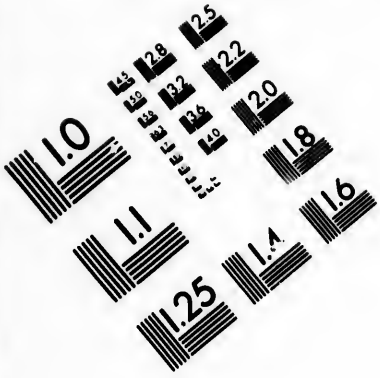

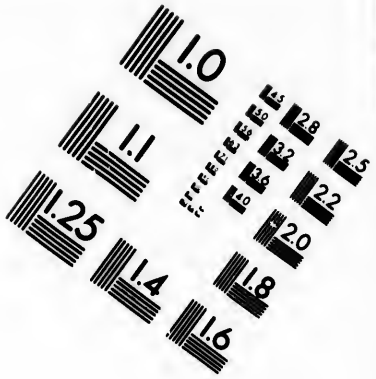

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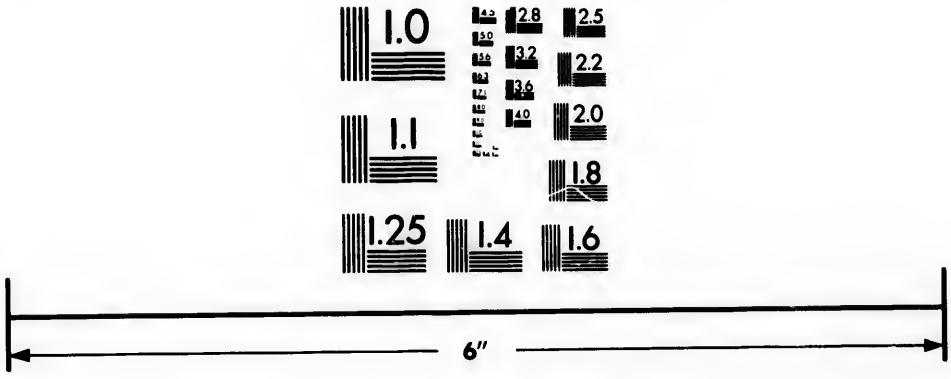

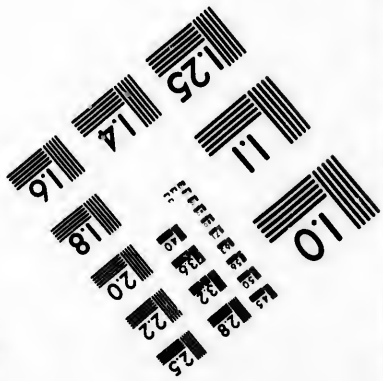

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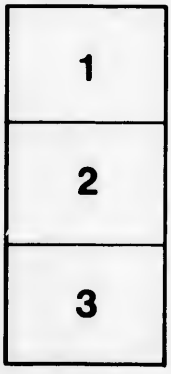

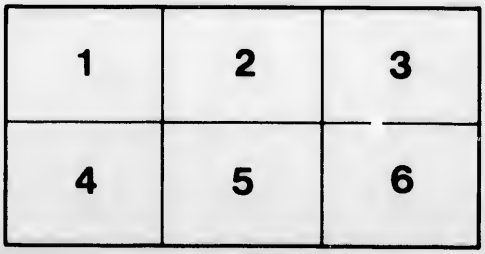

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VIEW WESTWARD IN PRINCE OF WALES SOUND, HUDSON'S STRAIT

SHOWING OUTLINE OF MOUNTAINS IN THIS REGION. ESKIMO TENTS IN FOREGROUND

REPORT

OF THE SECOND

HUDSON'S BAY EXPEDITION

UNDER THE COMMAND OF

Lieut. A. R. GORDON, R.N.

1885.

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REPORT OF THE HUDSON'S BAY EXPEDITION OF 1885, UNDER THE COMMAND OF LIEUT. A. R. GORDON, R.N.

The Honorable
The Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honor to report on the Hudson's Bay Expedition of this year, under my command as follows:—

In accordance with your instructions I left Toronto on April 27th, and after visiting Ottawa, and receiving your final instructions, I went to Halifax to take command of H.M.S. "Alert," to proceed with the purchase of stores, and generally with the organization of the Expedition.

I arrived at Halifax on May 3rd, and found that the "Alert" had been handed over by the Senior British Naval Officer in command at Halifax to Mr. H. W. Johnston, the Agent of the Department of Marine at Halifax. On the morning of May 4th I brought the "Alert" alongside the Marine Department wharf at Halifax, and proceeded with the work of fitting her out for the Expedition.

The "Alert" is a screw steam ship, barque rigged, of about 700 gross tons, and was specially rebuilt for the Arctic Expedition of 1876 under the command of Sir George Nares. She is so constructed as to be capable of resisting great ice pressure, and her engines being only fifty horse power nominal, the screw is small and strikes when the ship is at her load line several feet below the water, so that in every way she was well adapted for the work of the Expedition.

The engines are compound surface condensing and when running at full speed make about 120 revolutions per minute, which in smooth water and calm weather gives the ship a speed of about eight and a half knots. The consumption of fuel when using the best Welsh coal, and steaming full speed, was a little less than six tons per day, but on ordinary occasions with the expansion gear on, the ship would steam about six knots per hour on an average consumption of about four tons per day, and when steaming slowly in slack ice, only using one boiler, we could make four knots on two tons per day.

As soon as the "Alert" was moored at the Marine Department wharf, I requested Mr. W. M. Smith, Chief Inspector of Machinery for the Dominion, to examine the ship's engines and boilers and to order such repairs and renewals as he considered necessary to fit her for the voyage for which she was intended. After the repairs were made, Mr. Smith again inspected and tested the engines and boilers and reported them to be in good order.

The time from May 3rd to the 27th was spent in purchasing and getting on board all the necessary stores, coal, &c., the ship being provisioned on the basis of a crew of fifty for a voyage of four hundred days.

On May 27th, all the stores being on board and the members of the Expedition having joined, we sailed about 11 a.m., leaving the harbor in company with the D.S.S. "Lansdowne."

The following are the names and positions held by the members of the Expedition and Officers of the ship:—

Officers of the ship—Andrew Robertson Gordon, commanding Dominion steamship "Alert," Hudson's Bay Expedition; John James Barrie, first officer; Edward Watts, second officer; David Mooney, chief engineer; W. F. Esdaile, second engineer; W. F. Yeadon, carpenter.

The crew consisted of—2 boatswains, 12 able seamen, 1 lamp trimmer, 6 engineers' crew, 1 chief steward, 1 chief cook, 2 assistant stewards, 1 assistant cook.

The members of the Expedition were—Dr. R. Bell, F.R.S.C., medical officer, geologist, &c.; Mr. James McNaughton, assistant geologist; Mr. Frank F. Payne, Mr. James Tyrell, Mr. John McKenzie, Mr. Percy Woodworth and Mr. Gilbert Shaw, observers.

Station hands—Télesphore Mercier, John Mercier, William Mills, D. Creelman, Robert Yeadon, Albert Boutillier, Frank Paul, Maurice Fleming, G. P. Gooley, A. R. Bissette, J. R. Bowditch, William Smith.

Besides the above mentioned, Mr. D. G. Beaton, editor of the Winnipeg *Times*, accompanied the Expedition as the representative of the company who are interested in the construction of the railway from Winnipeg to Hudson's Bay, making a total of fifty-two persons in all on board at the date of sailing.

All officers and men who were engaged for the Expedition were carefully examined, as to their physical fitness for the work, by Dr. Wickwire, of Halifax, and passed as being in sound health, and of such a vigorous constitution as to be able to withstand the rigors of an Arctic climate.

In regard to the maintenance of discipline, all signed articles under the Canadian Government Vessels Discipline Act, those appointed as station hands signing a special agreement that the Act should be held to be in force in regard to them while ashore at their observing stations, in the same way as on board the ship.

THE VOYAGE.

On getting clear of Halifax harbor, about noon on the 27th, shaped course to the N.E., and steamed along the Nova Scotian coast, passing Scattari Island light at 1 a.m. of the 29th. On 30th May, when off Bay of Islands, about 8:15 p.m., we met a large and apparently compact body of field ice. I steamed to the westward, coasting this pack; and at 9:15 p.m., as it was then nearly dark, I decided to lie off for the night. At 4 a.m. on the 31st started the engines and proceeded to the westward, coasting the edge of the pack; and at 5 a.m., seeing that the ice seemed to extend to the south of west, took the pack, working through to the N.W. This ice was very close, but it was small, and much honeycombed, so that I was able to force the ship through without much difficulty, except on one or two occasions, when it was a little tighter than usual. At 4 p.m. got clear of the pack, having forced through between 35 and 40 miles of ice. I now shaped course for Greenly Island.

On the morning of 1st June I went into Blanc Sablon Bay to fill up with coal and water. I purchased 25 tons of coal from Job Bros & Co., who have a large fishing station here. The wind now set in fresh from the eastward. A good deal of ice came in, passing to the westward through the Straits, and it would have been waste of fuel to go out. I therefore remained here until 4 a.m. of the 4th, when the wind hauled out to the northward. We steamed to the westward under the north shore, finding a steadily widening field of ice, from Point Amour westward, and which filled the whole channel between Chateau Bay and Belle Isle with a tight pack of ice. Close in under the island (Belle Isle) was a narrow streak of open water through which we made our way, and passing close around the north end of the island we headed out through the pack to the eastward. The ice was very heavy, but not very tight together, so that we made good way through it, as long as daylight lasted. As soon as night set in I stopped the engines, and putting the ship under topsails and jib, kept her headed out to the eastward. At daylight on the 5th (2:45 a.m.) started the engines again, and open water being visible from the masthead, headed the ship for it, and got clear of the pack at 3:15 a.m.

5th June.—The edge of the ice at first ran about E.S.E., but at 4:40 a.m. we arrived at its eastern limit and were able to head up to N.N.E. On this course we again made the ice during the day, but whenever ice was reported ahead, the course was altered as necessary to keep the ship on the outer edge of the pack.

There was now lying between us and the Labrador coast about fifty miles of tight and heavy ice and large numbers of icebergs both interspersed through the pack and in the open water to the eastward.

6th June.—Shortly before midnight of the 5th, a dense fog set in which compelled me to take in all canvas and work the engines easy. About 8 a.m. the fog cleared away; took the pack and steamed away to the N.E. all day through heavy ice, which was in some places very closely packed, and in others contained lakes of

open water. At 10:30 p.m. ... was so close and heavy that I stopped the engines for the night.

7th June.—At 1:30 a.m. the wind veered to E.N.E., and the ice slacked off; started the engines and worked the ship to E.N.E., through heavy slack ice and at 9:30 a.m. got clear, shaped course N. by E. ½ E., wind blowing fresh and squally.

