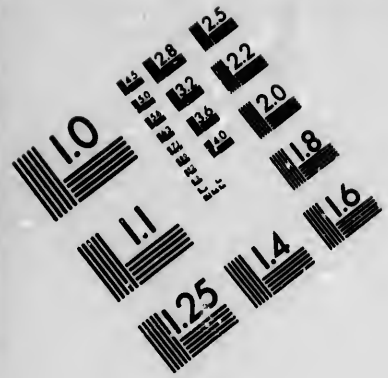
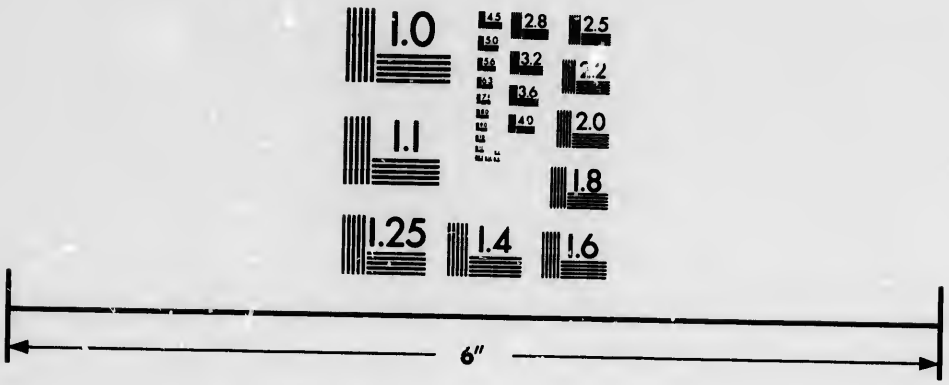
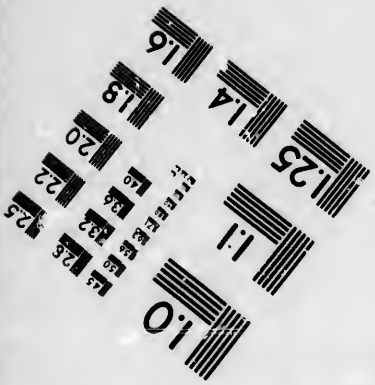
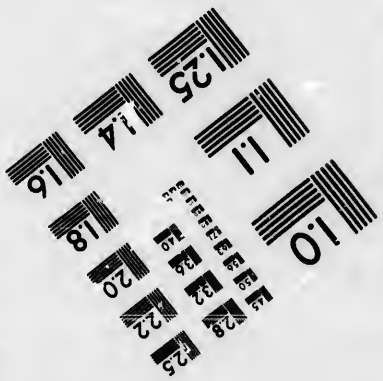


IMAGE EVALUATION TEST TARGET (MT-3)







Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments:/ Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☑ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☐ Includes supplementary material/ Comprend du matériel supplémentaire
- ☐ Only edition available/ Seule édition disponible
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image/ Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X

The copy filmed here has been reproduced thanks to the generosity of:

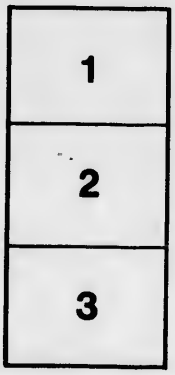
Library of the Public
Archives of Canada

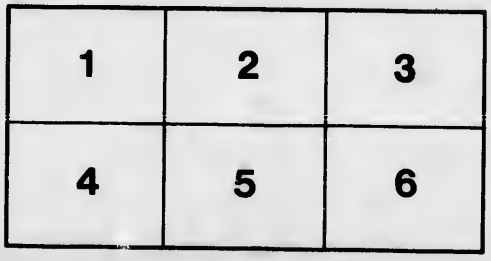
The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol ⟶ (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:





L'exemplaire filmé fut reproduit grâce à la générosité de:

La bibliothèque des Archives
publiques du Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminent soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole ⟶ signifie "A SUIVRE", le symbole ∇ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

GEOLOGICAL SURVEY OF CANADA.

ALFRED R. C. SELWYN, F.R.S., F.G.S., DIRECTOR.

REPORT

ON AN

EXPLORATION OF THE EAST COAST

OF

HUDSON'S BAY

1877

BY

ROBERT BELL, M.D., C.M., F.G.S., C.E.

PUBLISHED BY AUTHORITY OF PARLIAMENT.

Montreal:
DAWSON BROTHERS.
1879

MONTREAL, May 9th, 1878.

A. R. C. SELWYN, F.R.S., F.G.S.,

Director of the Geological Survey.

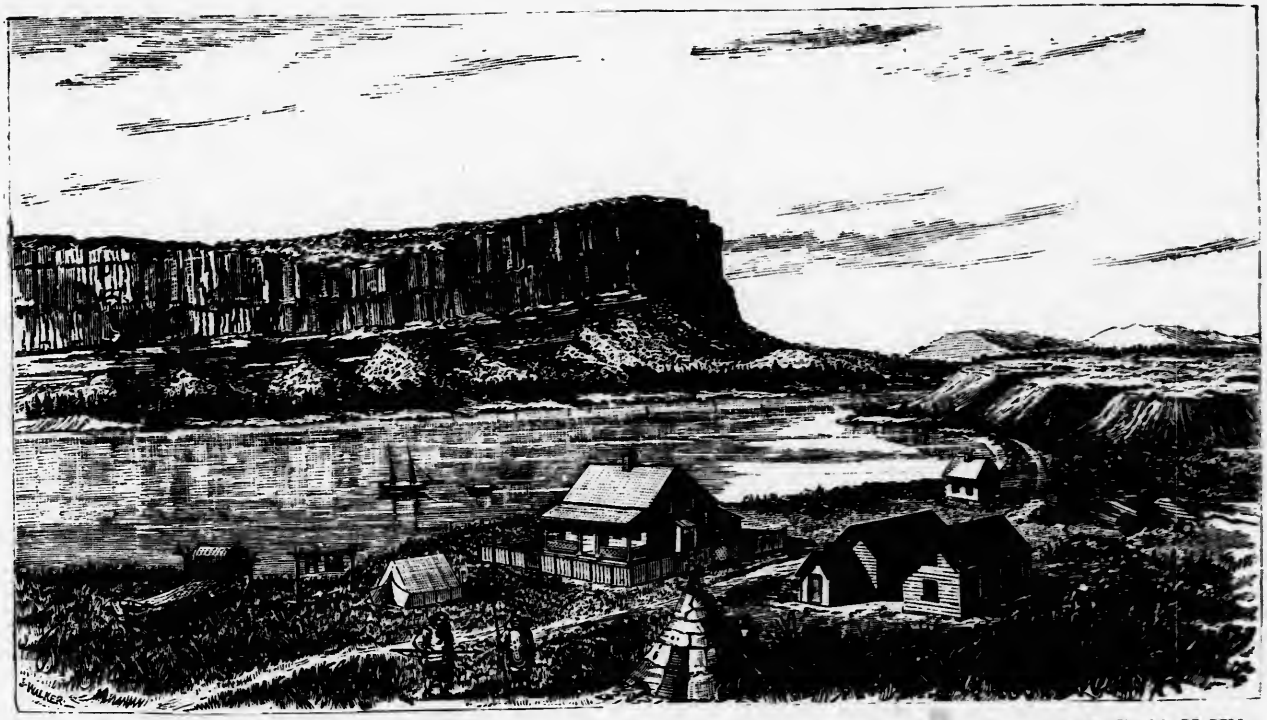
SIR,—I beg to submit the following report on the results of the exploration of the eastern coast of Hudson's Bay (including James' Bay) which I was instructed to make during the season of 1877.

I have the honor to be,

Sir,

Your obedient servant,

ROBERT BELL.



From a Sketch by DR. BELL.

Printed by Geo. E. Desbarats.

THE NORTH BLUFF, LITTLE WHALE RIVER, WITH HUDSON'S BAY CO.'S POST.

Overflows of Columnar Trap, resting on Dolomites and Quartzites.

THE NORTH BLUFF, LITTLE WHALE RIVER, WITH HUDSON'S BAY CO.'S POST.

OVERFLOWS OF COLUMNAR TRAP, RESTING ON DOLOMITES AND QUARTZITES.

REPORT

ON AN

EXPLORATION OF THE EAST COAST OF HUDSON'S BAY,

IN 1877,

BY

ROBERT BELL, M.D., C.M., F.G.S., C.E.

In order to commence operations, I proceeded from Montreal by the easiest route (namely that by way of Michipicoten on Lake Superior) to Moose Factory at the southern extremity of James' Bay. Thence I followed the eastern coast as far north as possible, allowing sufficient time to return to Moose Factory during the season of navigation. The Minister having sanctioned the suggestion that on my return to the post, I should if possible proceed by the Hudson's Bay Company's ship to London, England, with a view of gaining some reliable information respecting the navigation of Hudson's Bay and Strait, the directors and other officers of the Company readily agreed to allow me a passage by their vessel for which they proposed to make no charge. I may be here allowed to add that we were indebted to all the officers and employés of this Company with whom we met during the season, for rendering us any assistance in their power and for many acts of kindness and hospitality.

Route followed.

Ship to London.

Assistance from the Hudson's Bay Co.

No arrangements having been made for obtaining supplies on James' Bay, it became necessary to take along with us everything we might

Transport of supplies.

need for the whole season. Four canoes with an average of three men in each were required to transport this material from Michipicoten to Moose Factory. Leaving the former place on the 11th of June, we reached Moose Factory on the 30th of the same month, the journey having occupied nineteen days. The distance by the canoe route is 400 miles. Our loads, which amounted to between 6,000 and 7,000 pounds, and the four canoes to about 1,500 more, required to be carried on the men's backs twenty-seven times, past falls, chutes and the height of land, and the whole or the greater part of the load upwards of a dozen times more, making in all some forty portages or "demi charges." No accident of any consequence occurred on the trip, and the whole of our supplies were delivered at Moose in perfect condition.

In order to save expense, immediately on arriving at Moose Factory five of the party were paid off and sent back in one canoe to Michipicoten.

As it was considered very desirable to have a geological "traverse" made of the country between James' Bay and Abittibi Lake, to which the explorations of the Survey had already extended from the southward, Mr. A. S. Cochrane, one of my assistants, was instructed to make a track-survey of the Abittibi River to the lake of the same name, while I proceeded with the rest of the party to explore the east coast of James' and Hudson's Bays. Mr. Cochrane performed this duty successfully, and returned home in the month of September.

Survey of Abittibi River.

Through the courtesy of S. K. Parson, Esq., the gentleman in charge of Moose Factory, I obtained the use of a schooner's jolly-boat for the coast journey. My crew consisted of four voyageurs from Lake Superior, and one assistant. Two Indian guides belonging to the country were tried in succession, each for a short time, but as they proved to be worse than useless, we were obliged to depend entirely upon ourselves both in going and returning; and having taken unceasing care to provide against every contingency, we met with no mishap whatever during the whole of the round trip.

Boat and crew for coasting voyage.

Starting from Moose Factory on the 7th of July, we worked northward till the 24th of August, when we turned to come south again. We reached the south-eastern extremity of Portland Promontory—the most conspicuous point or headland on the east coast of Hudson's Bay, and which having as yet no name, I propose to call Cape Dufferin, in honor of the Governor-General of the Dominion. This Cape is situated at about 600 miles from Moose Factory, or nearly two-thirds of the distance from that place to Hudson's Strait. While going northward, as we followed the coast closely the whole way from Rupert's House, our track was probably upwards of 800 miles in length. In returning we touched at many points and islands which we had not an oppor-

Furthest point reached.

tunity of examining on the way up. Altogether, I think I have succeeded in obtaining a good general knowledge of the geology of the whole coast as far as we went.

Cape Jones, in about latitude 55° and directly opposite Cape Henrietta Maria, is considered the point at which we pass from James' Bay into Hudson's Bay, proper. From this point northward the geology became more interesting than it had been to the south, and I made a track-survey of the topography, as well as a careful record of the geology of the coast and islands to our turning point, a distance of nearly 300 miles from Cape Jones. In making this survey the distances were ascertained by means of Walker's patent ship log, the rate of speed of our boat, estimation of short distances by the eye, rough triangulation, and by observations for latitude, while the bearings were taken by compass, the variation of which was determined by numerous observations of the pole star.

Survey from Cape Jones northward.

Having made a *reconnaisance* of the coast from Moose Factory as far as the north shore of Rupert's Bay in 1875 (see report of the Geol. Survey for that year), the geological work of the present season only properly began where that of 1875 terminated. I may here recall the fact that during that season I made a track-survey of the route which we followed the present year from Michipicoten to Moose Factory, which proved to differ less than one per cent. from the correct distance as determined by the latitude and longtitude of each extremity. In passing over the same ground again the present season, a considerable improvement was accomplished in the topography of the large straggling sheet of water called Lake Mattagaming, and a survey was made of Brunswick Lake and River on the west side of the Missinaibi* branch of the Moose. These as well as our surveys of the Abittibi River and of the mouth of the Moose (to be noticed further on) will appear upon the map of the work of 1875. Many additional details which were noted in regard to the geology, cannot be given in the limits of this report, but a few of the more important facts require a passing notice. A narrow band of Huronian rocks crosses Crooked Lake at "the jog" near the middle. They consist of greenish silicious hornblendic and dioritic schists running N. 25° W., and dipping to the westward at an angle of 70°. From the Split-rock, or St. Peter's Portage, for a distance of about a mile down the Missinaibi River, felsites and mica schists are exposed which may belong to a narrow

Continuation of work of 1875.

New surveys.

Map.

Huronian rocks

* The name of this lake and of the river which flows from it to the main Moose River is frequently called Missinibi (Big Water) and it was so written in my report for 1875. Last year, however, I was informed by Mr. John Sanders, a native missionary in that region, and by Mr. Thomas Richards, in charge of the Hudson's Bay Company's post at Brunswick Lake, that the name meant Pictured Water, and that therefore the word should be written Missinaibi.

belt of the Huronian series. The only solid rocks found on the shores of Brunswick Lake and River consisted of Laurentian gneiss.

