forts. The Governor accordingly sent a detachment of soldiers, under the command of Chevalier de Troyes, overland from Quebec, who easily took possession of the Forts Rupert, Hayes and Albany, leaving Port Nelson only to the English.

1690.—D'Iberville sailed from Quebec with two ships to capture Fort Nelson. He failed to do so, but obliged the English to abandon Severn.

Kesley journeys  
from Fort  
Nelson to the  
Saskatchewan.

1691.—Mr. Geyer, governor at Nelson, sent Henry Kelsey inland to make discoveries and extend the trade by inducing the inland Indians to come to the fort. According to his journal, produced by the Company before the Committee of the House of Commons in 1749,\* "he set out from Deering's Point (probably Split Lake), where the Indians always assemble when they go down to trade, to seek the Stone Indians, and, after overtaking them, travelled with them and the Nayhaythaway Indians to the country of the Naywatamee-Poets, and was fifty-nine days on his journey, including the resting days. He first went by water seventy-one miles from Deering's Point, and then laid up his canoe and went by land 316 miles through a woody country, and then forty-six miles through a plain, open country, having seen only one river in his journey, shallow, but a hundred yards over; and after crossing ponds, woods and champagne lands for eighty-one miles more, which abounded with buffaloes and beavers, he returned back fifty-four miles, where he met the Naywatamee-Poets." From this it

\* Robson's Hudson Bay.

would appear that he travelled from some point on the Nelson River above Split Lake to the open country north of the Saskatchewan.

1693.—War having broken out between England and France, the Company, with the assistance of the Crown, retook Albany, Moose and Rupert forts.

1694.—D'Iberville, with two ships and 120 men, took York fort from the English, and the same year the French sent such a force from Canada that they easily drove the English out of Albany, Moose and Rupert forts. Iberville captures Forts York, Albany, Moose and Rupert. ~~and~~

1695.—The Company, with the assistance of the Bonaventure and Seaford, a second time recovered Moose, Albany and Rupert forts.

1696.—The English, with four ships, took York from the French, carrying the garrison prisoners to England.

1697.—The French sent a squadron of five ships under D'Iberville, who destroyed two English ships, and afterwards took possession of York and called it Fort Bourbon. By the treaty of Ryswick, signed in this year, each country was to return all places taken during the war, holding those taken previous to it. By this the only place left to the Hudson's Bay Company was the fort at Albany. This state of things continued until the treaty of Utrecht, 1713, when the French ceded all their rights in the bay to the English.

1702.—The French rebuilt Fort Severn, calling it Fort Neuve Savanne, and the river Rivière des Saintes Huiles; they also called Moose, Fort St. Louis, and Albany, Fort Ste. Anne.

1714.—The English formally took possession of York and the other forts on the bay.

1718.—A wooden fort was built at the mouth of the Churchill River, and named Fort Prince of Wales. Forts re-taken by the English.

1719.—Capt. Knight sailed with two ships to search for a north-west passage from the northern parts of the bay. They never returned.

1720.—About this year the Company sent Richard Norton inland from Churchill, and, according to the testimony of Brown before the Committee in 1749, he is said to have reached the Coppermine River, but this is doubtful, as no journal of the journey was produced.

1732.—A wooden fort was erected at Moose, and a small post established at the mouth of the Slude, or East Main River. About this time a post was also built at Richmond Gulf for trade with the Northern Indians or Esquimaux. The people here on two occasions were massacred by the Esquimaux, and the post was then abandoned.

1737.—Two sloops were sent to the northward from Churchill to open trade with the natives, and look for a northern passage to the westward; this latter object seems to have never been seriously undertaken.

1740.—Henley House was built about one hundred and fifty miles up the Albany River, to prevent the Indians communicating with the French.

Ellis' voyage.

1741.—Christopher Middleton, sent out to discover a north-west passage, wintered at Churchill on account of a dispute between him and Mr. Dobbs; another expedition under Wm. Moor and Francis Smith were sent out to settle the matter. They wintered in the Hayes River, and an account of the expedition was written by Henry Ellis, who accompanied them.

1752.—Joseph Robson published an account of his six years' residence at York and Churchill, where he had been sent by the Company to oversee the construction of the stone fort at Churchill, and survey the mouths of the Hayes, Nelson, and Churchill Rivers, plans of which are published in his book. He complains of the lack of interest exhibited by the Company in regard to the interior, and says that the officers in charge had never been five miles up any of these rivers.

Capt. Coate's notes of voyages.

1727-51.—Capt. W. Coates for these years was Captain of one of the Company's ships voyaging to the Bay; during this time he kept a series of sailing notes, entering in them a full account of the geography of the Bay; these notes he bequeathed to his son, with instructions to him, not to reveal them so long as the Hudson Bay Company continued to employ him. These notes, edited by John Barrow, were published by the Hakluyt Society in 1857, and form an important source of information in relation to the coasts, rivers and islands of the Bay.

From the time of the treaty of Utrecht until after the conquest of Canada, the Hudson Bay Company confined their trade strictly to the Bay, and did not go inland until they found themselves in danger of losing their trade to the Canadian traders, who secured the fur by meeting the Indians on the headwaters of the rivers, and thus saved them the long journey to the sea.

Hearne's journey from Churchill.

The Company becoming aware of this fact, resolved also to send inland, and in 1769 despatched Samuel Hearne, from Churchill, with instructions to accompany the Indians to their hunting grounds, visit the copper mine on the river of that name, and if possible reach the sea at its mouth. After two unsuccessful attempts, he accompanied some Northern Indians and wandering over the barren lands with them reached the mouth of the Copper Mine River, then visited Great Slave Lake, and returned across country to Churchill in 1773.

On his arrival he was immediately sent inland again, to build Cumberland House, on Pine Island Lake, a short distance north of the Saskatchewan River, the first of the Company's many posts in the North-West. From this date the Hudson Bay Company entered into active competition with the Canadian traders for the inland trade, and

soon had a great number of posts scattered over the North-West and on the Mackenzie River.

David Thompson, at first employed by the Hudson Bay Company, and afterward by the North-West Company, was the first person to fix with any degree of accuracy the positions of the different posts, and make surveys through the country; he was engaged at this work from 1790 until 1812. From 1816 to 1826 he was employed on a boundary survey between Canada and the United States, from the St. Lawrence to the Lake of the Woods.

Surveys by  
David Thomp-  
son, 1790-1812.

Philip Turner was another Surveyor, who explored extensively under the orders of the Hudson Bay Company, about the beginning of the present century, and may have made the surveys in Severn River country, as laid down on Arrowsmith's Map prepared for the Company.

In 1782, the French Admiral La Perouse entered the Bay with three war ships, and took Fort Prince of Wales, spiked the guns, and destroyed the factory, without any resistance being offered by Hearne, who was then in charge of the place; then sailing to York he destroyed a small battery at the mouth of the Hayes River, and burnt the factory, but failed to capture the Company's ships with their rich cargoes of fur.

Capture of  
Churchill by  
Admiral  
Perouse.

1814.—Lieut. Edward Chappell, on H.M.S. Rosamond, the convoy to the Company's ships, visited Churchill and York. He published an account of the voyage, with descriptions of the Bay, and a map of the Nelson, from its mouth to Lake Winnipeg.

Voyage of  
Lieut. Chappell

1820.—Sir John Franklin, on his first expedition overland to the Arctic Ocean, went by way of York and the Hayes River route to the Saskatchewan; he made a track survey of the route and published an account of it, in the narrative of the journey. Since that time many other travellers have passed over the same route.

Franklin's  
journey.

Geographical explorations of the country to the eastward of the Bay were not undertaken until about 1820, when Dr. Mendry and Mr. J. Coulson made explorations, under orders from the Company, and have left rough maps of their work. The former traversed the country from Richmond Gulf to Ungava Bay; the latter explored the East Main, Rupert and Notaway rivers, also the portage routes between the head waters of these rivers.

Shortly after this posts were built at the mouths of the Little Whale and Great Whale rivers, where important porpoise fisheries were formerly carried on, but of late years have been abandoned as being unprofitable. Fort George, at the mouth of Big River, was also built about the same time, and is at present the headquarters of the East Main district. It has been found impossible to get the exact date at which these posts were established.

Establishment  
of posts on East  
Main coast.

Missionary  
work.

About 1847 the first missionary work among the Indians of Hudson Bay was undertaken by the Methodists. These withdrawing six years later, were succeeded by the English Church Mission Society, which has continued the work ever since, and at present has churches at Churchill, York, Albany, Moose, Rupert House and Fort George. Rev. Mr. Peck, in charge of the last place, visits Little Whale River every spring, to meet the Esquimaux who come in from the islands at that time. By the efforts of these missionaries the whole of the Indians and the greater part of the Esquimaux living around Hudson Bay have become Christianized, and their moral tone considerably elevated.

Previous ex-  
plorations by  
the Geol. Sur-  
vey staff.

The Roman Catholics have a number of converts at Albany, who are yearly visited by a missionary of that faith from the Upper Ottawa.

The explorations in this section of the country undertaken by the Geological and Natural History Survey of Canada, previous to the present, are :—

- Report 1871-2. Upper part of the Albany River. Dr. R. Bell.  
 Report 1875-6. Mattagami and Missinaibie branches of the Moose River. Dr. R. Bell.  
 Report 1877-8. East coast of Hudson Bay, and country between Lake Winnipeg and Hudson Bay. Dr. R. Bell.  
 Report 1878-9. Churchill and Nelson Rivers. Dr. R. Bell.  
 Report 1879-80. Hudson Bay and some of the lakes and rivers lying to the west of it. Dr. R. Bell.  
 Report 1880-1-2. Geology of the basin of the Moose River. Dr. R. Bell.  
 Annual Report 1885. Observations on the Geology, Zoology and Botany of Hudson Bay and Strait. Dr. R. Bell. Report on the Mistassini expedition. A. P. Low.  
 Annual Report 1886. Attawapishkat and Albany Rivers. Dr. R. Bell. Severn and Berens Rivers. A. P. Low.

### *James Bay.*

James' Bay.

James Bay is that portion of Hudson Bay lying south of a line drawn from Cape Henrietta Maria, on the west, to Cape Jones, on the east coast. From the head of Hannah Bay, N. lat.  $50^{\circ} 55'$ , to Cape Henrietta Maria, the distance is, roughly, 300 miles, while the average breadth is 145 miles.

From Cape Henrietta Maria the coast runs S.S.E. to Mourning Point, a low point covered with trees, near lat.  $54^{\circ} 38'$ ,\* then south to Equan Point, lat.  $53^{\circ} 53'$ ; from there it trends well to the westward, to the mouth of the Equan River, and then east of south to the mouth of the Albany River, lat.  $52^{\circ} 17'$ , thus forming a considerable bay, and not

Incorrect maps running almost due north and south as represented on all modern maps.

\* Capt. Coats' Notes.

From the mouth of the Albany River the direction of the shore line changes to E.S.E. for a distance of forty miles to Cockespenny when it turns S.E. to the head of Hannah Bay. Hannah Bay is thirty miles deep, counting from a line drawn between Gull Point on the east side and the mouth of Moose River, and has an average breadth of fifteen miles.

This bay is separated from Rupert Bay by a long low point terminating in a peninsula, at one time an island, the isthmus is covered with willows and is lower than the land adjoining, the latter, on both sides, supports a thick growth of spruce and tamarac. Rupert Bay is thirty-five miles deep, with an average width of twelve miles.

The east coast of James Bay has a roughly north and south direction from the head of Rupert Bay to the mouth of Big River, one hundred and seventy-five miles. From this river the coast takes a gradual curve to the westward, the land at Cape Jones lying about east and west.

According to Capts. Taylor and Bishop, of the Hudson Bay Company's ships, the position of Cape Jones, as laid down on the Admiralty chart, is fully forty miles to the eastward of its true position; this being the case, the mouth of James Bay is that much narrower than is represented on the maps.

The Admiralty chart, from which all modern maps of Hudson Bay are constructed, was compiled in 1853 from information supplied by the Hudson Bay Company, gathered from notes and observations of the various captains of their ships; now as these observations were but approximately correct, the chart must be so also, especially in those parts unfrequented in the navigation of the bay, and such being the case, it is highly important that an accurate survey should be undertaken to correct these errors in the coast line, and enable ship captains unacquainted with the navigation of these parts, to enter James Bay with a certain degree of safety, a thing impossible with the present charts.

Importance of  
an accurate  
survey being  
made.

The general coast line of the west and south sides of James Bay is low and flat, with shallow water, deepening very slowly outwards all along, except where the rivers have cut out channels in the mud.

Although the average rise and fall of the tide does not exceed five feet, at the time of low water, only mud flats, strewn with large boulders, can be seen to seaward from high water mark. The shore is, in most places, marshy, covered with grasses and willows, with numberless small brackish ponds and lakes for a considerable distance behind high-water mark, while beyond, on slightly higher ground, is a dense growth of dwarfed black spruce and tamarac; it is often several miles from low-water mark to where the first really dry ground may be found.

Tides.

Shoals and  
mud flats.

Hannah Bay is so shallow that, with the exception of the river channels, it is almost completely dry at low water, and when a canoe is left by the tide, the sensation experienced by its crew is anything but pleasant, as they have to debark and stand in the mud, often beyond sight of the low fringe of bushes on the high water line, awaiting the return of the water. Rupert Bay is not quite so shallow as Hannah Bay, and has a channel up its centre to the mouth of the Notaway River.

Character of  
the coast on  
east side of the  
bay.

Along the east side of the bay the character of the coast changes, the low unbroken, muddy shores being replaced by higher rocky and sandy banks, deeply indented with small bays and fringed with innumerable rocky, shingle and sand islands as described by Dr. Bell (Report of Progress 1877-8.) The waters are much deeper and, although not free from danger on account of many hidden shoals, can be easily navigated in small craft, the islands and bays affording abundance of good shelter. The country inland from the bay varies similarly to the coast line. To the west and south it is almost flat, with its soil overlying nearly horizontal beds of Silurian and Devonian limestones for about one hundred and fifty miles inland to the Archæan country, so that the general level rises slowly and evenly towards the interior. The soil along the rivers appears to be good, and as the climate to the southward is probably favorable for the growth of cereals and root crops, nothing prevents future settlement in this region after the filling up of the north-west, except that without an extensive system of drainage, the lands remote from the rivers will be found too wet for successful farming, as it is said by the Indians, that with the exception of lands close to the rivers, the greater part of the country for a long distance inland from the bay is a mossy swamp.

Silurian and  
Devonian  
limestones.

Good soil.

Inland from the east coast the country is of a different character. The interior of this part is a rough table-land having an elevation of about seven hundred feet above sea level near its edge, and slowly rising inland to over two thousand feet at its highest.

Character and  
elevation of  
the interior  
table-land.

The edge of this table land leaves the coast to the north of Cape Jones, and runs in a S.S.E. direction, so that to the southward there is an interval varying from ten to thirty miles between it and the coast. In this portion the general level is not much over one hundred feet above the sea, and the soil is of Post-Pliocene clays and sands, with alluvium, affording good land for cultivation but as the climate is colder than on the west side, it is doubtful if it would allow the successful growth of any but the hardiest cereals, good crops of potatoes, however, and other roots could be and are grown as far north as the mouth of Big River. The land is rolling and broken by low rocky

Archæan hills which make up about one-third of the entire area, all of which would make excellent grass land. The best portion of it is along the river bottoms, and on the islands and banks.

Root crops,  
Good grazing  
land.

Eleven large and many smaller rivers flow into James' Bay; on the west side are the Equan, Attawapishcat, Albany, and Moose rivers; on the south, Hannah Bay or Harracanaw, and the Nottaway rivers; on the east, the Rupert, East Main, Old Factory, Big and Bishop Roggan rivers.

Rivers.

The water-shed of the country on the west side runs in a south-west direction from Cape Henrietta Maria, and consequently the rivers to the southward, having greater drainage areas, are the largest and longest.

The first river to the south of Cape Henrietta Maria is Raft River, an inconsiderable stream, the outlet of Raft Lake; it reaches the sea in lat.  $54^{\circ} 04'$ .

The next river is the Equan, a much larger stream, which takes its rise 300 miles to the westward, at the watershed between it and the Winesk River, flowing north; it enters the bay at lat.  $53^{\circ} 38'$ .

About lat.  $53^{\circ} 24'$  are the two mouths of the Attawapishcat River, which rises over four hundred miles inland, near the source of the east branch of the Severn River. It flows north, and drains an extensive area of unexplored country between the Equan and Albany rivers.

The Kapiscow River is a smaller stream entering the Bay at lat.  $53^{\circ} 05'$ .

The next important stream to the southward is the Albany River, the longest and largest on the west side of James Bay.

This river, one hundred and forty miles in a straight line south-west from its mouth, divides into two branches. The north or main branch comes from the west; it takes its rise a short distance from the headwaters of the English River, in Cat or Cat-fish Lake, about one hundred miles north-west of Lake St. Joseph, through which it flows, and which flows into Lake Winnipeg. The south or Kenogami Branch flows from Long Lake, thirty miles from the north shore of Lake Superior. At its mouth the Albany spreads out and flows between a number of low, swampy islands, forming a delta twenty-three miles long and ten miles broad between the mouths of its channels, the most southward of which empties into the sea in lat.  $52^{\circ} 12'$ .

At the south-west angle of the Bay is the wide mouth of Moose River, whose branches drain all the country to the south-west and south, from the rivers flowing into the eastern portion of Lake Superior and the headwaters of the Ottawa. The western or Missinaibie branch flows out of Missinaibie Lake, at the head of the Michipicoten River, within fifty miles of Lake Superior; the middle or Metagami branch flows from the south, and drains the country north of the

watershed to Lake Huron; the eastern or Abitibi branch flows out of Lake Abitibi, a short distance from Lake Temiscamingue on the Ottawa River.

Varying character of the rivers.

All the rivers flowing into the west side of James' Bay present the same physical characters; on their headwaters and upper parts, while flowing over Archean rocks, they alternate between long lake-like expansions with little current, and short contracted portions accompanied by heavy rapids and falls, thus affording good stretches of navigable water with portages between. On their lower courses, for a distance of one hundred and fifty to two hundred miles from their mouths, where they pass over the flat Devonian and Silurian limestones, the fall is uniform, and consequently the character changes, so that in ordinary low water during the summer and early autumn, owing to this uniformity of fall and to the rivers having too great a breadth for the amount of water discharged at this period, they present an almost unbroken succession of small shallow rapids, full of boulder and gravel bars, and only navigable for canoes of light draft.

Navigation.

For three or four weeks after the ice leaves the rivers, during the spring freshet, and again after the autumn rains, the higher water flattens out these numerous rapids and covers all obstructions, so that navigation with large boats, and even small steamers, is then possible; but at these times the current has a uniform rate of between five and six miles an hour, and therefore comparatively powerful steamers would be required to ascend the streams, the boats at present used being tracked up by men along the banks.

Near the head of Rupert Bay the Little Nottaway River enters. It is a small stream draining the country to the south between Hannah Bay and Nottaway River. This was called formerly Onenham Creek and was used as a winter harbour by the first voyageurs to the bay in the Company's service.

The mouth of the Nottaway River is directly at the head of Rupert Bay. This is a large river, one of whose branches rises in Lake Chibougamoo, a short distance to the westward of Lake Mistassini, and to the northward of the headwaters of the Ashouapmouchouan River, which empties into the Saguenay by way of Lake St. John; the other branch comes from a more southerly direction and rises near the heads of the Gatineau and St. Maurice rivers. In its lower parts the Nottaway River is so rough and rapid that instead of using it as a route to Waswanippi, a post on its upper waters, the Hudson Bay Company's canoes ascend the Rupert River, itself a very bad route, for one hundred miles to Lake Nemiscow, and thence pass by a portage route through small lakes and streams to the Nottaway.

On the east side of Rupert Bay, about half way between the mouths of the Rupert and Nottaway rivers, a small stream called Fish River enters.

In lat.  $51^{\circ} 30'$ , on the east side of Rupert Bay and near its mouth, the Rupert River flows in. This large body of water flows from Lake Mistassini, which is fed by several comparatively large streams, the longest and largest of which is the Temiscamie River, which rises to the north-east of the lake, near the headwaters of the Peribonka River flowing into Lake St. John.

The Rupert River, for one hundred miles from the sea, is very rough, and in ascending it canoes with their loads are forced, on account of its heavy rapids and falls, to make portages aggregating over ten miles in length. Portages on  
Rupert River  
route.

Continuing up the east side of James Bay, the next river flowing in is the East Main or Slude River, whose mouth is in lat.  $52^{\circ} 15'$ . This is a very large river, rising fully five hundred miles inland at the central water-shed of the Labrador Peninsula, which divides the waters running north into Ungava Bay, from those flowing west and south into Hudson Bay, and the Gulf of St. Lawrence respectively.

As has been previously stated, the course of the East Main River was roughly laid down by Mr. Clouston in 1824, who made a track survey to near its head. A copy of his map was obtained at Little Whale River last year and it is now in the office of the Geological Survey. The Hudson Bay Company use the upper part of this river as a route to their post of Nitchicooon, situated on a lake a short distance beyond the height of land on the head of one of the rivers flowing north into Ungava Bay. The route followed from Rupert House is by the Rupert River to a short distance beyond Lake Nemiscow, where a northern branch is taken, and passing thence through a chain of lakes, the East Main is reached, about two hundred miles from its mouth, and then ascended to its head through several more lakes. The lower part of the river is broken by a number of heavy rapids and falls, entailing long portages, and therefore the Rupert is taken in preference, thus obviating the long coast journey in open canoes, with its attendant delays and dangers. Falls and  
rapids. The present route to Nitchicooon is so difficult that the Hudson Bay Company have tried to find an easier one by the Big River to Fort George, but this was ascertained to be longer and harder than the one used at present. The difficulty of the trip can be appreciated when it is learned that the large canoes leave Nitchicooon with the first open water in the spring and are often dragged over the frozen lakes to the river, they thus reach Rupert House about 1st July; where, unloading their furs, they embark the trading outfit for the ensuing year and start immediately inland, only

reaching Nitchicoon at the close of open water, and frequently they have been frozen in before reaching their destination, in which case the outfit has had to be hauled to the post on sleighs after the snow had fallen.

Mica mine. About lat.  $52^{\circ} 33'$  the next large stream, called Old Factory or "Isonglass" River enters the bay. This is the river on which the company had a small post in 1685, and attempted to work a mica mine, but abandoned it as unprofitable. The only information obtainable concerning this stream is that it is a much smaller river than the East Main, and that its mouth is obstructed by sand and shingle shoals. To the northward of this are several small streams before the mouth of Big River is reached in lat.  $53^{\circ} 53'$ .

Big River. Big River is the largest river flowing into James Bay on the east side, and discharges probably a larger volume of water than the Albany, and therefore is the largest river entering the bay. In the latter part of this report it is more fully described.

Other rivers. Between the Big River and Cape Jones are the mouths of several rivers of considerable size, the largest is the Bishop Roggan, the other important ones being the Little Bishop Roggan, Seal and Salmon rivers. These drain a large area of country between Big and Great Whale rivers.

General character. The rivers entering James' Bay from the east for their entire length, pass, so far as known, through Archæan country, and consequently present physical characters somewhat different from those on the west side. On their headwaters they flow on the general level of the country and are nothing but a succession of lakes connected by short stretches of rapid rivers. After they have attained considerable volume and as they approach the margin of the interior table-land they begin to assume a true river character; they flow, with a moderate current, broken by sharp falls and heavy rapids, in old river valleys cut below the general level. Near the margin of the table-land the valleys become deeper, and the rivers are almost a constant succession of heavy rapids and falls until they reach the lower country, where they flow with a moderate current, with but few small rapids, in a distinct river valley between clay and sand banks of Post Pliocene age.

### *Harbours.*

Settlement. In relation to the future settlement of the country around James Bay and to the possibility of its use as a highway for future commerce between western Canada and Europe, the question of its harbours and their terminal facilities for railways is of the greatest importance. It is to be regretted that the natural harbours at the mouths of the

different rivers in the southern part of the bay meet the requirements of modern shipping only to a very moderate degree, and that to improve them sufficiently to admit of their being used as ports by large ocean steamers would entail an expenditure hardly likely to be warranted by the trade development of the future in this region.

The most important harbour in this part of the bay is that at the mouth of Moose River. A description of it is given in Capt. Coate's notes on the geography of Hudson Bay, 1727-51, and as it has changed but little since then, his sailing directions may here be quoted: "From the Gaskitt fifty-eight miles S. by W. you come to Moose River Road, eight miles from Sand Heads, North Point W.N.W. six miles in lat.  $51^{\circ} 34'$ , where you wait for the tide to go into that wide mouthed river which is not less than twelve miles over from North Point to the opposite side; which opens with three channels, but the north and east are so choked with banks and shoals, there is no using them; the mid channel will admit of a ship of twelve feet. Observing the tide over a bar one mile broad and one mile within Sand Heads is a little place which affords water for a ship to be afloat, called Little Ship Hole, to distinguish it from another four miles above Sand Heads, called Ship Hole, in three fathoms low water, where we moor and do our business. Eight miles below the factory on Roberson's Islands from Middleborough (Island) another island runs a shoal within half a mile of the ship, which cuts the river and prevents the ship going to the factory, which has plenty water all above that place."

Mouth of  
Moose River.

From this it will be seen that a ship while awaiting the tide to cross the bar, has to lie six miles from the mouth of the river, in a very dangerous position with a north-east gale. The channel on the bar is not over four hundred yards wide, and the Hudson Bay Company's ship, drawing fourteen feet of water, last summer, ran aground while crossing it, and had to remain in that exposed place until the next high tide.

The eight miles from the Ship Hole to Moose Factory is in places very shoal, and is rapidly filling in its upper part, so that the Company's schooner, drawing eight feet of water, can only come within about two miles of the Factory, whereas a few years ago her cargo was discharged close alongside that place. If a railway should be built to this harbour its terminus will need to be at Ship Hole; and to reach it a long and expensive line of embankment will have to be built from the South Shore, across sand and mud flats, partly bare at low water, and, owing to its exposed position, it would need to be correspondingly strong to withstand the force of water during the late fall gales. If approached from the north side, a large bridge will be required to cross the channel to the "Ship Sands," a low, flat, muddy island, partly cov-

Railway  
terminus.

ered with water at high tide, and lying close to the Ship Hole; in either case the terminus will have to be built largely on made ground.

As the present anchorage, six miles without the bar, is in only thirty-six feet, and as the water gradually shoals toward the river's mouth to a depth of fourteen feet at high water on the bar, and is only eighteen feet at low water at the Ship Hole, with a less depth of water for the four miles between it and the bar, it will be seen that to fit this harbour for the entrance of moderate-sized steamers, with a draft up to twenty feet, extensive dredging operations will be necessary for almost the entire distance from the outer anchorage to Ship Hole.