8th June.—Wind continued increase during the day, and at 6:30 p.m. was blowing a strong gale from the N.E., the ship lying to under fore-and-aft canvas and easy steam, with a very heavy and confused sea running, and the ship laboring a good deal. On the morning of the 9th, the wind moderated and I stood in towards the land, but shortly before midnight made the ice again and stood off. On the morning of the 10th we had heavy showers of snow, and in the afternoon a fresh gale from the N.W. with a heavy sea. On the 11th we were coasting the ice pack, with numerous large icebergs in sight. At one time thirty of these were in sight. About 9 p.m. of the 12th we were in Lat. 59° N., abreast of the mouth of Nachvak Bay, where station No. 2 had been established in the season of 1884. I headed the ship direct in for the land, which was distinctly visible, and taking the pack at once steamed in till 10:30, when we found the ice so tight and heavy that it was impossible to force the ship any farther to the west. I therefore headed her out to the eastward, and getting clear of the pack, proceeded to the northward.

On June 15th, at 5 p.m. made the edge of the ice about 35 miles east of Cape Resolution, the ice, though heavy, was slack; steamed in, working as near course as possible. At 1:30 a.m. of the 16th made the land—Cape Best. The ice was now run tight together, so we banked the fires and left the ship to pull under a foretopsail and F. T. staysail. To-day sounded at 10 a.m. no bottom at 120 fathoms, temperature at the surface 29°. 9, at 120 fathoms 32°. At 6 p.m. the ice set solid to the ship fore and aft, rafting and piling up all round. On the 17th it was reported to me that the iron stem plate had been broken off some distance below the water. This was a most serious injury, as I dare not drive the ship at all hard through the ice, but as the stem was still covered with boiler-plate sheathing, I thought it possible that we might with care still carry out the voyage. From June 15th to July 6th we were drifting with the ice. At times the ice would run abroad and then the ship was worked under steam or sail, in whatever direction seemed most promising. I append hereto a chart on an enlarged scale, showing approximately our drift in the ice.

We got up steam in one boiler at 6 p.m. on July 6th, and worked the ship steadily out to the eastward, and at 1:50 p.m. on the 8th, having made upwards of a hundred miles to the eastward, got clear of the ice and shaped course to the southward.

The voyage from the Straits to St. Johns, Nfld., occupied seven days, as we were delayed a good deal by fog, but we arrived at St. Johns on the evening of the 15th, and I immediately made arrangements to have the ship put in dry dock and for the forging of a new stem plate. All the repairs were satisfactorily accomplished, and on the evening of the 27th, having taken in a supply of coal, fresh provisions, &c., weighed and proceeded for Hudson's Straits.

Leaving St. Johns as before stated on the evening of the 27th July, we had fine weather and no delay from either fog or ice until arriving off Cape Mugford; here we met the ice again, but it was sufficiently open to steam through without difficulty. At 8:45 p.m. on August the 1st, we anchored in Skynner's Cove, Nachvak Bay, and found that the observers were all well and had passed a very pleasant winter.

On August 2nd, got under way and proceeded for Cape Chudleigh Station (Port Burwell). I took Mr. Skynner on board at Nachvak, leaving his two assistants, Messrs. Jordan and Rainsford, to carry on the work during the summer.

We found scattered ice all the way from Nachvak to the Straits, but at 4 a.m., when off Cape Chudleigh, found the ice run tight together; it now shut down dense fog, which, however, cleared off about 9:30 a.m., the ship had meanwhile got fast in the pack and we were carried nearly through Gray Strait by the tide when still fast, then back again for about six miles, but when the tide was about half ebb the ice slacked off and we were able to steam to the westward. Dense fog again set in

just before we were clear of the Strait, I therefore steamed N. W. (mag.) and lay to in the ice for the night.

On the following morning, August the 4th, observed a vessel in the ice in the Straits, supposed to be the Hudson's Bay Company's ship *Diana*, bound for Fort Chimo. The ice was so thick around the shore that it was with difficulty we were able to work our way into the harbour (Port Burwell), and when in there the ice was jammed so tightly that I walked from the ship to the shore without difficulty.

I found Mr. Burwell and his two assistants well, and they reported having spent a pleasant winter; that the house had been comfortably warm, and the supply of provisions ample and of good quality.

Owing to the impossibility of landing stores over the rough ice which filled the harbour, I arranged to leave Mr. Burwell and his men to continue the work of observing until the return voyage, and on the following morning (August 5th) got the anchor up at 6 a.m. and proceeded for Ashe Inlet.

I had concluded to make for Ashe Inlet, as our experience last year was that the north shore of the Straits was clear of ice before the south, and this was in accord with what the prevailing direction of the wind would indicate as being the probable movement of the ice. Outside the harbour we found the ice heavy, but fairly open for the first ten or fifteen miles, after which we found it tightly jammed and very heavy. At 10:50 a.m. I stopped the engines as we could not make any way through it, as the ice opened in leads from time to time, went ahead making nearly north, true, but not averaging on the whole much more than one and a half knots per hour up to midnight.

All day of the 6th met large quantities of ice, some of it very heavy, but as opportunity offered, worked the ship to the westward; made from noon of the 6th to noon of the 7th about 37 miles, nearly all which was made on the afternoon of the 6th. A little before noon of the 7th the ice ran abroad a little, and we were able to work through at about four knots an hour. During the afternoon we passed the Hudson's Bay Company's two ships, the "Princess Royal" (barque) and the "Cam Owen" (brigantine). We exchanged numbers with the "Princess Royal" and steamed up close to the "Cam Owen" and spoke to Captain Hawes. The latter vessel had been moored to a heavy ice-pan for several days, waiting for her consort to come up.

All of the 8th and up to 6 p.m. of the 9th the ship was jammed, but from this time up to midnight the ice ran abroad a little, and we made about 12 miles to the westward, but the ice closing in at midnight, the ship was again fast, and remained so up to 8 a.m. of the 11th. At this time the ice ran abroad, and at 2 p.m., having made about 22 miles to W.N.W., we were clear of the body of the ice. The weather was now very thick, but, as the ice was very much scattered, we had no difficulty in making our course.

On the morning of the 12th we were lying about 12 miles off the shore and just to the south of the entrance to Ashe Inlet, with clear water to the south of us, but between us and the shore a tight jam of ice. I steamed along the edge of the ice for some distance, and finally decided to try and force the ship in, but at 7 a.m. the ship was tightly jammed about 7 miles off shore. About 11 a.m. the ice slacked off a little, and I went ahead again with the engines. We succeeded in forcing our way in to within about 2 miles of the harbor, when the propeller struck a piece of ice and one of the blades was broken off. Got the screw on deck and attached a new blade, but by the time the work was finished (7 p.m.) the ship was beset, and was being carried to the westward. From this date up to August 21st we were either fast in the ice or working through, endeavoring to get up to Ashe Inlet. On the 17th we got within half a mile of the entrance to the harbor, and Mr. Ashe's two assistants came off to the ship over the ice. They reported Mr. Ashe sick, having, as they thought, sprained his wrist. I still hoped to make the harbor, but by the following morning the ship had been carried far to the westward, and on the 21st, when I gave up the attempt, the ship was between 40 and 50 miles to the westward of the Inlet. At 3:30 a.m. on this day I started the engines and at 7:45 p.m. got

clear of the south edge of the ice. I estimated that we had made about 25 miles from the land to the edge of the pack. At midnight stopped the engines to wait for day light, before making the land on the south shore.

At noon of the 22nd arrived and anchored in Stupart's Bay. We had not passed any ice after 9 p.m. the previous evening, nor was there a single particle visible all along the south coast.

I found here letters from Mr. Stupart stating that, in consequence of famine among the natives, he had been obliged to give them some of his provisions, and that, as the ship was later than he expected in arriving, he had thought it best to leave for Fort Chimo in his boat. As he stated that both he and his men were in excellent health, and as I was aware that he was an experienced boat sailor, I concluded not to go in search of them, but to go on with the voyage. Immediately after the anchor was down we proceeded with the work of landing the stores for Mr. F. F. Payne and party. I may here state the stations to which the officers and men were detailed for the year 1885-86.

Station.	Observer.	Station Hands.
No. 1, Cape Chudleigh.....	G. R. Shaw.....	Telesphore Mercier. John Mercier.
No. 2, Skynner's Cove.....	abolished.	
No. 3 Ashe Inlet.....	J. W. Tyrell, D. L. S.....	D. Creelman. William Mills.
No. 4, Stupart's Bay.....	F. F. Payne.....	Albert Boutillier. Frank Paul.
No. 5, Nottingham's Island	John McKenzie.....	Maurice Fleming. G. P. Gooley.
No. 6, Cape Digges.....	Percy Woodworth.....	A. R. Bissette. J. Bowditch.

At 6 p. m. all the stores, coal, etc., having been landed, we weighed and proceeded for Nottingham Island, where we arrived at noon on Monday, 24th, having encountered no ice whatever on the passage. At this station I regret to have to report the death of one of the station hands, A. D. Inglis, of Halifax. Assisted by Dr. Bell, I separately examined both Mr. De Boucherville and Mr. W. F. Esdaile, the surviving station hand. The examination showed clearly to my mind that the man had died from scurvy, brought on by neglect of the precautions mentioned in the printed instructions. The following is Dr. Bell's report on the case:—

"SS. 'ALERT,' HUDSON'S STRAITS, August 24th, 1885.

"To Capt. A. R. GORDON,
"Commanding H. B. Expedition.

"SIR,—Having asked me to give you my opinion of the cause of the death of station man, A. D. Inglis, which we heard of to-day on our arrival at Nottingham Island, I beg to hand you the following statement:

"Mr. Inglis was left at the station in charge of Mr. De Boucherville in August, 1884; the other station man was Mr. W. Esdaile. The two survivors came on board the ship this afternoon, having been relieved by a new party whose stores have just been put ashore. Soon after Messrs De Boucherville and Esdaile reached the "Alert," we called them into your cabin separately, and in your presence I examined them successively in regard to the illness and death of Inglis, questioning them very fully as to all the circumstances, signs and symptoms of his disease, and on the means which had been employed in the treatment of it. In this way we

obtained a complete history of the whole case. Immediately on Mr. De Boucherville's retiring from the cabin, Mr. Esdaile was summoned and requested to give his account of the case, and to answer a great variety of questions similar to those which had just been put to the former.

"The result, as you are aware, was a complete agreement of the two, and from their statements I have no doubt that the unfortunate men died from scurvy. In describing the case they mentioned nearly all the features which are usually observed in the common form of this disease, as met with on land. I was satisfied, and I think you were also, that the deceased had been kindly and assiduously cared for by Messrs. DeBoucherville and Esdaile, and that no blame can attach to either of them on account of this sad occurrence. As you have requested Mr. DeBoucherville to make a written statement of the case as just related by himself, I need not here report his account of it.