Lignite beds.

The existence of lignite on the Missinaibi River was referred to in my report for 1875, page 326. During the past season I found it *in situ* in several places on this river between the Long Portage and its junction with the Mattagami. The first or highest of these was in the

Coal Brook bed.

west bank of Coal Brook, three quarters of a mile from its mouth. Coal Brook is a small discharge or channel which leaves the main river opposite the head of the fourth or River-side Portage, and rejoins it at five-and-a-half miles below Round Bay at the foot of Hell's Gates. This bed of lignite is about three feet thick, and is underlaid by soft sticky blue clay and overlaid by about seventy feet of drift-clay or "till," full of small pebbles and passing into gravel towards the top. Much of the lignite retains a distinct woody nature; some of the embedded trunks are two feet in diameter. When dry it makes a good fuel, but contains a little iron pyrites.

Lignite two miles above Woodpecker Island.

On the south-east side of the river, at nineteen miles below Coal Brook or two miles above Woodpecker Island, a horizontal seam of lignite was found in the midst of a bank of "till" 125 feet high. It is from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet thick, and is made up principally of sticks and rushes. Below the lignite are 80 feet of yellow-weathering grey clay, and above it 45 feet of blue clay. Both varieties of clay are full of pebbles, and they also hold some striated boulders of Laurentian gneiss, Huronian schists and unaltered Devonian limestone.

6 feet of lignite five miles from the last.

At three miles below Woodpecker Island, or nine miles above the mouth of the Opazatika (Poplar) River, another bed of lignite occurs in the bank on the same side. It is six feet thick but diminishes to the eastward, and is of a shaly character, being made up of lamminæ of moss and sticks. Immediately beneath the lignite is a layer, one foot thick, of irregularly mingled clay and spots of impure lignite. Next below this are 40 feet of unstratified drift full of small pebbles, under which are a few feet of stratified yellowish sand and gravel. Resting upon the lignite are five feet of hard lead-colored clay with seams and spots of a yellow color, and layers of red, grey, drab and buff. Above all and forming the top of the bank 65 feet high, are ten feet of hard drab clay with striated pebbles and small boulders and holding rather large valves of *Saxicava rugosa*, *Macoma calcarea* (*Tellina proxima*) and *Mya truncata*.

Smaller seams of lignite.

Small seams of lignite were seen in two places in the bank on the same side, at, and again half-a-mile below, the foot of a rapid which occurs about six miles above the Opazatika.

"Bubbling Water."

In the interval between one and two miles above this stream the whole bed of the river appears to be underlaid by lignite. When

sounded with a heavy pole, it has an elastic feel and gives off large volumes of gas, which may also be seen at any time bubbling up spontaneously here and there all along this part of the river. This phenomenon has been observed by the Indians from time immemorial, and the locality has received the name of the "Bubbling Water." A box of specimens of the lignites of the above localities was brought to Montreal for examination. A number of rock-specimens for the museum were also obtained in different parts of the route from Michipicoten to Moose. I also collected a considerable number of fossils between the Long Portage of the Missinaibi Branch and Moose Factory. These have been examined by Mr. Whiteaves, who gives the following provisional list of the species, which shews that the formation from which they are derived is of Devonian age. In my report for 1875, page 316, Mr. Whiteaves gives a list of twelve species of Devonian fossils from similar rocks on the Mattagami branch of the Moose River.

Specimens.

Devonian fossils.

Provisional list of fossils collected between the Long Portage of the Missinaibi branch of the Moose River and Moose Factory.

PROTOZOA.

Stromatopora. (N. Sp.) Apparently undescribed, but possibly an extreme form of *S. concentrica*, Goldfuss. It differs materially from any of the species of *Stromatopora* from the Devonian Rocks of Ontario described by Dr. H. A. Nicholson.

CÆLENTERATA.

Favosites Winchelli, Rominger. Two specimens.

Favosites hemisphærica, Troost, *var. turbinata.* Of the usual turbinate form of this well marked variety, but with exceptionally small corallites.

Favosites polymorpha, Goldfuss. A portion of a branch.

Alveolites. Two species. One a massive form, perhaps identical with *A. vallorum* of Meek from the Mackenzie River; the other a branched, spreading species.

Cladopora cryptodens? Billings. One badly preserved example.

Syringopora Maclurei. Billings. A single specimen.

" *Hisingeri.* Billings. Two or three examples.

Aulopora? (Sp. undt.) Possibly the young state of a species of *Syringopora.*

Cyathophyllum (*Heliophyllum*) *Halli*, Edwards & Haime. One specimen.

" (*Acervularia*) *Davidsoni*, " " " " .

Cystiphyllum. (Sp. undt.) A fragment, shewing only the internal and generic characters.

Diphyphyllum (*Eridophyllum*) *Simcoense*, Billings. A typical but rather small form of this species.

Phillipsastræa Vernueili, Edwards & Haime. Two characteristic fragments.

Zaphrentis cornicula? Nicholson. Apparently the same as a species of *Zaphrentis* figured and described under this name by Dr. Nicholson on page 75 of his second "Report upon the Palæontology of the Province of Ontario," but most

likely distinct from the *Z. cornicula* of Lesuer, which, as Mr. Billings pointed out long ago, is probably a *Heliophyllum*. Dr. Rominger, who regards *Heliophyllum* as synonymous with *Cyathophyllum*, refers Lesuer's species to the latter genus.

POLYZOA.

Dictyonema. (Sp. undt.) A portion of a frond, showing the non-celluliferous side.

BRACHIOPODA.

Strophomena (*Strophodonta*) *concava*, Hall. A cast of a ventral valve.
" " *demissa*, Conrad. One imperfect specimen, but with both valves and most of the test preserved.
Streptorhynchus ? (Sp. undt.) A cast of a ventral valve.
Orthis Vanuxemi, Hall. " " " "
" N. Sp. A small species, with a shallow sinus in the dorsal valve. Abundant and tolerably perfect, but always with the outer layer of the test exfoliated.
Atrypa reticularis, Linnæus. Common.
Spirifera sculptilis ? Hall. Two detached valves, one dorsal, the other ventral. The hinge area is not visible, but in almost every other respect the specimens correspond with the description and figures of *S. sculptilis*.
Cyrtina Hamiltonensis, Hall. One nearly perfect example, with an unusually elongated foramen.
Rhynchonella pleiopleura, Conrad. Two specimens.

LAMELLIBRANCHIATA.

Leptodomus. (Sp. undt.) An immature left valve.
Conocardium trigonale, Conrad. Abundant.
Pterinea textilis, var. *arenaria*, Hall. A cast of a left valve.

GASTEROPODA.

Pleurotomaria. Two species. Too imperfect to be identified with any certainty.

CEPHALOPODA.

Orthoceras. Two species. One, which is marked with narrow, rather distant, longitudinal ridges, may be a cast of *O. profundum*, Hall. The other has a nearly central, moniliform siphuncle, and an apparently smooth surface.

CRUSTACEA.

Phacops rana ? Green. A cast of the head of a trilobite which appears to belong to this species.

The age of the rocks from which these fossils were collected is obviously Devonian and the horizon is probably nearly identical with that of the Corniferous formation of Ontario.

J. F. WHITEAVES.

Glacial phenomena.

Numerous additional observations were made in regard to the glacial phenomena on the route to Moose Factory. Although the striæ are generally well preserved and conspicuous on rock-surfaces which have been protected by a covering of earth or water, yet in

ings pointed
egards *Helio-*
ecies to the

erous side.

ut with both

e. Abundant
exfoliated.

ventral. The
he specimens

sually elong-

certainty.

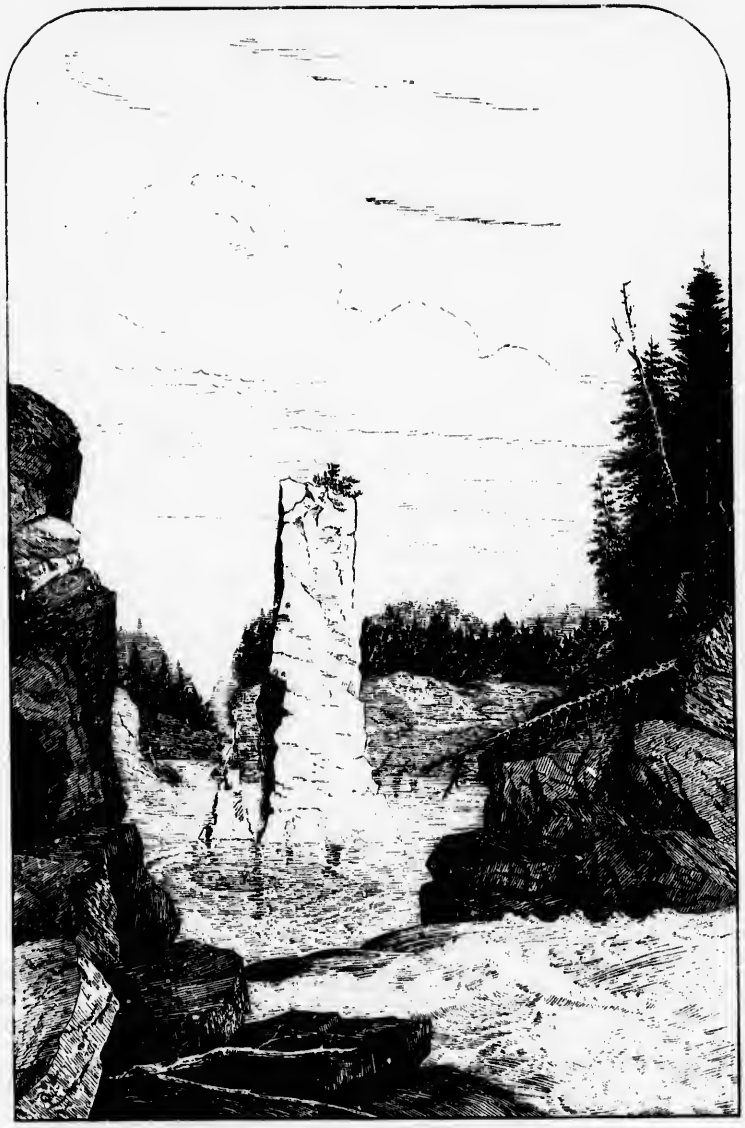
ather distant,
e other has a
a surface.

s to belong to

nsly Devonian
niferous forma-

TEAVES.

gard to the
lthough the
rock-surfaces
vater, yet in



Printed by Geo. E. Desbarats. From a Sketch by DR. BELL.

THE GREAT STONE "CONJURING HOUSE," MISSINAIBI RIVER,

Showing Post-glacial Denudation.

several places there are evidences that a considerable destruction of the solid rock has taken place since the glacial period. Probably the most remarkable of these locations is the Conjuring-house Rapid, where the river passes through a crooked gorge with rugged sides, excavated in the garnet-bearing micaceous gneiss, which here strikes N. 80° E. A curious angular pillar forty or fifty feet high stands perpendicularly in the middle of the rapid. Its proportions resemble, on a large scale, those of the Indian medicine-man's conjuring-house, from which circumstance it derives its name, and the Indians regard it with superstitious veneration. This gorge and pillar are represented in the sketch on the next page. Rock disintegration.

In the bed of the Moose River, near the north side and just below the forks, 46 miles from Moose Factory, a mastodon's jaw with one of the teeth was found by an Indian, who broke out the tooth with his axe and carried it to Moose Factory. Loose pieces of lignite are very abundant in the bed of the river at this locality, and it probably exists here *in situ* under the debris forming the bottom of the stream. Jaw of mastodon.

As mentioned in my report for 1875, marine shells were observed in the drift clays in various places all along the river from its mouth to Round Bay at the foot of the great Laurentian and Huronian plateau, 127 miles from Moose Factory, and elevated about 300 feet above the sea. Upwards of a dozen species were found at the mouth of the river, but the number diminishes in ascending the stream, and only two appear to persist to Round Bay, namely, *Saxicava rugosa* and *Macoma fragilis* (*Tellina grænlandica*). Marine shells.

Soil of the Country between Lake Superior and James' Bay.

In my report for 1875, I gave a general account of the soil, &c., in the region between the great lakes and James' Bay. Following the canoe-route from Michipicoten to Moose Factory, the country is more or less rocky as far as Missinaibi Lake, yet even in this section the proportion of rock-surface to the whole area may be comparatively small. But after passing the "Swampy Grounds," north of Missinaibi Lake, the traveller cannot fail to be struck by the abundance and the general fertility of the soil exposed in the banks of the Missinaibi and Moose Rivers all the way to Moose Factory. It consists mostly of a brownish, somewhat gravelly loam or earth, resting upon "till," and sometimes upon stratified clays or the solid rock, which, however, is seldom seen, except at the principal rapids and falls. But in the central third of the section between Lake Superior and James' Bay, or from the Brunswick to the Long Portage, a light-colored clay usually forms the surface. I examined the country for a mile or two back from the river in several places for the special purpose of ascer- Soil. Rock-surface. Brownish loam. Light-colored clay.

taining the nature of the soil, and found it excellent in all cases, but tending to become more swampy in receeding from the river in the Devonian region below the Long Portage. Samples of the soil were collected in a few places for subsequent examination. In traversing such a great extent of almost unbroken wilderness, one is apt to forget the possible value of this vast region for agricultural purposes. But the examples of the farms at New Brunswick House and Moose Factory shew, upon a small scale, what might be extended over a great part of the country. I have no doubt that at some future time this territory will support a large population.

Agricultural value

Return Journey.