**Poor harbours.**

Unsatisfactory as are the natural conditions of Moose Harbour, those at the Albany and Rupert rivers are worse. Off the mouth of the Albany, for fifteen or twenty miles, the bottom is very flat and the deepest water not over twenty-five feet, slowly shoaling to twelve feet at the mouth, with numerous obstructive shoals and bars, the whole rendering it impossible for deep draft vessels to use it. The country around the mouth of the river is so low and swampy that it is hard to say where the land ends and the sea begins, and is totally unfit for the purpose of a railway terminus. To reach the mouth of the Rupert a narrow channel in Rupert Bay must be followed, with water from thirty to twenty-five feet deep, after which it shoals to eighteen feet for seven miles to the junction of the Nottaway and Rupert River channels, and then eight miles of water varying from ten to fifteen feet, with dangerous shoals, must be passed to enter the river proper. From this it will be seen that this harbour can only be approached by small vessels of light draft, and can never be used by the large-sized steamers engaged in modern ocean transportation. The mouth of the East Main River is broad and consequently shoal, with not more than eight feet of water on the sand bars at its entrance; while for more than twelve miles from its mouth, on all sides, are innumerable boulder and sand shoals, and small rocky islands, some of which are partly bare, the whole rendering an approach to the river so highly difficult and dangerous that the Hudson Bay Company's schooner does not call there.

**Big River  
harbour.**

The mouth of Big River is the only good natural harbour on James Bay, and, with a small amount of dredging, would afford capital accommodation for large vessels. A ship entering the river has to pass a few low islands lying off its mouth, but as there is good water and plenty of sea room between them, they occasion little danger. Within four miles from the mouth of the river a good harbour is formed by two rocky islands lying close to the north or main channel; this is called Stromness Harbour, and, having a good anchorage, with plenty of water, well sheltered on all sides, is a convenient place to await a suitable state of tide to enter the river.

**Good  
anchorage.**

At the mouth of the river the channel is divided by a sandy shoal, partly bare at low water; the north channel is the deeper, and is used by the Company's schooner, chiefly owing to its proximity to Stromness Harbour, as there is a sufficient depth of water in either channel to float that craft. From Stromness Harbour the channel runs eastward directly towards the shore for two miles, when it turns sharply southward, one mile along the shore, to the mouth proper of the river, which can then be ascended about two miles to Fort George, where large vessels can be moored close to shore. From Stromness Harbour to Fort George at high tide the least water in the channel is eighteen feet. Fort George being situated on an island, there is another channel on its south side, but this is very small and obstructed by shoals, navigable only by small boats.

The island would afford excellent ground for a railway terminus but the difficulty of building a line along the east coast from the south end of James Bay, a distance of 180 miles, with the large bridges required to cross the Nottaway, Rupert, East Main and Old Factory rivers, would entail an expenditure hardly warranted by the amount of trade to be developed.

The development of Big River harbour will come with that of the Fisheries of inland waters. immense and excellent fisheries of the inland lakes of this region and to the northward, as well as the coast fisheries, which, after the failure of the present sources of supply, will be of great importance and value.

From Big River to Cape Jones the bay is obstructed by many low islands and shoals for several miles from the coast, and as the bottom is uneven and the water not deep, large vessels cannot approach the mouths of the rivers flowing into this part. To the northward of Cape Jones the character of the coast soon changes, becoming higher and more rocky, with bold water close in shore. The mouth of Great Whale River would make an excellent harbour if a channel were cut through the sand-bar that at present obstructs its outlet, and over which the Company's schooner cannot pass at low tide.

Little Whale River is also obstructed at its mouth by a dangerous bar, which can only be crossed by small craft, and is impassable when the wind blows freshly from the north to west, at such times being covered with tremendous breakers.

Other harbours suitable for small craft occur at frequent intervals among the islands and bays along the whole eastern coast, but are all too small and shoal for large vessels, except one at Cape Hope Islands, about twenty miles north of East Main River.

*Islands.*

Three groups  
of islands.

The islands of James Bay, from their geographical position and physical character, may be conveniently divided into three groups. The first consists only of the large island of Agoonski, lying off the western shore; the second includes the high drift islands, situated to the eastward of a line drawn through the middle of the bay, and separated from Agoonski on the west by a deep water channel; the third is composed of the rocky islands and sandy shoals along shore on the east coast. The Island of Agoonski, or Omer's Island, as it was called by Governor Bayly in 1673, is the largest in James Bay, being seventy-five miles long, with an average breadth of ten miles.

Agoonski.

Its south end lies about thirty-five miles N. E. from the mouth of the Albany, and is consequently about twenty-five miles directly east from the coast.

The eastern shore of the island runs N. N. W. for thirty-five miles from its south end, and then bending more to the westward runs W.N.W. to its north end, which is in Equan Bay, and distant about eight miles from the main land, so that the position of the island is inaccurately laid down on the present published maps, which show it lying roughly parallel to the coast and about fifty miles distant from it. Indians coming from the northward to Albany on the ice, in the winter, when travelling in a straight line from Equan Point to the mouth of that river, cross the north end of Agoonski, showing that part to lie well in shore. The island closely resembles the adjoining main land in physical character, being very low and swampy. The shore line above high-water mark is made up of muddy flats covered in part with grasses and sedges, followed farther inland by thick growths of small willows, these in turn giving place to small black spruce and tamarac as slightly higher ground is reached. The line of these trees is often over two miles inland from high-water mark, itself a long distance from the sea at low water. As far as the tree line and in places beyond it, are numerous small lakes and ponds of brackish water; good fresh water being only obtainable in a few places well inland.

Vegetation.

The shore between high and low water mark is composed of a stiff slimy mud. Scattered over it are many boulders of gneiss, large and small. At the various points the boulders are often piled together, forming higher elevations than the surrounding flats.

The water around the island is very shoal for several miles out, and as the bottom is uneven, being broken by numerous boulder shoals and bars, it is very dangerous to approach even with small boats owing to the dirty state of the water. In fine weather the first

notice given of these shoals is the bumping of the boat upon them. On the west side, between the island and the main land, the water is shallower than on the east side, so that at low tide the distance between shore and shore is reduced in some places towards the north end to not more than one mile. This is taken advantage of by the Indians, several families of whom hunt on the island, crossing from the main land to the island in their small canoes. They start from shore at high tide and follow the retreating water out to its lowest point, cross the narrow channel and reach the high water line on the opposite shore with the rising water. From its close resemblance physically to the western mainland, it is probable that Agoomski is underlaid by the nearly horizontal beds of Devonian limestone found on the rivers near the coast. If this is the case, the rocks are covered with drift material on the lower half of its east side, which is the only part of the island that has yet been examined geologically.

The fresh and brackish lakes and ponds on the island are favorite <sup>Animals.</sup> breeding places for ducks and geese, which congregate here in countless numbers in the autumn to feed on the grasses growing along the low shores. The snow goose is reported to breed here when delayed on its passage north in the spring. Rabbits and cariboo are reported to be numerous, white bears frequent its shore, and the fur of the otters killed here is remarkably good and dark. Owing to the shoal character and muddy state of the water around the island, few fish are caught along its shore.

The principal islands composing the second group are Charleton, Danby, Cary, Woods, Little Charleton, Struttons, Weston, Solomon's Temples, Twins, Spencer, Walter and Grey Goose islands, along with the Bear Islands, lying more to the westward. These have a close resemblance to one another, both in formation and physical appearance, being composed wholly of sand, clay and boulders, with no <sup>Sand, clay and boulders.</sup> bedded rocks in place. They all rise to considerable elevations above the sea level, present sharp escarpments, composed of clay and sand, along their margins, and the formation of all was probably due to the same causes, as shown later on in this report.

Charleton, the second largest island in James Bay, lies about twenty <sup>Charleton Island.</sup> miles north of Point Comfort, the end of the peninsula separating Rupert from Hannah Bay, and about one-third of the distance across the bay from the east coast, its north-east point being in lat. 52° 2' 13". In shape it is an oblique parallelogram, having diagonals eighteen miles long from north-east to south-west, and twelve miles long from north-west to south-east. As before stated, this island, like the others of the group, is composed of unstratified sand, clay and boulders, without any rock in place.

The interior is a rough, rolling plateau, varying in elevation from 50 to 200 feet above sea level. On the south and east sides it ends in an abrupt escarpment, highest on the south; on the west and north the high interior land descends with an unbroken slope to a low shore. Starting from South-east Point, this escarpment runs westward at an angle of twenty degrees to the shore, consequently, on its west side it is a considerable distance inland. At the east end it has an elevation of seventy-five feet above sea level. This increases for four miles, where the maximum elevation of 200 feet is reached, fifty feet above the general level of the interior plateau, and standing above it with a cut bank that height on the north side, one-quarter of a mile from the southern margin of the escarpment, beyond which it decreases slowly westward, and is lost in the general low level of the west side. The face of the escarpment was examined at several points along its length, and found to consist of a moderately fine, light sand, with some clay, coarser gravel and small boulders mixed through the mass, the whole showing no signs of stratification. Going north from the south-east point for one mile, the escarpment averages sixty feet in elevation, with its base within a few yards of high water mark. Behind this, at a distance of 200 yards, is a second escarpment, thirty feet higher than the first. These, on their face, have the same composition as the southern escarpment. At the end of this course, and for one mile and a-half beyond to House Point, the descent from the interior is less precipitous, the land rising in three terraces—the first, ten feet, the next, forty feet, and the highest one, a quarter of a mile inland, 100 feet above the sea.

From House Point, for half a-mile, the face of the twenty-foot terrace is made up of sandy clay, with much gravel and boulders, rising out of deep water. From here the escarpment turns N. 30° W. for five miles, and then east five miles and a-half, passing inland around the head of a low, muddy bay, and reaching the shore again one mile south of the north-east point.

**Terraces.**

Here, on the east side, two distinct terraces are visible, the lower being fifteen and the higher seventy-five feet above the sea. The face of the inner terrace is chiefly sand, mixed with a considerable quantity of clay, and with many boulders scattered through the mass. To the westward of the north-east point, along the shore, the lower terrace is soon lost in the upper one, which, a mile beyond the point, shows a face of forty feet, composed of an unstratified sandy clay matrix, holding large quantities of boulders and coarse gravel.

Further to the westward the cut bank gradually loses its elevation, and two miles beyond the last described place is only about ten feet high; from here to the south-west point no banks occur, the shore line being

low, and formed of sand and mud, with many loose boulders scattered over it. At frequent points along this part of the shore the boulders are heaped up together, thus rising a few feet above and breaking the monotony of the general level of the shore.

Most of the boulders are of Laurentian and Huronian gneisses and schists, associated with light yellow fossiliferous limestones of Devonian and Silurian age, non-fossiliferous, light and dark limestones similar to those found at Lake Mistassini and along the coast to the north of Cape Jones, and also masses of the dark green traps found associated with the latter rocks. Character of boulders.

From the base of the escarpment on all sides, numbers of clear, cold Good water. springs of excellent water issue at all seasons. Following the shore from the south-west point, the course is due east for half a mile along a sandy beach, about fifteen feet above high water, covered with many boulders near the point; then turning N.N.E., a similar sandy shore covered with coarse grass and low willows is passed over for one mile and a-half to a flat muddy bay; this bay, with another on the west side, leaves at high tide only a low narrow neck joining the south-west portion of the main island. From this bay the course of the shore changes to S. 70 E., and runs in this direction seven miles to South-east Point. Between the escarpment on the south side of the island and the shore is a considerable area of low swampy land not rising over ten feet above high water mark, where a low embankment averaging twenty feet broad, composed chiefly of boulders bedded in clay, has been pushed up by the floating ice, and forms a natural dyke to the lower land behind, which is very swampy and partly covered with long narrow fresh water lakes lying parallel to the escarpment and shore. Between high and low tide on this side, is a wide mud flat strewn all over with a great number of boulders. Beyond low tide mark the water is very shoal for a long distance out; with the exception of the stretch of coast on the east side, from South-east to half a mile beyond House Point, the above description of the shore applies to the whole of Charlton Island. To the westward and northward sand and boulder shoals, bare at low water, extend out for miles from the island, rendering it impossible for ships to approach from those directions.

The bay on the east side with the escarpment passing around it, already mentioned, is two miles and a half wide and one mile deep; at low water it is completely dry and exposes a broad mud flat, with many large boulders upon it.

The land between the water and the escarpment, like that on the south side, is very low and swampy, with over one-half its area covered by small shallow lakes, formed or enlarged by numerous beaver dams, upon the three small streams that flow into this bay.

Danby and  
Cary Islands

To the eastward of Charleton lie two small islands; the southern, called Danby, being two-thirds of a mile distant; the northern or Cary, two miles from Charleton.

Wintering  
place for ships.

Between these islands and Charleton is a deep channel, through which the tide runs, with a current varying from three to five miles an hour. At House Point the water is deep close along the shore, and it was here that Captain James wintered his ship in 1631; here, also, in 1675 the Hudson Bay Company's ships discharged their cargoes from England, and took in the furs brought from the different forts on the Bay in sloops. In 1695 this depot was abandoned, and the anchorage has since been used only by the Company's ships when obliged to winter in the Bay, as it is the only moderately safe place in the southern part of James Bay where a ship may winter and allow the crew to obtain good water and fuel. The last ship wintered here in 1884; remains of the low huts, partly built in the ground for the officers and crew, are to be seen about one-quarter of a mile south of House Point on the first plateau island, near a fine large spring of clear water, which never dries or freezes, and is consequently available throughout the year. On the point is the frame of a large shed, formerly covered with sails, in which the ship's cargo was stored. The only drawback to this place as a wintering ground is that the strong current setting up and down the channel causes it to open early in the spring, and it then carries large masses of ice forward and backward, which striking the ship are a source of great damage and danger.

Trees.

The soil of the high interior land being light and sandy, the rain readily soaks in, and consequently no lakes or streams are found on the surface, which is partly covered with moss. The trees growing in the interior are chiefly small white and black spruce, with a few aspen and balsam poplar, growing much thicker to the northward than on the southern parts, where they form open glades, the intervening spaces supporting a growth of small birch (*Betula pumila*) from one to two feet high. About one-half of the south-eastern portion of the plateau has been burnt over, leaving nothing but the bare sandy plain with small patches of moss growing on it, and presenting a very barren appearance. Between the escarpment and the shore, also on the low swampy lands on the west side, the trees are almost wholly made up of black spruce, with a few tamarac and balsam poplar. Fringing the shore are extensive areas of low willows, beyond which grasses and sedges alone grow over these portions at or near high water mark, where the shore is frequently overflowed by the tide. Cariboo and black bears in small numbers are found on the island; white bears often land after heavy gales on its northern shores; rabbits are very plentiful, but the island is chiefly noted for the beavers that abound in all its

Rabbits and  
other animals.

small lakes, being preserved by the Hudson Bay Company, who claim to have introduced them, and only allow them to be hunted every third or fourth year. The small lakes are favourite breeding places for ducks and grey geese, which find good feeding grounds on the low grassy flats along the shore, ptarmigan also breed on this island, it being their southward limit around Hudson Bay.

Danby Island, as before mentioned, is distant two-thirds of a mile from the southern portion of the east side of Charleton Island. It is roughly triangular in shape, each side having a length of two miles; one side lies parallel to Charleton, with its middle directly opposite House Point. Its shores are low and made up chiefly of sand and boulders, with muddy stretches between the points, and a raised bar of sand and boulders formed by ice, similar to that on the south side of Charleton, runs around the island near high water mark. Shoal water extends out from the north, east and south sides for long distances. The interior of the island is low and swampy, covered with a thick growth of small black spruce and tamarac, with a few balsam poplar.

Cary Island lies two miles north-east of Danby and three miles east from the north-east point of Charleton. It is four miles long from north to south, with an average breadth of one mile. On the western side the island is low and swampy, gradually rising inland. On its south, east and north sides are escarpments rising in the highest parts seventy feet above the sea. On the east side a raised beach of some fifteen feet in elevation runs along the shore, and extends inland from one to four hundred yards to an escarpment fifty feet higher, which has a face and top almost wholly composed of water worn boulders, averaging nine inches in diameter, and without glacial striae; they are packed tightly together in a condition similar to that shown by boulders on shoals at present, acted upon by the grounding and shoving of large masses of ice over them.

On the north and south sides, the face of the escarpment is largely composed of sandy clay with large numbers of boulders scattered through the mass. The island on its lower parts is wooded with black and white spruce and a few white birch and poplar, the top of the boulder escarpment is devoid of trees, and has a very barren appearance.

Lying N. 65° E. seven miles from the north-east point of Charleton is the western end of two small islands called the Struttons. The Strutton  
islands.

The western or larger island is five miles long from east to west, one mile and a-half broad in the middle, and tapering to a point at either end; the smaller island is nearly round, with a diameter of one mile and a-half. The deep channel with its strong current that passes through the Sound between Charleton, Danby, and Cary islands con-

tinues across the open bay on a N.E. course and runs between the Strutton islands, and from these follows on the same course to near the mouth of the East Main River, where it turns northward and is lost along the coast. The channel between the Struttons is one-third of a mile wide, and is obstructed at its south entrance by a small low boulder island one-half mile in circumference. The current, owing to the confined limits of the channel, rushes through at a higher rate of speed than in the Charleton sound, varying from four to six miles an hour.

The channel, between the Strutton Islands, has been tried as a wintering ground for a ship by the Hudson Bay Company, but it was found that the ice carried along on the strong current caused great damage to the vessel; the crew also suffered greatly from the ravages of scurvy, brought on it is said by the use of the stagnant water in the small lakes on the islands, where no running streams exist.

On all sides of these islands, with the exception of the above narrow deep channel, the water is very shoal, with an uneven bottom covered with sand and boulder shoals, some of which are bare at low water, but the greater number coming within a few feet of the surface, only show their presence by the breakers upon them during gales.

Raised boulder  
beaches.

The highest point of the interior of the larger island is seventy-five feet above the sea. On the south side the slope from the highest level is very gradual and is broken by low rounded hills of boulders lying transverse to the shore line, where they terminate in short points: to the westward a raised beach twenty-five feet high, formed chiefly of boulders thickly packed in clay with sandy patches, extends back about one-quarter of a mile to a second abrupt bank of packed boulders thirty feet higher. On the lower beach is an immense rounded boulder of red Laurentian gneiss fully ten feet cube, and consequently weighing over eighty tons.

On the east side along the sound and partly on the north side tightly packed boulder banks rise almost perpendicularly ten to forty feet from deep water and resemble, when examined closely, a built, dry stone wall, while at a short distance they have the appearance of an exposure of solid rock. Along the remainder of the shore and inland are immense numbers of boulders in sandy clay, showing that the greater part of the island is made up of them.

The smaller island is low, being formed chiefly of boulder clay with sandy shores covered with boulders on all the points. Both islands are scantily wooded on their lower parts with small white and black spruce and willows; numerous fresh and brackish ponds are situated on these parts also.

Little Char-  
leton Island.

Bearing N.N.W. fifteen miles from the western point of the Strutton's is the eastern end of another small island, at present called Little

Charleton or False Charleton, but named Trodiley Island in Capt. Coates' notes.

This island is very similar in composition and size to the larger Strutton Island, except that it is made up of finer material and fewer boulders than that island. Its greatest length from east to west is five miles and a-half, with an average breadth of one mile. The north-east part of the island is the highest, and rises fifty feet above the sea. On the eastern half of its south side is a raised beach of sand and gravel ten feet high, extending from the water inland from one to three hundred yards, to a steep sloping bank of sand and boulders twenty feet higher, after which the land gradually rises towards the interior. The western part of the south shore is low and sandy and gradually rises inland towards the east, with no cut banks; the western extremity ends in a low, narrow boulder point half a mile long. The north shore is covered with boulders or coarse gravel, except short stretches in the bottom of the small bays which are sandy. Beyond the middle of the north shore, and from there to the east point the island rises abruptly inland, having banks of thirty to forty feet, composed almost wholly of small and large boulders mixed with quantities of clay and sand, from the base of which issue small streams of clear cold water. Springs.

The western end of the island is devoid of trees, and shows a barren, sandy soil covered with low arctic plants, with numerous large boulders strewn over the surface. The south-eastern portion is covered with small white spruce trees, not more than ten inches in diameter at the base and less than forty feet in height, which grow in open glades, the sandy soil here being covered with deep moss.

About half way between the Struttons and Little Charleton are two small low islands composed of sand and boulders, with low willows growing on their highest parts, many sand and boulder shoals also are to be seen in this part of the bay.

Twenty-two miles distant, on a N. 35° W. course from the east point Weston Island. of Little Charleton Island, is the next high island, with its north end in lat. 52° 30' 32", called Weston Island on the present chart of the Hudson Bay Company; this island is named Solomon's Temple in Capt. Coates' notes, while four low islands a few miles to the northward, at present marked Solomon's Temple, he calls Lord Weston's Islands; it is proposed to return to the old names, and call the large bold island Solomon's Temple and the low islands Weston Islands.

Solomon's Temple is a narrow island eight miles long from north to south in the form of a crescent, convex on the west side, and terminating in long, narrow points made up of immense numbers of boulders packed tightly together. On the west side, rising gradually from Solomon's Temple.

either point, is a cut bank of sandy clay full of small boulders, having a face of fifty feet in its highest parts. Behind this bank the surface of the island is an undulating plain, covered with many boulders and dotted with small shallow lakes which fill every depression of its surface. With the exception of a few solitary stunted white spruce, no trees grow on the island, its surface being covered only with low arctic flowering plants, grasses, sedges and mosses. Two miles beyond the north point and seemingly an extension of it, is a small low boulder island about one mile in circumference.

Dr. Bell on  
subsidence of  
sea level.

On the northern end of Solomon's Temple great quantities of driftwood are heaped up from ten to twenty and occasionally thirty feet above ordinary high-water mark; on the shores of all the other islands similar piles of wood are found, most abundantly on their north sides; that on the higher levels is generally greatly decayed and composed chiefly of cedar. The presence of these piles of driftwood at such high levels has been taken as evidence of a rapid elevation of the land around Hudson Bay. Dr. R. Bell places the rate of upheaval of the land or "subsidence of the water" at from five to ten feet a century. Other evidence than that of the driftwood is required to sustain such a theory, as its presence at these high levels above ordinary tide may be accounted for in another manner than by a rapid elevation of the shores and islands. Owing to the shallow state of the water near the shores of the islands and mainland of James' Bay, the wind, when blowing on the land, has great effect in causing abnormal rises of tide by forcing the water from the deeper parts of the bay over the shallows; an instance in case was observed by the writer while anchored on the east side of Agoonski Island in a moderate gale from the north-west, August 8th, 1887. Here the ordinary rise of tide does not exceed five feet, yet after beaching his boat at 8 p.m., by midnight the water was twelve feet deep showing a rise of seven feet at least above the ordinary level. From this it is easy to believe that extraordinary gales in the late autumn at long intervals apart, would back the water into the bay to such an extent as to cause a rise of tide from ten to twenty feet above its ordinary level. These high tides, accompanied by great breakers, would necessarily throw the older and lighter wood, then on a high level, farther back, and pile newer wood in front and below it, thus forming a state of affairs as at present seen.

Other views.

Other facts tend to disprove a rapid elevation of land around James Bay, at least in its southern part. Capt. Coates, in his notes on the mouth of the Moose River, written one hundred and fifty years ago, describes it as it exists at the present time, with little or no change in the state of the channel or shoals; if a rise of five or ten feet a century

was occurring during this time, the mouth of the river would necessarily be greatly changed, and the shallow flats of Capt. Coates' time would be ten or fifteen feet above the sea. Another place where comparison between levels at different dates can be made is the isthmus connecting the peninsula at the end of the point dividing Hannah from Rupert Bay. At present it is a low muddy neck covered with willows nowhere five feet above high-water mark and distinct from the higher land on either side, which is covered with spruce and tamarac. Now if the change of level claimed were actually taking place, this peninsula two hundred years ago would have been an island with a considerable depth of water over the present isthmus, but on a map (*Partie de la Nouvelle France*, Hubert Jaillot, 1696) this very peninsula is marked, thus affording good evidence against a rapid change of level of this part of James' Bay.

Between Little Charleton and Solomon's Temple are seven or eight small low islands formed of sand and boulders and covered with low bushes on their higher interior parts; these islands are called the Tidlers.

The Westons are four low drift islands thirteen miles N.N.E. from Weston islands Solomon's Temple in lat.  $53^{\circ}$ . The largest is about seven miles long, and on its western end the Hudson Bay Company had a ship wrecked in 1724.

Thirty-six miles N.  $10^{\circ}$  W. from Solomon's Temple, in lat.  $53^{\circ} 04'$ , is South Twin Island. the south-east point of the South Twin Island. This island is pentagonal in shape, with its face to the southward; it is seven miles long from north to south, with an average breadth of five miles. Starting from the south-east point, the shore line for one mile and a half northward passes along the base of a steep cut bank of boulder clay, containing an admixture of sand, and varying in elevation from forty to sixty feet. From here the shore turns westward, passing around a bay, one mile and three-quarters wide by one mile and a half deep; the cut bank runs one mile farther inland; low mud flats, covered partly with small blackish ponds, occur between it and high water mark. Again approaching the shore on the north side of this bay the escarpment gradually changes to low rounded hills sloping inland, composed chiefly of boulders, with a shore line as far as the north point formed of numerous boulder points with low muddy bays between, covered with grasses.

Between the north and west points, four miles, is an escarpment, composed of boulder clay and gravel, forty feet high, running parallel to a shore, alternating between boulder points and sandy bays. From west to south-west point the shore line is low and of the same character as that above, with the ground rising slowly inland. Along the south

side, sand and clay greatly predominate; a cut bank one-quarter of a mile inland gradually rises to an elevation of forty feet near the south-east point, with a lower raised beach of ten feet in front, the latter composed of sand, the former of boulder clay.

The interior of the island rises gradually towards the centre, where it has an elevation of one hundred feet above the sea.

**Surface.**

Small lakes fill all the depressions on its surface. With the exception of some four or five stunted white spruce, less than ten feet high, no trees grow on the island, which is everywhere covered with mosses and arctic plants.

**Ice action.**

A fine example of the expansive power of ice may be seen half a mile inland from the south east point, where there is a small shallow lake, at present completely drained by a small stream, which has cut out a channel through the escarpment. This old basin is nearly round, with a diameter of five hundred yards, and had a depth of about six feet. Around the old shore line is a bank of boulders and clay, four feet high and eight feet wide at the base, overgrown with vegetation, and resembling the intrenchment of a fortified camp. This has evidently been pushed up by the total freezing of the lake and the expansion of the ice.