"I have the honor to be, Sir,

"Your obedient servant,

"ROBERT BELL, M.D.,

"*Medical Officer, Hudson's Bay Expedition.*"

The report by Mr. C. V. DeBoucherville states that the unfortunate man spent the greater part of the time during the winter months lying in his bed, and that he was unable to induce him either to take sufficient exercise or to partake of such variety of food as had been recommended by the doctor, and in his examination he stated distinctly that Inglis had not taken his lime juice, as required by the instructions.

It is a noticeable fact that both cases of scurvy which occurred this year were those in which the sufferers had neglected to take the lime juice regularly.

Immediately after the anchor was let go, the work of landing the stores and provisions was commenced, and at 8 p.m. we left for Cape Digges, having landed Mr. McKenzie and his two men and all the necessary fuel and stores. We lay to in the Straits that night and at 10 a.m. on the morning of the 25th anchored in the harbor at Cape Digges, were we found Mr. Laperrière and his men in excellent health, and reporting that they had spent a very pleasant and comfortable winter. I remained in this harbor, shifting coal and taking in ballast till the evening of the 28th, when we sailed for Churchill. Passing to the east of Mansfield Island I took a line of soundings all the way across the bay. We made Knightshill Beacon at 8 a.m. of the 31st, and anchored in Churchill harbor at 2 p.m. the same day; when we found that the Hudson's Bay Company's ship the "Cam Owen" which we had passed in the ice on the 7th of the month, had arrived here two days ahead of us.

I examined the meteorological instruments used here and got all the returns from Mr. Spencer. He reported that last spring had been exceptionally late in regard to the movement of the ice, but that the winter had not been a severe one.

From the 31st August to the 7th September, we remained in Churchill, the weather being very bad; it blew a gale almost continuously from the night of the 31st to the evening of the 6th. On some of the days it was impossible to communicate with the shore. I put up a tide gauge here and had continuous observations taken. I found the rise and fall of the Hudson's Bay Company's wharf to be between 9 and 10 feet, and the velocity of the current at the anchorage at half ebb to be five and a half knots, in the narrows at the entrance of the harbor it runs more rapidly. I estimate the maximum velocity at this point to be about eight knots.

On the morning of the 7th we left Churchill and shaped course across the bay for the North Sleepers, Dr. Bell being anxious to examine their geological formation, and as I wished to test the accuracy of their position as laid down on the chart. On the run eastward a regular series of soundings was taken, the lead being run down every four hours.

We had fine weather all the way across, and made the Sleepers on the afternoon of the 10th, but as the wind freshened so much that we could not have landed from the

boats, I stood out to sea for the night; the following morning (11th) Dr. Bell and his assistant were landed on one of the islands, and I obtained good observations for position. I also made a running survey of the western side of the most northerly portion of this group of islands, and named the islands after those gentlemen who had so generously contributed to Mission Work in Hudson's Bay.

On the following afternoon (12th Sept.) at 6 p.m. we arrived in Port Laperriere, Cape Digges. The 14th, 15th and 16th were spent in shifting coal and taking in ballast and water. On the 13th and 14th it blew a strong gale from the N.E., and on the 15th it continued to blow fresh though not amounting to a gale.

On the morning of the 13th Dr. Bell and party went over in one of the whale boats to the mainland, and the continued blow prevented their getting back to the ship till the evening of the 17th, when I picked them up at sea. At 7 a.m. we arrived off the entrance of Port DeBoucherville, Nottingham Island, and sent the boats in with some additional supplies for the station there. At 8:30 the boats having returned, left Nottingham Island for Ashe Inlet. We made an excellent run to the Inlet, arriving there at 9 on the following morning.

No field ice was met with except a few scattered pans lying off the S.E. end of Salisbury Island; there were, however, quite a number of icebergs, sometimes eight or ten being in sight at one time.

We anchored in Ashe Inlet at 9 a.m., and proceeded at once with the work of landing stores and provisions. Mr. Ashe, the observer in charge, was found to be suffering from an attack of scurvy. He was unable to walk at first, but after coming on board and receiving medical treatment he improved rapidly. Mr. Tyrell and his two assistants were landed here, and at 5 p.m. all stores, provisions, &c., being ashore, weighed and proceeded for Stupart's Bay, where we arrived and anchored at noon on Sunday, the 20th September. On entering the bay the ship touched the bottom aft, but she came off at once without any damage.

The weather was now very threatening in appearance. I, therefore, on the morning of the 21st, shifted berth farther out and at 4 p.m. let go a second anchor. All night of the 21st, the whole of the 22nd, and the morning of the 23rd, it blew a strong gale from the S.E., E. and N.E., with a heavy sea rolling into the harbor. At night on the 23rd the wind went down, and everything for the station having been landed, I left at 5.30 a.m. of the 24th. From this date up to the 29th we had almost continuously, heavy gales accompanied by blinding snow. After 8 a.m. of the 25th I laid the ship to, first on one tack and then on the other, and drifted out of the Straits. On the night of the 28th the wind moderated and I steamed round to the northward of the Buttons, and arrived at Port Burwell at 8 a.m. of the 29th.

The weather had now every appearance of a coming storm, but during the day the wind continued light and we were able to land all the provisions and stores for the station. At 10 p.m. let go the starboard anchor, the wind having increased to a gale from S.W., a heavy sea was coming into the harbor, and the ship rolling and laboring heavily. At 4 a m. of the 30th it was blowing almost a hurricane and the ship was laboring much, with a very heavy sea breaking on the shore astern. I therefore got steam up and had the engines ready for instant use. At 7 a.m. found the ship dragging, went ahead with engines, and weighed starboard anchor, when we found that it was foul and had not been holding. As soon as it was cleared I let it go again, and then weighed the port anchor, which was found to have been broken short off at the crown, both flukes being gone; the bower chain was then shackled on to the sheet anchor, which was let go. The gale continued up to the afternoon of the 1st. On the 2nd and 3rd all hands were employed in getting ballast and water, and shifting coal, but on the 4th, 5th and 6th it was again blowing a gale from the eastward. On the morning of the 7th the wind had moderated, and at 1 p.m. we left for Nachvak, where we arrived at 11 a.m. on the following day.

At Nachvak I received letters from Mr. R. F. Stupart, informing me of his safe arrival at Fort Chimo, and that he had gone down the Labrador coast in the Hudson Bay Company's steamer "Labrador."

As it was not the intention of the Department to continue the station at this point for another year, I took Messrs. Jordan and Rainsford on board, together with all their instruments and unused provisions, and at 5:30 p.m. left Nachvak homeward bound.

The 8th, 9th and 10th were fine days, but on the 11th we had a heavy N.E. gale and a blinding snowstorm, and at 4:30 p.m. the ship was lying to under storm mizen and reefed main trysail; the sea was breaking over us a good deal, and I determined to try the effect of oil. I therefore placed a keg so that the oil should drip through a discharge pipe on the weather side. The effect of the oil was instantaneous, and in the thirty hours succeeding only two seas struck the ship. The total amount of oil consumed was about eighty gallons. One point which was most noticeable was that before using the oil the engine-room hatch and all hatches except the after companion and the scuttle under the topgallant forecastle were battened down, and the water was constantly washing about on the deck; afterwards we were able to open one light of the engine-room skylight, and the decks dried up except for the little water that washed up through the scuppers in the waist as the ship rolled.

At midnight on the 12th the gale had abated and sail was made on the ship, but the engines started at half speed only, as there were still frequent and heavy showers of passing snow.

On the 12th at 9.50 p.m. made Bacalieu Island light, and at 8 a.m. on the following morning we anchored in St. Johns, Newfoundland. I here purchased coal and filled up the water tanks, and leaving St. Johns at 3 a.m. on the 15th, arrived and anchored in Halifax harbor at 3 a.m. on the 18th. After daylight weighed and steamed into the Marine wharf and when the ship was secured, discharged ship's company and station hands of 1884-85.

ICE OBSERVATIONS.

In order that the range of the straits commanded by each station may be fully understood, I have described on the accompanying charts circles representing the horizon limit of the observation post at each station. In locating the observing stations I always had in view the obtaining, if possible, a comparatively sheltered spot for the erection of the dwelling house and then subsequently, selected the observation point from which the ice was to be watched.

The following are the heights of the observing points at the several stations: —

Station No. 1, Port Burwell, height, 250 feet, horizon distance, 18 miles.

Station No. 2, Skynners Cove, height, 90 feet, horizon distance, 11 miles.

At this station observations were frequently made during the spring at altitudes of 400 and 500 feet, and on some occasions at upwards of 1,000 feet.

Station No. 3, Ashe Inlet, approximate height, 250 feet, horizon distance, 18 miles.

Occasionally observations were taken at a height of nearly 400 feet.

Station No. 4, Stupart's Bay, 350 feet, horizon distance, 22 miles.

Station No. 5, Nottingham Island, 120 feet, horizon distance, nearly 13 miles.

Station No 6, Port Laperrière, about 250 feet, horizon distance, nearly 18 miles.

At this station observations were occasionally made at much greater heights.

PORT BURWELL.

Ice Record.

August, 1884.

Record begins on August 10th, when no ice was in sight.

On the 18th. A large iceberg drifted into the mouth of the harbor.

On the 23rd. Several icebergs.

On the 24th. Some of the bergs floated into the harbor and a few were still to be seen in the Straits.

On the 27th. A number of icebergs in the Straits.

On the 29th. The harbor was covered with a thin coating of ice in the early morning.

On 30th and 31st. A number of small icebergs in the Straits.

September, 1884.

On September 4th. No icebergs were in view, nor any seen again till the 9th, from which date to the 18th a number were observed each day, some moving down into McLelan Straits and others into Ungava Bay.

On the 19th and 20th. No ice in sight, but on the 21st a number of small bergs off the harbor and in the Straits.

Icebergs continued in sight up to the 25th, on which day Straits are reported clear.

On the 29th and 30th. A few bergs came in sight.

October, 1884.

October 1st. A few icebergs in sight which appear to move down into Ungava Bay. Icebergs in sight reported daily after this up to the 8th.

On the 3rd. The fresh water lakes were frozen, and on October 5th the first appearance of drift ice; this, however, in quite small fragments and passed away again.

On the 9th. Straits clear of ice.

10th. Two large bergs in sight.

11th, 12th, 13th. A few bergs in sight.

14th, 15th, 16th. Clear of ice.

On the 17th. Four large bergs.

18th. Clear.

19th, 20th and 21st. A few bergs in sight.

22nd. Drift ice and bergs visible in the Straits.

On the 24th. No ice in sight.

25th, 26th, 27th, 28th and 29th. A few icebergs in sight.

On the 29th. The harbor is nearly frozen over.

30th. No icebergs in the Straits, but a few to be seen in Ungava Bay.

31st. No icebergs in the Straits, but small fragments of drift ice collect in the harbor.

November, 1884.

November 1st. Harbor is completely frozen over, but no icebergs or drift ice in sight.

November 2nd. Harbor ice 1½ inches thick, no icebergs in sight.

November 3rd. One iceberg and some drift ice in the Straits.