As already stated, Cape Dufferin was the most northern point which we reached on our voyage up the Eastmain coast. Turning southward on the 24th of August, we again reached Moose Factory on the 22nd of September, and learned that the Hudson's Bay Company's ship had sailed for London two weeks before our arrival, which was somewhat earlier than the usual date of leaving. While the necessary preparations for our return by Michipicoten were being made, I surveyed the mouth of Moose River and the vicinity of Moose Factory, and made daily observations for latitude at this post. Leaving Moose on Monday, October 1st, we reached Michipicoten on Monday the 22nd of the same month (having occupied just three weeks on the trip), and I arrived at Montreal on the 1st of November. Having thus briefly sketched our journeys in connection with the season's operations, I now propose to give a short account of the principal results in reference to the Eastmain coast. The great object of the expedition was of course to ascertain the nature and geographical distribution of the rock-formations in the region explored, and to determine the probability, or otherwise, of the existence of valuable minerals. But as already mentioned, I also made what topographical surveys were possible, and obtained, in addition, a large amount of information in regard to the soil and general contour of the country, the characters of the rivers and coasts, the climate, timber, and vegetation, fisheries, natural history and botany of the regions visited, the aboriginies, and, in fact, in regard to all matters which might, at any time, be of interest to the public.

Survey of mouth of Moose River.

Summary of results.

Geology of the Eastmain Coast.

Laurentian Gneiss.—From Rupert's Bay to Cape Jones the geology of the coast is comparatively uninteresting: The rocks consist of Laurentian gneiss with a belt of Huronian schists at Cape Hope, and another at the Paint Hills. The gneiss presents a great variety of

Laurentian series.

characters in this distance, and although I noted descriptions of these for reference in many places, they may not be worth giving at length in the present report. The average strike at Rupert's Bay was west-north-westward, but in going towards Cape Jones it gradually changed to north-west and north-north-west. The following examples of the character of the gneiss (briefly stated) with the strike at a number of localities, arranged from south to north, may serve instead of a more extended description. The directions refer to the magnetic meridian:

Average strike.

Examples of character and strike.

	STRIKE.
1. On S. W. point of Sherrick's Mount Island, gneiss is composed of coarse white felspar and quartz with garnets, interstratified with silicious and micaceous beds; general appearance, light-colored	N. 70° W.
2. 30 miles northward of Rupert's River, very massive coarse greenish and yellowish holding twisted masses of a hard black micaceous character. On the large scale it has a striking barred appearance	N. 70° W.
3. 22 miles, bearing N. by E. from N. point of Sherrick's Mount Island (the interval being occupied by grey gneiss), it is hard, micaceous and hornblendic, with beds of white felspar and numerous disseminated crystals of the same minerals	N. 60° W.
4. The prevalance of felspar characterizes the gneiss all the way from the last locality to the mouth of the East-main (or Slude) River, where the strike is	W.
5. From 5 miles N. of Cape Hope to Paint Hills, 39 miles N. of it, grey and reddish grey	Cortorted.
6. 11 miles N. of Paint Hills light pinkish grey massive gneiss	N. 60° W.
7. 40 miles S. of Big River (Fort George) grey finely-marbled gneiss, dips N. 70° E. $<$ 25°	N. 20° W.
8. From Big River for 10 miles southward, the gneiss is usually contorted. Average strike about	N. 45° W.
9. Governor's Island in mouth of Big River, grey gneiss dips S. 35° W. $<$ 45°	N. 55° W.
10. Esquimaux Point, 1½ mile N. W. of Fort George and near the last locality, grey gneiss dips S. 80° E. $<$ 9°	N. 10° W.
11. 14 miles N. of Governor's Island, reddish gneiss	N. 55° W.
12. 18 miles N. of Governor's Island, reddish grey gneiss	N. 50° W.
13. Islet 18¼ miles N. of Governor's Island; the lamination of grey gneiss is well marked. It holds black patches like embedded boulders	N. 65° W.
14. 20 miles N. of Governor's Island, grey gneiss	N. 65° W.
15. 21½ " " " "	N. 70° W.
16. Wind-bound Point on N. side of North Fishing Creek and 36 miles N. of Governor's Island, grey and red	N. 70° W.
17. Extremity of Cape Jones, three varieties of gneiss; general strike	N. 33° W.

Huronian band of Cape Hope.

Huronian Bands.—On the extreme western point of Cape Hope (island), the rock consists of dark grey hornblendic schist with some lighter and more silicious belts. Most of the schist is divided into small lenticular forms, each surrounded by granular white calcspar, which also occurs in patches and short veins. The rock is cut by numerous straggling veins of mixed calcspar and quartz, intercalated with schist. Some of them are wide, but short. They run in various directions. No metallic ores were obtained in any of them.

Huronian band of the Paint Hills.

The Paint Hills occur on a point with several islands lying off it a distance of about 39 miles north of Cape Hope. The most western or outermost hill on the point appears to be the highest. It has an elevation of about 150 feet above the sea. Here the rounded rocks are in some places, especially along the north-west side, stained reddish and brownish and resemble smooth oxidized surfaces of metallic iron. In some parts they weather to a green color. The rocks at the hills themselves consist of micaceous and hornblendic silicious schists with epidote in crystals and patches and epidosite in masses of varying size. The schists are full of disseminated specks of white iron pyrites which also occurs in small veins of white quartz. They also contain a good deal of white calcspar in the form of partings in the joints and cleavage-planes and also as isolated patches, which might be called granular crystalline limestone. The cleavage runs in two directions—S. 60° W. and S. 40° W., and dips to the north-westward.

Schist conglomerates.

On an islet half-a-mile north of the point, the rock is a dark grey mica-schist full of rounded pebbles of light grey fine grained granite, and of different varieties of silicious schists. The pebbles are mostly small, but some larger than the rest measured about eight inches in diameter. The cleavage runs east and west but the bedding strikes N. 10° W This is clearly shown by a belt of large rounded pebbles and small boulders (the largest being two feet in diameter) closely crowded together; and also by a parallel band close by consisting of soft green schist, which cuts the cleavage of the schist-conglomerate like a vein. A vein of granite composed of reddish-white quartz and very large crystals of white felspar traverses the islet in the same direction. At about six miles northward of Paint Hills, the cleavage of a greenish schist, occurring on an islet, strikes N. 30° W., and dips to the north-eastward at an angle of 70°. The breadth of this Huronian band at right angles to its course may be two or three miles.

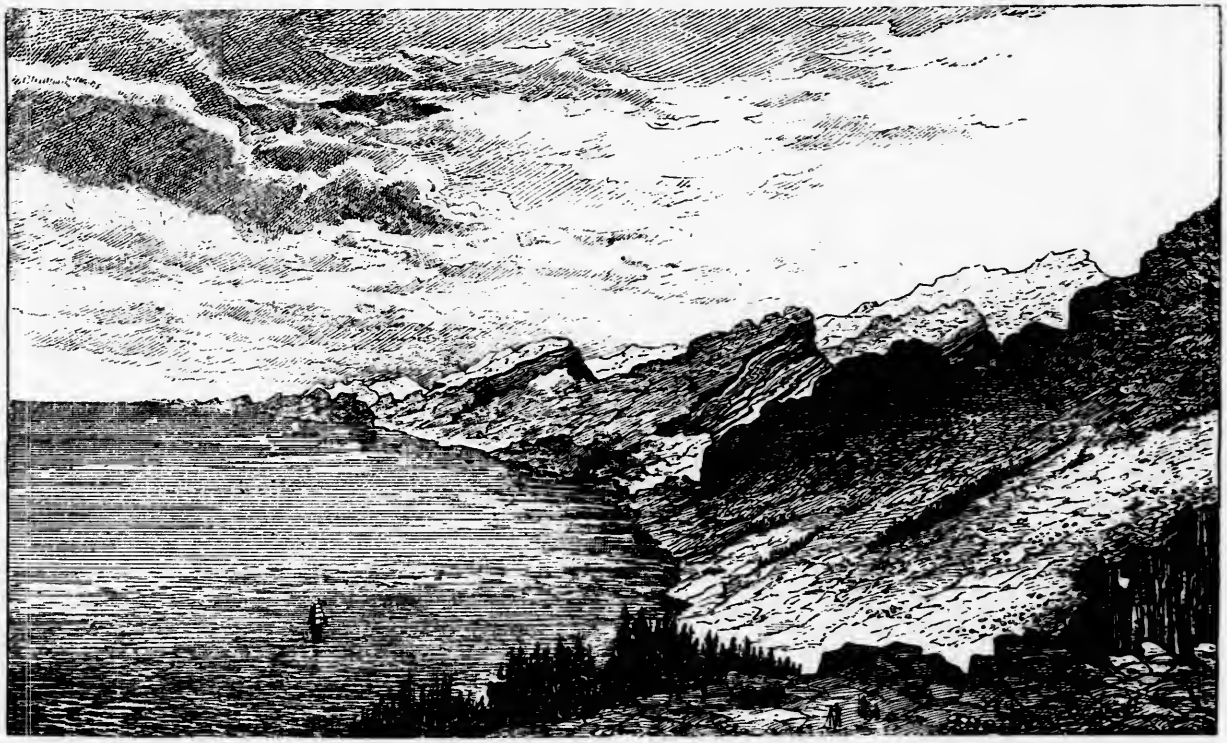
Islands off Paint Hills.

On the outermost islands, several miles to the south-eastward of the extremity of the point at the Paint Hills, the rocks consist of fine-grained dark greenish-grey hornblendic schist, with fine-grained silicious portions. Small veins of whitish granite also occur following the stratification which runs N. 30° W.

Cape Hope
t with some
divided into
ite calespar.
ck is cut by
intercalated
n in various
n.
ing off it a
most western
. It has an
ed rocks are
ned reddish
etallic iron.
at the hills
schists with
arying size.
rites which
tain a good
joints and
t be called
directions—

a dark grey
ed granite,
are mostly
t inches in
g strikes N.
ebbles and
ly crowded
soft green
like a vein.
very large
ection. At
a greenish
the north-
an band at

ward of the
ist of fine-
ne-grained
following



Printed by Geo. E. Desbarats.

From a Sketch by DR. BELL.

VIEW OF EASTMAIN COAST, HUDSON'S BAY, LOOKING N. E., FROM A POINT TEN MILES S. W. OF LITTLE WHALE RIVER.

Columnar Trap resting on Dolomites, Quartzites, &c., all dipping under the Sea.

In the above interval of the coast between Rupert's Bay and Cape Jones, dykes of dark-colored heavy trap were observed in numerous places cutting the gneiss. They varied from a few feet up to 80 feet or more in width. In all cases where their direction was taken it was found to be due north and south (magnetic). I have elsewhere referred to the influence of trap dykes in shaping out the present natural features of the regions to the northward of the great lakes (See Reports of the Geol. Survey, 1870, page 331, and 1875, page 315), and I have little doubt that these north-and-south dykes had something to do with producing the coast-line along which they occur. Trap Dykes. Influence on topography.

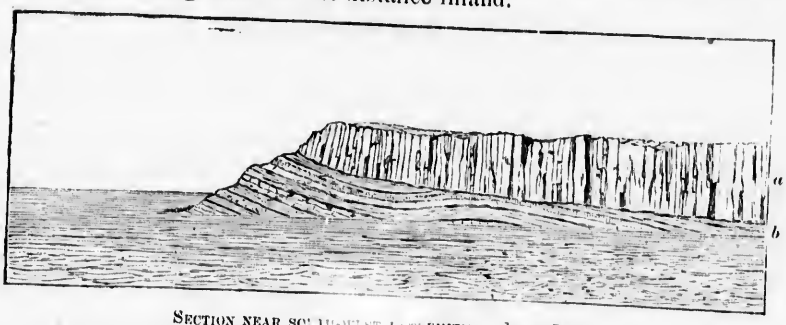
General Character of the Coast.—The outline of the land from Rupert's Bay to Cape Jones is undulating and rather low. The coast is fringed with a great number of islands with long points and peninsulas of the mainland among them. The water between these islands and points and for some distance out to sea is shallow. 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 northern shore 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. From Rupert's Bay to Cape Jones.

From the neighbourhood of Cape Jones, all the way to Cape Dufferin, the coast is of a different character and the rocks are more varied and interesting. The general outline of the land is higher and more uneven and it rises gradually as we go north all the way to the head of Manitounuck Sound. Here it becomes bold, rugged and often precipitous, and maintains this character nearly to the point at which we turned back. From Cape Jones to Cape Dufferin.

The islands along this part of the coast run in regular chains, nearly parallel with the shore, of which the principal are the Manitounuck, Nastapoka and Hopewell chains. Long Island, which begins a few miles north-east of Cape Jones, and measures about thirty miles from one extremity to the other, also lies parallel to the shore. Chains of islands.

Manitounuck Group of unaltered rocks.—The rocks of these islands and of the main shore from Manitounuck Sound to a point north of Richmond Gulf, consist of an unaltered stratified series, in which I could detect no fossils, and which resemble the Nipigon rocks more closely than any other yet described in the Dominion. They might for convenience at present be called the Manitounuck group. They are made up mostly of limestones (generally silicious and argilla- Manitounuck group of rocks.

ceous), sandstones and quartzites, shales, ironstones, amygdaloids and basalts. The strike corresponds with the general course of the shore and with the chains of islands. The dip is at a low angle (generally 4° or 5°) to seaward and consequently all the escarpments of the islands are on the side next the main shore, and those upon the latter all face inland. Many of the latter rise to a height of 700 feet or more above the level of the sea. At Little Whale River, a grey quartz conglomerate of great thickness occurs below these rocks; but the limestones, which are bluish-grey and generally silicious or argillaceous, are found in most localities at the base of the series. They usually occur in thick beds and contain cherty concretions having a concentric structure. The quartzites and sandstones come next in ascending order and also occur in massive beds. They vary in color from very light to very dark grey, and a few beds are reddish. Associated with the quartzites and overlying them is a series of cherts and shales mostly darkly colored. These are surmounted by a great thickness of amygdaloids of various kinds and by diorites of a basaltic character. The last mentioned rocks occur in patches on Long Island and as an almost continuous capping on top of the islands of the Manitounuck chain. From Manitounuck Sound to Richmond Gulf, the main shore consists of very massive beds of amygdaloid with the underlying basalts, shales, quartzites and limestones appearing in the cliffs at a greater or less distance inland.