Scattered over the surface of the island are great quantities of small angular fragments of light yellowish fossiliferous Silurian limestone, the probable result of the breaking up of large boulders of the same.

**North Twin Island.**

Separated by a channel five miles wide, and lying four miles to the westward of this island, with its south-west point in lat.  $53^{\circ} 04'$  is the North Twin. Like the other island, it has an abrupt escarpment on the east side, with a low shore line on the west rising slowly inland. From the south-west point along the south side, the low shore is composed of sand and gravel, with a wide margin of swampy land extending inland to the slowly rising interior. Low cut banks occur near the coast at the south-east point, where two terraces of ten and thirty feet elevation are seen, the lower formed of sand and gravel, the upper of boulder clay and sand.

On the east side is a wide shallow bay, with low swampy land from a quarter to a half a mile inland to the base of a boulder clay escarpment fifty feet high. On the northern part of the east side a low terrace, fifty feet high, composed of sandy clay, with a few boulders, rises near high water mark, and extends inland on an average a half mile to a second terrace thirty feet higher, and of similar composition. On the north side the land adjoining the shore is made up of sandy dunes dotted with boulders, rising slowly inland, with numerous boulder points along shore. Along the west side the shore margin is low and swampy, with sand and gravel beaches between boulder points, the

latter becoming more numerous to the southward. The banks on this side are generally sloping, with a few cuttings of sandy clay full of small boulders.

Inland, the ground rises irregularly towards the centre, where it is lower than the South Twins. The surface is dotted with many small lakes, and covered with a low arctic vegetation.

From the north-east point a low narrow bar of boulders, partly bare at low water, runs out in a north-east direction several miles towards Spencer Island.

The rising and falling tide rushing over this bar forms a strong rapid with heavy breakers. Another reef extends from the south-east point, five miles in a S. by E. direction; a ship was wrecked on it in 1732. On the north point is the wreck of a large sloop belonging to the Hudson Bay Company, lost here in 1886, while under the charge of some Esquimaux engaged in killing white bears on the islands. In the Bay on the east side a small ship's boat, painted white, was found, which must have been lost from some vessel engaged in the whale fishery in the northern part of Hudson Bay, as no such boat has been lost by the Hudson Bay Company.

Walter Island lies ten miles N. 40 E. from the north end of the South Twin. It is nearly round, with a circumference of two miles, and rises with steep banks to an elevation of sixty feet at the highest point. It is almost wholly made up of boulders, which are everywhere tightly packed by ice on the sides and top of the Island. Walter Island

Between Walter Island and the South Twin, six miles from the latter is a small bare knob of Laurentian gneiss, called Emily Rock, rising in the middle fifteen feet above high water mark, with a circumference of fifty yards. The gneiss is dark flesh red in colour, and made up of dark red orthoclase, with some quartz and black hornblende. It contains lenticular masses of hornblende. Strike N. 30° W. Emily Rock.

Spencer Island is fourteen miles distant from the north end of the North Twin on a N. 50° E. course. This island is one mile and a half long by three-quarters of a mile broad, with a generally steep shore line covered with boulders. On the south side is a sandy bay showing three areas of ten, twenty and fifty feet elevation, the two lower having cut faces of sand and gravel, the highest being formed of small rounded boulders tightly packed together, the same extending over a greater part of the southern interior. On the east side is another sandy bay, with a raised beach of that material fifteen feet in elevation. In this bay twenty-eight empty oil casks were found, which were probably from the same wreck as the boat on the North Twin, the Hudson Bay Company's people knowing nothing about them. To the northward the island is lower and the boulders fewer, with more intermixed sand. Spencer Island.

On the west side a wall of boulders rises directly from the water to elevations varying from twenty to fifty feet. All these islands are frequently visited by polar bears, who land to rest after heavy gales, and feed on the arctic berries that grow in great profusion everywhere; Arctic foxes are also quite plentiful.

The other islands of this group were not examined, but it is inferred from information obtained from the Hudson Bay Company's officer, and Capt. Coat's notes, that they are of similar origin and composition to those above described.

Islands of the third group.

The islands of the third group in James' Bay lie along the east coast, and have been described by Dr. R. Bell in the report of Progress of the Geological Survey, 1877-78, as follows: "The majority of the islands are rather low, and composed of boulders and shingle with few or no trees, but the solid rock occurs upon a large proportion of them. No regularity can be detected in the general arrangement of these islands. They present a kind of labyrinth which it would be very difficult to map with accuracy and which is not unlike that of the Georgian Bay, Lake Huron, except that on the east coast of James Bay the water is shallower, and shews evidence of receding rapidly, and the islands are, as above stated, mostly covered by boulders and shingle."

Meteorological notes.

From the meteorological observations taken during the summers 1887 and 1888, detailed in Appendix No. the following summary is compiled:

Three daily readings with the minimum temperature, taken on fifty-eight days in 1887, while on James' Bay, give a mean temperature of 55 degrees.

Similar readings on fifty-one days in 1888 give a mean temperature of 53 degrees. In 1887, there was fog on twenty and rain on fifteen out of fifty-eight days.

In 1888, fog occurred on twenty-eight and rain on twenty-four out of fifty-one days.

Of one hundred and fifty-three observations on the direction of the wind taken in 1887, twelve were from the N., sixteen from N.-E., four from E., twenty-two from S.-E., seventeen from S., twenty-five from S.-W., twenty-one from W., and thirty-six from N.-W., the resultant direction being due west.

Mean temperatures at Moose Factory.

Two hundred and twenty similar observations in 1888, give a resultant direction of S. 87° W. Three daily readings of the thermometer at Moose Factory during the months of June, July, August and September give the following mean temperatures: 1878, 61.7°; 1879, 54.3°; 1880, 56.2°. These taken with the mean temperatures given above would give an average mean summer temperature of

55.5°. This would be slightly higher than an average for the entire bay, as the mean temperature of Moose Factory is higher than many other places. Dr. R. Bell, in report of Progress 1877-78, places the average temperature of the sea along the east coast at 51°. This is much higher than the temperature of the main body of water, as the water of the east coast is warmed by the rivers flowing into the bay on that side, and being very shallow has its temperature raised by the action of the sun's rays. The difference in the vegetation growing on the outer islands and in the same latitude on the main land shews that the temperature of the former is much lower than that of the latter and this is due to the lower temperature of the main body of water, which is so cold that an immersion of the limbs for a few minutes at any time produces a numbness in the parts of the body so covered.

#### *Big River.*

The harbour and mouth of the Big, Kitchisipis, or Mistisipi River Big River. has already been described as far as Fort George. At this point the north channel of the river is one mile wide, and for two miles above to the head of Fort George island, it is obstructed by one large and several small islands. For the next four miles the river has an average breadth of three-quarters of a mile, is quite deep and flows with an even current, of about three miles and a half an hour with falling water, the course being N. 50° E. Here a small rocky island and reef stretches across the stream, forming a small rapid. From this point the river bends to the eastward, and for thirty-three miles, in a straight line, flows with a general course of N. 85° W. Three miles above the rapid is the lower of four large islands, which lie on the south side of the main channel, and extend upward six miles and a half past the head of tide.

Two miles above the upper island the river contracts in width to one hundred yards, and passes over and between a rocky barrier, which causes a fall of ten feet in the form of a low chute with heavy rapids below. Immediately above the chute is a low rocky island half a mile long. From here for nineteen miles the river has an average breadth of eight hundred yards, and flows with an average current of three miles an hour in a deep channel. Beyond this distance is a sharp bend to the north-east for one and a half miles, around the base of a rocky hill, when the former course is again followed for several miles. At the bend, the river is only two hundred yards wide, and consequently has a very swift current, up which canoes require to be tracked. Two miles beyond the bend a portage route of over one hundred miles in length leaves the river on the north side. The river from a few miles

beyond is greatly obstructed by falls and heavy rapids, while passing through a deep narrow gorge, where the rocky banks are so steep that portages cannot be made, thus rendering its navigation with canoes impossible.

Few tributary streams enter the river below the portage. Among the larger is a small river from the north, flowing in behind the islands, about two miles above Fort George. The next is on the south side behind the lowest island at the head of tide. One mile and a half above the chute is a small river, thirty yards wide at its mouth, coming from the south and called the A-che-gi River. Three miles and a half, and seven miles above the last on the same side, are two large brooks named respectively A-na-mis-cat and Ni-min-se-tat Rivers. Four miles below the bend a small river twenty yards wide at its mouth, called the Ne-co-pa-stick, also flows in from the south; at the bend a large brook descends in a beautiful fall from the rocky hill to the eastward, while in the upper bend and at the portage two large brooks enter from the north. From its mouth to the portage the river flows in a valley cut out of stratified marine clays and sands of Post Tertiary age. The banks on the islands and shores near the mouth of the river are composed chiefly of bluish white clay overlaid by a thin deposit of yellow sand, showing cut faces on the islands and at intervals along the shore ranging from ten to thirty feet in elevation above the river. A few miles up the river the banks become higher with thicker deposits of sand on top. Just above the first rapid an exposure on the south bank gives thirty feet of clay and ten feet of sand.

Hay flats.

On the islands at the head of tide the banks rise fifty feet above the river. At this place, on the north shore, are extensive low flats covered with marsh hay. This is cut and transported to Fort George in large boats and used to feed the cattle kept there during the winter. Above the chute, the banks are often over sixty feet high, with forty feet of stiff blue clay at the bottom, overlaid with sandy clay and sand.

Fossils.

Everywhere the lower clay beds hold fossils, the following being the species found: *Tellina grænlandica*, Beck, *Saxicava rugosa*, L., *Mya arenaria*, L., *Mya truncata*, L., *Buccinum tenue*, Gray, and *Mytilus edulis*, L. The upper sandy clay and sand beds contain very few fossils, *Saxicava rugosa*, being only sparingly seen in them.

Boulder clay

At the bend below the portage, on the east side of the river, is a deposit of boulder-clay, cut by the river, and showing a face of over seventy-five feet in height. This was evidently deposited by the glacier behind, and protected by the steep gneiss-hills seen a short distance to the eastward; the boulder-clay forms a tail to those hills. The coun-

try on either side of the river, above its banks, is a slightly rolling plateau of sand and clay, rising slowly inland, and broken through by low, rounded knobs of gneiss. The greater part of this country has been <sup>Timber.</sup> burnt over, and in such places is covered with a small second growth of black and white spruce, aspen poplar and tamarac, with Banksian pine predominating on the sandy portions. None of these trees exceed fifteen inches in diameter three feet from the ground. On the unburnt portions and along the river valley the trees are larger, some being eighteen inches in diameter fifteen feet from the ground. Here are found white and black spruce, balsam and aspen poplar, small white birch, tamarac and a few balsam spruce.

On the lower stretches of the river occasional low exposures of gneiss <sup>Rock exposures along river.</sup> outcrop from beneath the clays. As the stream is ascended these rise higher and higher, until, upon the upper part, they form bold hills, rising at intervals above the sands and clays. The following are the different exposures noted while ascending the river: On the north shore, opposite Fort George, and below to the mouth of the river, are a number of rock exposures, consisting chiefly of pink and grey fine-grained orthoclase hornblende-gneiss, along with a coarse pink hornblende-gneiss holding large porphyritic crystals of bluish-white triclinic felspar. <sup>Gneiss.</sup> Everywhere throughout these exposures are enclosures of lenticular and partly rounded masses of fine-grained rock, composed chiefly of black hornblende, probably segregations from the main mass. Strike N. 80° W.

On the south shore, behind Fort George, near the head of the island, are finely-bedded bands of a dark fine-grained hornblende-gneiss, made up of black hornblende and buff-weathering felspar, with little or no quartz. Along with these are lighter bands, in which orthoclase predominates. Strike N. 85° W.

At the mouth of the south channel are exposures of a dark hornblende rock, netted by veins of lighter fine-grained gneiss, forming a breccia; also coarse, greyish-pink gneiss, made up chiefly of large, pale crystals of orthoclase and dark hornblende, with very small quantities of quartz. Strike N. 72° W.

At the island in the first small rapid the rock is light-grey and pink orthoclase hornblende-gneiss, containing lenticular masses of fine-grained hornblende-schist. Strike N. 68° W.

On the south shore, at the chute, is coarse grey hornblende-gneiss, with thin bands and fragments of hornblende-schist, followed by thick beds of massive hornblende-schist, interfoliated with thin bands of light orthoclase-gneiss; then grey and pink gneiss, with a dark-red variety, made up of flesh-red orthoclase, black hornblende and quartz. Strike N. 75° W.

On the north side the rock is a dark, granitic, orthoclase hornblende-gneiss, associated with thick masses of dark-green hornblende-rock, containing grains of magnetite; the source of the colors of iron-sand frequently seen along the river shore.

At the chute are two dark-green trap dykes, weathering reddish-brown, which run S.  $66^{\circ}$  W. and S.  $47^{\circ}$  W., being respectively four feet and nine inches wide. On the north side, one-quarter of a mile below the chute, is a similar dyke, eighteen feet wide, running S.  $75^{\circ}$  W.

Three-quarters of a mile above the chute is an exposure of hornblende schistose gneiss, composed of alternate laminae of blackish, green hornblende and yellow weathering, grey felspar with patches of reddish orthoclase. In some parts the rock is a dark, fine-grained, hornblende gneiss, with large porphyritic crystals of whitish felspar, the largest crystals being one and a-half inches long by one-half inch broad, with their longer axis always parallel to the plane of stratification. Strike S.  $75^{\circ}$  W.

Five miles beyond the last, on the south bank, is a fine-grained, bluish grey gneiss made up of dark hornblende and bluish felspar, with little or no quartz, containing enclosures of dark hornblende segregations. Strike S.  $60^{\circ}$  W.

One mile and a-quarter above the last there are exposures of fine-grained dark-grey hornblende gneiss, weathering greyish yellow, containing porphyritic crystals of white felspar, and traversed by veins of pink orthoclase also having hornblende segregations.

Three miles beyond was seen similar hornblende gneiss, with massive hornblende rocks like those at the chute, also light pink highly felspathic gneiss containing much less hornblende and more quartz than the darker grey rock. Strike N.  $85^{\circ}$  W.

One mile farther up is more of the dark grey hornblende gneiss and black massive hornblende rock.

Three miles and a-quarter beyond the last are exposures of the porphyritic gneiss. Strike E. by W.

At the small rapid on the bend below the portage is a coarse red and grey gneiss, composed chiefly of red and grey orthoclase, crystals of which are perfectly developed, along with slightly altered dark-green hornblende and some mica and quartz. Strike S.  $77^{\circ}$  W.

#### *Portage Route between Big and Bishop Roggan Rivers.*

Big River to  
Bishop Roggan  
River.

Leaving Big River at the portage, the route passes overland, on a general course of N.  $40^{\circ}$  E. by a number of portages connecting small lakes, draining into Big River through a large lake on a river which flows into James Bay a few miles north of the mouth of Big

River, and thence by two portages into a large lake on the Bishop Roggan River.

The following details show the difficulty of taking canoes over this route.

The first portage from Big River is three miles and four chains in length, and passes almost directly north, ending in a small lake one-quarter of a mile broad, joined to another small lake by a brook five chains long; the second lake is thirty chains across.

From it the next portage, of five chains, was made to another small lake, half a-mile wide, followed by a portage of sixty-seven chains ending at a similar lake half a mile long, succeeded by a portage of seventy chains, then a lake of fifteen chains, followed by a portage of forty-six chains, a lake of ten chains, and another portage of seventeen chains, to a slightly larger lake called Wa-we-cho-to-chis, where the Indians, while traversing the portages, stop to fish. This lake is two miles long from the upper end to its discharge, a small sluggish brook obstructed by beaver dams. The route follows the winding course of this stream for half a mile to a portage three miles long, ending at a small lake three-quarters of a mile broad, followed in succession by a portage of thirty chains, a lake of twenty chains, a portage of forty-one chains, a lake of forty chains, a portage of forty chains, a lake of one mile, a portage of fifteen chains, a lake of fifteen chains, and a portage of twenty chains, to the banks of a small river tributary to Big River. This stream was ascended one mile and a quarter past three small rapids to Lake A-wi-chi-na-wi-ga-chi, a large body of deep clear water well stocked with fish, an abundant supply of pickerel, pike, white fish, and suckers being taken in the net here. This lake has two bays extending from its outlet, the western bay is several miles long, the northern one was followed three miles to its head, where a sluggish stream fifteen feet wide was ascended one-quarter of a mile to a lake thirty-five chains wide, followed by five portages of thirteen, thirty-six, eight, fifty-five, and eighty chains long, connecting lake traverses respectively of twenty, twenty-five, and one hundred and twenty-five chains to Pi-a-go-chi River, at this point a shallow rapid stream one hundred feet wide. This river empties into James Bay near Wasticoon, a high rocky island about eight miles north of the mouth of Big River. From the portage a short rapid, full of large boulders was ascended for half a mile and Pi-a-go-chi Lake entered near its western end. This is a long, narrow lake surrounded by low rocky hills in many places rising abruptly two hundred feet from the water. The route follows its eastern bay four miles and a half, and leaves it by a portage on the north shore several miles from its eastern end. The portage is fifty-five chains long and passes over two rocky

Succession of  
portages.

ridges, ending in a small lake fifty chains across, followed by another portage of forty-three chains to a large irregular body of water called A-pi-cho-ti-ne-chits Lake, which is drained by Bishop Roggan River.

Character of  
country on  
route.

Between Big and Bishop Roggan rivers the country is made up of ridges of low rounded gneissic hills rising from fifty to two hundred feet above the general elevation of the land, which is estimated from an average of the barometer readings taken, to be six hundred and seventy-five feet above sea level. These hills are partly covered with boulder sands and clays, while the intervening valleys are filled with deep mossy swamps and small lakes.

Timber.

The greater part of this region has been burnt over by frequent fires, which have in many places left the higher parts totally devoid of vegetation. The trees remaining are second growth black spruce, tamarac and banksian pine, never exceeding fifteen inches in diameter three feet from the ground. On the lower swampy lands and around the margins of the small lakes, where the fires have not destroyed the older trees, a dense growth of small black spruce and tamarac prevails with an occasional balsam spruce. On the portage leading from Pi-a-go-chi Lake, a few balsam poplars, four inches in diameter, were seen along with small red cherry trees, this being the northern limit of the latter.

Except in the immediate vicinity of Big River no stratified superficial deposits occur on this portion of the route. The sands and clays seen were unstratified and mixed with boulders. On the higher ground sand predominates, owing probably to the greater part of the clay being washed out of the thin deposits there overlying the rock, and carried down into the lower valleys, where the clay is greatly in excess.

Rocks along  
route.

On the first portage from Big River are exposures of pink and grey coarse-grained hornblende orthoclase gneiss. Strike S. 60° W. Similar gneiss, highly contorted, is seen on the second portage. Coarse pink hornblende orthoclase granitic gneiss, containing angular fragments of dark, fine-grained hornblende schist was seen on the third portage. On the fifth portage similar gneiss occurs along with a pink micaceous variety. Strike E. and W. Highly contorted pink and grey hornblende and mica gneiss, having a general strike of S. 20° W., is exposed on the seventh portage. On the eighth and ninth portages the rock is more micaceous, with great numbers of barren quartz veins. On the latter portage, fifteen chains from the south end, is a dark green diorite dyke, weathering deep brown, with a fine-grained compact structure near its contact with the surrounding gneiss, but rather coarsely crystalline in the mass. This dyke is two hundred and thirty feet wide and runs N. 27° W.

Similar pink and grey hornblende mica gneisses were seen on all the portages to the fifteenth, where they occur associated with grey hornblende gneiss, holding porphyritic crystals of grey felspar, like that described on the Big River.

On the portage from Pi-a-go-chi Lake the rock is chiefly composed of a fine compact pink graphitic gneiss, made up of orthoclase and quartz, with very small quantities of mica and hornblende. The quartz and orthoclase are arranged in alternate laminae averaging one-eighth of an inch in thickness. Strike N. 77° W.

On the next portage are similar rocks along with coarse-grained pink micaceous gneiss. Strike S. 87° W.

*South Branch of the Bishop Roggan River.*

The name Bishop Roggan is a corruption of the Indian word pi-chip-oui-an, meaning fishing weir, from the immense willow weirs, with basket sluices, built across the stream by the Indians to catch fish descending the river.

Lake Ab-pi cho-ti-na-chits, as before stated, is a large irregular body of water, full of islands and indented with many deep bays, the shape and size of which can only be ascertained by surveys of each, taking more time than could be afforded on a hurried trip over so extensive an area of country. From the last portage the route passes northward one mile and a half down a narrow bay, to a long, low point, crossed by a portage of six chains in length. Thence an irregular course between islands is followed for four miles in a general N.E. course to the outlet, where the river, fifty yards wide, is descended three-quarters of a mile, past a small rapid to Lake Ko-tan-i-wau-an. This is another large lake covered with islands, the river flowing out of its north west end. Its south-eastern shore was followed, two miles and three-quarters to the mouth of a small branch stream. The country around these lakes is comparatively flat, with low rounded gneiss hills, rising at intervals from fifty to one hundred feet above the swampy low lands.

Description of  
route by south  
branch.

The route passes up the small branch on a directly east course for three miles and a quarter to a fall eight feet high, where the river is ten yards wide. Between the fall and the lake below, the river, with an average breadth of two hundred yards, flows between low rocky hills, which rise from the water's edge, forming an irregular shore line. Above the fall, the valley is wider, the river or lake, here averaging four hundred yards in width, is broken into a great number of small bays, by low narrow points extending out from the base of the rocky hills.

Portages.

To Pi-mi-ga-ma-chi Lake, four miles, the course is N. 70 W. This lake is several miles long from east to west, by about one mile broad; the route leaves it by the river that flows in on its north side, two miles and three-quarters from the outlet, and passes N. W. up that stream three miles to Lake A-wah-a-gets, with two portages past small rapids. From here the river turns S. 78 E., for seventeen miles, to Lake O-ho-mi-chi-chits, passing through seven narrow lakes connected by small rapids, where the stream is too small and shallow to ascend with canoes. Lake O-ho-mi-chi-chits is cut into three bays by long rocky points; it was traversed in a general S. 50° E. course to its head, the distance being six miles. Here a low rocky portage, thirty-four chains long, crosses the height of land between Bishop Roggan and A-pa-chi-chits river, a tributary of Big River; the portage ends at a small lake forty-three chains long. Descending the small brook flowing out of it, for ten chains, another small lake, thirty chains long, is passed through to a portage of twenty chains, over a steep hill to a lake of one hundred chains. The discharge is full of small rapids and causes a portage of half a mile, at the end of which is a navigable stretch of forty chains, followed by more rapids and a portage of eighty-six chains, after which the crooked course of the river is followed for eighty-eight chains to Lake Ka-bun-ski-was, which is six miles long, with numerous deep lateral bays. From the outlet of this lake the river is again followed two miles and three-quarters, through two small lakes with rapids between, to a portage of one hundred and thirty-two chains, passing south over a ridge of hills and ending at Sha-tach-i-wan Lake, through which the Big River flows. The A-pa-chi-chits River, below the portage, passes through a deep gorge, and enters this lake one mile and a half east of the portage, by a fall sixty feet high.

Character of country.

As the small branch stream from Lake Ko-tan-i-wan-an is ascended, the country becomes more and more rocky and rough, with long ridges of hills running parallel to the river valley, massed closely together, having but small areas of swampy valley land between. The elevation of the hills above the surrounding water level varies from fifty to one hundred and fifty feet, as far as the water shed. Beyond this the hills rise from one hundred to two hundred and fifty feet above the general level to Lake Sha-tach-i-wan. These hills have for the greater part been recently burnt over, so that nearly everywhere they present the scorched bare surface of the rock, partly covered with boulders, and scattered over with the standing blackened trunks of trees; the whole having a very desolate, barren look. On the unburnt portions small black spruce and tamarac predominate along the lower parts of the branch, but are in a great measure replaced by small banksian pine as Big River is approached. A few small white birch and aspen pop-

Timber.

lar grow along the hillsides near Lake Ka-tan-i-wan-an. The northern limit of the mountain ash (*Pyrus Americana*, DC.) was reached on Lake Pi-mi-ga-ma-chi, where a few low trees were observed. Everywhere in the depressions and valleys between the hills are deposits of boulder Boulders. clay, while scattered over the hills are immense quantities of boulders. A curious ridge of packed boulders, forty feet wide, and rising from five to fifteen feet above the general level, was seen running N. 10° E. from the inlet of Lake Pi-mi-ga-ma-chi over a low hill. It was traced for a distance of one mile to the edge of a deep swamp and apparently continued over the hill on the other side of the swamp.

The rock throughout is chiefly a red syenitic gneiss, often granitic in Rocks. structure, composed of red orthoclase, black hornblende, with little or no quartz.

At the fall above Lake Kotaniwanan the rock is a coarse pink hornblende orthoclase gneiss. Strike S. 77° W.

On an island in Lake Pimigamachi similar gneiss is exposed. Strike S 85° W. At the head in Lake Awahagats is more of the same rock without signs of stratification. On the portages past the rapids of the seventeen mile stretch to Lake Ohomachichits are exposures of pink hornblende orthoclase granitic gneiss. On the height of land portage the rock is coarse and fine grained pink hornblende gneiss. Strike S 88° W. At the second rapid below Kabunskiwas Lake are exposures of fine grained, highly contorted, micaceous orthoclase gneiss, showing pink and grey bands. On the summit of the portage to Shatachiwan Lake is a coarse-grained grey hornblende gneiss, containing porphyritic crystals of pale pink orthoclase.

#### *Upper Big River.*

Shatachiwan Lake is about seven miles long from east to west, with Route by the  
Upper Big  
River. a wide bay on the south side, out of which the Big River flows. For three miles from its eastern limit, the lake has been filled up by alluvium brought down by the river. This forms a delta of low islands covered with willows and separated from each other by narrow shallow channels.

In ascending the river from the lake its courses are: First, N. 60° E. for ten miles and a half, then N. 30° E. for two miles and one quarter, bending then to north for two miles, then N. 30° W. for three miles and a quarter, followed by N. 60° E. for four miles and S. 60° E. for three miles and three-quarters; lastly N. 65° E. for fourteen miles, where the route leaves the river by a small tributary called Pa-ti-ta-wa-gau River which flows in from the north.

For the first few miles above the delta the river flows with an even

current of about three miles per hour, between low, muddy banks, and has an average breadth of four hundred yards.