4th. Shore ice has formed for four or five miles out from the mouth of the harbor, a large belt of ice can be seen in the central part of the Straits extending as far as the eye could reach, the shore ice extends out four or five miles all the way along the coast.

November 5th. Straits contained a great quantity of ice. Ungava Bay is completely covered with ice as far as can be seen, but the ice both here and in the Straits is much broken up.

6th. Harbor ice is now 3 inches in thickness. Ice continues to collect in the Straits and the Bay is covered.

7th. Harbor ice is four inches thick, drift ice continues to collect.

8th. No open water to be seen, ice continues in Straits about 5 inches in thickness.

9th. Harbor ice 6 inches thick, no open water visible.

10th. Harbor ice 7 inches thick.

11th. Harbor ice 8 inches thick. The ice in the Straits is now very rough, being composed of masses of ice piled over each other in all manners of shapes. Some of the fresh water lakes have now ice eighteen inches in thickness.

12th. No open water, harbor ice 9½ inches thick.
13th do do 10 do
14th do do 10½ do
15th. No open water.
16th. No open water, harbor ice 11 inches thick.
17th do do 11½ do
18th. Harbor ice is now 12 inches thick, and the ice in the Straits is much broken up and drifts with the current in places.
19th. Harbor ice 12½ inches thick, Straits' ice much broken up.
22nd. Harbor ice 13 inches.
24th. Harbor ice 13½ inches. On this night a very heavy easterly gale set in and at night it reached the force of a hurricane, the anemometer though firmly secured in its place by heavy, coarse thread wood screws was blown down and the house was lifted from its foundations several times.
At 4 a.m. on the 25th the gale began to abate. Notwithstanding the severity of this gale the condition of the ice remained apparently unchanged.
26th. Harbor ice 14 inches, ice outside unchanged.
27th. do 15 do do
28th. do 15½ do
29th. do 16 do Ice outside very rough, some pieces standing up 8 or 10 feet above the average level.
30th. Straits' ice tightly jammed.

December, 1884.

1st, 2nd, 3rd, 4th, 5th, 6th. No change in ice reported.
7th. Harbor ice 19½ inches thick.
8th, 9th. No change reported.
10th. Ice in the Straits continues to jam and pile up, and is in the roughest conceivable condition. A few icebergs are visible dotted here and there in the field ice.
11th, 12th, 13th. No change.
14th. The ice in the Straits has all frozen together forming a solid mass of field ice, broken only in a few places where there is a current, in which place the ice moves with the tide.
15th, 16th, 17th, 18th, 19th. No change in ice reported.
20th. A narrow current seems to extend from the north along the coast down into Ungava Bay, in which the ice moves to and fro with the tide, and carrying with it large icebergs. All the rest of the ice appears to be stationary, sometimes the ice jams with very great force in this current, causing a roaring sound.
21st, 22nd, 23rd, 24th, 25th, 26th 27th 28th, 29th, 30th, 31st. No change in ice is reported.

January, 1885.

January 1st to 26th. No change.
On the 27th large clouds of vapor rise from the different cracks in the ice.
28th, 29th, 30th. No change reported.

February, 1885.

February 1st, 2nd, 3rd, 4th. No change in the appearance of the ice.
5th. A narrow belt of open water extends from the north down along the coast into Ungava Bay.
6th. The ice in the Straits begins to break up, large ponds of water being visible.
7th. A very great quantity of ice has drifted out of the Straits, there appears to be now as large a space of open water as there is of ice. A quantity of ice has also drifted out of Ungava Bay.

8th. The Straits are nearly clear of ice; Ungava Bay is also open, except a wide belt of ice extending along the coast.
9th, 10th, 11th. Same as 8th.
12th, 13th. Could not see the Straits on account of drifting snow.
14th. The Straits are again completely covered with ice, which is much broken up, and seems rougher than formerly.
15th. Large patches of open water in the Strait.
16th. No open water.
17th. A few patches of open water, some icebergs are interspersed through the pack, and the whole of the ice seems to be moving.
18th, 19th. No change reported.
20th. A large quantity of ice has gone out of the Straits.
21st. Much open water in Ungava Bay, but not much in the Straits.
22nd. No open water is visible, but the ice is all small and keeps moving.
23rd, 24th, 25th. Same as 22nd.
26th, 27th, 28th. A large body of open water is to be seen in the Straits and Ungava Bay.

March, 1885.

1st. No open water to be seen in the Straits.
2nd, 3rd. A few patches of open water.
4th, 5th. No open water to be seen in the Straits, though the whole body of the ice moves with the tide.
6th. No open water, ice is tightly jammed, and in some places is piled up to a great height.
7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th. No open water visible.
16th. The ice on the fresh water lakes is now 5 feet 7 inches thick. A large amount of open water is to be seen in the Straits.
17th, 18th, 19th. A good deal of open water visible.
20th, 21st, 22nd, 23rd, 24th. A small area of open water is to be seen in the Straits.
25th, 26th, 27th, 28th, 29th, 30th, 31st. No open water; ice keeps moving.

April, 1885.

1st. A small quantity of open water visible.
2nd, 3rd, 4th, 5th, 6th. No open water.
7th. A small quantity of open water.
8th. A great quantity of open water.
9th. Much open water.
10th. No ice in the Straits though there is an narrow belt along the coast.
11th. Straits clear of ice.
12th. Only a few fragments of ice in sight.
13th. A small quantity of ice.
14th, Straits completely covered with ice, as far as can be seen.
15th. No open water.
16th. A small quantity of open water.
17th, 18th, 19th. No open water.
20th. A small portion of open water.
21st, 22nd. No open water.
23rd, 24th. A great deal of open water.
25th, 26th. Ice much closed up, a small quantity of open water only to be seen.
27th, 28th, 29th. No open water.
30th. A large quantity of open water to be seen in the Straits. The ice appears in great confusion, pieces dashing against one another with great force.

May, 1885.

1st. A large quantity of open water to be seen in the Straits.
2nd. No ice in the Straits near the coast, but a large quantity is to be seen on the horizon to the west and south-west.
3rd. A large quantity of ice is still to be seen in the Straits, but it appears much scattered and broken.
4th. Only a small quantity of drift ice in the Straits.
5th, 6th, 7th, 8th. Much ice in the Straits to the north, but Ungava Bay is clear.
9th. A small quantity of ice in the middle of the Straits, none on the coast.
10th. A large quantity of ice and a number of icebergs in the Straits. The ice appears to be going out to sea.
11th. Foggy.
12th. A large quantityof ice in long narrow strips, with open water between.
13th. South-west gale.
14th. A great quantity of ice in the Straits and Ungava Bay. This ice is different from any that has been seen here before, consisting of large cakes of solid field ice floating loosely apart, it is not piled up, but smooth.
15th. Straits completely covered with ice.
16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th. Straits and Bay full of ice. No open water visible.
25th, 26th, 27th, 28th, 29th. A small quantity of open water.
30th. No open water visible.
31st. A small quantity of open water.

June, 1885.

June 1st. Open water in Ungava Bay, none in Straits.
2nd. A small quantity of open water in Bay and Straits.
3rd. A large quantity of open water in the Straits.
4th. Much open water.
5th. Not much ice in Straits, but a large quantity on the horizon in Ungava Bay.
6th, 7th. Only a small quantity of ice to be seen in the Bay and Straits.
8th, 9th, 10th, 11th. A large quantity of ice, but floats loosely.
12th. Only a small quantity of open water is to be seen in the Straits. Ice much broken up and appears to be moving out to sea.
13th. Straits are more open to-day.
14th. Straits completely covered as far as the eye can reach. Ice much broken up.
16th, 17th. A small quantity of open water is visible.
18th, 19th, 20th, 21st, 22nd. No open water.
23rd, 24th, 25th. A large quantity of open water is visible in the Straits and Bay.
26th, 27th, 28th, 29th. Straits completely covered with ice.
29th. The harbor ice is melted through in places.
30th. No open water. The ice gets darker in color and is broken up into smaller fragments than before.

July, 1885.

1st, 2nd, 3rd, 4th. No open water.
5th. A large quantity of open water to be seen in the Straits, none near the coast or in the Bay.
6th, 7th, 8th, 9th, 10th, 11th, 12th. No open water.
13th. A few patches of open water.
14th. No open water.
15th. A small quantity of open water.
16th, 17th, 18th, 19th. A great deal of open water shows up.

20th, 21st. The ice in the Straits gets less in quantity, is much broken up and scattered.

22nd. Only a small quantity of ice is visible in the Straits.

23rd, 24th. A large quantity of ice is to be seen, and it keeps moving in and out of the harbor with the tide.

25th. Only a small quantity of ice is to be seen.

26th. Some ice is to be seen.

27th. Some ice in the Straits, none in Ungava Bay.

28th, 29th, 30th, 31st. A large quantity of ice to be seen in the Straits, the ice in some places is in solid fields and in others is widely scattered.

August, 1885.

August 1st, 2nd. The Bay and Straits are again completely blocked, only a small quantity of open water to be seen. The ice looks much cleaner than any that has been seen before.

3rd. A small quantity of open water in the Straits.

4th. Some open water along the coast; none in the middle of the Straits.

5th. A large quantity of the ice has drifted away.

6th, 7th. Much ice still remains in the Straits.

8th. Much ice in the Straits; none in Ungava Bay.

9th, 10th, 11th. Only a small quantity of ice to be seen.

12th. Straits completely covered with ice, only a few narrow belts of open water showing.

13th. More open water to be seen to-day than yesterday.

14th. Only a small quantity of ice to be seen in the Straits.

15th, 16th. A large floe of ice visible in the Straits.

17th, 18th, 19th. Ice still in the harbor; only a small quantity of ice to be seen in the Straits.

20th, 21st. No ice to be seen in the Straits.

22nd. A small quantity of ice visible in the Straits.

23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st. No ice.

SKYNNER'S COVE, STATION NO. 2.

Ice Record.

October and November, 1884.

October 10th. No ice from this date up to 14th November, when the cove is frozen over and the whole inlet covered with young ice.

November 18th. Ice 3 inches thick; this young ice comes in and goes out with the wind.

November 30th. Ice set, across the inlet.

December, 1884.

4th. Ice has made 5 miles out from east point of cove, and from this time forward remains fast.

January, 1884.

The thickness of ice half a mile out from station is 2 feet 2 inches.

17th. Unable to see anything out at sea, owing to fog bank hanging apparently over open water.

23rd. No ice visible out at sea.

26th. Observed field ice out at sea to-day for the first time; some open water still shows.

31st. Observed ice out to sea from West Hill (1,000 feet); ice extended as far as the eye could see.

February, 1884.

7th. Thickness of ice 3 feet 6 inches; temperature of water 28·5° Fahr.

8th. Fog hangs over ice outside.

9th. Ice set well out, some loose ice visible.

14th. Ice as far out to sea as can be seen.

17th. Ice for four miles out from shore, then clear water as far as can be seen from top of West Hill.