SECTION NEAR SOUTH-WEST EXTREMITY OF LONG ISLAND.
a. Overflow of columnar trap. *b*. Ferruginous beds, slightly unconformable to trap.

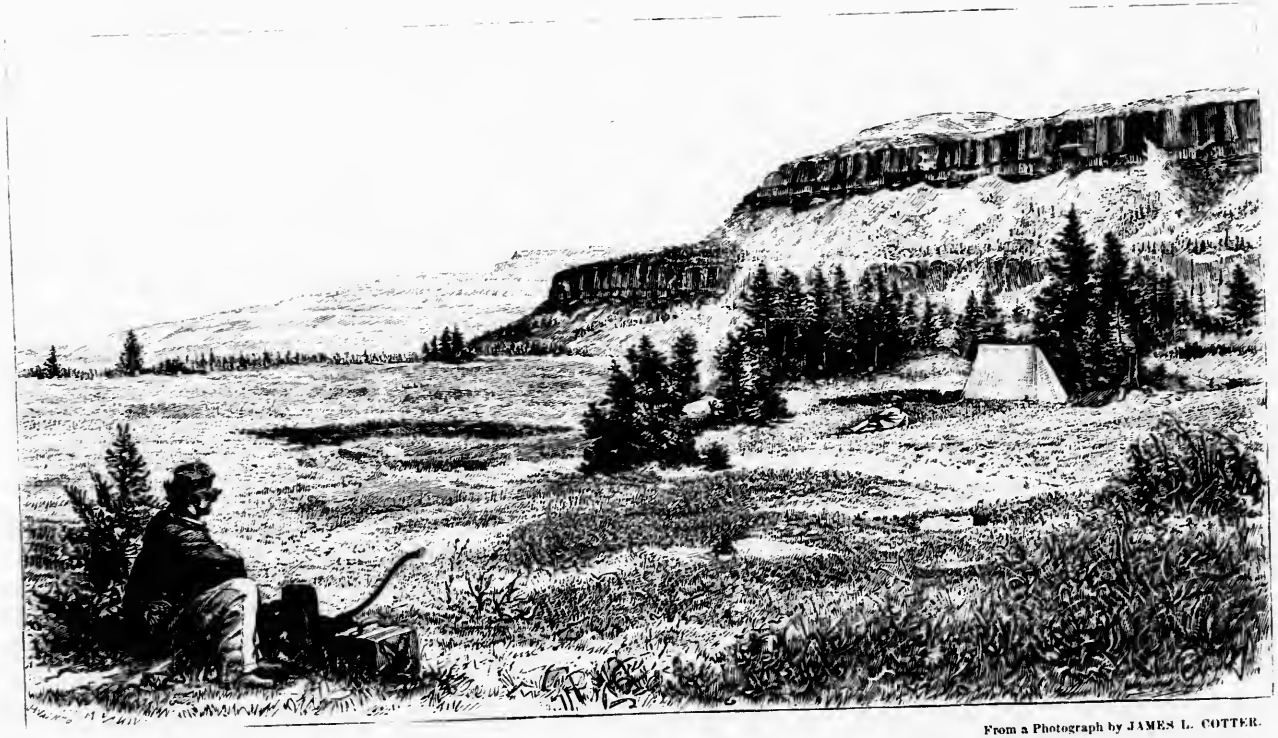
Nastapoka and Hopewell Islands.

The Nastapoka and Hopewell chains of islands consist of quartzites and shales with ironstone bands capped by basaltic diorites in some places. The general run of all these rocks is interrupted by numerous very low transverse anticlinals. The effect of this structure, under the powerful glacial denudation to which the whole country has been subjected, has been to cut out the channels between the islands and to give to each of the latter a crescent-like form, the convexity of each island being towards the main shore. The gaps through which Little

oids and
he shore
enerally
s of the
he latter
or more
quartz
but the
argilla-
They
aving a
next in
n color
eddish.
cherts
a great
basaltic
Island
of the
Gulf,
d with
ing in

trap.

zites
some
erous
r the
been
nd to
each
ittle



From a Photograph by JAMES L. COTTER.

Printed by Geo. E. Desbarats.

HILLS ON SOUTH SIDE OF LITTLE WHALE RIVER, EASTMAIN, HUDSON'S BAY.

Trap, Dolomites, Quartzites and Shales, resting on Sandstones and Conglomerates.

Whale River and other streams find their way to the sea, have also had a similar origin. There are also many similar gaps in the hills, which were at one time occupied by water, but which are now more or less filled up with sand or shingle, and some of them are elevated to a considerable height above the sea-level.

Instead of describing the rocks of the various islands of the Nastapoka chain and of the mainland opposite to them, I shall give a few representative sections, which will be more convenient for reference. Other details of the geology are given on the accompanying map.

Section north side Little Whale River.

The following is an approximate ascending section of the rocks exposed in the cliffs in the vicinity of the lead mine, three miles north-eastward of the Hudson's Bay Company's establishment at Little Whale River:—

	FEET.
Massive compact bluish dolomites, with chert, of which are exposed about	70
The lead-bearing band of a similar character to the last, but somewhat drusy	30
Thick-bedded bluish-grey dolomite	20
Interval concealed, about	100
Dark flaggy argillites and shales	40
Flesh-colored, pink and grey quartzites	60
Trap-overflow in five layers, about 250 feet in all, of which there are exposed near the lead mine about	50
	370

The general appearance of these cliffs, and the great trappean overflow which surmounts them, is shown in the accompanying view. The above section begins on high ground, and the total elevation of the top of the cliff of rudely columnar basalt, followed by amygdaloid, is probably upwards of 700 feet above the sea.

Section south side Little Whale River.

On the opposite or south side of the Little Whale River, some of the hills appear to be over 1,000 feet high. An approximate ascending section of the cliffs shown in the accompanying view would be as follows:—

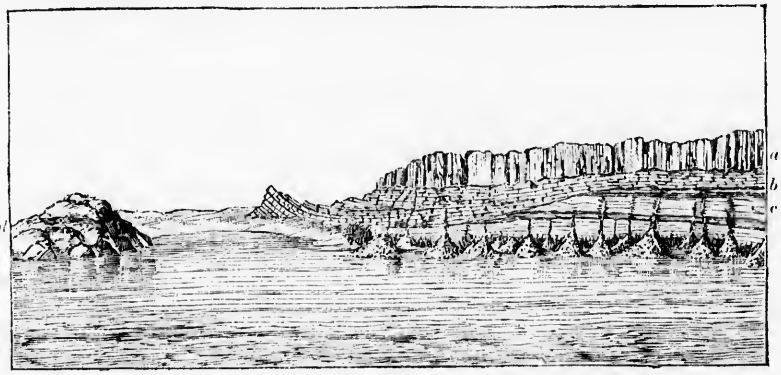
	FEET.
Coarse grey and reddish-grey somewhat altered sandstone with conglomerate layers, and conglomerate with sandstone layers; the pebbles are mostly quartz. The total thickness is probably double that exposed at the base, namely	150
Concealed, but probably a continuation of the last, overlaid by bluish-grey dolomite	350
The lead-bearing band of compact bluish-grey dolomite	35
Massive blue dolomite	30
Concealed about	300

	FEET.
Yellow-weathering compact blue dolomite	40
Single band of solid grey sandstone	5
Thinly-bedded grey sandstone, with ripple-marks, and hard flaggy and shaly argillite	100
Bluish-grey diorite, porphyritic in parts—least thickness	50
	1060

Castle Peninsula.

In the south-western part of Richmond Gulf, and on the north side of the outlet, a remarkable castle-like peninsula rises to a height of seven or eight hundred feet. The lower part consists of coarse grey sandstone passing into conglomerate, with white quartz pebbles, like that of Little Whale River, while the upper part consists of limestones slightly unconformable to the sandstones, and all capped with trap. On the same side, and between the Castle Peninsula and the narrowest part of the outlet, a boss of Laurentian gneiss, about 100 feet high, protrudes through the sandstones and limestones, as shewn in the accompanying section.

Boss of gneiss.



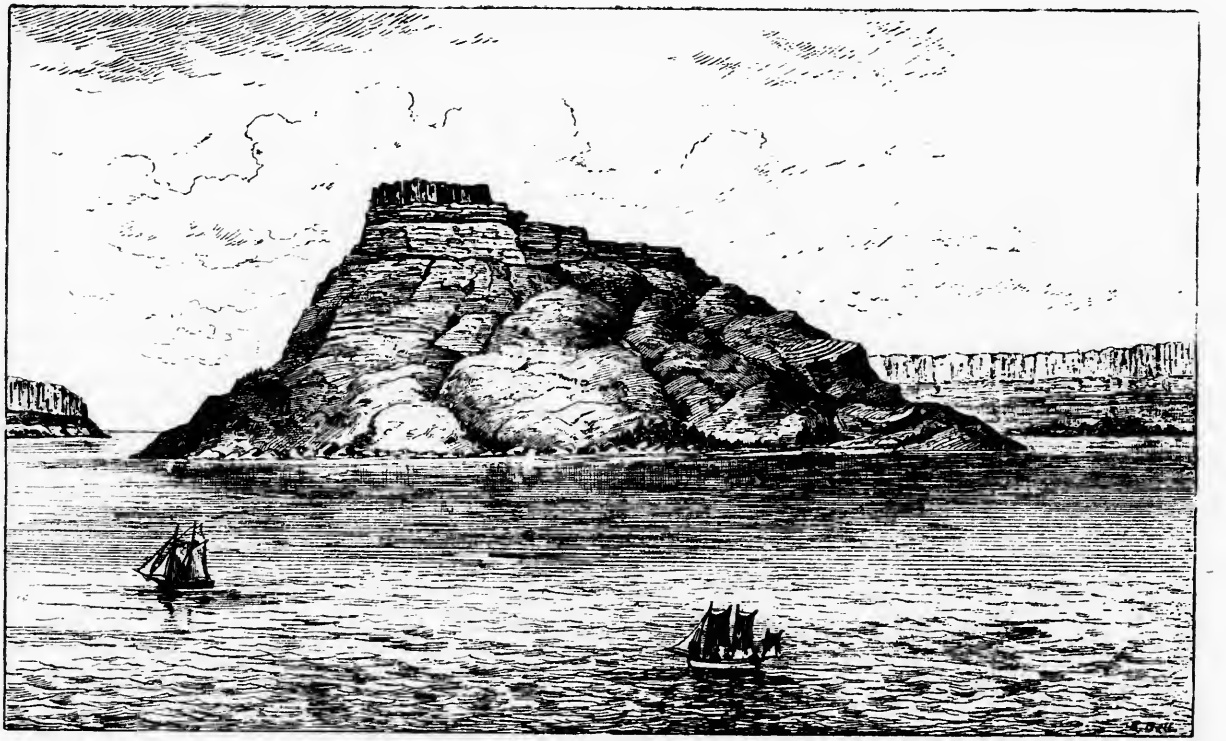
SECTION ON SOUTH SIDE OF CASTLE PENINSULA.

a. Overflow of columnar trap.
b. Dolomite, upturned in approaching gneiss.
c. Sandstone and conglomerate, unconformable to dolomite.
d. Boss of gneiss with sandy bay to east.

Section at Richmond Gulf

On the south side of the outlet of the gulf the following approximate ascending section of rocks is seen rising from the level of the sea:—

	FEET.
Coarse greyish sandstones, upwards of	400
Amygdaloidal trap	150
Bluish, grey and drab dolomites	60
The lead-bearing band of bluish drusy dolomite	20
Thick-bedded bluish dolomite	30
Grey quartzites and argillites	100
Basaltic diorite (followed elsewhere by amygdaloids)	200
	960



Printed by Geo. E. Desbarats.

From a Sketch by DR. BELL.

CASTLE PENINSULA AND OUTLET OF RICHMOND GULF, HUDSON'S BAY, LOOKING WESTWARD.

Columnar Trap. resting on Dolomites and Quartzites with Conglomerates and Sandstones at the Base.

Upon some of the islands in Richmond Gulf, and on its south-eastern shores, reddish-grey quartzites occur, which are generally thinly-bedded and somewhat disturbed. The group of rocks above described appears to overlie them unconformably. These quartzites may, perhaps, be of Huronian age. On the southern side of the gulf a massive crystalline greenish diorite is exposed, which may also be classified as Huronian. Supposed Huronian.

In the high hills to the southward, the upper rocks, at a distance of about two miles from the outlet, dip about N. W. $< 6°$, while those below them, supposed to be the coarse sandstones, dip about S. $< 5°$, shewing a want of conformity, with an angle between the stratification of the two sets of 11°.

The lead-bearing band appears to be frequently exposed in the escarpments from Manitounuck Sound to Richmond Gulf, and along the west side of the latter. Although comparatively thin, it is probably continuous in the above interval, and from its richness in galena may prove of economic importance. Lead-bearing band.

The last of the above sections may be taken as a fair representation of the rocks which form the high and narrow tongue of land, which separates Richmond Gulf from the open sea, and also the first ridge or range of hills all along the coast to the southward as far as the head of Manitounuck Sound. The dip to the westward is very uniform at an angle of about 5°, and the upper beds, which slope under the water all along the outside shore of this narrow peninsula, as well as the continuation of the similar coast to the southward nearly to Manitounuck Sound, are amygdaloidal and usually thickly studded with coarse agates, many of which are very large. They also hold occasional patches of iron pyrites of a curious vesicular variety. Isolated masses of epidosite, from two to twenty feet in diameter, are very common in these amygdaloids. They appear to be of a seggregated or concretionary character. The proportion of the epidote and the intensity of the green colour gradually increase from the circumference to the centre of each mass. On the extensive bare rock-surfaces along the sea-shore, they generally break up, under the weather, into angular fragments which become removed by some natural process leaving round pits or holes to mark the former positions of the epidotic masses. Uniform dip. Epidotic concretions.