Two miles above the lake is a low island three-quarters of a mile long, with two smaller islands at its head. One mile beyond the island is a rapid one-quarter of a mile long with three feet rise. Above the rapid is a broad quiet stretch of nearly a mile, to a chute of ten feet, where the river falls over horizontal ledges of gneiss. The portage past this chute is eleven chains long. Seventy chains above is another chute of fifteen feet, passed by a portage of thirteen chains, and followed by quiet water for three miles and a half to a small rapid one quarter of a mile long, with more good water for two miles to a chute and rapid of forty feet. Between the last two chutes the river is obstructed by a number of small islands, fourteen in all. The portage past the forty-foot chute is half a mile long and is followed thirty chains above by another of fifteen chains past a fall of thirty feet. From here around the western bend, a distance of four miles and a half, the river is easily navigable with canoes past four large islands to a fall of thirty feet. Beyond this no obstacle occurs in the navigation of the river to the Patitawagau branch, up which the route passes. According to the statement of the guide the river, for a great distance beyond, is free from rapids and is quite easily navigable with canoes. About the last portage the stream averages two hundred yards in width, is comparatively shallow, and flows with a uniform current of between two and three miles per hour.

Falls and  
portages.

Tributaries of  
Upper Big  
River.

The first large tributary of Big River above Shatchewan Lake is called the Man-i-wan River and flows in from the north one mile and three-quarters above the fifteen feet chute. It is fifty yards wide at its mouth. Two miles and a quarter above, another large branch called Wa-cha-ti-mi River enters from the eastward, and is seventy yards wide at its junction with the main stream. Several small brooks fall into the river on both sides between this point and the big bend to the east, where two small rivers, whose mouths are one mile apart, enter from the north; these are named Mes-ta-oh River and Fishing River, the former is ten and the latter twenty yards wide. Another northern branch called the Ka-o-chi-so-wi sto River flows in immediately above the thirty feet chute, this stream is forty yards wide at its mouth. Only one other river, the Ka-wa-chi-wan entered between the last and the Patitawagan. The Kawachiwan flows out of a large lake on the high lands a short distance to the north of Big River and enters the valley by a beautiful fall of fifty feet.

As has been already stated, in passing from the northward to Shatachewan Lake, a sudden fall of over one hundred feet takes place in the general surface of the country. The higher plateau with its rolling

hills trends from the lake towards the north-east, and forms a distinct wall to the wide, flat plains through which the Big River flows.

Above the lake the river has cut out a shallow channel through deposits of non-fossiliferous stratified sands and clays, which on the lower reaches sometimes show cut faces of pure sand, occasionally overlying thin deposits of clay without boulders. Beyond the river valley the country is almost flat, with a few isolated ridges of gneiss rising from fifty to one hundred and fifty feet above the general surface. At the chutes and rapids these ridges cross the river. Stratified sand  
clays.

Above the upper chute the river approaches the high rocky land on the north, along the base of which are two terraces rising twenty and fifty feet above the present river level. Where examined they were found to present faces of stratified sand and fine gravel in many places overlying beds of fine blue clay. Above Kawachiwan River the hills also approach the river from the south, and along their base similar terraces rise ten, thirty and fifty feet above the river. Terraces.

The deposits in which these terraces have been cut are of fluvial or lacustrine origin. The river at the close of the glacial period was probably dammed in various places with drift barriers which caused it to cover the wide flat valley between the higher rocky hills with lake areas in which the clays, sands and gravels were deposited.

Where the terraces are close to the higher rocky hills, their surface and faces are strewn with boulders evidently rolled down from the higher elevations where they thickly cover the rocky surface; at points distant from the hills no boulders were observed on the terraces.

Along the river valley and on the islands, the trees are chiefly black and white spruce and tamarac, with some balsam poplar and balsam spruce. Many of these trees are eighteen inches in diameter, three feet from the ground. On the higher parts out of the river valley the trees are smaller, and are black spruce, banksian pine and tamarac. Timber.

The country composing the river plain is generally swampy. Just above the delta of Shatachewan Lake, on the south bank, is an exposure of coarse, grey, garnetiferous hornblende-gneiss, penetrated by numerous veins of pure red orthoclase. Strike N. 47° E.

At the first rapid above, the rock is a fine-grained grey mica-gneiss, followed by coarse-grained, grey hornblende-gneiss, holding porphyritic crystals of pale-pink orthoclase. Rocks.

At the ten-foot chute is a very coarse-grained grey gneiss, with well developed crystals of hornblende and orthoclase; along with it are small bands of fine-grained, pink, orthoclase-hornblende-gneiss, penetrated by many large veins of quartz and orthoclase, holding red garnet and black tourmaline crystals. The bedding of these rocks is

apparently horizontal. On the portage past the fifteen-foot chute the same rocks were seen dipping S.  $< 70^\circ$ .

At the rapids, three miles and three-quarters above, the rock is a fine-grained, grey hornblende-gneiss. Strike N.  $40^\circ$  W.

On the portage at the forty-foot chute are exposures of highly contorted, pink and grey, fine-grained hornblende-gneiss.

At the twenty-foot chute similar rocks were seen.

A micaceous hornblendic-gneiss, greyish-green in color, along with pink bands of the same, holding segregations of hornblende and cut by veins of pink orthoclase, occur at the thirty-foot chute. Beyond this, to Patitawagan River, no rock exposures are seen in the river valley.

*Portage Route from Big River to the South Branch of Great Whale River.*

Description of route.

Leaving the Big River by the Patitawagan River, the route passes up that crooked stream in a general north-west course for fifty chains to a portage of half a-mile over a sandy plateau, sixty feet above the river valley, past a shallow rapid. Thence the winding course of the river is again followed two miles and three-quarter, past small rapids, causing portages of four, thirty-six and twenty-seven chains, to a small lake called Ka-wa-cha-ga-mi-chits. The river winds through a valley half a mile broad, cut out of stratified sands, on the lower parts showing cut faces sixty feet high. As the rate of fall of the river is heavy, these consequently become lower as the stream is ascended, until, near the lake, they have disappeared, giving place to rocky hills, partly covered with a thin layer of boulder-clay.

Lake Kawachagamichits is two miles long, with an average breadth of half a-mile. It is separated from another small lake forty-five chains long by a portage of six chains, with a similar portage at its upper end to A-chē-wa-ma-ni-ka Lake, out of which the Patitawagan River rises. This last lake is two miles and a-half long, with an average breadth of one-quarter of a mile, and is very deep. The waters of these lakes and the following ones are remarkably clear and cold, and are plentifully stocked with large white fish, lake and river trout, pickerel and suckers. The next portage is fifteen chains long, and forms the watershed between Big River and the north branch of Bishop Roggan River. The course, in a straight line from the mouth of the Patitawagan River to the height of land, is N.  $50^\circ$  W.

Character of country.

The country about the lakes is very similar to that described on the south branch of the Bishop Roggan River; it is made up of low rounded ridges of hills, rising from fifty to two hundred feet above the water level, with the intervening valleys covered with small lakes or mossy swamps. Everywhere are immense quantities of rounded

gneiss boulders; these constitute about three-quarters of the loose material which covers the rocky surface of the hills, and fills the valleys.

From the height of land portage, Ni-a-wa-ta-wi-ga-chi Lake is followed seven miles and a quarter in a N. W. direction. This is a long narrow lake, with numerous small natural bays, branching at its western end into three deep bays. The route passes to the discharge at the head of the western bay.

Here a portage of thirteen chains passes a rapid on the small <sup>Portages.</sup> stream flowing out. Following down this stream three miles and three-quarters on the same course, crossing portages of five, seventeen and fifteen chains in length, past small rapids, Lake Ka hi-pi-ka-mow is reached. The eastern bay of this lake is followed for three miles, when the route turns northward up a narrow passage into a large bay, running north and south, and follows the north arm of this bay to its head, three miles from the main lake. Here a portage of five chains crosses to a small narrow lake, ten feet higher than the last, into which it discharges by a small stream. The route follows up this lake one quarter of a mile to a portage of eight chains, that ends in a small lake fifteen chains across. A portage of twenty-two chains leads thence to a larger lake one mile long, separated from another lake, one mile and a half long, by a portage of six chains. The portage out of the upper end of the last lake is on the height of land between Bishop Roggan and the south branch of Great Whale River. The country passed through, drained by Bishop Roggan River, is very similar to that previously described, with lower hills averaging from twenty-five to fifty feet above the level of the water, and never exceeding one hundred feet.

Much more swampy land lies about the various lakes. Everywhere the hills and valleys are covered with innumerable boulders often perched upon the very summit of the hills.

The trees continue to decrease in size; they average six inches and <sup>Timber.</sup> are never over twelve inches in diameter three feet from the ground. They are black spruce and tamarac, with fewer banksian pine; a considerable number of very small white birch were seen on the rocky hill sides about the lakes.

The rock at all the exposures examined on the portages and along <sup>Granite gneiss.</sup> the lake shores was everywhere found to be a moderately coarse-grained, pink, hornblende orthoclase gneiss: often granitic in structure, and frequently holding segregations of hornblende. The general strike, when seen, was about N. 60° W.

*Upper Great Whale River.*Description of  
route followed.

Great Whale River heads in a small lake, half a mile long, separated by a short portage of ten yards from Lake Ka-hi-pi-ta-ni-cow, a large body of water covered with small rocky islands, and nearly divided by a long point running out from the east side. The route passes through this lake around the point, a distance of three miles and a half to a portage of twenty-five chains, which connects it with Ma-squa-chi-wi Lake. This lake is divided by ridges of hills forming long points into three bays; these lie in troughs parallel to the strike of the rocks, here N. 50° W.

The route crosses the two western bays, and passes up the eastern one to its head, the distance being four miles and one-half. From here three portages of six, twenty-three and thirty-four chains, with connecting small lakes of fifty-eight and twenty-five chains were passed over to Mis-him-in-i-we-tau Lake. The descent on the last portage is one hundred and sixty feet.

This lake, like Misquachiwi, is divided by rocky ridges into several long narrow bays parallel to the strike of the rock.

The portage reaches it at the upper end of the north-east bay, near the inlet of the river, which falls into it through a deep rocky gorge. This bay, with an average breadth of half a mile, runs ten miles in a direct N. W. course, to a long point separating it from a similar bay on the north side. The hills on either side of the bay rise on an average three hundred feet above the water, with numerous peaks one hundred feet higher; those on the south side slope gradually to the water's edge, while on the north they rise abruptly in rocky cliffs directly from the lake.

Beyond the point the route runs more to the northward, and in two miles and a half crosses the second bay, passing along the shore of a large island, through a narrows, into another deep bay running towards the north-west. Following along the east side of this, one mile and three-quarters, the outlet was reached, and a rapid of fifteen chain descended into Ka-bi-ma-chi-wan Lake, entering it about the middle, one mile and three-quarters from its outlet.

Leaving the north-east bay of Mishiminiwetau Lake the hills become lower, with the ridges farther apart, and consequently the amount of low swampy land is much greater.

A rapid, ten chains long, with a fall of four feet, connects Kabimachiwan with Ka-chin-wa-ste-gin Lake, the river here is thirty yards wide. The north shore of the latter lake was followed three miles and a quarter to a portage, which leaves the lake from the head of a small bay near its north-west end, where the river flows out. This portage

is fifteen chains long, and crosses a low rocky ridge, ending in a small lake half a mile across to the outlet, where the river is again obstructed by heavy rapids, causing a portage of fifteen chains, to another lake partly covered with many islands.

Here an east course was followed for one mile and a quarter past a long narrow point projecting from its west side, then turning north two miles and a half, the outlet was reached, and the river, here forty yards wide, descended one mile and three quarters past small rapids to Pos-pis-ka-ga-mi Lake. One mile to the east of the entrance of the river another large stream called Ka-mo-chi-mo-pas-ti-quo River enters. This lake is four miles long from south-east to north-west, with an average breadth of a mile and a half. Its western shore was followed three miles to the river flowing out.

Beyond this the river passes through no more lakes and flows in a distinct valley.

The country surrounding the last lakes is nearly flat and very <sup>Timber.</sup> swampy, with a few low ridges of hills, littered with large quantities of rounded boulders. The trees continue to grow smaller, and are almost wholly confined to the valleys and low lands. Black spruce predominates with some tamarac, and a very few banksian pine.

On the portage to Masquachiwi Lake the rock is a coarse-grained pink hornblende gneiss. Strike N.  $10^{\circ}$  W. A fine grained compact pink hornblende mica gneiss, holding dark hornblendic segregations, striking N.  $70^{\circ}$  W., was seen on the portage to Lake Mishiminiwaten. <sup>Rocks.</sup> On the large island in that lake a fine-grained reddish grey mica gneiss occurs strike N.  $75^{\circ}$  W. Exposures of red and grey fine grained mica gneiss are to be seen at the rapid above Kachinwastegin Lake strike N.  $82^{\circ}$  W. On the portage below the same lake, the rock is a grey fine-grained, mica hornblende gneiss, cut by large veins of light pink orthoclase. Strike N.  $75^{\circ}$  W.

At a small island in Pospiskagami Lake is a dark red fine grained mica gneiss made up largely of flesh red orthoclase, strike N.  $72^{\circ}$  W.

#### *Lower Great Whale River.*

The river where it leaves Lake Pospiskagami is one hundred and fifty yards wide, is quite shallow, and for two miles and a half flows <sup>Character of river.</sup> with a swift current between low rocky banks, cut by numerous small bays. Here a rapid of eight feet is passed by a portage of fifteen chains; followed by another stretch of swift water for two miles and a half to a fall of eight feet. Below this, the river is three hundred yards wide and very deep, passing N.W. three miles through a straight gorge with rocky hills on either side, which rise from two to three hundred

feet above the water; these hills are bare on top, with small black spruce trees growing along their bases on the river bank, and in the small valleys between the hills. The rock surface on the hills is covered with blackish lichens (*tripe de roche*), which gives it a dark purple color when seen from a distance. Below this gorge are two falls fifteen and eight feet, half a mile apart; these are passed by portages of twenty-one and two chains respectively. Below these a similar quiet stretch of three miles is passed, when the river suddenly turns round the foot of a hill three hundred feet high, which stands directly in the course. In passing this hill the river contracts and is broken by a fall of thirty feet. The portage here is twenty-two chains long, and passes up a valley between the hill and the highland on the west side.

Below this fall the river turns N. 60° W., and flows three miles and three-quarters past a small branch from the west, called *Ka-min-a-squa-ga-ma-stick* River. At the end of this course another small branch from the west also enters. The Indians, when coming from inland by the river, to avoid the rough part immediately below, ascend this branch some distance, then pass by a portage route through several small lakes, and reach the river again seven miles below. For four miles and three-quarters from the last course the river runs north in a narrow valley between rocky hills, rising abruptly from 200 to Seven portages. 400 feet above the water. In this distance no fewer than seven portages, of fifteen, four, fifty-five, thirty, fifteen, seven and fifteen chains long, are made past falls and rapids of six, five, sixty, thirty, eight, thirty-five and twenty feet fall respectively.

Immediately below these the river again turns north-west, and is a continuous, shallow rapid for two miles and a-half. This is very difficult to descend in canoes, on account of the great number of large boulders which block the channel.

At the foot of the rapid is the lower end of the Indian canoe route. From here the river, with an average breadth of 100 yards, flows along at the rate of four miles per hour, between slightly lower hills, for five miles on the same course, to its junction with the main or north branch, which is 400 yards wide, and was seen flowing directly from the west from the base of a range of hills upwards of ten miles distant. Below the forks the river is over 400 yards wide, and flows to the north for two miles and a-quarter. Here the stream contracts to about fifty yards in width, and passes down through a cañon, whose walls rise perpendicularly 400 feet above the water. The total descent in two miles is 230 feet. At the head of the cañon are two falls of thirty and sixty feet, with a third one of fifty feet one half mile below. The rest of the descent is gradual, and consequently the pent up water

rushes through the gorge in a mass of foam, with huge waves rising thirty and forty feet high, the whole forming a wonderfully wild and grand scene.

The portage past this obstruction passes over the hills on the west side, and is rather more than two miles long. Leaving this gorge, the valley gradually widens out to half a-mile, and the river again flows towards the north-west, with an even current of three miles an hour, for eight miles and a-half, where, again narrowing to 100 yards, it takes a short bend to the east, and again to the north for three-quarters of a mile, where it breaks through a range of hills rising 500 feet above it, and falls sixty-five feet over a sharp ledge. Turning westward, and again widening out to one-third of a mile, the river flows at the rate of four miles per hour in an uninterrupted course, ten miles, to its mouth.

Portage two miles.

Below the forks the hills along the river rise from three to five hundred feet in elevation above its surface. They reach their highest altitude near the last fall and then gradually decrease towards the coast where they average about three hundred feet. No stratified drift deposits were seen along the sides of the river valley until the Indian portage route was reached. From here, stratified sands and gravels of fluvial origin were observed on the hill sides up to elevations of one hundred feet; above this the small amount of loose material is wholly boulder till. The erratic boulders are not scattered so thickly over the bare hills as they are farther inland. From the forks along the valley to the cañon, stratified sand and gravel are deposited along the hill sides up to an elevation of one hundred feet where a marked terrace is observable.

Below the cañon the river has cut banks varying from twenty to fifty feet high. The lower parts of these are composed of about thirty feet of light blue clay overlaid with ten feet of sand, which in turn is in places capped with a thin deposit of gravel. No fossils were found in these beds, although they are probably of marine estuarine origin like those nearer the mouth of the river.

From the lower fall to the mouth of the river the channel is cut out of deposits of clay, capped with sand, which form a terrace of seventy-five feet elevation in the valley between the rocky hills. The clay beds are full of Post Tertiary marine fossil shells: the sand above holds no fossils. Between the rocky hills and the sea shore on the north side of the river is a sandy plain two miles broad and one hundred feet high at the base of the hills, it slopes away to the shore, is covered only with coarse grass and is wholly devoid of trees.

On the south side a like plain fills a broad valley between the inland hills and those forming the south point of the river. The head of tide

is eight miles above the mouth, the river is here obstructed by three small boulder islands, with two similar islands below.

The vegetation on the lower part of the river is almost arctic in character, the only trees are stunted black spruce and a few tamaracks, which grow on the terraces and in valleys and crevices between the rocky hills.

Snow and ice.

At the end of July many patches of snow and ice were seen on the north slope of the gorges in the hills facing the river. At the first portage below Pospiskagami Lake the junction between the coarse-grained pink hornblende gneiss and a band of dark-green chloritic and altered hornblende rocks of Huronian age was seen. Near the line of contact the Laurentian gneiss is highly twisted and shattered, so that fragments are seen embedded in the massive schistose, chloritic rock, lying at right angles to the line of contact. Offshoots from the green rock cut the gneiss and fill small cracks in it. The whole has the appearance of an igneous mass, which has broken through the gneiss cracking and twisting it along the contact, and injecting itself into all the small open fractures in the same.

Contact of  
Huronian and  
Laurentian  
rocks.

At the lower end of the portage are green chloritic or altered hornblende rocks, highly schistose in structure, with light quartz veins generally running parallel to the bedding, but seen in places to cut from one plane to another. Strike N. 10° W.

The next exposure on the river is three-quarters of a mile below, where the rock is composed of dark green altered hornblende, and a dark triclinic felspar, the whole resembling an altered diorite. Thirty chains farther down stream exposures of grey Laurentian hornblende orthoclase gneiss occur. A quarter of a mile beyond is a pink hornblende orthoclase gneiss. A fine grained pink syenitic gneiss, enclosing lenticular masses of dark hornblende was seen three-quarters of a mile below the last exposure. Strike N. 20° W.

At the portage, past the eight feet fall, the rock is a greyish-pink hornblende orthoclase gneiss, highly contorted, with lenticular enclosures of hornblende.

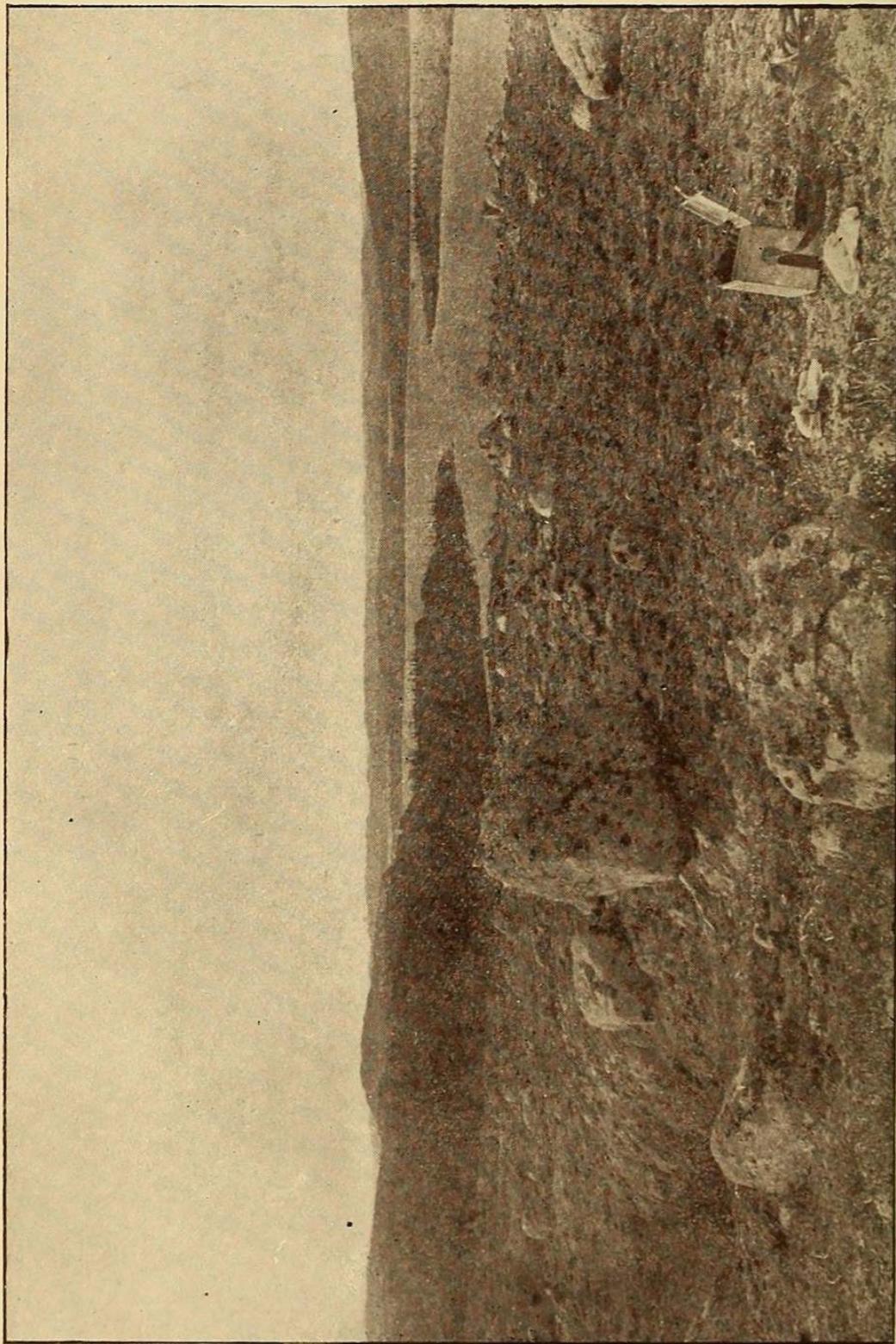
For one mile along the upper part of the south side of the straight stretch below the fall mentioned above, the rock is composed of grey felspar, and light green felspar. This rock breaks into slabs about two feet thick, and dips S. 5° E. < 65°.

Enclosures in  
the gneiss.

Half a mile below the last exposures is a highly contorted pink hornblende orthoclase gneiss, containing large quantities of fragmented hornblende schist bands enclosed. Strike S. 35° W.

At the fifteen feet chute the rock is similar to the last, and from here to the mouth of the river all the exposures examined were made up of red and grey hornblende orthoclase gneiss, the red predominating.





A. P. LOW, PHOTO., 1888.

Clearwater River, N. Lat.  $50^{\circ} 12'$ , W. Long.  $76^{\circ} 05'$ , looking down stream, 40 miles inland from Richmond Gulf.

THE DOMINION ILLUSTRATED PRINT, MONTREAL.

Almost everywhere are enclosures of a greater or less number of lenticular masses of hornblende schist, with bands of the same sometimes highly shattered. The strike ranges from S. 30° W. to S. 80° W.

*Route from Richmond Gulf to Clearwater Lake.*

In latitude 56° 12' 30" a break in the sloping rocks of the Manitounuck group, described by Dr. R. Bell in Report of Progress, 1877-78, affords an outlet to a large salt water lake. This outlet, called Richmond or Hazard Gulf, is two miles long, and not over four hundred yards wide in its most contracted part. With the change of tide the water rushes in and out through it with great velocity, forming large whirlpools, a source of great danger in the navigation of the channel with small craft. The sides of the channel are very steep and rise from the seashore to over one thousand feet on the inner side.

The Gulf Lake or Artiwinipec, often erroneously called Richmond Gulf Lake, has the form of an isosceles triangle. The base on the south is nineteen miles long, while the perpendicular from it to the northern apex is twenty-three miles. It is surrounded by high hills. On the west, sharp cliffs, formed by the broken faces of the Manitou-neck rocks, which dip towards the sea, rise in places twelve hundred feet above the water. The south and east sides are bounded by lower rounded hills of Laurentian and Huronian rocks in part flanked by beds of limestone, sandstone and trap. These hills vary from four to eight hundred feet in elevation. The surface of the lake is broken by a number of high rocky islands, three of which are of considerable extent. Small black spruce trees grow along the base of the hills, in the low valleys between them and on many of the islands. Everywhere else the rocky surface is partly covered only with a low arctic flora.

On the higher parts of the hills numerous patches of snow were seen at the end of August.

The water of the lake is deep and clear, and probably abounds with fish, judging from the presence of large numbers of seals and gulls which feed upon them. In a small lake, which lies in a depression of the hills between the Gulf Lake and the coast and empties into the lake, the Esquimaux catch large quantities of a small species of salmon which never exceed ten pounds in weight. The rise of tide in the east bay is about twenty inches.

At the head of the east bay, directly opposite to the outlet of the lake, is a small stream called Wi-ach-ti-wan River.

Two miles from its mouth, on the north side of the bay, is the entrance of the Clearwater River, which descends with many rapids

Route to  
Clearwater  
Lake.

Portages and  
fall.

and falls, through a gorge in the Laurentian Hills. Owing to the difficulty in passing these, the route to Clearwater Lake ascends the smaller stream a short distance and then passes overland to that river, reaching it a point beyond the highly obstructed part. The Wiachtiwan River, one mile from its mouth, has a sheer fall of three hundred and fifteen feet. To pass this, a portage two miles and twenty-five chains long is made over the hill on the north side. The highest point on the portage is five hundred feet above the sea level. One mile beyond, a fall of fifty-five feet causes a second portage of seventeen chains.