18th. From West Hill, ice out for 20 miles, then open water just visible.

23th, 24th, 25th, 26th. Ice outside as far as could be seen.

27th, 28th, Foggy.

March, 1885.

4th. No open water visible out at sea, day clear.

19th. Open water 1½ miles outside the Breaker.

26th. Loose ice and some open water showing about four miles miles out.

Note. The Breaker is a reef which lies about 2 miles outside the entrance of the Bay and the same distance from the south face of Mount Razorback.

April, 1885.

4th. Ice as far out as can be seen.

8th. Ice loose from the Breaker eastwards and seems to be drifting in and out.

14th. Ice loose about 100 yards inside the Breaker, and seems to drift in and out with the tide.

18th. Ice as far out to sea as the eye can reach from top to West Hill (1,000 feet).

19th. Open water from one mile east of S.E. point for 20 miles.

29th. Open water from Breaker eastwards for about 3 miles; outside that is loose ice.

22nd. Loose ice as far as can be seen from a spot between 300 and 400 feet high on the S.E. point of Inlet. Open water all closed in with the rising tide.

24th. No open water visible.

May, 1885.

On the 2nd strong west wind blows ice out of the mouth of Inlet, after this date it continues to swing off and on the coast, occasionally showing strip of open water five to ten miles in width, and then swinging back tight with no water visible.

June, 1885.

1st. Field ice outside blown off and apparently gone south.

10th. Climbed up 400 feet (estimated) on 2nd point east; looking S.E. there is loose ice as far as can be seen; looking east there is a considerable stretch of water widening till clear to the horizon in the N.E.

12th. Open water as far as horizon from anemometer tower (about 100 feet above M.S.L.) ice shows up on the horizon.

13th, 14th, 15th. Ice off the coast as far as the eye can reach, open water only near the shore.

16th. No open water visible.

17th, 18th. Same as 16th.

19th. Ice about one mile from the mouth of the Inlet. A few scattered pieces round the shore.

20th, 21st, 22nd. Ice swings off the coast and back again.

23rd. The Hudson's Bay Officer, Mr. Ford, who is a native of this coast, tells me there are three separate packs of ice recognized as having to pass down the coast each spring. The first is called "Kugiet," or loose ice; the second is in larger pieces and much discolored with sand and dirt, called "Anidlujuck;" the third is clear blue and clean, and is called "Newlowjuck." The second batch of ice is the one with which the seals are got.

23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th. Ice still off the coast at varying distances.

July, 1885.

1st, 2nd, 3rd, 4th, 5th, 6th, 7th. Ice visible off the coast, and swinging with the tide at different distances off shore.

8th, 9th, 10th. No ice in sight out at sea. On the 10th the Inlet ice went out in a single pan, two miles across and about six miles long.

11th, 12th, 13th. No ice in sight.

14th. Large masses of ice ten miles out at sea.

15th. Ice visible about ten or eleven miles out.

17th, 18th, 19th. Dense fog.

20th. Field ice about four miles off the coast.

21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st. Field ice off the coasts at varying distances, sometimes close in and fills up Inlet, at other times only visible on the horizon.

August, 1885.

1st. Ice off about ten miles.

3rd. No ice visible outside, nor was any seen between this date and 9th October, on which day the station was abandoned.

ASHE INLET, STATION NO. 3.

Ice Record.

August, 1884.

25th to 31st. No ice visible in the Straits.

September, 1884.

Some icebergs were seen during the month but no field ice, except a few scattered pieces on the 8th.

October, 1884.

1st. Ice formed on sheltered parts of the Inlet.

2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th. A few icebergs in sight each day.

10th, 11th. No ice visible in the Straits.

12th. A few bergs seen to-day.

13th, 14th, 15th. No ice visible.

16th, 17th, 18th, 19th, 20th, 21st, 22nd. A few icebergs visible.

23rd, 24th. No ice.

25th. Very few icebergs visible.

November, 1884.

14th. A few icebergs and some field ice, Inlet frozen over with 3 inches of ice.
15th, 16th, 17th 18th. 19th, A few icebergs and loose field ice in sight all the time.
20th, 21st. Solid field ice as far out as can be seen.
22nd. Heavy field ice and some icebergs in sight.
23rd. Field ice carried off shore.
27th, 28th, 29th. A few bergs and much field ice in sight.
30th. Compact field ice as far out as can be seen.

December, 1884.

1st. Compact field ice extends to the horizon.
1st to 17th. Observer reports ice continues the same solid field extending to the horizon.

January, 1885.

6th. Field ice now very thick floating as before in one continuous mass with very narrow and short channels along the shore or rarely in the midst of it with the wind off shore, there is a continuous channel between the field ice and the shore, thickness of ice in the Inlet 2 feet 3 inches.

February, 1885.

3rd. Occasional open channels along the shore with off shore wind, if the wind continues these sometimes attain a width of two miles. Ice in the Inlet is now 2 feet 9½ inches.

March, 1885.

4th. Field ice continues the same. Ice in Inlet 2 feet 10¼ inches.

April, 1885.

4th. Field ice continues the same as last month. Thickness of ice in Inlet, 3 feet 10 inches.
17th. Field ice in smaller detached pieces, with about 15 per cent. of open water amongst it. The continuous north-west wind has carried the field 7 miles off shore.
20th. From one to three miles of open water along shore.
21st. Cold weather; snow, and on shore, winds have made the ice increase in quantity, thin ice is forming between the pans.
23rd. A little ice is forming in the Straits.
25th. Ice is set in on this shore.
28th. Ice is beginning to open a little.

May, 1885.

3rd. Ice in Inlet 4 feet 3 inches thick, field ice same as last report.
4th. Water now shows on top of the ice in the Inlet.
5th. The field ice begins to look very sodden and dirty quite a number of spaces of open water of considerable extent appear.
6th. About 10 per cent. of open water shows ice tight in, on the shore.
8th. Ice the same with an open channel along the shore. Wind N. W.
15th. Ice tight against the shore.
23rd. Ice very open to the east of the Island with a good wide channel along this shore.

24th. To the east, as far as the horizon, there is almost perfectly open water continuing as a narrow belt along the shore to the westward, about one and a half to two miles in width.

25th. Wind having shifted to S. E. field ice is returning.

26th. Ice set tight against the shore with about 15 per cent. of open water showing to the eastward.

29th. Ice more off shore.

June, 1885.

1st. Ice still on shore but very dirty looking.

3rd. Thickness of ice in Inlet 4 feet 4½ inches the ice is beginning to honeycomb.

4th to 7th, ice very compact on this shore.

9th. Ice still compact in Straits.

10th. N. W. wind, ice has opened off the shore leaving a channel three quarters of a mile wide all along the shore.

11th. Field ice much piled up one block on another, much open water to the east which however narrows down to about 4 miles, abreast of the station.

13th. Ice about one mile off shore.

14th. N. W. wind has carried the ice 10 miles off.

15th. Ice is heavily set in on this shore, but a number of narrow and disconnectedchannels show through it.

18th. There seems to be an almost continuous channel, from 1 to 2 miles wide and about 18 miles off shore between here and there the ice is tight.

21st. Open channel along the shore, no ice visible to S. E. and E.

23rd. Ice as before.

24th. Two whale boats of Eskimo came down from the trading station west of here (Capt. Nipkins).

25th. Ice distributed evenly as far as can be seen about 30 per cent of open water shows.

26th. Ice tight on this shore only 15 per cent of open water now visible.

28th. Ice very open to the south-east and well open to the south to-day and since the 26th a wide continuous channel has remained open near the horizon.

July, 1885.

1st. Open water still shows about 18 miles off shore, ice tight on the shore.

2nd. Thickness of ice in Inlet 3 ft. 3½ inches field ice remains the same.

5th. Thickness of ice in Inlet 3 ft. 1¼ inches, ice continues tight one shore but very open to the east and south-east.

6th. Ice well out from shore. Ice in inlet now only 2 feet 3½ inches thick.

7th. Ice only 2 feet thick in inlet. Field ice the same.

8th. Ice in inlet now 1 foot, 9½ inches in thickness. Field ice the same as before with open water channel showing 18 miles off shore.

12th. Ice left the Inlet.

17th. Field ice tight on this shore.

18th. Ice about one mile off shore.

19th. Ice very open though close to shore.

22nd. Ice since 20th very close to shore, no open water visible.

23rd. Much field ice.

24th. To the east apparently unlimited open water.

25th. The ice from the Straits grounding in the Inlet, shows a thickness of 30 feet.

27th. No ice visible south-east of station. Large spaces of open water elsewhere.

28th. Ice set in from all directions on shore.

31st. Ice continues.

August, 1885.

4th. Eastern edge of field ice is now opposite east end of this Island. Channel of open water 15 miles off shore.

5th. Eastern edge of ice now opposite station. Channel now probably 10 miles wide.

12th. channel now about 10 miles out and in width continues beyond the horizon. No ice to the eastward. "Alert" appeared and broke her propeller trying to force her way through the belt of ice.

17th. Ice as before.

21st. North-west wind is now carrying the ice off shore.

30th. Field ice is all gone since the 21st, only a few straggling pieces have been seen.

September, 1885.

18th. No field-ice has been seen since last report.

STUPART'S BAY, STATION NO. 4.

Ice Record.

August, 1884.

During the latter part of this month there was a small quantity of loose ice in the Straits.

September, 1884.

During the first week there was a little loose ice floating about but after the 8th, with the exception of a few bergs, there was no ice visible.

October, 1884.

Ice began to form in the Straits on the 22nd, and by the 28th was probably between 3 and 5 inches thick, with very little water in any direction.

November, 1884.

1st. Ice in Bay about 8 inches thick. For a distance of several miles from shore ice much broken, with a general movement to the south-east; further out it is much more compact.

15th. The ice which has covered Straits for past fortnight seems to have been carried to the south-east and packed in near shore. Water to east and north is now covered with much thinner ice; no really open water to be seen.

19th. Ice quite compact to northward. North-east a large patch of clear water on horizon. To eastward much open water for some miles out from shore, but none visible beyond.

21st. Ice still much broken and scattered; in fact there is now very little for some miles from shore. Ice blink along horizon except at one point to north, where it is doubtful whether there is any ice at all.

23rd. For several miles out very little ice, and in distance it seems much broken and scattered. To northward there is scarcely any.

26th. Ice in Straits much broken and scattered, especially to north-east and east, where there are mere patches of ice here and there.

28th. A patch of old heavy ice to northward; water beyond.

30th. Very little ice to be seen from look-out post to day; two or three patches to north and north-east, the rest is mere scum, clear water along the shore.

December, 1884.

2nd. To north and north-east, Straits covered with loosely packed ice east and south-east it is more scattered and open.

5th. To-day ice is compact for many miles out. To south-east there is no sign of open water but in other quarters the sky along the horizon has every appearance of open water.

7th. Ice in Straits generally compact, but to north and north-east there is some water visible and a sky which would seem to indicate open water.