The Nastapoka chain of Islands begins near Little Whale River and runs northward, nearly parallel to the coast, for about ninety miles. It consists of fourteen principal islands, all of a crescent-like form, narrow and destitute of trees, with numerous smaller islands between them. Some of them are five or six miles long. Their distance from the main shore varies from two and one-half to five miles. The general dip is westward towards the open sea at angles varying between about 3° and 6°. The structure of each island resembles that of all the Nastapoka Islands.

others, the rocks of the whole chain belonging to one set, illustrated by the sections which follow. The first represents approximately, in ascending order, the strata of Belanger's Island, lying off the entrance to Richmond Gulf, the most southern large island of the chain.

Section at Belanger's Island.

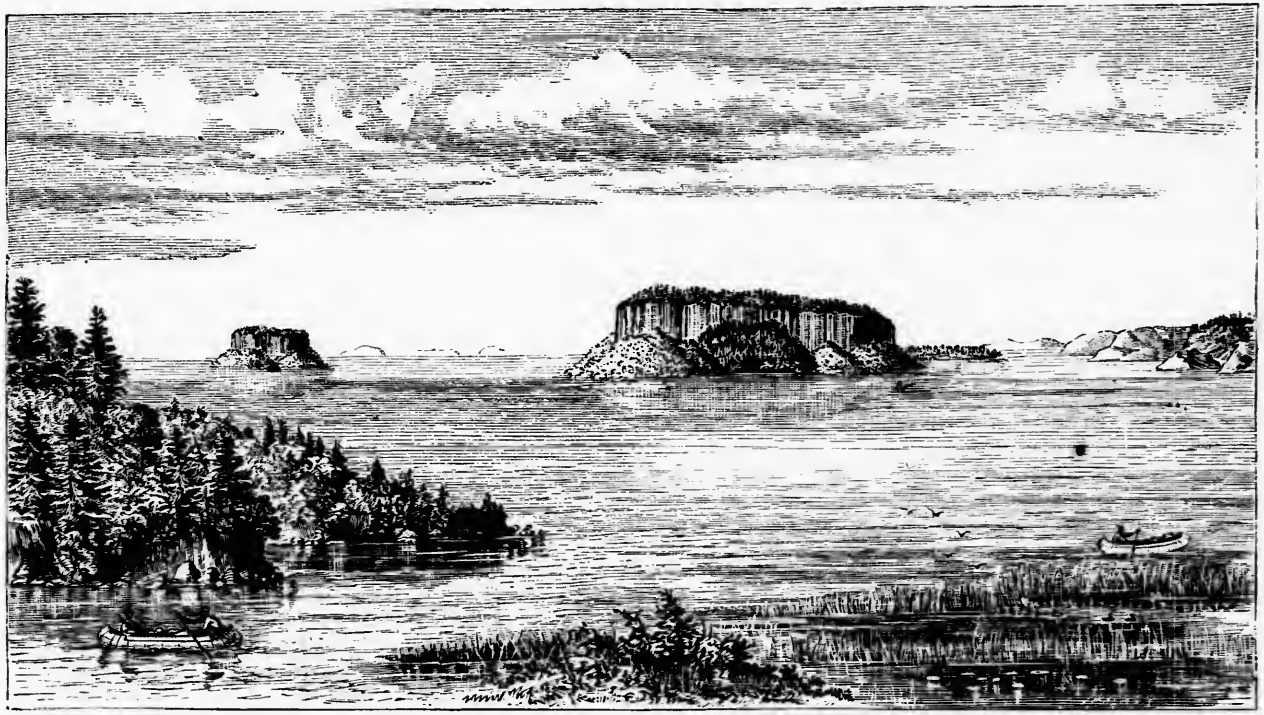
	FEET.
1. Bluish dolomite, weathering yellow, all in large concentric masses with olive-green slate between. These large masses are again formed of small concentric concretions, two to six inches in diameter	10
2. Olive-green silicious slate	20
3. Interval of concealment, thirty or forty chains wide, between the eastern edge of the island and the base of the talus, occupied by numerous small ridges and ancient beaches of coarse shingle up to forty feet above the sea, which with a dip of 5° would represent a thickness of about	200
4. Greenish silicious shale with grey quartzose sandstone	150
5. Single band of light grey sandstone	10
6. Grey quartzose sandstones interstratified with greenish silicious shales	105
7. Black slate, some of which splits into good flags	15
8. Highly ferruginous impure dolomitic band	10
9. Drab-colored manganiferous spathic ironstone in thin bands, some of which weather brown and others black	18
	538

The upper part of this section forms a cliff rising nearly perpendicularly to a height of 348 feet above the sea. A few chains north of the position of number two in the line of section, some grey arenaceous beds hold small veins of a beautiful olive-green chalcedony resembling jade.

Flint Island.

Flint Island, which is of small size, lies three-quarters of a mile south of Belanger's Island. The rocks here dip S. 80° W. (mag.) < about 7°, and consist of forty feet of grey sandstone, overlaid by sixty feet of felsitic slates and argillites, all capped by thirty feet of beds of manganiferous spathic iron interstratified with greenish argillaceous sandstone. The iron ore, which is in great abundance, divides into thin beds, generally weathering black, and the surfaces have a curious finely reticulated appearance resembling honey-comb. One of the specimens of this ore collected on Flint Island, is found by Dr. Harrington to contain 25.44 per cent. of metallic iron and over twenty-four per cent. of carbonate of manganese. These ores are found in great quantities throughout the whole of the Nastapoka chain of islands and will be again referred to in the section on economic minerals. The lower strata of Flint Island are cut by a vein of white quartz from two to twelve inches thick containing much coarsely crystalline siderite which turns black on exposure to the weather.

Iron Ore.



Printed by Geo. E. Desbarats. From a Sketch by DR. BELL.

VIEW OF THE OUTER AND INNER "BARNS," LAKE NIPIGON, FROM THE MOUTH OF THE WABINOSH RIVER.

Columnar Trap, resting on Dolomites, Quartzites and Shales.

The southern point of the second Nastapoka Island, between four and five miles west of the outlet of Richmond Gulf, presents the following ascending section:— Sections at second Nastapoka Island.

	FEET.
Greenish-grey felsitic slate	20
Greenish sandstone. The surfaces are so completely stained with oxide of iron that the debris resembles a pile of hematite	50
Yellow-and-black weathering manganiferous and spathic ironstone beds.	10
Grey calcareous sandstone with chert	40
	120

This section represents the uppermost strata of the island. At the highest point on its eastern side the following approximate ascending section is presented in a cliff facing the mainland:—

	FEET.
Hard grey, rather thinly-bedded sandstones, with greenish shaly partings	120
Dark greenish-grey massive felsite slate	40
Dark-green argillaceous sandstone, with glossy black surfaces	50
Greyish sandstones with shales—say	90
	300

About three-quarters of a mile north of this place an isolated rock, which we called Gull Islet, rises a few feet above the level of the sea. It consists of massive grey dolomite, full of patches of black chert, and may occupy a place near the horizon of the dolomite at the base of the section of Belanger's Island. Islet of dolomite.

Since the strata of the Nastapoka Islands and of the mainland opposite are comparatively undisturbed and have the same strike and dip, it may be assumed that the measures concealed under Nastapoka Sound are conformable, and would amount to about 1,000 feet in vertical thickness. This, with a minimum of 1,200 feet to represent the strata around Richmond Gulf, and 600 for the rocks of the Nastapoka Islands, would give a total of 2,800 feet as the thickness of the whole (Manitounuck) group on this part of the coast. Not only do the rocks of this group, as a whole, bear a lithological resemblance to those of the Nipigon series, but there is a similarity in the landscapes to which they give rise, which is especially noticeable in the style of cliffs formed by the rudely columnar traps of the two sets, as may be seen by comparing the accompanying sketch, taken at the mouth of the Wabinosh River, on Lake Nipigon, with those representing the escarpments at Little Whale River. Total thickness of strata. Nipigon series.

On one of the islands of the Nastapoka group, which we called Davieau's Island, about sixty miles north of the inlet of Richmond Gulf, the following approximate ascending section was measured. Section at Davieau's Island.

The greatest vertical height of the island is 270 feet. It lies two and a-half miles from the main shore, which here consists of Laurentian gneiss:—

	FEET.
Greenish-grey fine-grained quartzose sandstone	40
Black slates	50
Grey sandstone	45
Black slates	30
Band of red chalcedony	7
Black slates and dark greenish-grey shaly sandstone, with magnetic iron	130
Manganiferous spathic ironstone beds, weathering yellow	20
	322

In continuation of the Nastapoka group is an island lying between two and three miles off the main shore, with a length of six or seven miles, beginning opposite the mouth of the Langlands River. About fifteen miles further north is a somewhat smaller island, lying about two miles off shore. These two islands and the northern half of the last Nastapoka Island, to the south of them, are capped by a considerable thickness of trap, which would apparently occupy a higher place in the series than any of the strata of the preceding sections.

Trappean overflow.

The unaltered rocks, above described, terminate on the mainland (in going northward) between Richmond Gulf and the Nastapoka River, and beyond this limit, Laurentian gneiss holds the shore all the way to Cape Dufferin.

Gneiss begins on mainland.

The Hopewell chain consists of ten principal islands lying between Hopewell Point and Cape Dufferin. They resemble the Nastapoka Islands in form and appearance, but are not so high, and most of them lie closer to the mainland. The rocks of which they are composed appear to be equivalent to the upper strata of the Nastapoka chain. The characters and arrangement of these rocks will be best illustrated by a few sections taken in different parts of the group. The following represents an approximate ascending section on the landward side of the first large island, at a point two miles north-west of the extremity of Hopewell Point:—

Hopewell Islands.

Sections on Hopewell Islands.

	FEET.
Black slate	30
Dark-grey thinly-bedded sandstone	30
Massive light-grey sandstone	10
Black shale with two bands of dark-grey quartzite and one band (three feet thick) of ironstone	40
Fine-grained dark greenish-grey trap (maximum of this locality)	40
	150

On the largest island in the centre of Hopewell Sound, between the

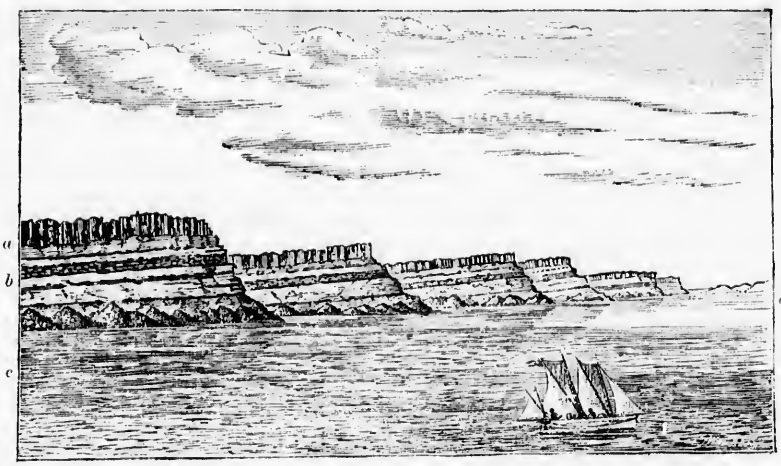
middle of the second island of the chain and the mainland, the following ascending section occurs:—

	FEET.
Black slate and grey quartzite—about	30
Massive dark-grey quartzite—about	60
Very darkly-coloured, somewhat columnar, trap—about	70
	160

At a point, on the landward side of the fifth large island of the group, about three-quarters of a mile north-west of a very narrow strait separating it from the main shore, the following approximate ascending section was measured:—

	FEET.
Black slates and grey quartzose sandstone	30
Light-grey quartzose sandstone	40
Black slate	25
Massive dark-grey quartzite	30
Very dark coarsely columnar trap	45
	170

All the islands of the group have a similar structure, but the relative proportions of the different strata vary somewhat in passing from one to another. The appearance of the inner side of these islands is illustrated by the accompanying sketch, which represents a view north-westward up the first island from near Hopewell Point.



VIEW OF NORTH-EAST SIDE OF FIRST HOPEWELL ISLAND.

a. Overflow of columnar trap.
b. Quartzites and black slates.
c. Hopewell Sound.
d. Main shore—Gneiss.

ECONOMIC MINERALS.

Metalliferous veins.

Owing to the undisturbed nature of the rocks above described, mineral veins are of rare occurrence among them. The few which we

observed were generally small and consisted principally of quartz and calcspar, with either no metallic minerals at all or only crystals and patches of iron pyrites and siderite and occasional specks of copper pyrites.

Lead. *Lead.* In the lower part of the magnesian limestone portion of the series, there is a band about twenty-five feet in thickness of an open or drusy character in which galena, in bunches, occurs in sufficient quantities to be of economic value. In 1858–59, the Hudson's Bay Company obtained nine tons of this ore from numerous small openings which were made about three miles north-east of their establishment at Little Whale River: but it appears to be equally or more abundant in some spots in the same band of limestone on the south side of the river. This band is traceable to Richmond Gulf, at the entrance of which I found bunches of galena in it, which would weigh upwards of a hundred pounds. Specimens from 'the mine' on the north side of Little Whale River which I brought to Montreal in 1875 were found by Dr. Harrington to contain 5.104 ounces of silver to the ton of ore. That from the south side of the inlet of Richmond Gulf he finds to contain, when separated from the gangue, 12.03 ounces of silver in every 2,000 lbs of the ore.