Above this the river averages forty yards in breadth, and winds through a valley half a mile wide between rounded gneiss hills which rise from three to five hundred above it.

The river was followed eleven miles and a-half in a general course of S. 80° E. Here a portage of one mile, fifteen chains, follows a small tributary stream to the north up from the valley to a small lake on the table-land above. The difference in elevation between the ends of the portage is three hundred and fifty feet.

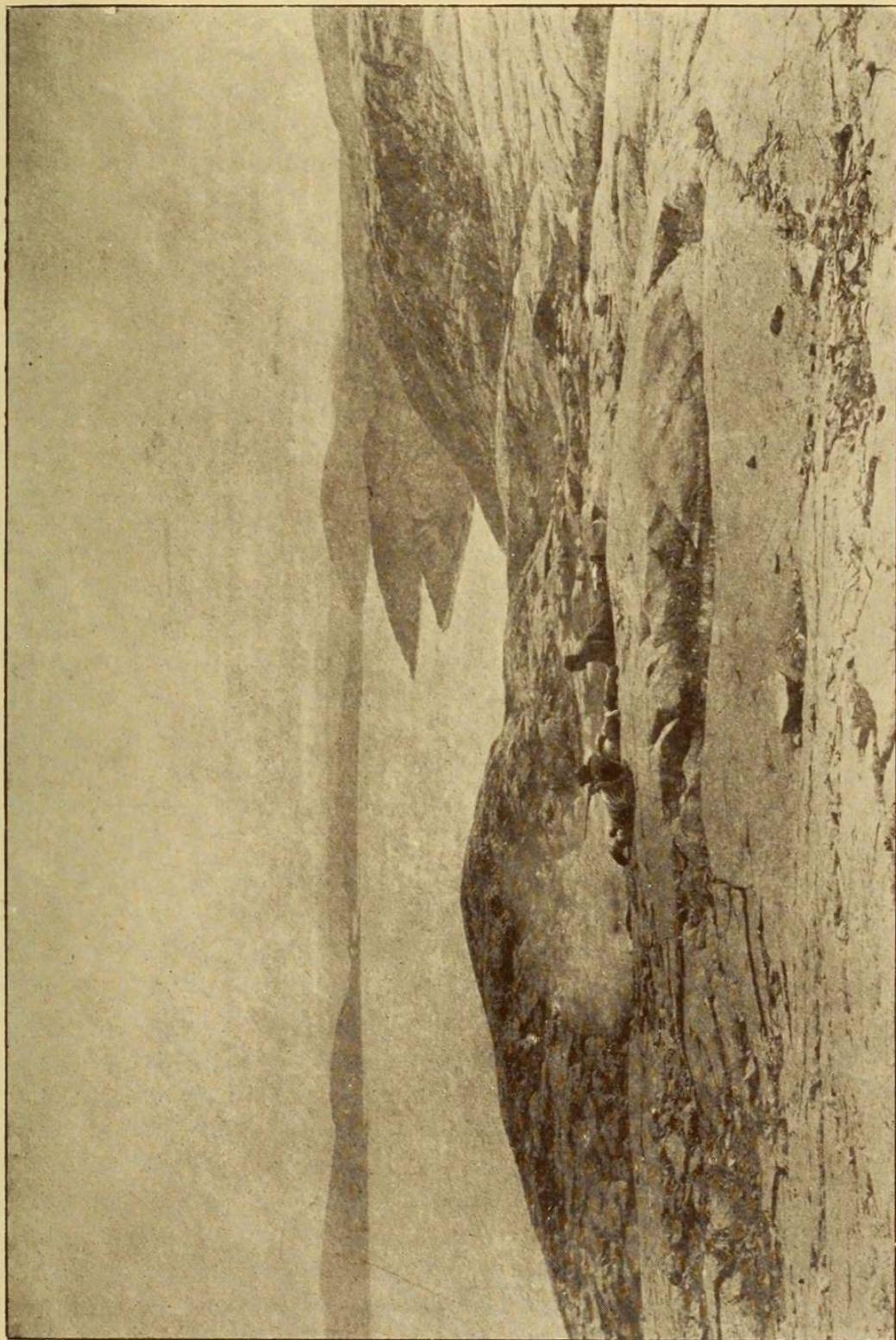
This stream flows from the east two miles and three-quarters through five small lakes connected by five small rapids, past which small portages are made, to a height of land portage of forty-eight chains that ends in a lake drained by another tributary flowing into the Wiachtiwan River farther to the eastward.

The route passes down this lake two miles to its outlet, where a portage of eight chains is made past a small rapid to another lake one mile and a-half long, followed by a portage of thirty-five chains to a large lake seven miles long, the course from the height of land portage being directly east.

Four portages of four, ten, seventeen and twenty-three chains connecting lake traverses of twenty-eight, eighty and eighty chains lead, in a north direction, to a large lake which drains in the Clearwater River. This lake is five miles and a-half long from east to west, with an average breadth of half a mile; it is broken by a number of deep, narrow bays at either end, parallel to the general course of the lake.

The route crosses from the head of the most northward bay at the east end by a portage of twenty-eight chains over a low hill into the small stream which empties it. This stream was descended in a north-west direction two miles and a-half, and there left on the north side by a portage of twenty-four chains, up a steep hill to a small lake half a mile long, from which a portage of five chains was made to Clearwater River.

A quarter of a mile up the river, an island one mile and a-half long divides it into two channels, the north channel was ascended past three



A. P. LOW, PHOTO., 1888.

THE DOMINION ILLUSTRATED PRINT, MONTREAL.

South shore of Richmond Gulf Lake, N. Lat.  $56^{\circ} 10'$ , W. Long.  $77^{\circ} 12'$ , looking East, from hill 450 feet above sea level.



rapids where demi-charges were made. Above the island the river flows through a narrow valley for two miles and three-quarters, past two heavy rapids where small portages are made in ascending. From here the river widens out to half a mile, for seven miles and a-half into what is called Na-twa-ca-mi Lake; at the head of the lake is a heavy rapid passed by a portage of thirteen chains; beyond the rapid the current is sluggish for two miles and a quarter to the forks, where the two outlets of Clearwater Lake join.

Both streams are here obstructed by rapids, and the route follows up the south or smaller one one mile and a-quarter, and then crosses a portage of twelve chains from a small bay into a larger stream above the rapid.

From here the river, for one mile, is about one hundred yards wide and flows between high rocky banks to the outlet of Clearwater Lake, which is greatly obstructed by large high rocky islands.

The course from the point where the river was reached to the lake is due east.

A good view of Clearwater, or Ka-wa-cha-ga-mi Lake, was obtained from the top of an island, one mile east of the outlet, and two hundred and sixty feet above the water. The lake is surrounded by rocky hills which rise from two to four hundred feet above it. The greatest length from east to west appeared to be about thirty miles, while the average breadth was about ten miles. At its west end are a great number of high rocky islands, which continue along the south shore towards the east: about the middle of the lake many more islands appear to stretch across from shore to shore, so as to almost shut out a view of the east end.

With the exception of a few clumps of stunted black spruce trees, that grow in protected valleys, the vegetation is wholly made up of low Arctic plants, which in part cover the bare rocks.

The water of the lake is very deep and remarkably clear; the Indians catch great quantities of large lake and river trout, white fish and suckers in the lake and the river flowing out.

From the north side of Clearwater Lake a short portage route through three or four small lakes, leads to Saal Lake, out of which the Nastapoka River flows.

The Indians say that this is a much larger lake, surrounded by a low flat country totally barren.

From the Valley of the Wiachtiwan River to Clearwater Lake, the country traversed is a low plateau rising slowly towards the interior, and everywhere broken by roughly parallel ridges of low rounded gneiss hills, which rise from one to three hundred feet above water level; between the ridges are long narrow chains of lakes or mossy swamps.

**Trees.** Stunted trees of black spruce, with a few tamaracks grow on the low lands, around the margin of the lakes and in the swamps, none of these exceed thirty feet in height, nor are any over eight inches in diameter three feet from the ground.

**Vegetation.** The hill-tops are usually covered with a thin growth of white moss and arctic berries; on account of the absence of trees, fine views of the surrounding country may be obtained from any of the higher hills.

**Terraces.** Along the sides of the rocky hills, one mile up Clearwater River from Gulf Lake, five terraces were seen cut out of marine clays and sands, the highest reaching an elevation of over three hundred feet above sea level.

**Ancient sea beach.** On the portage from the mouth of Wiachtiwan River, the road first passes up a rocky hill, partly covered with sand, and then along the top of a sandy gravel bank, fifty feet high, cut out of the stratified drift by a small stream. It then ascends an easy slope covered by coarse sand and gravel to a flat terrace fifteen chains wide and two hundred and thirty-five feet above sea level. This is covered with small bars and hummocks of coarse gravel, the remains of an old sea beach.

Beyond this the road again ascends an easy slope over sands and gravel to the edge of a flat plain four hundred and forty feet above the sea. Across the face of this plain, from the high hills on the north to a solitary rocky hill on the south, between the plain and the river valley, are a number of rounded knolls, in two rows. These average fifty feet in diameter and rise about five feet above the general level. They are composed of coarse gravel and small water-worn boulders, and were evidently formed in the shallow water of the old seashore line.

**Change in river channel.** From here the road passes along the side of the hill on the south as the plain behind is swampy and covered with small spruce trees. At the east end of the hill is a narrow ridge of sand mixed with gravel and small boulders, one hundred feet above the river, with a sharp slope on either side. The portage follows the crest of the ridge and gradually descends from the hill towards the east to the level of the plain, where the valley of a small stream is followed to the river below. The sand and gravel of the ridge is nearly one hundred feet thick and overlies bedded clays, which form the cut banks along the small stream to the river edge. The origin of the ridge is probably due to the cutting action of the river, which at the earlier part of the period of upheaval of the land, evidently flowed to the north of the hill, and carried away about one hundred feet of sand and gravel from the top of the present plain. Later, it assumed its present course to the south of the hill, and cut away the deposits on that side leaving only the

ridge to mark the height of the old deposits. Along the valley of Wiachtiwan River, above the portage, terraces with faces cut out of stratified sand and clay are quite common, especially on the upper part. On the portage from the river valley, the first terrace is thirty feet above the river, the second, one hundred and sixty feet, and the third, a broad plain on the upper level, three hundred and ten feet, or six hundred and seventy-five feet above sea level.

The deposits out of which these are formed consist of stratified sands, with fine gravel on the top plain. Although no fossils were found in these beds, they are probably of estuarine origin and mark the amount of elevation of the land since the period of submergence subsequent to the period of glaciation.

Beyond this point, as far as Clearwater Lake, no stratified surface deposits were noted. The loose material is wholly made up of boulder till. The boulders are scattered over hill and valley in the utmost profusion. Often large rounded masses of rock of many tons weight were seen perched on the very summits of the hills and held in place by smaller boulders wedged underneath. In one place a boulder, over three feet in diameter, was seen perched upon another of twice the size. These boulders all appear to be derived from the immediate country rock and have not travelled far from their original place. The only example of a far-travelled erratic seen was a small boulder of white fossiliferous limestone, similar to that found in Hudson Straits and on the west side of Hudson Bay. This was found on the top of a hill two hundred feet above the outlet of Clearwater Lake. As the drift was here directly from the east, and as low flat land is reported by the Indians to occur about Seal Lake in that direction, it is highly probable that deposits of similar rock will be found in that neighbourhood, the boulder being carried from there by the ice.

At the lower end of the portage, from the mouth of the Wiachtiwan River, is a small exposure of light green felspathic argillite, belonging to the Manitounuck group of Dr. Bell (see Report of Progress 1877-78.) Along the hillside, on the upper part of the portage, a cliff of the same rocks dip N. 60° E. < 35°, and gives the following section in ascending order:

- (1.) Apple green silicious argillite, fifty feet.
- (2.) Light yellowish grey sandstone, six feet.
- (3.) Light grey crystalline limestone mixed with grains of quartz and shading into sandstone, with a calcite matrix, very hard and tough, thirty-five feet.
- (4.) Bedded dark green amygdaloidal trap, one hundred feet.

Between this exposure and Clearwater Lake Archean gneisses only, were seen.

On the portage past the fifty-five feet fall, is a fine-grained pink micaeous gneiss, penetrated by large veins of pink orthoclase and quartz.

Dykes.

On the hill top, on the portage from the river valley, the rock is chiefly a dark red syenitic granite, holding small dark red garnets. Along with it are thin bands of highly contorted fine-grained pink micaceous gneiss. An immense dyke of dark green diorite, made up of moderately large crystals of dark green hornblende, and dark blue plagioclase. This dyke is over two hundred yards wide, and was seen cutting the hills on the opposite side of the river valley several miles away. Its direction is S. 35° E.

Another similar dyke, sixty feet wide, cuts the rocks in a N. 25° E. direction at the small lake half a mile north of the other, and may be an offshoot of the larger dyke.

Gneiss.

On the portages between the small lakes to the height of land are exposures of pink mica-gneiss, associated with a dark-red variety, made up principally of dark-red orthoclase, with some quartz and small quantities of mica and a greenish hornblende. These rocks are often very much contorted; their general strike is S. 80° W. At the height of land portage are similar exposures, the hornblende showing signs of decomposition. Strike N. 63° W.

The rocks examined along the lakes and portages of the next tributary were found to contain more hornblende, with little or no mica, and in places to enclose hornblendic segregations. General strike N. 57° W.

On crossing the height of land to the lakes draining into Clearwater River, the rocks contain larger quantities of hornblende, with more frequent hornblendic enclosures and schist bands.

Diorite dykes.

On the portage from the small branch to Clearwater River are two dykes. The first one is on the hill, a short distance from the branch; it is olive-green in color, very fine-grained and compact in structure, and varies in width from five to fifty feet, with a direction of N. 70° E. The second dyke, near the Clearwater River, is coarser in texture, and composed of light-green plagioclase and dark-green hornblende; it is sixty feet wide, and runs N. 75° W. The rock cut by these dykes is a coarse-grained, pink hornblende-gneiss, containing broken bands of hornblende-schist. Strike N. 55° W.

At the head of the island, a short distance from the portage to Clearwater River, another diorite dyke, thirty feet wide, was seen running N. 85° W.

All along the Clearwater River to the lake the rock exposures were found to be composed of a pink hornblende-gneiss, often granitic in structure, associated with a greater or less number of bands of dark hornblende-schist, and usually enclosing fragments or segregations of hornblende-rock. The average strike is north-west.

## GLACIATION AND SUPERFICIAL DEPOSITS.

The hills everywhere inland to the east of Hudson Bay have been rounded off, planed and scratched by an immense glacier, which moved over the highest land, where the striæ and ice-grooves upon the rock surface attest its former presence. Ice grooving.

The following list of striæ show that the glacier moved in a uniform direction, a few degrees south of west, over all inequalities of the surface, except the deep valley of Great Whale River, where it was diverted and followed the course of the river valley.

On the Clearwater route the general direction is more nearly west than in the country to the south.

Everywhere the glacier appears to have followed the general slope of the country from the high interior gathering grounds.

From the evidence afforded by striæ and travelled boulders on the rivers falling into Hudson Bay from the west and south, collected by Dr. R. Bell it would appear that the continental glacier flowed down from the high land on the east side of the bay, crossed it, and had momentum and thickness sufficient to push itself in a direction south of west, up the west side over the wide margin of flat deposits of limestone, which extend inland from the present coast line some 200 miles, and then over the higher Archæan country that forms the watershed between Hudson Bay and the great lakes. Flow of great glacier.

## LIST OF GLACIAL STRIÆ ON THE BIG, GREAT WHALE AND CLEARWATER RIVERS.

On an island in Big River seven miles above Fort George.	S. 70° W.
At the chute in Big River . . . . .	S. 75° W.
Seven miles above the chute . . . . .	S. 80° W.
Eighteen miles above the chute . . . . .	S. 70° W.
Twenty-two miles above the chute . . . . .	S. 85° W.
On 1st Portage, from Big River to Bishop Roggan River (top of hill) . . . . .	S. 80° W.
On 3rd Portage from Big River to Bishop Roggan River.	S. 50° W.
On 5th Portage from Big River to Bishop Roggan River.	S. 62° W.
Island in Piagochiwi Lake . . . . .	S. 85° W.
On portage to Abpichotinachits Lake . . . . .	S. 87° W.
Island in Pamigomachi Lake . . . . .	S. 75° W.
Seven miles up Bishop Roggan River from Awagats Lake.	S. 80° W.
Three miles above the last . . . . .	S. 85° W.
Apachichits River near the portage to Big River . . . . .	S. 78° W.
Big River, at the head of the Delta . . . . .	S. 75° W.
Big River, at 1st ten feet chute . . . . .	S. 78° W.
Big River, at fifteen feet chute . . . . .	S. 85° W.
Big River, two miles and a-half above last . . . . .	S. 76° W.

Big River at thirty feet chute.....	S. 86° W.
On portage to Kahipikamow Lake.....	S. 78° W.
On portage from Kahipikamow Lake.....	S. 62° W.
Portage to Masquacuiwi (top of hill).....	S. 60° W.
Portage to Mishiminewaten Lake.....	S. 63° W.
On Mishiminewaten Lake.....	S. 63° W.
At Rapid to Kabimichatiwan Lake.....	S. 85° W.
Portage to Pospiskagami Lake.....	S. 62° W.
Island in Pospiskagami Lake.....	S. 63° W.
1st Portage on Great Whale River below Pospiskagami Lake.....	N. 75° W.
Half a-mile below the last.....	N. 60° W.
Portage two miles below the last.....	N. 70° W.
One mile below the last.....	N. 70° W.
On Portage past eight foot fall in long gorge two and a- half miles below the last.....	N. 82° W.
On portage at rapid at head of Indian portage route.	N. 80° W. & N. 35° W.
On portage past sixty foot fall.....	N. 70° W.
At Forks.....	N. 68° W.
On hill top, on two mile portage past canon.....	N. 77° W.
On lower end of two mile portage past canon.....	N. 68° W. & N. 50° W.
On last portage Great Whale River.....	N. 65° W.
At foot of portage from Gulf Lake up Wiachtiwan River.	S. 83° W.
On dyke at top of hill, on portage from Wiachitiwan River.....	N. 70° W.
On portage from 3rd lake above the last.....	W.
On the long lake of 2nd tributary.....	S. 85° W.
At lower end of same lake.....	S. 80° W.
On height of land portage to Clearwater branch.....	S. 85° W.
On last portage to Clearwater River.....	S. 77° W.
At portage past upper rapid on large island in the Clear- water River.....	W.
At island in Natwagami Lake.....	S. 85° W.
On hill two miles below the outlet of Clearwater Lake...	S. 78° W.
On top of island in Clearwater Lake 260 feet above the lake.....	S. 78° W.

Terminal  
moraine.

During some long period between the time of extreme glaciation and the close of the period of ice, the glacier did not extend beyond the middle of James Bay, and there, in a terminal moraine, deposited great quantities of sand, clay and boulders, part of which form the present unstratified drift islands, before described in detail in this report.

The evidence of stratified deposits of marine sands and clays along the valleys, near the mouths of the rivers on the east side of Hudson Bay, shows that a subsidence of the land of over five hundred feet (and probably nearly seven hundred feet) took place after the period of glaciation; since then the land has been slowly rising, with periods of quiet, as shown by the terraces cut out of the drift along the high land of the coast.

Terraces.

APPENDIX I.

List of plants collected on the Rupert and Moose rivers, along the shores of James' Bay, and on the islands in James' Bay, during the summers of 1885 and 1887, by J. M. Macoun.

The first column in the following list contains those species found growing along the Moose River, the second those growing along the Rupert River, and the third column those growing along the shores and on the islands of James' Bay:—

	Moose River.	Rupert River.	James' Bay.
RANUNCULACEÆ.			
Anemone parviflora, Michx.....	*	*	*
“ dichotoma, Linn.....	*	*	*
Thalictrum dioicum, Linn.....	*	*	
Ranunculus aquatilis, Linn., var. trichophyllus, Chaix...	*	*	
“ Cymbalaria, Pursh.....			*
“ affinis, R. Br., var. validus, Gr.....			*
“ abortivus, Linn.....	*	*	*
“ Pennsylvanicus, Linn.....	*		
“ recurvatus, Poir.....	*	*	
Caltha palustris, Linn.....		*	*
Coptis trifolia, Salisb.....	*	*	
Actæa spicata, Linn., var. rubra, Ait.....	*	*	
NYMPHÆACEÆ.			
Nymphæa odorata, Ait, var. minor, Sims.....	*		
Nuphar advena, Ait.....	*	*	
“ rubrodiscum, Morong.....	*		
FUMARIACEÆ.			
Corydalis glauca, Pursh.....	*	*	
“ aurea, Willd.....	*		
CRUCIFERÆ.			
Nasturtium palustre, DC.....	*	*	*
Cardamine hirsuta, Linn.....	*	*	*
“ pratensis, Linn.....	*	*	*
Arabis humifusa, Wat., var. pubescens, Wat.....			*
“ hirsuta, Scop.....	*		
“ confinis, Watson.....	*		
“ perfoliata, Lam.....	*		

	Moose River.	Rupert River.	James Bay.
<i>Erysimum cheiranthoides</i> , Linn.....	*		*
<i>Sisymbrium humile</i> , C. A. Meyer.....			*
<i>Draba incana</i> , Linn., <i>var. confusa</i> , Poir.....			*
“ <i>aurea</i> , Vahl.....			
VIOLACEÆ.			
<i>Viola blanda</i> , Willd.....	*	*	*
“ <i>cucullata</i> , Ait.....	*	*	
“ <i>canina</i> , Linn., <i>var. Muhlenbergii</i> , Gray.....	*	*	
“ <i>Canadensis</i> , Linn.....	*		
POLYGALACEÆ.			
<i>Polygala pauciflora</i> , Willd.....	*		
CARYOPHYLLACEÆ.			
<i>Silene acaulis</i> , Linn.....			*
<i>Arenaria verna</i> , Linn., <i>var. hirta</i> , Wat.....			*
“ <i>Michauxii</i> , Hook.....		*	*
“ <i>peploides</i> , Linn.....			*
<i>Stellaria longifolia</i> , Muhl.....	*		
“ <i>borealis</i> , Bigel. <i>var. alpestris</i> , Gray.....		*	
“ <i>longipes</i> , Goldie.....	*	*	
“ “ <i>var. Edwardsii</i> , T. & G.....			*
“ <i>humifusa</i> , Rottb.....		*	
<i>Cerastium arvense</i> , Linn.....	*	*	
“ <i>alpinum</i> , Linn.....			*
LINACEÆ.			
<i>Linum perenne</i> , Linn.....			*
GERANIACEÆ.			
<i>Geranium Carolinianum</i> , Linn.....	*	*	
<i>Impatiens fulva</i> , Nutt.....	*		
RHAMNACEÆ.			
<i>Rhamnus alnifolia</i> , L'Her.....	*	*	
SAPINDACEÆ.			
<i>Acer spicatum</i> , Lam.....	*	*	
LEGUMINOSÆ.			
<i>Astragalus alpinus</i> , Linn.....			*
<i>Hedysarum boreale</i> , Nutt.....	*		
<i>Vicia Americana</i> , Muhl.....	*	*	
<i>Lathyrus maritimus</i> , Bigel.....			*
“ <i>palustris</i> , Linn.....	*	*	
“ <i>ochroleucus</i> , Hook.....	*		

	Moose River.	Rupert River.	James' Bay.
ROSACEÆ.			
Prunus Pennsylvanica, Linn. ....	*	*	
“ Virginiana, Linn. ....	*		
Spiræa salicifolia, Linn. ....	*	*	
Neillia opulifolia, Benth. & Hook. ....	*		
Rubus Chamæmorus, Linn. ....	*	*	*
“ arcticus, Linn. ....	*	*	*
“ “ var. grandiflorus, Ledeb. ....	*	*	*
“ triflorus, Rich. ....	*	*	*
“ strigosus, Mx. ....	*	*	*
Dryas octopetala, Linn., var. integrifolia, Cham. & Sch. ....			*
Geum macrophyllum, Willd. ....	*	*	
“ strictum, Ait. ....	*	*	
“ rivale, Linn. ....	*	*	
Sibbaldia procumbens, Linn. ....			*
Fragaria Virginiana, Duchesne. ....	*	*	*
“ vesca, Linn. ....	*		
Potentilla Norvegica, Linn. ....	*	*	*
“ Pennsylvanica, Linn. ....		*	*
“ maculata, Pour. ....			*
“ emarginata, Pursh. ....			*
“ palustris, Scop. ....	*	*	*
“ fruticosa, Linn. ....	*	*	*
“ Anserina, Linn. ....	*	*	*
“ arguta, Pursh. ....	*	*	*
“ tridentata, Solander. ....	*	*	*
Rosa Sayi, Watson. ....	*	*	*
Pirus Americana, DC. ....	*	*	
Amelanchier Canadensis, T. & G., var. oblongifolia, T. & G. ....	*	*	
“ var. oligocarpa, T. & G. ....	*		
SAXIFRAGACEÆ.			
Saxifraga tricuspidata, Retz. ....			*
“ aizoides, Linn. ....			*
“ Hirculus, Linn. ....			*
Mitella nuda, Linn. ....	*	*	*
Parnassia palustris, Linn. ....	*	*	*
“ Kotzebuei, Cham. & Schlecht. ....			*
Ribes oxycanthoides, Linn. ....	*	*	*
“ lacustre, Poir. ....	*	*	*
“ rubrum, Linn. ....	*	*	*
“ prostratum, L'Her. ....	*	*	*
DROSERACEÆ.			
Drosera rotundifolia, Linn. ....	*	*	
“ intermedia, Drev. & Hayne, var. Americana, DC. ....	*	*	
HALORAGEÆ.			
Hippuris vulgaris, Linn. ....	*	*	*
ONAGRACEÆ.			
Epilobium angustifolium, Linn. ....	*	*	*
“ latifolium, Linn. ....			*