10th. No water to be seen to-day. From appearance of sky would say there is open water to north, leading east, ice apparently very compact to the east and south-east.

13th. Weather thick, slight fog hanging over Straits. One lake visible to north-east otherwise as far as can be seen the ice except near shore closely packed.

18th. As far as can be seen ice quite compact to north-east and north, to east and south-east there is open water with very little loose scattered ice for some miles from shore. Beyond that a thick bank of fog.

22nd. Ice compact as far as eye can reach, except to eastward where it seems somewhat loose, but fog prevents our seeing any great distance in that direction.

28th. Slight fog over Straits as far as can be seen. Ice compact in all directions

31st. Thick over Straits but not as dense as yesterday. Can see much open water but there are numerous ice fields moving east and south-east.

January, 1885.

1st. Ice in Straits much broken and moving east and south-east; thick fog bank resting at a distance of a few miles, where there is, I think, quite open water, more especially to eastward. No fog over land or near shore, except over patches of water, from which a thick mist rises.

4th. This morning compact ice to north and north-east, a clear horizon; water from this point to east, north-east, away to horizon, and east and south-east dense fog bank in distance in these directions.

6th. Ice has closed down more to eastward but there is still open water to eastward and a dense fog bank.

8th. Ice has closed down to eastward and only a few patches of open water to be seen; fog on horizon; to north and north-east, ice compact, clear horizon.

12th. North of a line drawn eastward, from lookout station ice is compact, a clear horizon and no water. To southward apparently open water but cannot see far owing to fog.

14th. Ice compact between north and north-east, between north-east and south-east apparently open water; dense fog bank to eastward.

15th. Straits very much open to-day. To northward ice is loose, while at some distance out there is a fog bank apparently over water. Between north-east and south-east there is little or no ice to be seen.

16th. Ice for some miles out, but water all along the horizon, water is nearer land to eastward than to northward.

18th. Atmosphere is very thick, but should judge that open water is nearer shore than yesterday; to eastward it approaches almost the mouth of bay, but north-east and north there is still ice for some distance out.

21st. Straits completely packed; no water to be seen; fog bank along horizon from north to east.

22nd. Ice closely packed.

23rd. Morning, ice moving off shore, in afternoon strip of water about half a mile wide near shore.

25th. A line of water along horizon, north to north east, where a long patch of drift ice separates it from more open water, closer in shore; east and south-east it is well open with loose patches.

28th. A good deal of fog over Straits; ice rough and broken with long lanes of water running east and west. At one point to north east, there appeared at 3 p. m. to be open water; at any rate could see no ice beyond. Too misty to see far.

29th. Thick fog north-east and east, northward a good deal of ice, but water along horizor, open close inshore.

February, 1885.

1st. No water to be seen to-day except patch at entrance to bay, ice compact in all directions, weather gloomy but no fog.

2nd. Ice compact in all directions. Ice in bay two hundred yards from low water mark, four feet thick.

4th. No water except close along shore. Ice near mouth of bay three feet six inches thick.

6th. Ice closely packed in all directions, no water to be seen except a small patch close inshore to northward.

8th. Ice more broken up near shore. Straits generally closely packed.

10th. Open water for some distance out from shore, ice beyond seems loose and much broken. Hazy over Straits, so could not obtain a clear view.

14th. A number of lakes of water in all directions, one largo one to northward, the outer ice is apparently much more loosely packed to-day.

15th. Water along shore and to eastward for some miles out, ice all along horizon, weather quite clear.

17th. Many patches of water along shore; to north and north-east a very watery sky and dark horizon but cannot see the open water.

20th. Straits quite blocked, no water except close along shore.

21st. A dark watery horizon to eastward.

23rd. A dark watery sky north and north-east, but can see no water.

27th. Not particularly clear; ice compact in all directions.

March, 1885.

1st. Ice compact no water, fog bank on horizon to east north-east at noon.

5th. Lane of water about a half mile wide along shore, to north and north-east ice not so closely packed as for some time past, there being many small patches of water, no sign of water on horizon; weather clear.

7th. Lane of water near shore, to eastward thick fog; to north and north-east ice loose, fog on horizon. Ice in bay two hundred yards from low water mark four feet six inches thick.

9th. No open water in any direction.

15th. Ice opening in all directions, fog along horizon; to eastward large patches of water within a short distance of shore.

16th. Weather thick, cannot see far, many patches of water to east and south-east.

18th. Straits completely blocked in all directions.

23rd. Afternoon a strip of water widening out along shore with south and south-west winds; to eastward ice becoming very loose, to northward can see no water but dark horizon.

25th. Large patches of water visible in all directions more especially to north and north-east; cannot see over five or six miles. Porpoises seen near shore.

27th. To north and north-east water for some miles out and fog beyond; to eastward where there was water near shore yesterday there is now young ice sufficiently thick to bear a man; water on horizon.

28th. Much water to-day, especially north and south-east; ice much broken up and loose, water all along the horizon.

29th. From north to north-east, for say ten miles out, ice loose, with many long lanes of water, fog beyond; north-east to east-south-east water near shore, and beyond, a dense fog bank.

30th. A little more ice to northward than yesterday; very loose and broken to eastward, water sky all along horizon; water along shore.

31st. Ice a little more compact; water near shore, and a good many lanes and openings to eastward, fog along the horizon; ice in bay four feet nine and a half inches.

April, 1885.

1st. To north and north east round shore and for some few miles out, thin newly made ice, beyond this a long band of drift ice with several long lakes in it; water sky horizon; much open water to eastward as far as can be seen, but weather dull and hazy.

3rd. Ice by no means closely packed; many ponds and openings in all directions. Fog all along horizon.

4th. Water along shore increasing in width for many miles to eastward; only ice which has formed during past week. A clear ice horizon, except possibly at one point to N. N. E. and another E. N. E., where there may be water.

7th. Ice in all directions to-day; around shore not very compact, many small openings in newly made ice; fog along horizon.

12th. Thick and misty over Straits; to north and north-east ice, apparently close and compact. To eastward, at a distance of about five miles, water, but cannot see how far it extends. Strip of water running up bay.

14th. A little more water near mouth of bay, but ice generally close and compact in all directions; hazy on horizon, more especially to eastward.

15th. A few small patches of water around shore, otherwise ice compact.

17th. Ice compact in all directions.

21st. Morning. Except one or two small patches, close to shore, no water in any direction. Afternoon. Since last observation south-east wind has moved ice from shore. A band of water about a mile wide and still increasing all around shore. Ice, especially to eastward, loosening and many patches of water.

22nd. No water to be seen.

26th. Patch of water near mouth of bay, but ice in Straits generally compact; no sign of water on horizon.

27th. Band of water around shore; in afternoon ice looser.

29th. Band of water increased much north and north-east; ice looser in all directions.

May, 1885.

2nd. A dark horizon; fog north and east; no water near shore. Afternoon. A few patches of water near shore; a dark horizon, but can see no water.

8th. Morning, no water. 4 p. m. Great visibility; could see an immense distance over Straits, but no water. To northward a dark, cloudy appearance, almost looked like land on other side, perhaps mirage, but more likely reflection from water; sky overcast.

10th. Fog on horizon north and east; ice opening out from shore.

11th. Bank of fog along the horizon; ice in bay five feet five inches thick.

13th. Drifting heavily all day. 7 p. m. Band of water around shore; ice easing off fast; large rent in bay; ice east and south.

14th. 7:30 a. m. Belt of water along the shore and running to head of large bay; water on horizon to north-east; other directions can see no water, but weather hazy; ice loose north-east and east.

16th. Still a belt of water around shore, but not as much as yesterday; ice closing in again.

18th. No water.

19th. Ice much looser for some miles out from shore, with patches of water here and there; Ice thick along the horizon.

21st. Ice seems very loose for some distance from shore; many lanes and breaks east and south-east; open water for some miles from shore.

22nd. Patches of open water at mouth of bay; ice horizon.

23rd. Broad belt of open water around in morning; closed up again in afternoon; water sky horizon to north-east.

24th. Clear, ice horizon.

27th. No water to be seen.

31st. Narrow belt of water round shore.

June, 1885.

1st. Ice loose near shore, but a clear ice horizon.

3rd. Esquimaux report that from a hill some miles distant there is water to be seen to the north.

4th. Water round shore; water sky to northward 7:30 p.m. Ice loosening in all directions; large body of water to eastward increasing. To northward some miles off coast, water; I think a large amount, but weather thick; cannot see far; p.m., weather foggy.

6th. 7th, Foggy.

8th. Water sky horizon between north and east-north east.

9th. Dark horizon to north-east, ice opening out from shore.

10th. In evening dark fog bank on horizon to eastward.

11th, 7:30 a.m. A particularly clear horizon; south-east to north-east no sign of water, ice compact; north-east to north, ice on horizon loose. A long lane of water about eight miles out running east and west, patch of water at mouth of bay, otherwise none near shore 11:30 a.m., no change since last observation, very clear horizon 3:30 p.m. Still a clear horizon; north-east to north, ice still loose but no large patches of water, north-east to south-east ice compact.

12th. No water in any direction.

13th. Patch of water at mouth of bay, increasing in size, otherwise no water in any direction.

14th. No water except patch at mouth of bay; 11:30 a.m. From appearance of sky there is loose or moving ice east-north-east and north-east, and water beyond horizon to north-east; broad patch of water at mouth of bay and several small patches some distance from shore thick to northward, 3:30 p.m. Water horizon sky north and east, ice around shore much the same as last observation; 7:30 p.m. closed up at mouth of bay and round shore, water sky horizon; 11 p.m. very dark sky to east-south-east.

15th. Ice loose near shore; weather foggy.

18th. Fog all day 7:30 p.m. Open water north-east and east as far out as can be seen through fog. To northward water around shore extending out for two or three miles; ice to south-east of mouth of harbor loose and much broken up.

19th. Water and loose ice for some miles out from shore, beyond that there is ice; to north-east and east it is apparently looser than in the other directions.

20th. Ice loose and broken up in all directions except east, between east and north patches of water as far out as we can see, fog along horizon.

21st. Ice generally not so loose as yesterday, but still by no means compact. About eight miles out north north-east to east-north-east a long lane of water; dark watery horizon between north and east.

22nd. Scarcely any water but a water sky horizon at most points.

24th. To north and north-east ice around shore more loosely packed than for some days past, still a water sky horizon.

25th. Ice slackening off shore, and in the evening a water sky horizon.

29th, 7:30 a.m. Narrow strip of water along shore, very hazy north to east north-east. East north-east to south-east, not so thick; clear ice horizon; no water in any direction 11:30 a.m. Dark hazy horizon east to north, but with exception of bay no water visible, ice compact. 5:30 p.m., dark horizon all round to northward, very

hazy; to eastward, ice may be a trifle looser otherwise no change. 7:30 p.m., dark sky east and north-east, all other directions hazy.

30th. This evening, at 7:30, mirage showed considerable body of water from north-east by north, to east north-east; judge this roughly to be about thirty miles distant; water sky to north, and also to east.