Copper. *Copper.* I was presented with some specimens of pure copper pyrites, associated with calcspar and quartz crystals, said to have been collected in the vicinity of Richmond Gulf, and I found specks of the same mineral in small calcspar veins about one mile north of the entrance to the Gulf. On the landward side of Long Island, about three miles from its south-western extremity, numerous small veins of calcspar and other minerals, which cut the trap, contain specks and small patches of copper pyrites.

Gold. *Gold.* Dr. Harrington has found traces of this metal in the iron pyrites which I collected from a small vein cutting the gneiss on a point about one mile south of Great Whale River and also in that from other small veins in the dolomite which forms Dog Island close to the main shore a few miles north of Cape Jones. The drift of the Little Whale River valley appeared to show indications of alluvial gold, but numerous pannings at the first fall and elsewhere failed to bring any of the precious metal to light.

Silver. *Silver.* Besides the silver in the galena already referred to, this metal was found by Dr. Harrington in the proportion of 0.145 of an ounce to the ton, along with the traces of gold, in the pyrites from both of the above localities. Small veins of pyrites similar to those of Dog Island occur in the similar dolomites in numerous places along the coast. The dolomite on the south-western side of the southernmost of the two islands which form Teska Harbour is

traversed by a group of small parallel veins of white calcspar with iron pyrites all lying close together and measuring from twenty to fifty feet in width. The group runs N. 35° W. and S. 35° E. (mag.) and underlies to the S. W. at an angle of 10° from the perpendicular. The dolomite between the veins of the group is broken into small angular pieces.

Zinc. Blende is found with calcspar in small veins cutting the dolomites on the south side of Little Whale River, and in crystals along with the bunches of galena in the lead-bearing band in other localities. Although it was nowhere seen in economic quantities, its existence is worth noting, as it may be found to occur in larger abundance on this part of the coast. Zinc.

Iron. The spathic iron-stone bands which have been shown to form the uppermost rocks (with the exception of the trap in the three northern islands) of the whole of the Nastapoka chain are found by Dr. Harrington to constitute valuable ores of iron. An average specimen of a compact variety from Flint Island, he finds to contain 25.44 per cent. of metallic iron and upwards of twenty-four per cent. of carbonate of manganese. A crystalline variety from Davieau's Island gave 27.83 per cent. of metallic iron. These spathic ores form a band which would average not less than twenty feet in thickness throughout the whole group of islands, which, as already stated, have a length of about ninety miles exclusive of the more northern islands. The band is divided into layers of a few inches in thickness. The colour, on fresh fracture, presents various shades of drab, buff and brown. The surfaces weather black and various shades of brown. All the beds may not be equally rich but the greater part of them on all the islands visited appear to be sufficiently so to constitute a valuable ore for the manufacture of spiegeleisen. The enormous abundance of the ore is its great feature. Forming the uppermost band on nearly all these large islands, where the dip is so low and the underlying strata confined to the cliffs along their eastern sides, the iron-stone beds are spread over the greater part of their area, which, in the aggregate amounts to many thousands of acres. The islands being destitute of timber and the rocks much shattered by the frost, &c., the ore, ready broken, may be gathered up in inexhaustible quantities. The islands offer good shelter for vessels and the ore might be conveniently loaded in many places. Iron.

Along the landward side of Long Island for three miles from its south-western extremity, highly ferruginous beds, varying from ten to fifty feet thick, some of which may be valuable as ores of iron, are seen near the water's edge, overlying sandstones and shales and underlying compact trap. On an island about one mile long and situated half a

mile south-west of the southern extremity of Long Island, a ferruginous band is seen in a similar position and another higher up, between two thick layers of trap.

Loose masses of a shaly, somewhat argillaceous, bright red hematite were found along the coast in the vicinity of Richmond Gulf and they may have been derived from some of the red bands interstratified with the sandstones, quartzites, &c., among the lower strata around the Gulf.

Magnetic iron-sand is washed out of the drift, in considerable quantities at various places along the coast, such as Great and Little Whale Rivers, near Little Cape Jones and near Langlands River.

Manganese.

Manganese. The spathic iron ores above described being so rich in carbonate of manganese, the black oxide of the metal may be reasonably looked for in some parts of their distribution. The high percentage of manganese in these ores, as already stated, will render them valuable for the manufacture of spiegeleisen, and owing to their abundance and accessibility they may some day be found worth carrying to Europe or the United States.

In my report for 1875, page 324, it was stated that a specimen of black crystalline siderite from near Little Whale River, which had been given to me, contained rather a large amount of manganese.

Molybdenum.

Molybdenum. At Great Whale River I was presented with a specimen of molybdenite said to have been found in the neighbourhood.

Pyrites.

Pyrites. Veins of iron pyrites, in several places along the coast, were mentioned in reference to the occurrence of gold and silver. I also found it in patches in the amygdaloids in the neighbourhood of Richmond Gulf. In 1875 specimens of massive and other varieties of iron pyrites from the region about Little Whale River were presented to me.

Ornamental Stones.

Ornamental Stones.—Among the stones fit for polishing for ornamental purposes may be mentioned the agates, carnelians, epidosites and porphyries of the trappean rocks between the Manitounuck and Nastapoka Sounds. The agates are very abundant in the amygdaloids, and are often of large size, but they are mostly coarse, poorly coloured, and, on trial by different lapidaries, it is found difficult to give them a high polish. The red chalcedony, which occurs as a bed on Davieau's and other islands of the Nastapoka chain, and the olive-green chalcedony, resembling jade, which was found in small veins on Belanger's Island, are suitable for polishing as ornamental stones. The rare mineral axinite, which had never before been observed *in situ* in the Dominion, was discovered in small veins in the trap on the coast, about one mile and a-half south of the mouth of Little Whale River, in crystals, along with quartz, calcspar, epidote, chlorite and asbetsos, and also in the granular form. Both forms are of a purple colour,

and the granular variety takes a high polish. Red jasper, with "floating" particles, like that of the Nipigon series near Thunder Bay, Lake Superior, is found on Long Island. A greyish-green argillite with black streaks, like that which was used by the ancient Indians of Canada for making ceremonial and other implements, was found in a cliff on the north side of Little Whale River. The transparent quartz crystals which abound in the druses of the lead-bearing band of Little Whale River, &c., may be mentioned in this connection. A soft green stone, like serpentine, which the Indians carve into tobacco pipes, is said to be obtained a few miles north of Fort George, but I was unable to find the spot. The rocks in the neighbourhood are Laurentian gneiss.

Dolomite for calcining.

Dolomite for calcining.—The bluish and greyish dolomites, which are so abundant towards the base of the Manitounuck group, are found by Dr. Harrington to contain very little insoluble matter, and to be pure dolomites, well-suited for the manufacture of lime and mortar.

Hydraulic Cement-stone.

Hydraulic Cement-stone.—On Belanger's Island and also on White Bear Island I found a very dark-grey compact rock in rather thin beds, having a conchoidal fracture, and weathering to a bright yellowish-brown colour, which would apparently make an excellent hydraulic cement. Beds, which appear to be suitable for the same purpose, are found in several of the Nastapoka Islands.

Building Stones

Building Stones.—Good building stones, in considerable variety, are met with on the islands all the way from Cape Jones to Cape Dufferin, and on the mainland from Great Whale River nearly to the Nastapoka River. The more massive kinds are found among the dolomites and sandstones or quartzites already described. Although there is little probability of building stones ever being required to any considerable extent on the Eastmain coast, I mention them, and also the materials for making mortar and cement, as there is a possibility of their being wanted in other parts to which they might be most conveniently shipped from this region.

Brick Clays.

Brick Clays.—For the reason just stated, I may also mention that clays, apparently well-suited for making bricks, occur on the banks of the Little and Great Whale Rivers, and in the valleys of some of the smaller streams entering the sea along this part of the coast, as well as in those of nearly all the rivers further south.

Asbestos.

Asbestos was found in small quantities with the axinite, already referred to, about a mile and a-half south of Little Whale River. It was described as occurring in larger quantities elsewhere on the coast, but the localities were not ascertained.

Soapstone.

Soapstone.—The Esquimaux of the east coast and the islands of Hudson's Bay use a grey soapstone for making all their kettles and

lamps, which are frequently more than two feet in length. It is of a tough and durable variety. I have seen holes in several of their kettles, after long use, successfully patched by inserting new pieces of stone cemented with clay. As nearly as I could ascertain from them, the soapstone is obtained not far from Mosquito Bay, latitude 60° 45′.

Flagstones. *Flagstones.*—The black slates and flaggy felsites which abound in the Nastapoka Islands, and some of the thinly-bedded sandstones of the Manitounuck Islands and Richmond Gulf, would make excellent flagstones.

Anthracite. *Anthracite.*—The existence of this valuable mineral on Long Island was referred to in my report for 1877, page 325. It has a conchoidal fracture and bright lustre, and was found by Mr. Hoffmann to contain 94·91 per cent. of fixed carbon and only 0.35 per cent. of ash. It is probable that it does not occur as a seam of altered bituminous coal like ordinary anthracite, but rather as resulting from hardened pitch or a mineral like Albertite, by the loss of its bitumen; and may not exist in large quantities. I was prevented by circumstances from visiting the locality at which it is found, which is said to be on Long Island, at four or five miles from its south-western extremity.

Petroleum. *Petroleum.*—On the Abittibi River, which was explored by one of my assistants in connection with the work of the season, bituminous limestones and carbonaceous shales were found, belonging to the Devonian formation, which have a strong resemblance to the petroleum-bearing strata of the same age in the Athabaska-Mackenzie valley. These rocks occur all along the Abittibi between twenty-nine and thirty-nine miles from its mouth, and in one place the limestone contains a little free petroleum.

Soil of Eastmain.

Soil. Along the east side of James' Bay, from the vicinity of Rupert's House to Cape Jones, there is a strip of country, averaging perhaps twenty to thirty miles in width from the sea shore, which, from all that I could learn from others or observe myself, appears as if it might, some day, have a certain agricultural value. Viewed from the bay, it has a gently undulating aspect, and slopes gradually down to the shore. It is wooded with spruce, tamarac, poplars, and small white birch. At Logs. Fort George I saw a quantity of good spruce logs which had been brought down the Big River for building purposes. Many of them measured two feet in diameter at the butt, and their average age, judging by the rings of growth, was nearly 100 years. The soil of the strip of country just described is generally sandy, often underlaid by stratified greyish clays, which occasionally come to the surface; with boulder-drift, or solid rock beneath all, but either of these also sometimes forms the

surface. The gardens of Rupert's House, Eastmain and Fort George show that potatoes and all the ordinary vegetables thrive well. The Hudson's Bay Company's establishment at Eastmain is maintained for the purpoe of raising stock. The cattle and sheep which we saw there were in excellent condition. Gardens. Cattle.

Climate and Timber.

As stated in my report for 1875, the climate, in going northward from the height of land beyond Lake Superior, does not appear to get worse, but rather to improve, till James' Bay is reached. Among other possible causes, this is owing to the constantly decreasing elevation of the country, the greater length of the summer day in the north, and the accumulation of warm river-water in the head of James' Bay. Climate and Timber.

The original timber along the lower stretch of Moose River has been mostly burnt within the last fifty or sixty years, but whenever the old spruces have escaped, they are of a larger growth than those seen on any other part of the route from Michipicoten. In regard to the distribution of the timber, it is a curious fact that small white elms appear below the Long Portage of the Missinaibi branch of the Moose, after having been last seen on the lower parts of the Michipicoten River near Lake Superior. The northern limit of the white cedar is just south of Rupert's House. At Great Whale River, the white birch exists only as a large shrub. The poplars disappear between Fort George and this river. The tamarac was found nearly as far north as the spruce, which is last seen on the coast near the northern part of Richmond Gulf. The latter tree, however, is said to extend much further north at a distance back from the sea. Northern limits of trees.

During our journey up the coast and back, in the months of July, August and September, we enjoyed very fine weather the most of the time. There was very little rain and only two or three days of fog. The prevailing winds were from the southward and the temperature was warm and pleasant. The superiority of the weather over that of Lake Superior was a subject of frequent remark among my "voyageurs," who had been accustomed to that lake all their lives. We saw no ice, with the exception of a little "bay ice" at the commencement of our journey, which had been driven in to the neighbourhood of the mouth of Moose River after northerly winds had prevailed for many days. Weather.

I took the temperature of the sea upwards of twenty times during our voyage, which extended over the greater part of July, August and September, and found it to average 53° Fah. I also noted the temperature of the rivers which we visited, and found that of the average of five of them to be 61° Fah. We bathed in the salt water almost daily, and found the temperature agreeable. Temperature of the sea. Sea bathing.

Table of temperatures.

The following table gives the result of the above observations and also the temperature of the air at the different times at which they were made. The Fahrenheit thermometer was used, and whenever the sea happened to be calm the instrument was lowered to a depth of three or four feet below the surface:—

Temperature of the Sea, Rivers and Air along the Eastmain Coast in 1877.