	Moose River.	Rupert River.	James' Bay.
<i>Epilobium tetragonum</i> , Linn .....	*	*	
“ <i>palustre</i> , Linn., <i>var. lineare</i> , Gray .....	*	*	
<i>Oenothera biennis</i> , Linn .....	*		
<i>Circaea alpina</i> , Linn .....	*	*	
UMBELLIFERÆ.			
<i>Sanicula Marilandica</i> , Linn .....	*	*	
<i>Cicuta maculata</i> , Linn .....	*	*	
“ <i>bulbifera</i> , Linn .....	*	*	
<i>Sium cicutæfolium</i> , Gmelin .....	*	*	
<i>Archangelica atropurpurea</i> , Hoffm .....			*
<i>Heracleum lanatum</i> , Mx .....	*	*	*
ARALIACEÆ.			
<i>Aralia hispida</i> , Vent .....		*	
“ <i>nudicaulis</i> , Linn .....	*	*	
CORNACEÆ.			
<i>Cornus Canadensis</i> , Linn .....	*	*	*
“ <i>sericea</i> , Linn .....		*	
“ <i>stolonifera</i> , Mx .....	*	*	*
CAPRIFOLIACEÆ.			
<i>Sambucus racemosa</i> , Linn .....	*	*	
<i>Viburnum pauciflorum</i> , Pylaie .....	*	*	*
<i>Linnæa borealis</i> , Gronov .....	*	*	*
<i>Lonicera cœrulea</i> , Linn .....	*	*	
“ <i>involuta</i> , Banks .....	*	*	*
<i>Diervilla trifida</i> , Mœnch .....	*	*	*
RUBIACEÆ.			
<i>Galium asprellum</i> , Mx .....	*	*	
“ <i>trifidum</i> , Linn .....	*	*	*
“ <i>triflorum</i> , Mx .....	*	*	
“ <i>boreale</i> , Linn .....	*	*	*
COMPOSITÆ.			
<i>Eupatorium purpureum</i> , Linn .....	*	*	
<i>Solidago lanceolata</i> , Linn .....	*	*	*
“ <i>Canadensis</i> , Linn .....	*	*	*
“ <i>bicolor</i> , Linn., <i>var. concolor</i> , T. & G .....	*	*	
“ <i>uliginosa</i> , Nutt .....	*	*	
“ <i>macrophylla</i> , Pursh .....	*	*	
“ <i>humilis</i> , Pursh .....			*
<i>Aster Lindleyanus</i> , T. & G .....	*	*	
“ <i>puniceus</i> , Linn .....		*	
“ <i>salicifolius</i> , Ait .....			*
“ <i>umbellatus</i> , Mill., <i>var.</i> .....	*	*	
“ <i>nemoralis</i> , Ait .....		*	
“ <i>macrophyllus</i> , Linn .....	*		
“ <i>lævis</i> , Linn .....	*	*	

	Moose River.	Rupert River.	James' Bay.
<i>Erigeron hyssopifolius</i> , Mx.....	*	*	*
“ <i>Canadensis</i> , Linn.....	*	*	*
“ <i>Philadelphicus</i> , Linn.....	*	*	*
“ <i>uniflorus</i> , Linn.....	*	*	*
“ <i>acris</i> , L., <i>var. Droebachensis</i> , Blytt.....	*	*	*
<i>Antennaria plantaginifolia</i> , Hook.....	*	*	*
“ <i>dioica</i> , Gärten.....	*	*	*
“ <i>Carpathica</i> , R. Br.....	*	*	*
<i>Anaphalis margaritacea</i> , Benth. & Hook.....	*	*	*
<i>Bidens frondosa</i> , Linn.....	*	*	*
“ <i>cernua</i> , Linn.....	*	*	*
<i>Achillea Millefolium</i> , Linn.....	*	*	*
<i>Chrysanthemum arcticum</i> , Linn.....	*	*	*
<i>Matricaria inodora</i> , L., <i>var. nana</i> , Hook.....	*	*	*
<i>Tanacetum Huronense</i> , Nutt.....	*	*	*
<i>Artemisia borealis</i> , Pall.....	*	*	*
“ <i>Canadensis</i> , Mx.....	*	*	*
<i>Petasites palmata</i> , Gray.....	*	*	*
“ <i>sagittata</i> , Gray.....	*	*	*
<i>Senecio aureus</i> , Linn.....	*	*	*
“ “ <i>var. obovatus</i> , T. & G.....	*	*	*
“ “ <i>var. Balsamitae</i> , T. & G.....	*	*	*
“ <i>Pseudo-Arnica</i> , Less.....	*	*	*
<i>Cnicus muticus</i> , Pursh.....	*	*	*
<i>Hieracium umbellatum</i> , Linn.....	*	*	*
“ <i>scabrum</i> , Mx.....	*	*	*
<i>Taraxacum officinale</i> , Web., <i>var. lividum</i> , Koch.....	*	*	*
“ “ <i>var. alpinum</i> , Koch.....	*	*	*
<i>Lactuca leucophæa</i> , Gray.....	*	*	*
<i>Prenanthes alba</i> , Linn.....	*	*	*
“ <i>racemosa</i> , Mx.....	*	*	*
LOBELIACEÆ.			
<i>Lobelia Dortmanna</i> , Linn.....	*	*	*
“ <i>Kalmii</i> , Linn.....	*	*	*
CAMPANULACEÆ.			
<i>Campanula rotundifolia</i> , Linn.....	*	*	*
“ “ <i>var. arctica</i> , Lange.....	*	*	*
VACCINIACEÆ.			
<i>Vaccinium Canadense</i> , Kalm.....	*	*	*
“ <i>Pennsylvanicum</i> , Lam.....	*	*	*
“ <i>uliginosum</i> , Linn.....	*	*	*
“ <i>Oxycoccus</i> , Linn.....	*	*	*
“ <i>macrocarpum</i> , Ait.....	*	*	*
<i>Chiogenes hispidula</i> , Torr. & Gray.....	*	*	*
ERICACEÆ.			
<i>Arctostaphylos alpina</i> , Spreng.....	*	*	*
“ <i>Uva-ursi</i> , Spreng.....	*	*	*
<i>Cassandra calyculata</i> , Don.....	*	*	*
<i>Epigæa repens</i> , Linn.....	*	*	*

	Moose River.	Rupert River.	James' Bay.
<i>Andromeda polifolia</i> , Linn. ....	*	*	*
<i>Kalmia augustifolia</i> , Linn. ....	*	*	*
“ <i>glauca</i> , Ait. ....	*	*	*
<i>Ledum latifolium</i> , Ait. ....	*	*	
<i>Pyrola minor</i> , Linn. ....	*		
“ <i>secunda</i> , Linn. ....	*	*	*
“ <i>rotundifolia</i> , Linn., <i>var. asarifolia</i> , Hook. ....	*	*	*
“ “ <i>var. pumila</i> , Hook. ....			*
<i>Moneses uniflora</i> , Gray ....	*	*	
<i>Chimaphila umbellata</i> , Nutt. ....	*		
<i>Monotropa uniflora</i> , Linn. ....	*		
PLUMBAGINACEÆ.			
<i>Armeria vulgaris</i> , Willd. ....			*
PRIMULACEÆ.			
<i>Primula Mistassinica</i> , Mx. ....	*	*	*
“ <i>farinosa</i> , Linn. ....	*	*	*
<i>Trientalis Americana</i> , Pursh. ....	*	*	
<i>Steironema ciliatum</i> , Raf. ....	*		
<i>Lysimachia stricta</i> , Ait. ....	*	*	
“ <i>thysiflora</i> , Linn. ....	*		
OLEACEÆ.			
<i>Fraxinus sambucifolia</i> , Lam. ....	*		
APOCYNACEÆ.			
<i>Apocynum androsæmifolium</i> , Linn. ....	*	*	
GENTIANACEÆ.			
<i>Gentiana serrata</i> , Gunner. ....	*	*	*
“ <i>Amarella</i> , Linn., <i>var. acuta</i> , Hook., f. ....	*	*	*
<i>Pleurogyne rotata</i> , Griseb. ....			*
<i>Halenia deflexa</i> , Griseb. ....	*		
<i>Menyanthes trifoliata</i> , Linn. ....	*	*	
BORRAGINACEÆ.			
<i>Mertensia maritima</i> , Don. ....			*
“ <i>paniculata</i> , Don. ....	*		
SCROPHULARIACEÆ.			
<i>Mimulus ringens</i> , Linn. ....	*	*	
<i>Veronica Americana</i> , Schwein. ....	*	*	
“ <i>scutellata</i> , Linn. ....	*	*	
“ <i>alpina</i> , Linn. ....	*		*
“ <i>peregrina</i> , Linn. ....	*		*
<i>Castilleia pallida</i> , Kunth, <i>var. septentrionalis</i> , Gray ....			*
<i>Euphrasia officinalis</i> , Linn. ....	*	*	*
<i>Bartsia alpina</i> , Linn. ....			*
<i>Pedicularis Grœnlandica</i> , Retz. ....			*

	Moose River.	Rupert River.	James' Bay.
Pedicularis Lapponica, Linn.....			*
“ palustris, Linn., var. Wlassoviana, Bunge. . . . .		*	*
“ Canadensis, Linn.....	*		
“ flammea, Linn.....			*
“ hirsuta, Linn.....			*
Rhinanthus Crista-galli, Linn.....	*	*	*
Melampyrum Americanum, Mx.....	*	*	*
LENTIBULARIACEÆ.			
Utricularia vulgaris, Linn.....	*	*	
“ intermedia, Hayne.....	*	*	
Pinguicula vulgaris, Linn.....	*	*	*
LABIATÆ.			
Mentha Canadensis, Linn.....	*	*	*
“ “ var. glabrata, Benth.....	*	*	*
Lycopus sinuatus, Ell.....	*	*	*
Dracocephalum parviflorum, Nutt.....	*	*	*
Scutellaria lateriflora, Linn.....	*	*	*
“ galericulata, Linn.....	*	*	*
Brunella vulgaris, Linn.....	*	*	*
Stachys palustris, Linn.....	*	*	*
PLANTAGINACEÆ.			
Plantago major, Linn.....	*	*	*
“ eriopoda, Torr.....			*
CHENOPODIACEÆ.			
Chenopodium capitatum, Benth & Hook.....	*	*	
POLYGONACEÆ.			
Polygonum amphibium, Linn.....	*	*	
“ lapathifolium, Ait, var. incanum, Koch.....	*	*	
“ viviparum, Linn.....	*	*	*
“ cilinode, Mx.....	*	*	*
Rumex salicifolius, Weinm.....	*		
“ verticillatus, Linn.....			*
ELÆAGNACEÆ.			
Elæagnus argentea, Pursh.....	*		*
Shepherdia Canadensis, Nutt.....	*		
SANTALACEÆ.			
Comandra livida, Richardson.....	*	*	
“ umbellata, Nutt.....	*		
URTICACEÆ.			
Urtica gracilis, Ait.....	*	*	

	Moose River.	Rupert River.	James' Bay.
MYRICACEÆ.			
<i>Myrica Gale</i> , Linn. ....	*	*	*
CUPULIFERÆ.			
<i>Betula lenta</i> , Linn. ....	*		
“ <i>lutea</i> , Mx., f. ....	*	*	
“ <i>papyrifera</i> , Mx. ....	*	*	*
“ <i>pumila</i> , Linn. ....	*	*	*
“ <i>glandulosa</i> , Mx. ....	*	*	*
<i>Alnus incana</i> , Willd. ....	*	*	
“ <i>viridis</i> , DC. ....	*	*	*
SALICACEÆ.			
<i>Salix candida</i> , Willd. ....	*	*	
“ <i>desertorum</i> , Rich. ....	*	*	
“ <i>myrtilloides</i> , Linn. ....	*	*	
“ <i>glauca</i> , Linn. ....			
“ <i>discolor</i> , Muhl. ....	*	*	*
“ <i>arctica</i> , R. Br. ....			*
“ <i>cordata</i> , Muhl. ....	*		
“ <i>herbacea</i> , Linn. ....			*
“ <i>lucida</i> , Willd. ....	*		
“ <i>rostrata</i> , Rich. ....	*		
“ <i>reticulata</i> , Linn. ....			*
“ <i>lanata</i> , Linn., <i>var.</i> <i>Macouniana</i> , Bebb. ....			*
<i>Populus tremuloides</i> , Mx. ....	*	*	*
“ <i>balsamifera</i> , Linn. ....	*	*	*
EMPETRACEÆ.			
<i>Empetrum nigrum</i> , Linn. ....			*
CONIFERÆ.			
<i>Juniperus communis</i> , Linn., <i>var.</i> <i>alpina</i> , Gaud. ....	*		
“ <i>Sabina</i> , Linn., <i>var.</i> <i>procumbens</i> , Pursh. ....	*		
<i>Pinus Banksiana</i> , Lambert. ....	*	*	*
<i>Picea nigra</i> , Link. ....	*	*	*
“ <i>alba</i> , Link. ....	*	*	*
<i>Abies balsamea</i> , Miller. ....	*	*	*
<i>Larix Americana</i> , Mx. ....	*	*	*
HYDROCHARIDACEÆ.			
<i>Elodea Canadense</i> , Planchon. ....			
ORCHIDACEÆ.			
<i>Liparis Loeselii</i> , Rich. ....	*		
<i>Calypso borealis</i> , Salisb. ....	*	*	
<i>Microstylis ophioglossoides</i> , Nutt. ....	*		
<i>Corallorhiza innata</i> , R. Br. ....	*	*	
<i>Listera cordata</i> , R. Br. ....	*	*	
“ <i>convallarioides</i> , Nutt. ....	*	*	
<i>Spiranthes Romanzoviana</i> , Chamisso. ....	*	*	

	Moose River.	Rupert River.	James' Bay.
<i>Goodyera repens</i> , R. Br.....	*	*	
<i>Calopogon pulchellus</i> , R. Br.....	*		
<i>Pogonia ophioglossoides</i> , Ker.....	*		
<i>Orchis rotundifolia</i> , Gray.....	*	*	*
<i>Habenaria dilatata</i> , Gray.....	*	*	
“ <i>hyperborea</i> , R. Br.....	*	*	*
“ <i>obtusata</i> , Rich.....	*	*	*
“ <i>Hookeri</i> , T. & G.....	*		
<i>Cypripedium acaule</i> , Ait.....	*	*	
“ <i>pubescens</i> , Swartz.....	*	*	
IRIDACEÆ.			
<i>Iris versicolor</i> , Linn.....	*	*	
<i>Sisyrinchium mucronatum</i> , Mx.....	*	*	
LILIACEÆ.			
<i>Streptopus amplexifolius</i> , DC.....	*	*	
“ <i>roseus</i> , Mx.....	*	*	
<i>Smilacina stellata</i> , Desf.....	*	*	*
“ <i>racemosa</i> , Desf.....	*		
“ <i>trifolia</i> , Desf.....	*	*	
<i>Maianthemum Canadense</i> , Desf.....	*	*	*
<i>Allium Schoenoprasum</i> , Linn.....	*	*	*
<i>Lilium Philadelphicum</i> , Linn.....	*		
<i>Tofieldia borealis</i> , Wahlenb.....	*	*	*
“ <i>glutinosa</i> , Willd.....	*	*	
<i>Clintonia borealis</i> , Raf.....	*	*	
JUNCACEÆ.			
<i>Juncus filiformis</i> , Linn.....	*	*	*
“ <i>effusus</i> , Linn.....	*		*
“ <i>Balticus</i> Dethard, <i>var. littoralis</i> , Engelm.....	*	*	*
“ <i>triglumis</i> , Linn.....	*		*
“ <i>tenuis</i> , Willd.....	*	*	*
“ <i>bufonius</i> , Linn.....	*		
“ <i>alpinus</i> , Villars, <i>var. insignis</i> , Fries.....	*	*	
“ <i>nodosus</i> , Linn.....	*		
“ <i>Canadensis</i> , J. Gray, <i>var. coarctatus</i> , Engelm.....	*	*	
<i>Luzula spadicea</i> , DC.....	*	*	
“ <i>spicata</i> , Desv.....			*
“ <i>comosa</i> , Meyer.....			*
“ <i>arcuata</i> , Meyer.....			*
<i>Typha latifolia</i> , Linn.....	*	*	
<i>Sparganium simplex</i> , Huds.....	*		
“ <i>affine</i> , Schnitzlein.....		*	
“ <i>hyperboreum</i> , Laest, <i>var. Americanum</i> , Beeby.....			*
AROIDÆ.			
<i>Calla palustris</i> , Linn.....	*	*	
<i>Acorus Calamus</i> , Linn.....	*		
ALISMACEÆ.			
<i>Alisma Plantago</i> , Linn., <i>var. Americanum</i> , Gray.....	*		
<i>Sagittaria variabilis</i> , Engelm., <i>var.</i> .....	*	*	

	Moose River.	Rupert River.	James' Bay.
NAIADACEÆ.			
Triglochin maritimum, Linn.....			*
“ “ var. elatum, Gray.....	*	*	
Potamogeton natans, Linn.....	*		
“ rufescens, Schroeder.....		*	
“ amplifolius, Tuck.....	*		
“ gramineus, Linn., var. graminifolius, Fries..		*	
“ “ var. heterophyllus, Fries.....	*	*	
“ praelongus, Wulfen.....	*		
“ perfoliatus, Linn.....	*	*	
“ zosterifolius, Schum.....	*		
“ pauciflorus, Pursh.....	*	*	
“ pusillus, Linn.....	*	*	
“ rutilans, Wolfgang.....			*
“ marinus, Linn.....		*	
“ pectinatus, Linn.....	*	*	*
“ Robbinsii, Oakes.....	*		
Naias flexilis, Rostk. & Schmidt.....		*	
ERIOCAULONACEÆ.			
Eriocaulon septangulare, With.....	*		
CYPERACEÆ.			
Eleocharis palustris, R. Br.....	*		*
“ tenuis, Schultes.....	*		
“ acicularis, R. Br.....	*		
Scirpus caespitosus, Linn.....			*
“ sylvaticus, Linn., var. digynus, Boeckl.....	*		*
Eriophorum cyperinum, Linn.....	*		*
“ alpinum, Linn.....		*	*
“ vaginatum, Linn.....		*	
“ capitatum, Host.....			*
“ polystachyon, Linn.....	*		
Carex nardina, Fries.....			*
“ pauciflora, Lightf.....	*		
“ microglochin, Wahl.....			*
“ polytrichoides, Muhl.....	*	*	
“ teretiuscula, Good.....	*	*	
“ stipata, Muhl.....	*		
“ chordorhiza, Ehrh.....		*	
“ tenella, Schk.....	*		
“ canescens, Linn.....	*	*	
“ “ var. vulgaris, Bailey.....		*	
“ echinata, Murray, var. microstachys, Boeck.....		*	
“ scoparia, Schk.....	*	*	
“ straminea, Schk.....	*		
“ Buxbaumii, Wahl.....	*	*	
“ atrata, Linn.....		*	
“ alpina, Swartz.....			*
“ aurea, Nutt.....	*	*	
“ Oederi, Retz.....	*	*	
“ flava, Linn.....	*	*	
“ aquatilis, Wahl.....		*	*
“ lenticularis, Mx.....	*	*	

	Moose River.	Rupert River.	James' Bay.
" <i>maritima</i> , Muller.....			*
" <i>Magellanica</i> , Lamarck.....	*	*	
" <i>rariflora</i> , Smith.....			
" <i>limosa</i> , Linn.....	*	*	
" <i>vaginata</i> , Tausch.....	*	*	
" <i>concinna</i> , R. Br.....		*	
" <i>arctata</i> , Boott, <i>var.</i> <i>Faxoni</i> , Bailey.....		*	
" <i>flexilis</i> , Rudge.....	*	*	
" <i>capillaris</i> , Linn.....	*	*	
" <i>riparia</i> , W. Curtis.....			*
" <i>filiformis</i> , Linn.....	*		*
" <i>lanuginosa</i> , Mx.....	*	*	
" <i>Michauxiana</i> , Boeckl.....		*	
" <i>oligosperma</i> , Mx.....		*	
" <i>miliaris</i> , Mx.....		*	
" <i>saxatilis</i> , Linn.....			*
" <i>rotundata</i> , Wahl.....			*
" <i>rostrata</i> , With.....			*
" " <i>var. reticulata</i> , Bailey.....	*	*	
" <i>monile</i> , Tuck.....	*	*	
" <i>retrorsa</i> Schw.....	*		
GRAMINEÆ.			
<i>Beckmania erucæformis</i> , Host, <i>var. uniflorus</i> , Scrib.....		*	*
<i>Panicum dichotomum</i> , Linn.....		*	
<i>Hierochloa alpina</i> , Rœm. & Schultz.....			*
" <i>borealis</i> , Rœm. & Schultz.....	*	*	*
<i>Alopecurus alpinus</i> , Smith.....		*	*
" <i>geniculatus</i> , Linn., <i>var. aristulatus</i> , Munro.....		*	*
<i>Stipa Richardsonii</i> , Link.....		*	
<i>Oryzopsis asperifolia</i> , Mx.....	*	*	
<i>Muhlenbergia glomerata</i> , Trin.....	*		
<i>Phleum alpinum</i> , Linn.....			*
<i>Agrostis scabra</i> , Willd.....	*	*	*
<i>Cinna pendula</i> , Trin.....	*	*	
<i>Deyeuxia Canadensis</i> , Hooker.....	*	*	*
" <i>Langsdorffii</i> , Kunth.....		*	*
" <i>neglecta</i> , Kunth.....		*	*
" <i>borealis</i> , Macoun.....		*	*
<i>Deschampsia atropurpurea</i> , Scheele.....		*	
" " <i>var. minor</i> , Vasey.....			*
" <i>cæspitosa</i> , Beauv.....	*	*	
" " <i>var. maritima</i> , Vasey.....			*
" <i>alba</i> , Rœm. & Schultz.....	*	*	
<i>Trisetum subspicatum</i> , Beauv. <i>var. molle</i> , Gray.....			
<i>Eatonia Pennsylvanica</i> , Gray.....	*		
<i>Catabrosa aquatica</i> , Beauv.....	*	*	*
<i>Poa alpina</i> , Linn.....			*
" <i>cæsia</i> , Smith.....	*		*
" <i>cenisia</i> , Ait.....			*
" <i>pratensis</i> , Linn.....	*	*	
<i>Glyceria arundinacea</i> , Kunth.....			*
" <i>Canadensis</i> , Trin.....	*	*	
" <i>fuitans</i> , R. Br.....	*		
" <i>maritima</i> , Wahl.....	*		
" <i>nervata</i> , Trin.....	*	*	
<i>Festuca ovina</i> , Linn., <i>var. brevifolia</i> , Watson.....			*

	Moose River.	Rupert River.	James' Bay.
<i>Bromus ciliatus</i> , Linn.....	*	*	*
<i>Agropyrum tenerum</i> , Vasey.....		*	
<i>Hordeum jubatum</i> , Linn.....		*	*
<i>Elymus mollis</i> , Trin.....			*
EQUISETACEÆ.			
<i>Equisetum arvense</i> , Linn.....	*	*	
“ <i>palustre</i> , Linn.....	*	*	
“ <i>scirpoides</i> , Mx.....	*	*	
FILICES.			
<i>Polypodium vulgare</i> , Linn.....	*	*	
<i>Pellæa gracilis</i> , Hook.....		*	
<i>Pteris aquilina</i> , Linn.....	*	*	
<i>Asplenium viride</i> , Hudson.....	*	*	
“ <i>Filix-fœmina</i> , Bernh.....	*	*	
<i>Phegopteris Dryopteris</i> , Feè.....	*	*	
“ <i>calcareæ</i> , R. Br.....		*	
<i>Aspidium spinulosum var. dilatatum</i> , Gray.....	*	*	*
<i>Onoclea sensibilis</i> , Linn.....	*	*	
<i>Cystopteris fragilis</i> , Bernh.....	*	*	
“ <i>montana</i> , Bernh.....		*	
<i>Woodsia Ilvensis</i> , R. Br.....	*	*	
“ <i>glabella</i> , R. Br.....	*	*	
<i>Osmunda regalis</i> , Linn.....	*	*	
“ <i>Claytoniana</i> , Linn.....	*	*	
<i>Botrychium Lunaria</i> , Swartz.....	*	*	*
“ <i>Virginicum</i> , Swartz.....	*	*	*
“ <i>ternatum Swartz, var. lunarioides</i> , Willd.....		*	*
LYCOPODIACEÆ.			
<i>Lycopodium annotinum</i> , Linn.....	*	*	*
“ <i>dendroideum</i> , Mx.....	*	*	*
“ <i>clavatum</i> , Linn.....	*	*	*
“ <i>complanatum</i> , Linn.....	*	*	*
“ <i>sabinaefolium</i> , Willd.....		*	

## APPENDIX II.

### LIST OF DIURNAL LEPIDOPTERA AND COLEOPTERA

Collected by Mr. J. S. COTTER at Moose Factory in 1888, and by Mr. J. M. MACOUN on the south coast and islands of James Bay in 1887. Determined by Mr. JAS. FLETCHER, Dominion Entomologist.

#### DIURNAL LEPIDOPTERA TAKEN AT MOOSE FACTORY.

- Papilo Turnus*, L. (8 specimens.) 16 June–16 July.  
*Pieris Napi*, Esp., winter form *Oleracea-hiemalis*, Har. (12 specimens.)  
11–18 June.  
*Pieris Rapæ*, L. (2 specimens.) 17–24 August.  
*Colias Scudderii*, Reak. 17 August.  
*Colias Nastes*, Bd. No particulars.  
*Argynnis Polaris*, Bd. 18 June.  
*Phyciodes Tharos*, Dru. winter form *Marcia*, Edw. 31 August.  
*Grapta Progne*, Cram. 18 June.  
*Vanessa Antiopa*, L. (2 specimens.) 11 June.  
*Vanessa Milberti*, God't. (3 specimens.) 18–20 June.  
*Pyrameis Atalanta*, L. (17 specimens.) 6–19 June.  
*Limenitis Arthemis*, Dru., var. *Lamina*, Fab.  
*Cænonympha Inornata*, Edw. (3 specimens.) 31 August.  
*Lycæna Pseudargiolus*, Bl., winter form *Lucia*, Kirby. (3 specimens.)  
25 June.

#### COLEOPTERA TAKEN ON THE SOUTH COAST AND ISLANDS OF JAMES BAY.

- |  |                                      |
|--|--------------------------------------|
| <i>Cicindela 12-guttata</i> , Dejean.    | <i>Acmaeops proteus</i> , Kirby.     |
| <i>Calosoma frigidum</i> , Kirby.        | <i>Leptura chrysocoma</i> , Kirby.   |
| <i>Chlaenius sericeus</i> , Forster.     | <i>Monohammus scutellatus</i> , Say. |
| <i>Silpha Lapponica</i> , Hlist.         | <i>Orsodachna atra</i> , Ahr.        |
| <i>Dicerca divaricata</i> , Say.         | <i>Adoxus vitis</i> , L.             |
| <i>Buprestis maculiventris</i> , Say.    | <i>Lina Lapponica</i> , L.           |
| <i>Asemmum mæstum</i> , Haldeman.        | <i>Lina scripta</i> , Fabricius.     |
| <i>Criocephalus obsoletus</i> , Randall. | <i>Gonioctena pallida</i> , L.       |
| <i>Aylotrechus undulatus</i> , Say.      | <i>Upis ceramboides</i> , L.         |
| <i>Rhagium lineatum</i> , Olivier.       | <i>Lepyryus colon</i> , L.           |
| <i>Pachyta liturata</i> , Kirby.         |                                      |

### APPENDIX III.

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#### NOTES ON THE BREEDING HABITS OF CERTAIN MAMMALS, FROM PERSONAL OBSERVATIONS AND ENQUIRIES FROM INDIANS.