July 1885.

1st. Mirage appearance; line of water with ice beyond, north-east to east, patch N. E. by N., cannot see ice beyond.

2nd, 3 p.m. Mirage N. N. E. to E. by N., not very distinct, but shows moving ice, with water beyond; from N.E. by E. to N.N.E. ice seems more open, and there is water around shore.

3rd, 7 p.m. Dark watery horizon all round, except north to north-east. I think water on horizon.

4th, 12:45 p.m. Mirage shows open water N.N.E. to E. N.E., looks very open and clear N.E. to E.N.E., ice loose for some miles from shore.

5th, 5 p.m. Mirage along horizon, except N, and S.E., most marked E.N.E. to E., where it appears as a large body of water not very far out.

6th. Ice slackening off shore in morning; in afternoon weather foggy.

7th, 12:45 p.m. Mirage now plainly visible on horizon, between N. and E. water and ice fields. 3.30 p.m., a few breaks visible at a considerable distance from shore; ice on horizon; N.N.E. seems loose.

8th. Ice moved off shore a couple of miles, and seems loose beyond to N.N.E; can see mirage of opposite shore, but thick fog hangs below and prevents seeing anything of ice condition.

9th, 7:30 a.m. The belt of water around the shore has widened very considerably, and beyond more especially between N.N.E. and E. the ice seems much looser; further out there is thick fog Between E. and S. E. the ice does not look as loose; but owing to fog cannot see far. 11.30 a.m., great change, the ice has moved off many miles, in fact to N.E can see no ice, and between N.E. and E. it is loose; fog prevents seeing far. East and S.E. there is ice, but even this seems loose. 7.30 p.m., ice closing in; dense fog over Straits; during lift in fog made out ice to northward to be loose, with numerous small openings for many miles out; same to eastward; fog along the horizon.

10th. Morning, inner edge of ice about two miles from shore; afternoon, ice closing inshore again; fog on horizon about ten miles distant.

11th. In afternoon no water to be seen in any direction; mirage of open water and ice between N.N.E. and N.E.

12th. No water to be seen in any direction, ice loose around shore. 3.30 p.m., ice moved off shore a little with falling tide.

13th. Thick fog nearly all day.

14th, 3:30 p.m. Between north and east ice has moved off shore six or seven miles; east to south-east less water. A very dark line, with overhanging cloud bank along horizon, north and east to east ice looks compact. 7.30 p.m., ice closing in again with rising tide. Strips of water to east about eight miles off. Ice in the distance north north-east and north-east, looks loose, dark sky along the horizon.

15th. Water increasing around shore to east and east south-east. Ice loose and broken up for some six or seven miles out. To north and N.N.E can see three small patches of water about eight miles out; horizon hazy; afternoon and evening dense fog.

16th. Ice slack near shore; weather generally foggy.

17th, 11:30 a.m. Seven or eight miles of water and loose ice round the shore between east and north; weather generally hazy and confused mirage.

18th. Dense fog over Straits, can see only a short distance, ice opening out at mouth of bay, open water round shore, dark fog bank north and east. 11:30 a.m. still foggy, open all round shore and as far as can be seen ice looks loose east and south-east. 8 p.m., can only see some four miles from shore, as far as that it is quite open, some few pieces of floating ice to south-east.

19th. Field of loose ice stretching to horizon north and N.N.E.; water with a little loose ice N.N.E to E.S.E; ice E.S.E. to S.E, but weather thick. 11:30 a.m., little change since morning, field ice moving south-east. 3:30 p.m., can see no change, fog over Straits; cannot see much over five miles.

20th. Bank of fog along coast about eight miles off shore, all open within that. 11.30 a.m.. can see edge of ice under fog bank N. to E.N.E. E. to S.E. a little loose scattered ice, bay opening out. Noon, fog lifted for a short time, ice shows to E.N.E., but only loose and scattered. N.E. rather more ice with water beyond, very much blurred with mirage; fog to north.

21st, 7:30 a.m. Between north and N.E. eight or ten miles of water, beyond which is field of loose ice to horizon N.E. to S.E., many miles of water and very loose ice fields, beyond which is a fog bank; E. and S.E. confused mirage. In morning ice seemed more compact to northward.

22nd, 7:30 a.m. Open water N. to N.E., about seven miles from shore, beyond, loose scattered ice as far as horizon. In other directions water inshore with loose ice beyond and fog hanging over it. 11:30 a.m, very little ice to north; N.N.E. fog bank about ten miles from shore with edge of loose ice showing underneath. Around shore nothing but a few pieces of loose ice. 3:30 p.m., a line of loose ice with water beyond, N. to N.E about fourteen miles off. To N.E. all open; E. to S.E. a line of ice along horizon. Altogether what we can see is very loose and abroad. Very little ice N. to N.E. N.E to S.E. line of loose ice, cannot see beyond; mirage of opposite shore visible.

23rd. Scarcely any ice at all for ten or fifteen miles, beyond that it is scattered and loose with mist hanging over it between east and north. 11:30 a.m., little change, now no ice to northward, but mirage of water and ice, horizon hazy. 3:30 p.m., loose ice along horizon. Tremulous atmosphere and mirage make it impossible to see with any degree of certainty. 7:30 p.m., N. to N.N.E. a little loose ice on horizon. N.E. to E.S.E. can just see line of loose ice; S.E. ice loose and scattered.

24th, 7:30 a.m. Except some small loose scattered pieces around shoals, no ice is to be seen in any direction; thick horizon. 11:30, no change since last. 3:30, very thick, can only see a mile or so from shore; no ice. 7:30 p.m., dense fog six miles off, quite clear as far as that.

25th. Between N. and E. there is more loose ice than for some days past moving east, inner edge of field ice from five to eight miles distant. Between east and S.E. scarcely any ice is to be seen, slight fog in distance, water to north and more ice to N.E. E. and S.E. still scarcely any. 7:30 p.m., scarcely any change since p.m. No ice to speak of E. and S.E., fog in distance in other directions.

26th, 7:30 a.m. Can see a line of loose ice from N.E. to E.S.E., but too thick to see the extent. Can see nothing to north. 11:30, a good deal of loose ice about six or eight miles from shore, reaching from north to E.N.E and extending as far as horizon to N.E. by N. and E.N.E, open water beyond. All open to east. 5 p.m., a little ice to N.N.E. and N.E. Elsewhere all open, getting very foggy. 7:30 p.m., dense fog, can see no distance.

27th, 7.30 a.m. Fog bank some miles distant resting on Straits between east and north, a small amount of scattered ice between it and shore. 11:30 a.m., for ten or fifteen miles much loose ice, beyond that a fog bank. To E.S.E. many miles of clear water, in other directions very little. 3:30 p.m., loose ice floe to horizon in all directions moving eastward, clear horizon. 7:30 p.m., loose ice in all directions in shore and off shore, very hazy on horizon.

28th. A good deal of loose ice scattered over Straits, especially to north not much east, horizon hazy. 11:30 a.m., can see nothing of Straits, thick fog. 3:30 p.m., weather still thick.

29th, 7:30 a.m. Foggy over Straits between north and N. E. Cannot see more than a mile from shore, no ice N. E., and E. Can see three or four miles, loose ice as far as that; more ice E. and E. S. E., than in other directions. 10 a.m., occasionally during lifts in fog can see many miles, apparently not as much ice as for past few days. 3 p.m., and evening, dense fog over Straits.

30th. Loose ice scattered over Straits especially to northward, where it seem, more compact and reaches to horizon, fog bank along horizon N.E. to E. Noon, very little ice now to north and a good deal to E. N.E., but with open water beyond elsewhere it is loose and scattered, 3:30 p.m; not much change since last. 7:30 p.m., from N. to N.E. a little loose ice, water beyond, N.E. to E. very little ice, and E. to S.E. a good deal scattered ice. Can see about ten or twelve miles.

31st, 7.30 a.m. Can see about fifteen miles, very little ice in any direction, horizon foggy; weather became foggy shortly after 8 a.m., and continued so until evening.

August, 1885.

1st. Can only see for six or seven miles in any direction, within that very little ice to be seen. 11.30 a.m., a little loose scattered ice around coast with open water beyond; hazy horizon. 3:30 p.m., no change since last 7:30 p.m., a little loose ice in all directions, moving off coast.

2nd. A small amount of scattered ice in all directions. 11 a.m. Ice which has been around inshore to S.E., moving out into Straits, scattered ice in all directions. 2 p.m. Fog bank some miles out 7 p,m. Fog bank about four miles out.

3rd. Thick for over land and Straits 11.30 a.m. A little loose ice around shore, all open beyond, harbor full of ice 3:30 p.m., no change 7:30 p.m. Straits all open as far as we can see in any direction, a little loose ice around shore and in Bay.

4th. Scattered ice near shore and in large bay; none off shore N.E. to E.S.E., fog some fifteen miles out, 11 a.m.; thick fog, 3 p.m.; and all evening slight fog near shore, dense further out.

5th, 7:30 a.m. Thick fog over Straits. Noon, a little ice near shore, all open beyond, bay jammed. 3:30 p.m., and evening, thick fog over Straits; 3:30 p.m., quite clear. A very little loose ice near shore none off shore. 7:30 p.m. no change.

7th. A little loose ice, scattered near shore and in bay, otherwise none to be seen in Straits. In p.m. thick haze over water.

8th, 7:30 a.m. Fog bank a few miles from shore. 11:30 a.m. Can see mirage of loose ice on horizon to N.N.E., and also to E.N.E., and E., otherwise no ice to be seen, weather somewhat hazy. 3:30 p.m. Notice to be seen in any direction, hazy N.E., to E.N.E. 7:30 p.m. Dense fog bank about four miles out.

9th. No ice to be seen, hazy in p.m.

10th. Fog over Straits in early morning, no ice.

11th. do do do

12th. No ice, clear horizon.

13th. Weather thick, no ice.

NOTTINGHAM ISLAND, STATION No. 5.

Ice Record.

September, 1884.

1st. Closely packed ice extending across the Straits.

2nd. Ice moving with the tide, large field near Cape Digges, not much change in appearance from yesterday.

3rd. Bay to the south-west clear of ice, straits remaining in same condition as before.

4th. Heavy loose field ice in Straits.

5th. Straits comparatively clear.

6th. Large field of ice off Salisbury Island, elsewhere Straits clear.

7th. Foggy.

8th. Large field of ice near Salisbury Island extending over towards the south coast, another field is moving into the Straits from the Bay.

9th, 10th. Heavy loose ice in Straits.

11th. Ice much scattered but extends to the east as far as the eye can reach.

12th. Ice same as yesterday,

13th. Heavy loose ice in straits moving west.

14th. Straits clear of ice to the east, but to south-west of island it is closely packed.

15th, 16th. Ice moving east, pack is loose but extends in every direction.

17th. Ice has been driven south and is moving east closely packed, Straits comparatively clear.