		Date.	Hour.	River.	Sea.	Air in Shade.
1	Rupert's River at Rupert's House.....	July 11	10 A.M.	61°		48°
2	Eastmain River, two miles up.....	" 15	9.30 "	59°		66°
3	Middle of great bay south of Cape Hope.....	" 15	2 P.M.		59°	72°
4	Twenty-five miles north of Cape Hope	" 16	12.30 "		47°	65°
5	Eight miles south of Big River	" 17	5 "		47°	57°
6	Mouth of Big River	" 17	7 "	63°		63°
7	Twenty miles north of Big River.....	" 18	4 "		57°	62°
8	Wind-bound Point, thirty-five miles north of Big River.....	" 19	2 "		53°	70°
9	Ten miles E. N. E. of Cape Jones....	" 24	4 "		45°	58°
10	Thirty-six miles north-eastward of Cape Jones.....	" 25	7 "		52°	73°
11	Fifty-three miles north-eastward of Cape Jones.....	" 26	12.30 "		48°	82°
12	Black Whale Harbour.....	" 26	9 "		53°	
13	Great Whale River opposite H. B. Co's Post	" 28	1 "	68°		82°
14	Do. after two cold windy days.....	" 30	9 "	59°		48°
15	Open sea, forty miles N. of Great Whale River	Aug. 1	6 "		53°	70°
16	"Second" River at fifty-one miles north of Great Whale River.....	" 2	9 A.M.	63°		
17	Off do.....	" 2	9.15 "		52°	
18	South side Richmond Gulf	" 9	11.30 "		61°	68°
19	South point Cairn Mountain Island, Richmond Gulf.....	" 9	3 P.M.		62°	72°
20	Opposite Last or northern Nastapoka Island.....	" 16	3 "		50°	55°
21	Land-locked Harbour.....	" 17	11.30 A.M.		55°	66°
22	South-east of last Nastapoka Island .	" 25	12.30 P.M.		53°	65°
23	Middle of Nastapoka Sd. between N. River and Salmon Fishery Cove..	" 26	2 "		53°	70°
24	Midway between Inlet of Richmond Gulf and Belanger's Island	" 27	6 "		57°	65°
25	Open sea between Great Whale River and Manitounuck Sound.....	Sept. 1	11 A.M.		52°	53°
26	Great Whale River opposite H. B. Co's Post	" 2	2 P.M.	54°		59°
27	Off Esquimaux Harbour.....	" 3	1.30 "		53°	56°
28	Dead dog Cove, after three days' blow	" 6	3 "		51°	58°
29	Mouth of Big River, Fort George.....	" 18	7 A.M.	59°		51°
30	Kimishoo's Bay, forty miles south of Fort George	" 19	7 "		50°	49°
31	Off South Point of Rupert's Bay	" 21	7 "		55°	50°
	Average.....	.....	.....	Of five rivers. 61°	53°	62½°

The average temperature of the air between the 11th of July and the 21st of September, from the above observations, would appear to be 62½°, which is very nearly the mean temperature of the rivers; while the average for July and August would be 65½°. As most of these observations were taken in the morning or the evening, and as the nights were generally warm, owing to the prevalence of southerly winds, this is perhaps not far from the true mean temperature for these two months, and it is only ¾° above the average of the mean temperatures, for these months, of ten principal stations from Halifax, N. S. to Fort Simpson on the McKenzie River. Averages.

On our return to Moose Factory, in the end of September, we found that there had been no frost there all summer and the most tender plants, such as melons and cucumbers, beans, balsams, tobacco, the castor-oil bean, etc., growing in the open air, were still quite green and flourishing. Last summer was, however, probably a finer one than usual. No summer frosts.

From all that I could gather, from personal observation and information from others, it would appear that the climate of the East-main coast, especially beyond the limits of timber, is rather dry in all years. Considerable rain falls in the spring and autumn, but little in the summer, and little snow in winter. I was informed by Mr. Spencer and Mr. Clark of the Hudson's Bay Company that the ice in Great and Little Whale River and the Nastapoka River, which flow through the 'Barren Grounds,' breaks up in the spring about two weeks earlier than in the rivers passing through the wooded regions further south. Rain-fall. Breaking-up of river ice.

Rivers of Eastmain.

Kitchi-sipi or Big River, which enters James' Bay at Fort George, is the largest stream on the coast. It appears to be fully as large as the Ottawa. It is navigable for boats to the first fall, about twenty-seven miles from the mouth. Next in size is the Eastmain River, which seems little inferior to the Big River. The following are the next largest rivers in the order of their apparent volumes: Rupert's River, Great and Little Whale Rivers, Nastapoka River, Seal River. Principal rivers

Fish and Mammals.

The water about the head of James' Bay is so muddy that fishes of all kinds seem to be scarce, still the porpoises resort to certain parts, even here, for the purpose, it is said, of feeding on small fish. In the rivers and brooks flowing into this part of the bay, the fishes most commonly caught are a species of whitefish (smaller than that of the great lakes), pike, pickerel, carp, chub and, in some places, speckled Muddy water. Kinds of fish.

trout. The last-named fish is found here and there in the mouths of streams as far north as our journey extended.

Clear sea-water

In coasting northward, the muddy water disappears on rounding Sherrick's Mount, but the sea has a slightly yellowish tinge nearly as far as Cape Jones. Here it becomes perfectly bright and transparent, and some forms of marine animal life were observed for the first time. The common sea-urchin (*Echinus granularis*, Lam.), which had not been seen to the south, now became extremely abundant, and continued so as far as we went. The common six-rayed starfish (*Asteracanthion polaris*, Müll.), of the Gulf of St. Lawrence, was found in a few places to the north of Cape Jones.

Sea-fishing.

In the channels among the islands between the Eastmain River and Cape Jones, the Indians were catching abundance of fish in gill-nets set in from one to three fathoms of water. These consisted of the whitefish, above referred to, and a large and fine species resembling that of Lake Superior, sea-trout and "rock-cod." The last-named species seldom weighed more than two or three pounds, and was altogether inferior to the common cod, of the existence of which in Hudson's Bay I could get no reliable information. The favourite fishing ground of the natives is at the mouth of Seal River, a short distance south of Cape Jones.

Seal River.

A few miles north of Cape Jones we found the Indians engaged in fishing with gill-nets, set in about two fathoms of water, close against the shelving rocks of the sea coast. They were taking considerable numbers of a fish which is called salmon in this country, and which has a strong resemblance to the common salmon (*S. Salar*) in outline, fins, head and mouth, and the flesh has the same colour and flavour. The average size is, however, smaller, the largest which we saw during the summer weighing only about ten pounds, but many were nearly as heavy. We saw the same fish amongst those caught at Seal River, also in a stream entering Richmond Gulf, and in considerable numbers in the hands of the Esquimaux, near Cape Dufferin. These people had killed them (with spears like those used by the Mic-Mac Indians) in the mouths of small rivers and in narrow arms of the sea. Sea-trout and the "sea-toad," or sculpin *(Cottus)*, were also among the fish taken by the Esquimaux on this part of the coast. The common capeling (*Mallotus villosus*, Cuvier) was occasionally found cast ashore by the waves. Small trout were abundant in the brooks from Cape Jones, northward as far as we went.

Salmonidæ.

Capeling.

Marine mammals.

In regard to the marine mammals, so valuable for their oil, one would require to spend at least a twelvemonth on the coast and to have special facilities for obtaining information, before speaking with much confidence on the subject. During our coast voyage, the common

shore seal were seen about as abundantly as one observes them in the Gulf of St. Lawrence in the summer time, but they may be in much larger number in the breeding season, as is the case in the Gulf, where two vessels have just made a good catch (March, 1878), while most of those who went to the open sea fared but indifferently this year.

Besides the common seal we often saw much larger ones, which, from the descriptions I obtained, I judge to belong to the various species of the large seals of Newfoundland. I may here mention that while making my survey of the mouth of Moose River in the end of September I killed a grey seal which measured eight feet three inches between extremities, and would weigh upwards of 700 pounds. Seals.

White porpoises were seen in considerable numbers all along the coast. In former years they were killed in the months of the Great and Little Whale Rivers by raising a barrier of netted rope (previously concealed in the bottom of the river) after a shoal of them had ascended the stream a short distance during high tide. Once secured in this way, a portion of the shoal, at a time, was imprisoned in a smaller barrier and the animals shot from the bank. Of late years, however, they appear to have learned the danger of passing over the submerged barrier and refuse to enter Great Whale River so long as the barrier remains, and this mode of capturing them has consequently failed. The white porpoise.

The walrus is killed by the Esquimaux, principally about the entrance to Hudson's Straits and around the Belcher Islands. In former years this animal is reported to have been seen occasionally as far south as Little Whale River. On the opposite side of Hudson's Bay walruses are said to have be a seen near Cape Henrietta Maria. The narwhal is occasionally killed by the Esquimaux in the northern part of Hudson's Bay. The walrus. The narwhal.

In the spring, soon after the shore-ice disappears, the polar bear occasionally comes ashore on Long Island and the smaller islands between it and Great Whale River. In the winter they have been known to range as far south as the head of James' Bay. The polar bear.

Superficial Geology.

In the southern part of the Eastmain coast the glacial striæ have a south-westerly course, but in going northward the direction gradually changes till it has become nearly west at Cape Jones. From this point, as far as we went, the course continued to be about west and north of west, or towards the centre of the bay. The grooving is remarkably well preserved on the bare hills and on the rocks generally from Great Whale River northward. In this region one cannot help Glacial striæ.

being struck by the more modern appearance of the glaciated surfaces, than in the inhabited parts of Canada to the south. The following table shows the course of the striæ in sixty-six localities between Sherrick's Mount and Cape Dufferin:

Table of striæ.

Directions of the Glacial Striæ on the East Coast of James' and Hudson's Bay.

[The localities are arranged in their order from south to north, and the bearings are all referred to the magnetic meridian.]

1.	South-west point of Sherrick's Mount	S. 55° W.
2.	Coast 22 miles north of north point of Sherrick's Mount	S. 70° W.
3.	Governor's Island, mouth of Eastmain River	W.
4.	Coast 9 miles north of Eastmain River	S. 45° W.
5.	Western extremity of Cape Hope	S. 50° W.
6.	Coast 5 miles north of Cape Hope	S. 50° W.
7.	Between 5 and 28 miles north of Cape Hope—increasing from S. 45° W. to	S. 55° W.
8.	Paint Hills, 39 miles north of Cape Hope. Two sets—older (?)	W.
	Do. do. do. do. Newer (?)	S. 50° W.
9.	About 3 miles north-west of Paint Hills. Three sets—oldest (?)	N. 60° W.
	About 3 miles north-west of Paint Hills. Intermediate	S. 70° W.
	Do. do. do. Newest (?)	S. 45° W.
10.	Coast 45 miles north of Paint Hills	S. 70° W.
11.	Coast 50 miles north of Paint Hills	S. 55° W.
12.	Between 40 and 60 miles south of Big River, increasing from S. 50° W. to	S. 60° W.
13.	Kimishoo's Bay, 39 miles south of Big River, and islets in vicinity	S. 65° W.
14.	Between 5 and 35 miles south of Big River—S. 70° W. to	W.
15.	Esquimaux Point, Big River, 1½ mile north-west of Fort George	S. 80° W.
16.	Coast 20½ miles north of Big River	W.
17.	Coast 24½ miles north of Big River	S. 80° W.
18.	Wind-bound Point, 35 miles north of Big River	S. 80° W.
19.	North Fishing Creek	S. 80° W.
20.	Last island off south-west Point of Long Island. Three sets—S., S. 60° W., and	S. 80° W.
21.	South-west extremity of Long Island. Striæ in every direction from S. 20° E. (round by S. W.) to W. The two prevailing directions are about S. 5° W. and	S. 65° W.
22.	Long Island, 3 miles from the south-west extremity	S. 70° W.
23.	Long Island, 22 miles from the north-east extremity	S. 70° W.
24.	Long Island, 15 miles from the north-east extremity	S. 65° W.
25.	Cape Jones—extremity	S. 65° W.
26.	Narrows 10 miles east-north-east of Cape Jones	S. 70° W.
27.	Shipastik, 27 miles north-east of Cape Jones	S. 60° W.
28.	Red Head Island, 57 miles north-east of Cape Jones	N. 50° W.

29. Red Head—main shore	N. 80° W.	Glacial striæ.
30. Top of White Bear Island	N. 80° W.	
31. Rocky Point, between Red Head and Limestone-block Point	N. 75° W.	
32. Limestone-block Point, 64 miles north-east of Cape Jones. Older (?) set	N. 70° W.	
Limestone-block Point, 64 miles north-east of Cape Jones. Newer (?) set	N. 80° W.	
33. Near Dead Dog Cove, 2 miles south of Teska Harbour. Older (?) set	N. 70° W.	
Near Dead Dog Cove, 2 miles south of Teska Harbour. Newer (?) set	N. 85° W.	
34. South side of Dead Dog Cove	S. 75° W.	
35. West side of Dead Dog Cove	N. 75° W.	
36. Teska Harbour, 67½ miles north-east of Cape Jones	N. 70° W.	
37. Black Whale Harbour, 69½ miles north-east of Cape Jones.	N. 70° W.	
38. Esquimaux Harbour, 71 miles north-east of Cape Jones	N. 60° W.	
39. Coast 80 miles north-east of Cape Jones	N. 55° W.	
40. Point at south side of mouth of Great Whale River	N. 60° W.	
41. Sides of Boat's Opening, head of Manitounuck Sound	N. 65° W.	
42. Second River, 51 miles north of Great Whale River	N. 60° W.	
43. Black Bear River, 58 miles north of Great Whale River	N. 60° W.	
44. Coast for several miles south and north of Little Whale River	N. 60° W.	
45. Shore at Narrows on south side Cairn Mountain Island, Richmond Gulf. Striæ with same bearing run up to top of hill, 400 feet or more in height	N. 45° W.	
46. Southern point of Cairn Mountain Island, Richmond Gulf, S. 70° W. to N. 55° W., N. 45° W. and	N. 35° W.	
47. North-east side of Cairn Mountain Island	N. 45° W.	
48. Main shore, half-a-mile north of entrance of Richmond Gulf	N. 70° W.	
49. Most southern island of the Nastapoka chain, 5 miles from entrance of Richmond Gulf	N. 80° W.	
50. Belanger's Island, landward side, but south of the centre of the island	S. 60° W.	
51. Belanger's Island, landward side, and opposite the centre of the island	N. 65° W.	
52. Gap in hills about 1 mile north of entrance of Richmond Gulf. Striæ slope up wall of rock	N. 50° W.	
53. Salmon Fishery Cove, 6 miles north of the entrance of Richmond Gulf. Older (?) set	N. 60° W.	
Salmon Fishery Cove, 6 miles north of the entrance of Richmond Gulf. Newer (?) set	N. 80° W.	
54. Coast 25 miles north of entrance of Richmond Gulf. Older (?) set	W.	
Coast 25 miles north of entrance of Richmond Gulf. Newer (?) set	S. 70° W.	
55. Coast between Nastapoka and Langlands River	N. 65° W.	