By Mr. MILES SPENCER, Fort George, Hudson Bay.

*Rangifer Groenlandicus*, L. Barren Ground Caribou.

These animals mate about the end of October, and the calves, one or two in number, are born about 1st July. The young at birth are the size of a small calf, red and white in color, very active, with open eyes. The female suckles the young for a period of two months.

*Lynx Canadensis*, Geoffroy. Canada Lynx.

The season of heat occurs about 1st March, when coition takes place as in dogs. The young, one to three in number, are born in holes lined with grass and moss. At time of birth they are slightly larger than the common adult red squirrel, of a grey color, helpless, with closed eyes. They are suckled by the female for three months, the male assisting in rearing them.

*Canis lupus occidentalis*, Richardson. Wolf.

Coition dog-like. It takes place about the middle of March, and the young, one to five in number, are born about the middle of June, in holes or under rocks. The young, when born, are about the size of an Esquimaux or Newfoundland pup, grey in color, with closed eyes and helpless. They are suckled for two months after birth by the female, who is assisted by the male in rearing them.

*Vulpes lagopus*, L. White or Arctic Fox.

These animals pair about the 1st March, and the young are born about the end of June. From one to seven are produced at a litter in holes under rocks. At time of birth they are somewhat larger than a squirrel, light grey in color, helpless, with closed eyes. The female suckles the young for two months, and is assisted by the male in rearing them.

*Gulo luscus* (L.), Sabine. Wolverine.

The wolverine mates about the middle of March, coition being dog-like. The young, one to three in number, are born about the middle of June. At birth they are about the size of an Esquimaux pup, reddish brown in color, helpless, with closed eyes. They are born in holes and under rocks, and are suckled for two months. The male assists in rearing the young.

*Mustela Americana*, Turton. Marten.

Coition is dog-like. It occurs about the 1st March, and the young are born, about the end of April, in holes, in rotten trees, lined with grass and moss. From one to five are produced at a birth, when they are the size of a new-born kitten, brown and black in color, helpless, with closed eyes. The female suckles the young for a period of five weeks, and is unassisted by the male in rearing them. Sometimes the female gives birth in a burrow in the ground.

*Putorius vison*, Brisson. Mink.

Coition dog-like. It takes place towards the end of February, and the young, one to three in number, are born about 1st May. At time of birth they are the size of a small mouse, very black in color, helpless, with eyes closed. The female makes a nest in a hole lined with grass, and suckles the young for six weeks. The male does not assist in rearing the young.

*Mephitis mephitica*, Shaw. Skunk.

Coition is dog-like, and takes place about 1st October. The young, one to three in number, are born in holes about 1st May. At time of birth they are the size of a large mouse, light brown in color, helpless, and eyes closed. The female suckles them for six weeks. The male does not assist in rearing the young.

*Lutra Canadensis*, Turton. Otter.

Coition dog-like. It takes place towards the end of February, and the young, one to three in number, are born, about 1st May, in holes, lined with grass. When born they are the size of a small squirrel, very black in color, helpless, with closed eyes. The female suckles them for six weeks, and is unassisted by the male.

*Ursus Americanus*, Pallas. Black Bear.

The period of heat occurs at the 1st of June, when coition takes place as in dogs. The young, one to three in number, are born at the end of October, in holes under rocks, lined with brush,

grass and moss. At the time of birth the cubs are the size of a squirrel, black in color, quite helpless, with closed eyes. They are suckled for five months, the male assists in rearing the young.

*Thalassarctos maritimus*, Linn. White Bear.

Coition, which is dog-like, takes place about the middle of April, and the young, from one to three in number, are born in holes under rocks lined with brush, grass, and moss, towards the end of October. At time of birth they are the size of a large rat, white in color, helpless, and with closed eyes. They are suckled for five months, the male assisting in rearing them.

*Fiber zibethicus*, L. Muskrat.

This animal mates about the middle of May, coition being cat-like, and the young, from one to six in number, are born about the middle of June. At time of birth they are the size of a small mouse, light brown in color, helpless, with closed eyes. The nest is built in a house or lodge, made of sticks and mud, in shallow ponds or quiet streams, and is lined with grass and moss. The female suckles the young for three weeks, and is assisted by the male in rearing them. The muskrat breeds twice subsequent to the first birth during the summer.

*Erethizon dorsatus*, L. Canada Porcupine.

Coition, which is cat-like, takes place about 1st October, and the young one is born unsheltered at the end of April. When born it is the size of a small rat, black in color, active, with open eyes. The female suckles it for two weeks, and is unassisted by the male in rearing it.

*Castor fiber*, L. Beaver.

At the end of February coition, which is cat-like, takes place, and the young, from one to nine in number, are born about the 1st June, in a house lined with brush and grass. They are then the size of a rat, light brown in color, helpless, with closed eyes. The female suckles the young for six weeks, and is assisted by the male in rearing them.

*Arctomys monax*, L. Woodchuck, Wenusk.

Coition, which is cat-like, takes place about the middle of October, and the young, from one to ten in number are born about the 1st May. At time of birth they are the size of a large mouse, yellow-

brown in color, helpless, with eyes closed. The nest is in a hole lined with grass. The female suckles the young for six weeks, and is assisted in rearing them by the male.

*Delphinapterus catadon*, L. White Porpoise.

Coition takes place under water. The two animals, with a noise as if they were rubbing hard against each other, rise to the water until nearly the whole body is visible, then come in sudden contact, and fall asunder. The time of mating is about the middle of June, and the young, one to two in number, are born towards the end of July, when they are from two to four feet long, of a lead color, very active, with open eyes. The female suckles them for at least three months.

APPENDIX IV.

(1) METEOROLOGICAL OBSERVATIONS ON JAMES BAY IN 1887, BY A. R. CUNNINGHAM, AND ON THE EAST COAST OF HUDSON BAY IN 1888, BY C. H. MACNUTT.

The barometer used was a small aneroid, but the readings have been corrected for instrumental error, and are believed to be nearly exact.

The Temperature is stated in degrees Fahrenheit. The force of the wind is estimated according to a scale from 0 to 10. The proportion of the sky covered by clouds is estimated by a scale of 0 to 10, 0 being a cloudless sky, 10 a completely clouded sky. The character of the clouds is denoted by the usual letters or combination of letters referring to Howard's classification.

PLACE.	Date.	Hour.	Barometer corrected.	Ther. corrected.			Direction of wind.	Force of wind.	Amt. of cloud.	Kind of cloud.	Weather	
				Air.	Max.	Min.					at time.	during last interval.
Missinaibie Station	1887, May 25	7.00 a.m.	28.46	0	0	42	0	2	K.S.	Fair.	Fair.	
"	" 25	2.00 p.m.	28.40	0	0	42	0	5	K.S.	Dull, part cloudy.	Passing showers.	
"	" 25	9.00 p.m.	28.35	0	0	42	2	8	S.	Passing showers.	Passing showers.	
"	" 26	7.00 a.m.	28.28	0	0	44	2	10	S.	Light rain.	Light rain.	
"	" 26	2.00 p.m.	28.32	0	0	44	2	10	S.	Light rain.	Light rain.	
"	" 26	9.00 p.m.	28.45	0	0	46	2	10	S.	Rain and gloomy.	Rain.	
"	" 27	7.00 a.m.	28.69	0	0	46	2	2	K.C.	Fair.	Clearing.	
"	" 27	2.00 p.m.	28.70	0	0	46	2	0	0	0	Fair.	Fair.
"	" 27	9.00 p.m.	28.71	0	0	46	1	0	0	0	Very fair.	Very fair.
"	" 28	7.00 a.m.	28.69	0	0	49	1	0	0	0	Very fair.	Very fair.
H. of L. Portage to Missinaibie River	" 28	2.00 p.m.	28.65	0	0	49	2	4	K.S.	Fair.	Very fair.	
Portage to Missinaibie Lake	" 28	9.00 p.m.	28.62	0	0	49	1	0	0	0	Very fair.	Very fair, squally.
"	" 29	7.00 a.m.	28.59	0	0	40	1	0	0	0	Very fair.	Very fair.
Missinaibie Lake.	" 29	2.00 p.m.	28.58	0	0	40	1	3	K.S.	Fair.	Detached clouds.	
"	" 29	9.00 p.m.	28.54	0	0	40	0	8	S.	Gloomy.	Detached clouds.	
"	" 30	7.00 a.m.	28.58	0	0	48	0	2	K.C.	Fair.	Fair.	
Keg Portage, Missinaibie River	" 30	2.00 p.m.	28.59	0	0	48	2	10	S.	Thundershowers.	Thunder from 1 p.m.	
Keg Portage	" 30	9.00 p.m.	28.63	0	0	48	1	6	K.S.	Banked clouds.	Cleared at 8 p.m.	
Head of Swamp	" 31	7.00 a.m.	28.75	0	0	47	1	9	S.	Gloomy.	Light showers during night.	
Island Portage	" 31	2.00 p.m.	28.82	0	0	47	1	10	S.	Heavy thunder storms.	Thunder showers.	
Green Hill Portage	" 31	9.00 p.m.	28.93	0	0	48	0	10	S.	Overcast.	Passing showers.	
"	June 1	7.00 a.m.	28.86	0	0	48	1	10	S.	Overcast.	Passing showers.	
St. Peter	" 2	7.00 a.m.	28.86	0	0	48	1	9	S.	Overcast.	Light showers at 4 a.m.	



PLACE.	Date.	Hour.	Barometer corrected.	Thermometer.			Direction of wind.	Force of wind.	Amt. of cloud.	Kind of cloud.	Weather at time.	Weather during last interval.
				Air.	Max.	Min.						
	1887.											
Riverside Portage, Missinaibi River.....	June 18	2.00 p.m.	29.05	72.	.....	.....	S. E.	1	4	K S.	Banked clouds.	Passing showers.
Conjuring Ho. Portage, Missinaibi River.....	"	9.00 p.m.	29.04	60.	.....	.....	0.	0	5	K S.	Banked clouds.	Passing showers.
"	"	7.00 a.m.	29.02	48.	.....	.....	0.	0	10	S.	Overcast.	Passing showers.
"	"	2.00 p.m.	29.02	68.	.....	.....	0.	0	10	S.	Rain.	Light rain.
"	"	9.00 p.m.	29.07	58.	.....	.....	0.	0	10	S.	Overcast.	Light rain.
"	"	7.00 a.m.	29.12	68.	.....	.....	S. E.	2	2	C.	Fair.	Light showers.
"	"	2.00 p.m.	29.10	77.	.....	.....	S.	3	2	K.	Fair.	Fair.
Store Portage,	"	2.00 p.m.	29.05	74.	.....	.....	S.W.	1	10	S.	Overcast.	Cloudy.
"	"	7.00 a.m.	28.80	58.	.....	.....	S.W.	1	10	S.	Overcast.	Light rain.
"	"	2.00 p.m.	28.76	80.	.....	.....	N.W.	2	8	K S.	Banked clouds.	Passing showers, heavy.
"	"	9.00 p.m.	28.83	62.	.....	.....	S.W.	1	8	K S.	Gloomy.	Gloomy.
Long Portage,	"	7.00 a.m.	28.88	51.	.....	.....	S.W.	3	10	S.	Gloomy.	Rain during night.
"	"	2.00 p.m.	28.92	56.	.....	.....	N. E.	6	10	S.	Overcast.	Overcast.
"	"	9.00 p.m.	28.95	53.	.....	.....	0.	0	10	S.	Overcast.	Overcast.
"	"	7.00 a.m.	28.95	53.	.....	.....	0.	0	10	S.	Overcast.	Shower early in a.m.
"	"	2.00 p.m.	29.02	66.	.....	.....	0.	0	10	S.	Light rain.	Showers all morning.
"	"	9.00 p.m.	29.10	55.	.....	.....	0.	0	10	S.	Light showers.	Showers.
"	"	7.00 a.m.	29.42	50.	.....	.....	0.	0	10	S.	Gloomy.	Passing showers.
"	"	2.00 p.m.	29.52	60.	.....	.....	N. E.	1	10	S.	Overcast.	Light rain.
"	"	9.00 p.m.	29.64	55.	.....	.....	0.	0	10	S.	Light showers.	Overcast, with light showers.
"	"	7.00 a.m.	29.83	54.	.....	.....	N.W.	1	10	K S.	Overcast.	Passing showers.
"	"	2.00 p.m.	29.96	61.	.....	.....	N. E.	2	10	K S.	Overcast.	Overcast.
"	"	9.00 p.m.	30.06	58.	.....	.....	0.	0	9	K S.	Clearing.	Overcast.
"	"	7.00 a.m.	30.22	58.	.....	.....	S. E.	2	10	K S.	Detached clouds.	Clearing.
"	"	2.00 p.m.	30.18	69.	.....	.....	0.	0	1	C.	Fair.	Fair.
"	"	9.00 p.m.	30.12	57.	.....	.....	0.	0	3	K.	Fair.	Fair.
"	"	7.00 a.m.	30.16	59.	.....	.....	S. E.	4	2	C.	Fair.	Fair.
"	"	2.00 p.m.	30.49	88.	.....	.....	S.	6	1	K.	Fair.	Fair.
"	"	9.00 p.m.	30.48	72.	.....	.....	S. E.	2	0	0	Very fair.	Very fair.
"	"	7.00 a.m.	30.47	61.	.....	.....	S.	1	2	K.	Fair.	Fair.
"	"	2.00 p.m.	30.46	85.	.....	.....	N.W.	1	6	K.	Fair.	Fair.
"	"	9.00 p.m.	30.47	75.	.....	.....	N.W.	1	3	K.	Fair.	Fair.
"	"	7.00 a.m.	30.54	68.	.....	.....	0.	0	4	K. C.	Fair.	Very fair.
"	"	2.00 p.m.	30.49	93.	.....	.....	S. W.	3	5	K S.	Fair.	Fair.
"	"	9.00 p.m.	30.23	80.	.....	.....	S. E.	4	5	K S.	Fair.	Fair.
"	"	7.00 a.m.	30.25	66.	.....	.....	N.W.	7	5	K S.	Fair.	Fair.
"	"	2.00 p.m.	30.08	83.	.....	.....	N.W.	7	2	K S.	Very fair.	Very fair.
"	"	9.00 p.m.	29.98	70.	.....	.....	S. E.	5	8	K	Passing showers.	Passing showers during night.



PLACE.	Date.	Hour.	Barometer corrected.	Thermometer.			Direction of wind.	Force of wind.	Amt. of cloud.	Kind of cloud.	Weather at time.	Weather during last interval.
				Air.	Max.	Min.						
1887.												
South Twin Island.....	July 16	9.00 p.m.	30.24	42.	.....	N. E.	8	10	S.	Overcast with fog.	Overcast with fog, heavy gale.	
"	" 17	7.00 a.m.	30.37	42.	37.	N. E.	5	4	K	Overcast with fog.	Gloomy.	
"	" 17	2.00 p.m.	30.34	56.	.....	N. E.	5	4	K	Fair.	Clearing to fair.	
"	" 17	9.00 p.m.	30.30	41.	40.	N. W.	6	2	K	Fair.	Fair.	
"	" 18	7.00 a.m.	30.30	40.	.....	S. W.	4	1	C	Fair.	Fair.	
"	" 18	2.00 p.m.	30.30	78.	.....	S. W.	4	1	C	Fair.	Fair.	
North Twin Island.....	" 18	9.00 p.m.	30.18	50.	.....	S. W.	5	1	K	Gloomy, overcast.	Fair.	
"	" 19	7.00 a.m.	30.06	49.	42.	S. E.	1	9	K	Overcast.	Heavy thunder storm in a.m.	
"	" 19	2.00 p.m.	30.04	53.	.....	S. W.	5	10	S	Foggy.	Rain and fog.	
"	" 19	9.00 p.m.	29.97	57.	47.	S. W.	4	10	S	Very foggy.	Thick fog.	
"	" 20	7.00 a.m.	30.10	52.	.....	S. W.	5	5	S	Fair.	Clearing to fair.	
"	" 20	2.00 p.m.	30.15	52.	.....	S. W.	5	3	K	Fair.	Fair.	
Spencer Island.....	" 20	9.00 p.m.	30.18	47.	.....	N. W.	2	5	K	Detached clouds.	Fair.	
"	" 21	7.00 a.m.	36.11	48.	38.	S. W.	3	5	K	Light rain.	Overcast.	
Comb Hills, East Coast.....	" 21	2.00 p.m.	30.08	58.	.....	S. W.	5	8	K	Overcast.	Light rain.	
Near Mouth of Big River.....	" 21	2.00 p.m.	30.04	53.	.....	0.	0	10	S	Overcast.	Overcast.	
"	" 22	7.00 a.m.	29.88	50.	43.	N. E.	6	9	S	Banked clouds with thunder.	Overcast.	
Fort George.....	" 22	2.00 p.m.	29.73	73.	.....	N. E.	4	7	K	Overcast.	Overcast.	
"	" 22	9.00 p.m.	29.76	55.	.....	N. E.	6	10	S	Overcast.	Overcast.	
"	" 23	7.00 a.m.	29.92	43.	40.	N. W.	6	10	S	Fair.	Fair.	
"	" 23	2.00 p.m.	29.97	56.	.....	S. W.	5	8	S	Very fair.	Very fair, brilliant aurora.	
"	" 23	9.00 p.m.	30.14	48.	.....	N. W.	3	0	0	Overcast.	Light rain early in a.m.	
"	" 24	7.00 a.m.	30.24	39.	32.	W.	3	0	S	Overcast.	Overcast with fog.	
"	" 24	2.00 p.m.	30.28	53.	.....	N. W.	3	10	S	Very fair.	Clearing to fair.	
"	" 24	9.00 p.m.	30.34	47.	.....	0.	0	1	K	Gloomy, overcast.	Overcast and misty.	
Stromness Harbor.....	" 25	7.00 a.m.	30.42	45.	41.	N. W.	3	10	K	Fair.	Clearing to fair.	
"	" 25	2.00 p.m.	30.47	59.	.....	W.	3	4	K	Very foggy.	Dense fog in p.m.	
"	" 25	9.00 p.m.	30.44	48.	.....	N. W.	4	2	K	Fair.	Fair, cleared early in a.m.	
Grey Goose Island.....	" 26	7.00 a.m.	30.45	53.	40.	N. E.	2	6	K	Very fair.	Very fair.	
"	" 26	2.00 p.m.	30.40	55.	.....	S. E.	3	2	K	Fair.	Fair.	
"	" 26	9.00 a.m.	30.28	49.	.....	S. E.	1	1	K	Very fair.	Very fair, fog during night.	
Near Cape Jones.....	" 27	7.00 a.m.	30.22	49.	.....	S. E.	1	2	K	Very fair.	Very fair, strong wind.	
"	" 27	2.00 p.m.	30.18	66.	.....	N. W.	7	2	K	Very fair.	Very fair.	
"	" 27	9.00 p.m.	30.24	49.	.....	N. W.	4	1	K	Dense fog.	Dense fog.	
"	" 28	7.00 a.m.	30.28	45.	39.	S. W.	3	3	K	Fair.	Cleared early in a.m.	
"	" 28	2.00 p.m.	30.27	50.	.....	S. W.	4	5	C	Very fair.	Fair.	
Cape Jones.....	" 28	9.00 p.m.	30.17	46.	40.	W.	5	6	0	Misty.	Misty.	
"	" 29	7.00 a.m.	30.05	59.	.....	S. W.	5	6	K	Gloomy.	Light rain.	
Bear Island.....	" 29	2.00 p.m.	30.03	54.	.....	S. W.	6	9	K	Heavy rain.	Overcast.	



PLACE.	Date.	Hour.	Barometer corrected.	Thermometer.			Direction of wind.	Force of wind.	Amt. of cloud.	Kind of cloud.	Weather at time.	Weather during last interval.
				Air.	Max.	Min.						
1887.												
Cockspenny	Aug. 14	2.00 p.m.	30.22	57.		N. E.	5	2	K	Fair.	Fair.	Fair.
Inner Ship Hole	" 14	9.00 p.m.	30.16	57.		S. E.	2	5	K	Fair.	Fair.	Light showers and fog.
	" 15	7.00 a.m.	30.10	62.		S. E.	2	6	K	Thunder showers.	Rain and fog.	Rain and fog.
	" 15	2.00 p.m.	30.14	57.		N. E.	2	8	S.	Overcast.	Clearing.	Clearing.
Moose Factory	" 15	9.00 p.m.	30.39	59.		N. E.	2	4	K	Fair.	Fair.	Fair.
"	" 16	7.00 a.m.	30.28	55.	36.	N.	1	5	K	Fair.	Overcast.	Overcast.
"	" 16	2.00 p.m.	30.18	60.		N. E.	2	10	S.	Rain.	Rain during afternoon.	Rain during afternoon.
"	" 16	9.00 p.m.	30.00	57.		E.	4	10	S.	Overcast.	Clearing.	Clearing.
"	" 17	7.00 a.m.	29.86	9.	50.	S. W.	5	0	0.	Very fair.	Fair.	Fair.
"	" 17	2.00 p.m.	29.73	73.		W.	4	5	K	Fair.	Light rain.	Light rain.
"	" 17	9.00 p.m.	29.65	69.		W.	4	10	S.	Fair.	Light rain.	Light rain.
"	" 18	7.00 a.m.	29.88	65.	52.	W.	5	5	K	Fair.	Clearing.	Clearing.
"	" 18	2.00 p.m.	29.87	69.		N. W.	6	8	S.	Overcast.	Fair.	Fair.
"	" 18	9.00 p.m.	29.88	60.		W.	6	2	K	Fair.	Rain during night.	Rain during night.
"	" 19	7.00 a.m.	29.88	42.	41.	S. W.	6	10	S.	Overcast.	Overcast.	Overcast.
"	" 19	2.00 p.m.	29.95	50.		W.	9	10	S.	Overcast.	Overcast.	Overcast.
"	" 19	9.00 p.m.	30.10	46.		W.	5	10	S.	Overcast.	Overcast.	Overcast.
"	" 20	7.00 a.m.	30.07	51.	45.	W.	5	0	S.	Overcast.	Overcast.	Overcast.
"	" 20	2.00 p.m.	30.04	53.		N. W.	5	9	S.	Overcast.	Overcast.	Overcast.
"	" 20	9.00 p.m.	30.02	48.		W.	5	8	S.	Overcast.	Overcast.	Overcast.
"	" 21	7.30 a.m.	30.02	52.	45.	W.	4	10	S.	Overcast.	Overcast.	Overcast.
"	" 21	2.00 p.m.	30.06	52.		W.	4	10	S.	Overcast.	Overcast.	Overcast.
"	" 21	9.00 p.m.	30.08	48.		W.	5	8	S.	Overcast.	Overcast.	Overcast.
"	" 22	7.00 a.m.	30.21	51.	47.	N. W.	3	8	S.	Overcast.	Overcast.	Overcast.
"	" 22	2.00 p.m.	30.22	54.		N. W.	2	9	S.	Overcast.	Overcast.	Overcast.
"	" 22	9.00 p.m.	30.22	52.		0.	0	9	S.	Overcast.	Overcast.	Overcast.
"	" 23	7.00 a.m.	30.20	50.		0.	0	9	S.	Overcast.	Overcast.	Overcast.
"	" 23	2.00 p.m.	30.18	52.		0.	0	9	S.	Overcast.	Overcast.	Overcast.
"	" 23	9.00 p.m.	30.17	56.		N. E.	6	10	S.	Gloomy.	Overcast.	Overcast.
"	" 24	7.00 a.m.	30.20	45.	45.	N. E.	5	10	S.	Overcast.	Overcast.	Overcast.
"	" 24	2.00 p.m.	30.14	58.		E.	3	9	S.	Overcast.	Overcast.	Overcast.
"	" 24	9.00 p.m.	30.13	54.		0.	0	1	C.	Fair.	Overcast.	Overcast.
"	" 25	7.00 a.m.	30.14	42.	37.	N. W.	5	10	S.	Light rain.	Clearing.	Clearing.
"	" 25	2.00 p.m.	30.14	50.		N. E.	5	8	S.	Detached clouds.	Fair.	Fair.
"	" 25	9.00 p.m.	30.11	50.		0.	0	2	S.	Fair.	Fair.	Fair.
"	" 26	7.00 a.m.	30.11	41.	35.	0.	0	0	0.	Very fair.	Fair.	Fair.
"	" 26	2.00 p.m.	30.08	55.		W.	3	4	K.	Fair.	Fair.	Fair.
"	" 26	9.00 p.m.	30.02	60.		0.	0	7	K.	Fair.	Fair.	Very fair.
"	" 27	7.00 a.m.	30.08	33.	32.	0.	0	0	0.	Very fair.	Very fair.	Very fair.
"	" 27	2.00 p.m.	30.03	85.		E.	3	1	K.	Very fair.	Very fair.	Very fair.