Glacial striæ.

56. White Whale Point, 54 miles north of entrance of Richmond Gulf ..... N. 70° W.
57. Canon Point, 72 miles north of entrance of Richmond Gulf. N. 55° W.
58. Coast south-east of last (most northern) Nastapoka Island. N. 65° W.
59. Coast opposite last Nastapoka Island, 109 miles north of entrance of Richmond Gulf..... N. 65° W.
60. Coast midway between last Nastapoka Island and Land-locked Harbour ..... W.
61. Two islets 5 miles south of Land-locked Harbour..... N. 80° W.
62. Seaward side of first (or easternmost) large island north-west of Hopewell Head and on main shore opposite... W.
63. Porpoise Cove, Hopewell Sound ..... S. 65° W.
64. Landward side of third island of Hopewell chain. The striæ run up and over brink of cliff 160 feet high..... S. 70° W.
65. Islands off Five-mile Inlet—average course..... W.
66. Head of Five-mile Inlet..... N. 80° W.

Shells in the drift.

The boulder-clays contain numerous shells, of which the most abundant species are *Tellina Grænlandica* (Beck,) *Saxicava rugosa* (Linn., *Mya arenaria* (Linn.,) *M. truncata* (Linn.,) *Pecten Islandicus* (Müll.,) *Cardium Islandicum*, (Linn.,) *C. Grænlandicum* (Chem.) (small), *Astarte lactea* (Brod. and Sby.,) *A. Laurentiana* (Lyell) and *Mytilus edulis* (Linn.)

Subsidence of the sea.

There is abundant evidence that the sea-level is falling at a comparatively rapid rate in Hudson's Bay. Since the Hudson's Bay Company's Posts have been established at the mouths of the various rivers, there has been an increasing difficulty in approaching them with large craft. On the islands and shores all along the Eastmain coast the

"Raised" beaches.

'raised' beaches are very conspicuous at all heights up to about 300 feet immediately near the sea, but, no doubt, higher ones would be found further inland. Drift-wood (mostly spruce) is found almost

Drift-wood.

everywhere, above the highest tides, in a more and more decayed state the higher above the sea, up to a height of at least thirty feet, and in some places up to forty and fifty feet, above which it has disappeared by the long exposure to the weather. Judging by the rate of decay of spruce-wood in this climate its preservation in large quantities, during an 'elevation' of the land, or rather a fall in the water, to the extent of thirty feet, would indicate a change in the relative level of the sea, amounting to perhaps between five and ten feet in a century. The probability that this fall in the sea-level will continue to go on in the

Effect on harbours.

future is worth considering in any proposals which may hereafter be entertained of navigating Hudson's Bay or forming harbours on its coasts.

Record of present level of the sea.

Should Hudson's Bay continue to subside in the future, the rate of fall may hereafter be ascertained by recording its present level in relation to existing features in such a manner as that it may be easily recognized, even after the lapse of hundreds of years. I shall, there-

fore, mention its actual condition in two places, convenient for this purpose, and which are shewn on the accompanying map. The first is at a narrow strait between the eastern side of the fifth island of the Hopewell chain and a point of the mainland which runs up from the south-eastward. The channel is about twenty yards wide. At high tide our jolly-boat, drawing two feet of water, passed straight through without touching, in a course bearing N. 10° W. (mag.), but returning, at low tide, it was necessary to pilot our way with care in a curving channel in the centre. A short distance northward of this narrow passage, the bearing, by compass, up the bay on the north side of the above point, and which is about three miles deep, is east-south-east. Sailing N. 20° W. (mag.) up the centre of Hopewell Sound, at about four miles from the strait, we passed close to the right side of a high island capped with trap, which lies about two miles east of the northern extremity of the large island on our left whose shore had gradually receeded north-westward from the strait, to that distance. Keeping on in the same course, at twelve or thirteen miles from the narrows we were off the entrance of what I named the Five-mile Inlet, from its estimated length.

Five-mile Inlet.

Turning north-east and passing between two high islands, we entered the above arm of the sea, which has a large bay on the left a short distance in. In ascending the inlet, its course turns a little more to the right and at the end of about four miles, it narrows very much, at the same time curving regularly round in the form of a fish-hook, till it has a westward course and then emerges in a lagoon, which runs north-eastward about one mile and terminates at a rapid brook, on which there is a narrow lake a short distance up. The rocks rise steeply on either side of the passage whose narrowest part is at its entrance to the lagoon, where at low tide, it is only five to six yards wide and so shallow that it was necessary for us to disembark in order to pole the jolly-boat through. On the east side of the mouth of the brook at the head of the lagoon, the Esquimaux have built several stone "caches." A second brook enters the northern bight of the lagoon, close to the first, and a third falls in directly opposite. Owing to the narrow connection of the lagoon with the sea, these brooks dilute its waters so that they have only a brackish taste.

Survey of the Abittibi River.

Survey of Abittibi River.

As mentioned in the beginning of this report, a track-survey of the Abittibi River as far as the lake of the same name, was made by one of my assistants, Mr. A. S. Cochrane, who has plotted his work on a scale of four miles to one inch. The following short account of the

river and the geology of its banks is drawn up from Mr. Cochrane's personal description, aided by his notes, map and specimens. The position of the mouth of the river is taken from my own plan of the Moose, and that of the outlet of Abittibi Lake from the late Mr. Walter McOuat's survey of that sheet of water. The distance, in a straight line, between these two points, as thus laid down, is 165 miles bearing S. 12° E. (ast.), while, according to Mr. Cochrane's map, it is 160 miles with the same bearing—a difference of only three per cent. The Abittibi River joins the Moose about eighteen miles above Moose Factory or twenty-five from the open sea. In following the stream itself the total distance to Abittibi Lake was found to be 212 miles, but taking the corrected length of each of the five stretches into which the river may be divided, the aggregate is 186 miles, as follows:

Distances.

1. From the mouth to the Sextant Rapids..... S. 27° W., 39 miles.
2. Sextant Rapids to mouth of Frederick House River S. 5° E., 60 "
3. Frederick House River to Jaw Bone Creek..... N. 83° E., 10 "
4. Jaw Bone Creek to Black River..... S. 13° E., 54½ "
5. Black River to outlet of Abittibi Lake..... N. 89° E., 52½ "

Levels.

Abittibi Lake is about 857 feet above the level of the sea and as the junction of the river with the Moose is about fifty feet above the same level, the total rise in the Abittibi River would be about 807 feet. The first stretch has a swift current like that of the main Moose. A rapid rise takes place in the ten miles about the end of this stretch, or from the fort of the Clay Falls to the head of The Otters. Beginning at fifteen miles higher up the stream, there is a rapid rise for another ten miles, or from the foot of the Long Portage to the head of the Little Long Portage. At the Couchiching Falls, seven miles below the outlet of Abittibi Lake, there is a rise of about fifty feet. In other parts of the river, there are considerable stretches of smooth water between the rapids, in which the current is not too strong for paddling canoes up-stream. The longest of these is between the Long Sault and Duck Deer Rapids, a distance of twenty-eight miles. The following table describes the various portages in their order from the mouth upward to Abittibi Lake:

Portages.

Portages on Abittibi River.

Number.	Name of Obstruction.	Length of Trail in yds.	Nature of Obstruction.	How Obstruction is overcome.
1	Moose River Portage..	225	Rapid.	Demi-charge. Pole upward. Run down.
2	Clay Falls do. ..	1031	do.	Demi-charge. Pole upward. Run down.
3	Sextant Rapid.....	913	do.	Demi-charge. Pole upward. Run down.
4	The Otters Portage...	4129	Falls and chutes.	By the east side trail.
5	The Long do. ...	3442	do.	Portage both ways.
6	Oil Can do. ...	238	Chute.	do do.
7	Birch do. ...	715	Rapids and chutes.	do. do.
8	A Portage do. ...	146	Rapid.	Portage. Pole up. Run down.
9	Rocky do. ...	392	do.	Portage upward. do.
10	Little Long do. ...	942	do.	Portage both ways.
11	Lop-stick do. ...	140	do.	Portage upward. Run down.
12	Island do. ...	(say) 200	do.	Pole up. Run down.
13	Three Carrying Places Portage	(one) 730	Chute.	Portage both ways.
14	Kettle Fall Portage...	150	Fall.	do. do.
15	Island do. ..	(say) 112	Rapid.	Pole up. Run down.
16	The Long Sault (Lower Portage) ...	130	do.	Portage up. do.
17	The Long Sault (Upper Portage) ...	112	do.	Portage both ways.
18	Iroquois Portage.....	150	Fall.	do. do.
19	The Two Portages (Lower)	74	Chute.	do. do.
20	The Two Portages (Upper).....	130	Rapid.	Run down by large canoes only.
21	Couchiching Portage .	564	Fall and chute.	Portage both ways.

Character of country.

The first or lowest stretch flows through a level country overspread with an even covering of drift, and the banks of the river, which are not high, consist of boulder-clay overlaid by more or less sand or gravel and brownish loamy and gravelly earth. In the second stretch as far up as the Three Carrying Places Portage, a distance of forty-five miles, the river runs in a narrow valley with a clayey bottom and rocky hills, varying from 50 to 200 feet, but averaging 100 feet in height, on each side. No high ground was observed near the river throughout the rest of its upward course, except at the Duck Deer Rapids and at a bend nineteen miles, in a straight line, from the outlet of Abittibi Lake, where hills rise on either side to heights of 80 and 120 feet respectively.

Geology.

Geology.

A finely granular buff-colored dolomite occurs in the rapids at the mouth of the river. No rock *in situ* was observed from this point for twenty-nine miles, at which distance a brownish-black carbonaceous

Black shale.

shale is met with in the west bank. It has a low specific gravity, splits with a conchoidal fracture, is easily cut with a knife, yielding a brown powder, and is capable of a high polish. On being sufficiently heated it burns for a short time, and emits a sulphurous odour. This

Devonian limestones.

carbonaceous shale appears to be associated with the Devonian limestones, which crop out about a mile further up, and are seen here and there at the water's edge, under banks of boulder-clay fifty feet high, all the way to the Sextant Rapids, a distance of about nine miles. The limestones, which occur in almost horizontal beds, consist of almost pure carbonate of lime. They are characterized by a prevailing yellowish colour, which, however, is modified with various shades of light grey, buff and pink or red. They are all very soft, have an open or porous texture and low specific gravity and contain the remains of corals. They are more or less bituminous and one of the specimens collected holds a little free petroleum. At the foot of the Sextant Rapids a very light reddish-grey, soft, porous limestone is

Reddish-brown marl.

underlaid by about twenty feet of a reddish-brown or dark chocolate-coloured calcareo-arenaceous marl with irregular green spots.

The southern boundary of the Devonian basin crosses the Abittibi River in a north-easterly direction at the Sextant Rapids, which are at the end of the first stretch of the river. Beyond this point, Laurentian and other crystalline rocks are found all the way to Abittibi Lake. From the commencement of the second to the end of the fourth stretch, the general course of the river may correspond nearly with that of the

Laurentian and Huronian.

dividing line between the Laurentian series to the west and the Huronian to the east. Most of the rocks observed along the second stretch consist of different varieties of gneiss, which need not be here described in detail, but at the Long Portage and the Oil-can Portage, which is the next above it, the rocks are dark-grey (more or less crystalline) felsites; while between Lop-stick Portage and the Three Carrying-places Portage they consist of greenish-grey felspar and mica schists, having calcareous slicken-sided surfaces, and olive-green calcareous quartziferous hornblende schists. A soft blackish semi-crystalline diorite occurs at the head of the Sextant Rapids, but whether in beds or as a dyke was not ascertained. The felsites of the Oil-can Portage are cut by dykes of dark compact diorite. Towards the upper extremity of the second stretch, Mr. Cochrane met with

Granite.

rocks which appear to be light-red and light-grey varieties of granite

of medium texture, but, judging from the hand specimens, one cannot be certain that they are not massive gneiss. Tender grey mica schists, with rusty partings, were the only rocks met with along the third stretch, and also along the fourth, as far as the Duck Deer Rapids, above which gneiss was found for a few miles. In the neighbourhood of the upper extremity of the fourth stretch fine-grained greenish-grey calcareous diorite, with speeks of iron pyrites, was found two miles below the Iroquois Portage and again one mile above the junction of the Black River at the end of this streteh. Compact dark-green diorite with conchoidal fracture occurs on the fifth or last streteh at twelve, and again at nine miles below Abittibi Lake. It holds occasional spots of white chalcedony, and the joints are lined with thin partings of calcspar. In some parts the rock is cut by numerous retieulating silicious strings containing grains of iron pyrites. These diorites are probably a westward continuation of similar varieties described by the late Mr. McOuat as extending westward, past the south side of Abittibi Lake, and whieh he mentions as occurring at the first (or Conchieling) falls about seven miles below the lake. (See Report of Geological Survey for 1872, page 128.) Along the fifth stretch at the Two Portages, and at three other plaees in the twelve miles above them, Mr. Cochrane found grey argillaceous sehists, slightly calcareous and having thin partings of calcspar in the joints. Diorites. Argillaceous schists.

Drift. It has been already mentioned that drift clays similar to those of the main Moose River extend up the Abittibi as far as the Sextant Rapids at the end of the first stretch. Marine shells were observed in these clays for some miles from the junetion of the two rivers. At Moose Factory, I was informed that some years ago a party of Indians had found some large bones in the bed of the Abittibi in this part of its course. From the description, I judged them to be those of an extinct elephant. I have already referred to the discovery of the jaw of a mastodon where the Missinaibi and Mattagami Rivers join to form the main Moose River. Drift.

Some loose pieces of lignite were found on the west bank of the Abittibi a short distance above Big Cedar Creek, about twenty-three miles from the mouth. Lignite.