PLACE.	Date.	Hour.	Barometer corrected	Thermometer.			Direction of wind.	Force of wind.	Amt. of cloud.	Kind of cloud.	Weather at time.	Weather during last interval.
				Air.	Max.	Min.						
1888.												
Cedar Island,	June 14	7.00 a.m.	29.36	67.	55.	N.	2	5	K C.	Hazy.	Detached clouds, fair.	
Abittibi Forks,	"	9.00 p.m.	29.50	56.	50.	N.	6	10	S.	Squally with rain.	Squally and overcast.	
"	"	7.00 p.m.	29.54	60.	50.	N.	2	1	K C.	Fair with haze.	Fair.	
Moose Factory	"	9.00 p.m.	29.66	49.	.....	N.	4	4	K S.	{ Threatening, { part cloudy.	Fine day.	
"	"	7.00 a.m.	29.74	52.	.....	N.	5	.....	.....	.....	.....	
"	"	9.00 p.m.	29.70	60.	.....	N.	6	5	K S.	Passing clouds.	Part fair, squally.	
"	"	7.00 p.m.	29.80	50.	.....	W.	5	.....	.....	Clear sky.	Very fair.	
"	"	9.00 p.m.	30.02	51.	75.	N.	2	0	K C.	Fair.	Fair with detached clouds.	
"	"	7.00 a.m.	30.12	66.	.....	0.	0	1	K C.	Rain.	Overcast with light rain showers.	
"	"	9.00 p.m.	29.94	70.	81.	S.	2	10	S.	Nearly overcast.	Squally with rain.	
"	"	7.00 a.m.	29.93	70.	73.	N.E.	2	9	K S.	{ misty and over- { east.	Fair, partly cloudy.	
Mouth of Moose River	"	9.00 p.m.	29.98	64.	.....	N.E.	3	8	K S.	{ Haze with { threateningsky.	Haze and much cloud.	
"	"	7.00 a.m.	29.97	57.	.....	E.	4	7	K S.	{ Haze and smoke. { Smoke and part { cloud.	Haze but fair.	
Between Moose River and Charleston Island	"	2.00 p.m.	29.93	59.	.....	E.	2	3	K C.	Fair.	Fair day with much smoke.	
S.W. Point Charleston Island	"	9.00 p.m.	29.84	60.	.....	N.E.	2	8	K C S.	Detached clouds.	Fair.	
"	"	7.00 p.m.	29.76	62.	.....	N.E.	3	5	K C.	Haze with de- tached clouds.	Fair.	
"	"	2.00 p.m.	29.67	77.	.....	N.E.	1	8	K C.	{ Haze with haze and smoke, { fair day.	Haze and smoke, fair day.	
"	"	9.00 p.m.	29.58	69.	.....	N.E.	2	8	K S.	Wind changed at 4 a.m.	Wind changed at 4 a.m.	
E. Point Charleston Island	"	7.00 a.m.	29.50	66.	.....	S.W.	7	7	K C.	Overcast with fog and squalls.	Overcast with fog and squalls.	
Carey Island	"	2.00 p.m.	29.69	55.	.....	N.W.	8	9	K S.	Heavy gale with fog.	Overcast with haze and high wind.	
"	"	9.00 p.m.	29.74	43.	.....	N.W.	6	8	K S.	{ Overcast and { foggy.	High wind with heavy squalls.	
"	"	7.00 a.m.	29.95	45.	.....	N.W.	5	10	S.	{ Overcast and { foggy.	Overcast and foggy.	
E. Coast 10 m. S. of East Main Rv	"	2.00 p.m.	29.98	47.	.....	N.W.	5	10	S.	Overcast and squally.	Overcast and squally, strong high wind.	
"	"	9.00 p.m.	29.98	49.	.....	N.W.	6	10	S.	{ Overcast and { foggy.	Fog and cloud, squalls and high wind.	
"	"	7.00 a.m.	29.98	67.	47.	N.W.	4	10	K S.	{ Squally, over- { cast and gloomy.	Squalls with strong wind.	
"	"	2.00 p.m.	29.94	55.	.....	N.W.	7	10	K S.			

Location	Date	Time	Temp	Wind	Bar	Clouds	Remarks
E. Coast 10 m. S. of East Main River	"	25 7.00 a.m.	29.88	N.W.	53.	5	10 S. Showers at intervals.
H. B. Post, East Main	"	25 2.00 p.m.	29.82	N.E.	65.	5	10 S. Overcast with fog.
6 m. S. of Cape Hope Island	"	25 9.00 p.m.	29.84	N.	50.	3	10 S. Gloomy with fog.
"	"	26 7.00 a.m.	29.93	N.W.	44.	6	6 K S. Overcast to clear.
6 m. N. of Cape Hope	"	26 2.00 p.m.	29.99	N.W.	62.	8	1 K. Smoky and fair, strong wind.
"	"	26 9.00 a.m.	30.12	N.	42.	3	0 C. Fair with haze.
"	"	27 7.00 a.m.	30.28	N.	43.	1	0 C. Fair with haze and smoke.
Paint Hills	"	27 2.00 p.m.	30.22	N.W.	53.	2	3 C. Very fair.
5 m. N. of Paint Hills	"	27 9.00 p.m.	30.25	0.	53.	0	8 K S. Detached clouds.
30 m. S. of Big River	"	28 7.00 a.m.	30.30	S.E.	73.	1	4 C. Fair with detached clouds.
25 m.	"	28 2.00 p.m.	30.19	S.W.	67.	2	3 K S. Hazy.
20 m.	"	28 9.00 a.m.	30.13	0	63.	0	10 K S. Hazy.
20 m.	"	29 7.00 a.m.	30.01	S.E.	60.	2	10 S. Overcast and foggy.
Fort George, Big River	"	29 2.00 p.m.	29.96	S.W.	65.	3	8 K S. Overcast and misty.
"	"	29 9.00 p.m.	29.54	S.W.	60.	4	10 S. Squalls with drizzling rain.
"	"	30 7.00 a.m.	29.95	N.W.	45.	3	10 S. Squalls with rain and fog.
"	"	30 2.00 p.m.	30.18	N.W.	52.	5	9 K S. Very foggy.
"	"	30 9.09 p.m.	30.26	N.W.	45.	4	0 C. No cloud, thin fog.
July	"	1 7.00 a.m.	30.31	N.W.	67.	3	7 K. Detached clouds.
"	"	1 2.00 p.m.	30.24	N.W.	60.	3	8 K S. Overcast.
"	"	1 9.00 p.m.	30.18	0	46.	0	10 K S. Partly overcast, heavy dew.
"	"	2 7.00 a.m.	30.03	S.E.	65.	2	8 S. Overcast.
"	"	2 2.00 p.m.	29.94	S.E.	66.	2	10 S. Misty and dull.
"	"	2 9.00 p.m.	29.80	S.E.	61.	2	10 S. Overcast with fog.
"	"	3 6.00 a.m.	29.53	S.E.	62.	3	10 S. Very squally with fog.
Big River	"	3 2.00 p.m.	29.52	S.E.	73.	4	6 K S. Rain and fog.
1st Portage, Big River	"	3 9.00 p.m.	29.50	0.	68.	0	9 K S. Clearing.
6 m. above 1st Portage	"	4 7.00 a.m.	29.42	S.	61.	2	10 S. Fair and squally.
"	"	4 2.00 p.m.	29.32	S.	63.	3	10 S. Overcast with light rain.
"	"	4 9.00 p.m.	29.28	0.	42.	0	10 S. Heavy rain all morning.
"	"	5 7.00 a.m.	29.50	N.W.	47.	3	10 K S. Stopped raining at 5 a.m.
At Big Bend, Big River	"	5 2.00 p.m.	29.68	N.W.	64.	3	1 C. Cleared at 9 a.m.
On 3 m. Portage	"	5 9.00 p.m.	29.67	0.	68.	0	0 C. Fair.
"	"	6 7.00 a.m.	29.67	0.	45.	0	3 K C. Fair.
"	"	6 2.00 p.m.	29.43	S.	74.	3	2 K C. Very fair.
"	"	6 9.00 p.m.	29.24	0.	65.	0	9 S. Showers.
"	"	7 7.00 p.m.	29.28	S.W.	43.	2	10 S. Dull and foggy.

PLACE.	Date.	Hour.	Barometer corrected.	Thermometer.		Direction of wind.	Force of wind.	Amt. of wind.	Kind of cloud.	Weather at time.	Weather during last interval.
				Max.	Min.						
1888.											
On 3rd Portage to Bishop Roggan River.....	July 7	2.00 p.m.	29.41	71.		S. W.	2	9	K	Dull.	Overcast.
On 5th ".....	" 7	9.00 p.m.	29.45	45.		S. W.	3	5	K	Fair.	Fair.
On 5th ".....	" 8	7.00 a.m.	29.45	34.	31.	S. W.	1	0	K	Very foggy.	Overcast and foggy.
Wayichotochis Lake.....	" 8	2.00 p.m.	29.38	70.		S. W.	1	9	K	Misty and dull.	Fair.
On 7th Portage to B. R. River.....	" 8	9.00 p.m.	29.24	60.		0	0	10*	S.	Heavy rain.	Overcast with heavy showers.
".....	" 9	7.00 a.m.	29.32	40.	31.	N. W.	3	5	K	Very foggy.	Raining all night.
On 9th Portage to B. R. River.....	" 9	2.00 p.m.	29.19	61.		N. W.	5	4	K	Squally and misty	Fair and misty.
".....	" 9	9.00 p.m.	29.20	51.		N. W.	1	10	S.	Detached clouds	Detached clouds.
Awichinawigamache Lake.....	" 10	7.00 a.m.	29.09	41.	32.	S. E.	2	10	S.	Overcast.	Light rain.
".....	" 10	2.00 p.m.	28.66	50.		S. E.	1	10	S.	Heavy rain.	Heavy rain.
".....	" 10	9.00 p.m.	28.68	41.	37.	S. E.	1	10	S.	Dull and foggy.	Dull and foggy.
".....	" 11	7.00 a.m.	28.63	41.	51.	S. E.	1	10	S.	Heavy fog.	Dense fog
17th Portage to B. R. River.....	" 11	2.00 p.m.	28.64	51.		S. E.	1	10	S.	Dull and foggy.	Dense fog
".....	" 11	9.00 p.m.	28.72	50.		0	0	10	S.	Overcast.	Clearing.
Pigochiwi Lake.....	" 12	7.00 a.m.	28.52	51.	41.	N. E.	4	3	K	Fair.	Fair.
Abpechotenachits Lake.....	" 12	2.00 p.m.	28.92	72.	81.	E.	6	4	K	Fair.	Fair.
".....	" 12	9.00 p.m.	29.04	49.		N.	3	0	0.	Very fair.	Very fair.
".....	" 13	7.00 a.m.	29.10	47.	39.	N.	3	3	K	Fair.	Fair.
8th Fall Bishop Roggan River.....	" 13	2.00 p.m.	29.10	61.	*90s	N.	5	2	K	Fair.	Fair.
Awahagats Lake.....	" 13	9.00 p.m.	29.12	44.		N. W.	3	0	0.	Very fair and clear.	Clear.
".....	" 14	7.00 a.m.	29.18	47.	108s 30.	N. W.	2	2	K	Fair.	Fair.
Upper River.....	" 14	2.00 p.m.	29.14	69.		N. W.	4	1	K	Fair.	Fair.
H. of L. Portage from B. R. Rv.....	" 14	9.00 p.m.	29.10	49.		0.	0	1	S.	Fair.	Fair.
".....	" 15	7.00 a.m.	29.16	46.	112s 35.	0.	0	1	C.	Clear.	Clear.
Apachichits River.....	" 15	2.00 p.m.	29.19	71.		S. E.	2	0	0.	Very fair.	Very fair.
".....	" 15	9.00 p.m.	29.18	63.		0.	0	3	K	Very clear and fair.	Very fair.
Kabunskwao Lake.....	" 16	7.00 a.m.	29.18	59.	128s 47.	S. E.	1	6	K	Detached clouds.	Fair.
Chatachiwan Lake.....	" 16	2.00 p.m.	29.18	78.		S.	0	5	K	Detached clouds.	Passing showers.
10 ft. chute, Upper Big River.....	" 16	9.00 p.m.	29.12	57.		0.	0	8	K	Overcast.	Passing showers with hail.
".....	" 17	7.00 a.m.	29.05	62.	91s 56.	S. E.	1	10	S.	Overcast.	Overcast.
40 ft. ".....	" 17	2.00 p.m.	29.08	69.		0.	4	6	K	Misty.	Misty, passing showers.
At Big Bend, ".....	" 17	9.00 p.m.	29.00	69.		0.	4	5	S.	Misty.	Misty.
Upper Big River.....	" 18	7.00 a.m.	29.02	59.	74. 54.	S.	1	8	S.	Misty and smoky.	Smoke and mist, thunder storm.
".....	" 18	2.00 p.m.	28.93	68.		S. E.	2	9	K	Overcast and misty.	Smoke,

\* Maximum in the sun marked thus (s).

Patitawagan River.....	"	18	9.00 p.m.	23.79	58.	.....	49.	0.	0	5	K	S.	Smoko.	Overcast and smoky.
"	"	19	7.00 a.m.	28.66	59.	.....	49.	0.	0	8	K	S.	Thunder storm.	Passing with passing thunder storms.
"	"	19	2.00 p.m.	28.61	73.	.....	94s	S.	1	8	K	S.	Thunder storm.	Passing showers.
H. of L. Portage to W. Branch of B. R. River.....	"	19	9.00 p.m.	28.64	59.	.....	55.	W.	1	10	S.	S.	Heavy rain.	Heavy rain.
"	"	20	7.00 p.m.	28.64	57.	.....	55.	N.W.	1	10	S.	S.	Heavy rain.	Heavy rain.
"	"	20	2.00 p.m.	28.68	61.	.....	.....	N.W.	4	10	S.	S.	Overcast.	Stopped raining at 11 a.m.
"	"	20	9.00 p.m.	28.74	57.	.....	.....	0.	0	8	S.	S.	Overcast.	Passing showers.
Niwatawigachi Lake.....	"	21	7.00 a.m.	28.78	59.	.....	54.	N.E.	1	6	K	S.	Detached bank- ed clouds.	Passing showers.
"	"	21	2.00 p.m.	28.78	72.	.....	75.	N.W.	2	8	S.	S.	Overcast.	Passing thunder showers.
Kabipikanow.....	"	21	9.00 p.m.	28.74	60.	.....	.....	0.	0	3	S.	S.	Squally.	Passing thunder showers.
Kabipitawicow Lake.....	"	22	7.00 p.m.	28.62	59.	.....	56.	S.	2	6	S.	S.	Passing showers.	Passing showers.
Masquachi Lake.....	"	22	2.00 p.m.	28.70	64.	.....	81s	S.W.	4	6	K	S.	Detached clouds.	Passing showers.
"	"	22	9.00 p.m.	28.92	55.	.....	.....	W.	2	5	K	S.	Detached clouds.	Overcast, clearing.
Mishiminewatan Lake.....	"	23	7.00 a.m.	28.98	50.	.....	49.	S.	1	10	K	S.	Overcast.	Partly overcast.
"	"	23	2.00 p.m.	28.93	64.	.....	108s	N.W.	1	5	K	S.	Banked clouds.	Passing showers.
"	"	23	9.00 p.m.	28.94	50.	.....	.....	N.E.	1	6	S.	S.	Raining.	Overcast with light rain.
Pospishagami Lake.....	"	24	7.00 a.m.	28.94	53.	.....	45.	N.W.	1	2	K	S.	Banked clouds.	Passing showers.
"	"	24	2.00 p.m.	29.95	62.	.....	88s	N.W.	2	7	K	S.	Passing shower.	Passing showers.
"	"	24	9.00 p.m.	29.10	49.	.....	.....	W.	1	10	S.	S.	Overcast.	Overcast.
8 ft. Fall Upper Gt. Whale Rv	"	25	7.00 a.m.	29.12	47.	.....	44.	W.	2	9	K	S.	Overcast.	Overcast.
Canoe Route,	"	25	2.00 p.m.	29.25	60.	.....	82s	N.W.	3	7	K	S.	Detached clouds.	Detached clouds.
20 ft. Fall,	"	25	9.00 p.m.	29.38	45.	.....	.....	0.	0	10	S.	S.	Overcast.	Overcast, with fog.
2 m. Portage,	"	26	7.00 p.m.	29.44	33.	.....	32.	0.	0	5	K	S.	Fair.	Foggy early in morning.
65 ft. Fall,	"	26	2.00 p.m.	29.73	59.	.....	.....	N.W.	3	8	K	S.	Detached clouds	Fair.
H. B. Post Gt. Whale R <sup>iv</sup> er...	"	26	9.00 p.m.	29.84	45.	.....	.....	E.	1	0	0.	S.	Fair.	Fair.
Manitoumuck Sound.....	"	30	9.00 p.m.	29.73	53.	.....	50.	N.E.	2	10	S.	S.	Overcast.	Overcast with showers.
"	"	31	7.00 a.m.	29.19	54.	.....	.....	S.W.	1	10	S.	S.	Rain and fog.	Heavy rain with fog.
"	"	31	2.00 p.m.	29.43	49.	.....	.....	S.W.	3	10	S.	S.	Rain and fog.	Heavy rain with fog.
"	"	31	9.00 p.m.	29.62	52.	.....	.....	S.W.	3	10	S.	S.	Dull and foggy.	Stopped raining at 6 p.m.
H. B. Post, Lt. Whale River	Aug.	1	7.00 a.m.	29.62	52.	.....	49.	S.W.	2	10	S.	S.	Thick fog.	Foggy.
"	"	1	2.00 p.m.	29.66	54.	.....	.....	S.W.	8	10	S.	S.	Fog and rain.	Fog with rain after 10 a.m.
"	"	1	9.00 p.m.	29.88	56.	.....	.....	S.W.	7	10	S.	S.	Fog clearing.	Squally with fog.
"	"	2	7.00 a.m.	29.94	53.	.....	.....	S.W.	4	10	S.	S.	Fog and rain.	Showers and fog.
"	"	2	2.00 p.m.	30.08	61.	.....	96s	N.W.	1	2	C	S.	Fair.	Fair.
"	"	2	9.00 p.m.	30.01	48.	.....	.....	S.	3	2	K	S.	Fair.	Fair.
"	"	3	7.00 a.m.	29.32	57.	.....	46.	E.	7	8	K	S.	Fair and squally.	Very fair and squally.
"	"	3	2.00 p.m.	29.75	65.	.....	.....	E.	7	10	K	S.	Fair with squalls.	Strong wind fair.
"	"	3	9.00 p.m.	29.76	55.	.....	.....	E.	4	8	K	S.	Passing showers.	Squally with passing showers.
Richmond Gulf.....	"	4	7.00 p.m.	30.00	48.	.....	.....	N.W.	2	9	K	S.	Misty.	Fog and light rain.
"	"	4	2.00 p.m.	29.97	63.	.....	.....	N.W.	4	5	K	S.	Fog clearing.	Foggy.
"	"	4	9.00 p.m.	30.03	51.	.....	.....	N.W.	1	7	K	S.	Fair.	Fair.
"	"	5	7.00 p.m.	30.05	49.	.....	42.	N.W.	1	4	K	S.	Fair.	Fair.
Top of Portage past 315 ft. Fall	"	5	2.00 p.m.	29.69	52.	.....	.....	N.E.	2	10	S.	S.	Overcast.	Cloudy.
55 ft. Fall.....	"	5	9.00 p.m.	29.69	52.	.....	.....	0.	0	10	S.	S.	Overcast.	Part cloudy.
"	"	6	7.00 a.m.	29.59	53.	.....	41.	N.E.	1	10	S.	S.	Fog.	Fog.

\* Maximum in the sun marked thus (s).

PLACE.	Date.	Hour.	Barometer corrected.	Thermometer.			Direction of wind.	Force of wind.	Amt. of cloud.	Kind of cloud.	Weather at time.	Weather during last interval.
				Air.	Max.	Min.						
1888.												
Wiachtiwan River.....	Aug. 6	2.00 p.m.	29.52	64.	.....	.....	N. E.	2	10	S.	{ Misty and over- cast.	Cloudy.
Portage from River Valley.....	" 6	9.00 p.m.	29.10	57.	.....	.....	N. E.	3	10	S.	Overcast.	Passing showers.
H. of L. Portage.....	" 7	7.00 a.m.	28.84	61.	.....	54.	S. W.	6	9	K S.	Passing showers.	Passing showers.
Portage to large lake on 2nd tributary.....	" 7	2.00 p.m.	28.92	66.	.....	.....	S. W.	6	9	K S.	Overcast.	Passing showers.
On Large Lake.....	" 7	9.00 p.m.	29.03	55.	.....	.....	S. W.	2	9	K S.	Overcast.	Overcast.
On Large Lake on Clearwater Branch.....	" 8	7.00 a.m.	29.04	54.	.....	44.	0.	0	9	S.	Overcast.	Overcast.
"	" 8	2.00 p.m.	29.05	67.	.....	.....	S.	2	8	S.	Cloudy.	Overcast.
"	" 8	9.00 p.m.	28.88	58.	.....	.....	S.	1	10	S.	Overcast.	Passing showers.
"	" 9	7.00 a.m.	28.63	58.	.....	55.	S. E.	2	10	S.	Overcast.	Overcast.
"	" 9	2.00 p.m.	28.33	68.	.....	.....	S.	2	7	K S.	Fair.	Passing showers.
"	" 9	9.00 p.m.	28.53	44.	.....	.....	S. W.	2	10	S.	Squally, dull.	Heavy rain in afternoon.
"	" 10	7.00 a.m.	28.59	40.	.....	35.	S. W.	2	10	S.	Dull and squally.	Heavy squalls with rain.
"	" 10	2.00 p.m.	28.69	42.	.....	.....	S. W.	4	10	S.	Rain.	Rain.
"	" 10	9.00 p.m.	28.88	42.	.....	.....	S. W.	2	10	S.	Squalls, foggy.	Fog and squalls.
"	" 11	7.00 a.m.	29.19	40.	.....	34.	S. W.	6	10	S.	{ Fog and high wind.	Squally high wind with fog.
Portage to Clearwater River.....	" 11	2.00 p.m.	29.30	55.	.....	.....	S. W.	6	8	K S.	{ Misty, strong wind.	Squalls, overcast.
Above Large Island, ".....	" 11	9.00 p.m.	29.42	40.	.....	.....	S. W.	2	9	K S.	Fair.	Fair.
Natwacami Lake.....	" 12	7.00 a.m.	28.46	45.	.....	37.	S. W.	2	3	K C.	Fair.	Fair.
Portage between outlets.....	" 12	2.00 p.m.	29.41	61.	.....	.....	S. W.	3	2	K C.	Fair.	Fair.
"	" 12	9.00 p.m.	29.32	42.	.....	.....	S. W.	1	2	K S.	Fair.	Fair.
Clearwater Lake.....	" 13	7.00 a.m.	29.21	50.	.....	40.	W.	3	9	S.	Partly overcast.	Partly overcast.
Above Island, Clearwater River.....	" 13	2.00 p.m.	29.19	53.	.....	.....	W.	3	10	S.	Rain.	Heavy rain after 10 a.m.
"	" 13	9.00 p.m.	29.22	52.	.....	.....	W.	1	10	S.	Heavy rain.	Heavy rain.
"	" 14	7.00 a.m.	29.12	47.	.....	41.	N. E.	1	10	S.	Overcast.	Rain all night.
Large Lake on Clearwater Branch.....	" 14	2.00 p.m.	29.07	51.	.....	.....	E.	1	10	S.	Overcast.	Overcast with rain.
H. of L. between Clearwater.....	" 14	9.00 p.m.	29.05	48.	.....	.....	E.	1	10	S.	Heavy rain.	Steady rain all afternoon.
Portage to Winchtiwan Valley.....	" 15	7.00 a.m.	29.05	47.	.....	32.	W.	1	9	K C.	Foggy.	Rain in earlier part of night.
"	" 15	2.00 p.m.	28.99	57.	.....	.....	W.	1	3	K C.	Overcast.	Clearing.
"	" 15	4.00 p.m.	29.04	53.	.....	47.	S. E.	1	5	K S.	Fair.	Fair.
2 m. Portage to Gulf Lake.....	" 16	7.00 p.m.	29.12	67.	.....	.....	S. E.	6	3	K S.	Fair.	Fair with strong breeze.
Gulf Lake.....	" 16	9.00 p.m.	29.63	63.	.....	.....	S. E.	6	3	K S.	Fair.	Fair with strong breeze.
"	" 17	7.00 a.m.	29.85	43.	.....	41.	E.	6	9	K S.	Squally, clouded.	Rain during night.
"	" 17	2.00 p.m.	29.89	53.	.....	.....	W.	2	8	K K	Very squally.	Rain during night.
"	"										Passing showers.	Squally.



PLACE.	Date.	Hour.	Barometer corrected.	Thermometer.			Direction of wind.	Force of wind.	Amt. of wind.	Kind of cloud.	Weather at time.	Weather during last interval.
				Air.	Max.	Min.						
Comb. Hills	1888. Sept. 2	9.00 p.m.	30.35	37.	..	W.	4	5	K	Fair.	Clearing.	
Paint Hills	" 3	7.00 a.m.	30.32	38.	35.	S. E.	3	10	S	Overcast.	Light rain.	
5 m. S. of Paint Hills	" 3	2.00 p.m.	30.06	40.	..	S. E.	4	4	S	Squally.	Squally, overcast.	
Cape Hope	" 4	9.00 p.m.	29.84	39.	..	S. E.	6	10	S	Dull, overcast.	Showers.	
East Main River	" 4	7.00 a.m.	29.83	40.	39.	N.	3	10	S	Fog.	Fog.	
" "	" 4	2.00 p.m.	30.05	42.	..	N.	6	10	S	Rain and foggy.	Rain and fog.	
Strutton Island	" 5	7.00 a.m.	30.14	41.	..	N. E.	7	10	S	Rain and fog.	Fog with snow flurries.	
S. E. Point of Charleton	" 5	2.00 p.m.	30.35	35.	32.	N. W.	2	4	S	Snow flurries.	Snow flurries, squally.	
Mimistickewaten	" 6	9.00 p.m.	30.47	37.	..	S. W.	1	9	K	Overcast.	Fair.	
" "	" 6	7.00 a.m.	30.53	37.	34.	S. W.	2	4	K	Fair.	Fair.	
" "	" 6	9.00 p.m.	30.43	44.	..	S. W.	1	1	K	Very fair.	Fair.	
10 m. N. of Moose River	" 7	7.00 a.m.	30.20	50.	47.	S. W.	1	3	K	Fair.	Fair.	
5 m. "	" 7	2.00 p.m.	30.05	59.	..	S. W.	4	5	K	Smoke, smoky.	Smoke.	
5 m. "	" 7	9.00 p.m.	29.93	60.	..	S. W.	6	3	K	Smoke, fair.	Squally and smoky.	
Moose River	" 8	7.00 a.m.	29.74	54.	51.	S. W.	7	1	K	Fair.	Squally.	
Moose Factory	" 8	2.00 p.m.	29.65	57.	..	S.	2	8	K	Misty.	Misty.	
" "	" 8	9.00 p.m.	29.46	58.	..	S. W.	3	10	S	Misty.	Showers.	
" "	" 9	7.00 a.m.	29.61	53.	51.	S. W.	3	10	S	Rain and fog.	Heavy thunder storm in afternoon.	
" "	" 9	2.00 p.m.	29.69	56.	..	W.	4	10	S	Rain and fog.	Rain and fog.	
" "	" 9	9.00 p.m.	29.77	55.	..	W.	4	10	S	Dull.	Overcast.	
" "	" 10	7.00 a.m.	30.02	54.	52.	W.	2	9	S	Overcast.	Overcast.	
" "	" 10	2.00 p.m.	30.10	53.	..	W.	2	10	S	Overcast.	Overcast.	





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