18th. Straits clear save for some scattered pans.

19th, 20th. Straits nearly clear of ice but weather thick from time to time.

21st, 22nd, 23rd. Straits clear for navigation but scattered ice seems to come from the west and drift towards the south coast.

24th. Some large ice-bergs visible to the east of the island.

25th. Heavy ice densely packed to the south-east.

26th. Ice has moved east and is much scattered.

27th. Scattered ice to the eastward, large pan ice coming in from the westward and moving east.

29th. Harbor covered with tight sheet of ice, Straits to the eastward comparatively clear in a.m.; in p.m. a good deal of ice.

30th. Heavy pack of ice to south-west seems to be coming from west and is much heavier than usual.

October, 1884.

1st. Clear water in middle of Straits, heavy pack along the shore.

2nd. Straits full of ice as far as can be seen, no open water visible.

3rd. Ice loose body of pack has moved east.

4th. Fog bank to the south in a.m.; in p.m. cleared and showed heavy field of ice lying north and south to the east of the island, clear water to south-west.

5th. Snow storm; ice packed on the shores.

6th. Fog and snow.

7th. Snow in a.m.; in the afternoon loose drift ice all over the straits.

8th. Straits clear to south, heavy ice to west and north-west.

9th. Snowstorm.

10th. Straits clear (first observation since landing that ice has not been in sight somewhere).

11th. Ice near south coast of island moving from the west.

12th. Scattered ice moving eastward.

13th. Ice very compact to the eastward.

14th. Ice extends to the south and is very compact, clear water shows to the southeast.

15th. Snowstorm.

16th. Straits to the south of us clear of ice, but large fields still to the south of Salisbury Island.

17th. Fog.

18th. Snowstorm.

19th. Straits this a.m. have a wintry appearance, the field of ice seems to extend nearly over to Wolstenholme, a narrow streak of open water only, showing some distance off shore. Straits east of here are also packed as far as can be seen with the telescope.

20th. Ice in straits same as yesterday.

21st. Ice remains heavy to the south-west, but that to the eastward is moving east.

22nd. Much of the ice to the south-west has gone and there is now but little ice opposite the station, the ice still remains off Salisbury Island.

23rd. Large icebergs coming in from the westward and any amount of heavy field ice in every direction.
24th. Heavy ice closely packed in the Straits.
25th. Heavy ice moves east and young ice forms in the Straits.
26th. Straits opposite are frozen as far as can be seen.
27th, 28th, 29th, 30th. Ice solid and immovable extending in every direction.
31st. Ice east of here moving to north-east, ice to south remaing stationary.

November, 1884.

1st. The south side of the Straits seems lined with field ice from Cape Digges eastward. Some large icebergs in the middle of the Straits, but clear water to the eastward.
2nd. Snowing all day.
3rd. Heavy field ice up to within five miles of south point of this island, to the eastward one solid and continuous pack.
4th, 5th, 6th, 7th. Ice closely packed everywhere.
8th. Much of the ice seems to have moved eastward, open water shows some distance off shore.
9th. Straits clear of ice to south and east but the field ice off Salisbury Island is now moving west again.
10th. Heavy field ice is swinging with the tide.
11th. Ice has set fast—no water visible.
12th. Ice to the east very compact but to the south only a few large bergs are visible.
13th. Snowing.
14th. Small strip of open water close to shore, elsewhere ice is fast and close.
15th. Ice to the east solid and immovable, but a strip of open water five miles in width is along the shore.
16th. Mist on straits.
17th. Ice closely packed everywhere.
18th, 19th, 20th, 21st, 22nd, 23rd. Ice tight, except for a few hours on the 20th, when a little open water showed up along shore.
24th, 25th. Snowing.
26th. Hazy over Straits.
27th, 28th. Ice tightly packed.
29th. Ice has moved to the north-east, Straits comparatively clear.
30th. Ice working its way west again.

December, 1884.

1st. Heavy ice but loose with patches of water showing.
2nd, 3rd, 4th. Ice closely packed in every direction.
5th. Loose ice to the south-west closely packed to the eastward.
6th. Large strip of clear water some distance off shore, elsewhere ice tight but moves with the tide.
7th. Heavy ice in every direction with spots of open water.
8th. Heavy ice, no open water.
9th. Ice has moved southeast, some open water shows off the coast.
10th. Snowing.
11th. Straits completely blocked.
12th to 31st. Straits completely blocked.

January, 1885.

1st, 2nd, 3rd, 4th. Ice solid in every direction.
5th. Snowstorm.

6th, 7th, 8th, 9th, 10th, 11th. Heavy ice everywhere.
12th, 13th, 14th, 15th. Snowstorm and drift so that straits cannot be seen.
16th. Ice in every direction.
17th, 18th, 19th, 20th, 21st. Ice in every direction unmoved.
22nd. The ice field to the eastward has moved east leaving a space of open water running north and south for some distance, but the Straits to the south are completely blocked.
23rd, 24th. Ice close in every direction.
25th. Mist some distance off shore.
26th. Snowstorm and drift.
27th. Drifting snow.
28th. Ice packed closely in every direction.
29th, 30th, 31st. Straits completely blocked.

February, 1885.

1st, 2nd, 3rd, 4th. Ice packed solidly in every direction.
5th, 6th, 7th. Snowstorm and drift.
8th, 9th, 10th, 11th. Straits blocked with heavy ice.
12th. Snow drifting.
13th. Straits blocked as before.
14th. Snow drifting.
Straits blocked continuously from the 15th to the 28th of the month.

March, 1885.

1st, 2nd, 3rd. Ice solid in every direction.
4th, 5th. Snowstorm and drift.
6th. The Straits to the eastward is clear of the heavy ice and is now covered with a smooth sheet of young ice.
7th, 8th, 9th. Young ice remains to the east, south and west, heavy ice is packed as before.
10th. Heavy ice again moving up from the eastward, and that to the southward is moving off, the sheet of smooth young ice taking its place.
11th. The heavy ice from the eastward is now within a quarter of a mile of the shore, and seems to be working towards the southwest.
12th. Ice in much the same position as yesterday.
13th, 14th, 15th, 16th. Straits completely covered with heavy ice.
17th. Snowdrift.
18th. A belt of open water to thenorth east, heavy ice still solid to the south.
19th. Snow drifting.
20th. Ice to the eastward swings off and back with the tide.
21st. A small belt of open water about two miles off the coast to the east, elsewhere the ice is closely packed.
22nd. Masses of vapor rise from the belt of open water which renders it impossible to see any great distance to the eastward, but there is no change in the ice to the south.
23rd, 24th, 25th, 26th, 27th. Heavy ice closely packed in every direction.

April, 1885.

1st. Clear water shows to the east and northeast, but ice is closely packed to the south.
2nd. Ice from the south has moved east, clear water shows to southwest.
3rd, 4th. Snow drifting.
5th. Ice seems loose and a good deal broken up.
6th. Ice to the south is loose, but east of this seems very compact.

7th. Clear water to the eastward, heavy close ice to south and S.W. of station.
8th. Clear water remained all day to the east, but at night the ice seems to be returning; ice very compact in S.W.
9th. Only a small strip of open water now shows to the east of this, elsewhere the Straits are closely packed.
10th. No open water visible.
11th. Snow falling and drifting.
12th, 13th. Straits in every direction closely packed with heavy ice.
14th. Snow falling and drifting.
15th. Ice to south very compact, small amount of open water to N.E.
16th. Ice to south and west very compact, more open water shows to east, in which direction the ice seems to be moving.
17th. Ice same as yesterday.
18th. Snow drifting; cannot see any distance.
19th, 20th. Heavy closely packed ice in every direction.
21st. Patches of open water show up through the pack to-day.
22nd. Ice east of here swings out and back with the tide.
23rd, 24th. Heavy ice in every direction.
25th, 26th. Ice is moving eastward; the middle of the Strait seems clear of ice.
27th, 28th. Snow drifting.
29th. Strait completely covered with ice.
30th. Snow drifting.

May, 1885.

1st. Snow drifting.
2nd. Heavy ice, closely packed, with ice in every direction.
3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th. Heavy ice in every direction.
11th. Snow drifting, unable to see the Straits.
12th. Ice moving south; large sheet of open water east of this station.
13th. Open water to the east of this station, but the ice seems heavy and closely packed to the south.
14th. Same as 13th.
15th. Ice seems loose and a good deal broken up.
16th. East and south-east ice is closely packed, but some patches of open water show to the south.
17th. Ice close everywhere.
18th. Open water to the east, near the Island, and very little ice showing to the southward.
19th. Ice swings with the tide again.
20th. Ice to the south-east closely packed; open water between here and Salisbury Island.
21st. Ice has moved up to-day against the wind; clear water to the west of the station.
22nd. The clear water now extends about 10 miles to the east of the station, but the ice at that distance seems set solid, and the Strait completely blocked.
23rd. Strait covered in every direction with loose ice.
24th. Strait densely packed to south and east.
25th. 26th, 27th, Straits covered with closely packed ice.
28th. Open water for a short distance south; ice close to the east of this station.
29th, 30th. Straits completely blocked.
31st. Three or four small patches of open water near the station, elsewhere the ice is closely packed.

June, 1885.

1st, 2nd. Ice closely packed.
6th, 7th, 8th, 9th, 10th. Ice closely packed.

11th. Ice is moving east in a body; Straits open to south, but east of here the ice is closely packed.

12th, 13th. Straits open to south, heavy ice to the eastward.

14th. Ice has again come west, but there is still a small belt of open water to the south.

15th. Heavy ice in every direction, but some narrow belts of open water show up in places.

16th. Open water shows to both south and east, but heavy ice is still visible to the east beyond the open water.

17th. Heavy and closely packed ice to the south.

18th. Open water in a narrow belt to S. W.; elsewhere Straits full.

19th. Straits full of heavy ice, with small patches of open water showing here and there.

20th. No open water showing.

21st. Patches of open water in south and S. W., ice solid to the east.

22nd. Ice moving to eastward, open water shows to south and west in long belts of varying width.

23rd. The ice between here and Salisbury Island is moving west, it seems to extend to the mainland on the south side; and is closely packed.

24th. Large sheets of open water showing to south-west.

25th. S. W. of station clear water, no movement of the ice to eastward.

26th, 27th. Straits packed with ice, apparently all the way across.

28th, 29th. S. W. of station clear of ice, but much still remains to the east.

30th. Clear water to south and west, ice still extends to south of Salisbury Island.

July, 1885.

1st, 2nd. Straits to east of here are clear of ice, but ice now shows to S. W. and south.

3rd. Ice is moving down from Salisbury Island, and the field to the S. W. is moving up to eastward.

4th. Loose ice covers the whole Straits as far as can be seen to south and west, but open water shows beyond the ice to the eastward.

5th. Ice is loose and drifting to the eastward, clear water to S. W.

6th. Misty weather.

7th. The wind having shifted to N. E., ice from Salisbury Island is moving this way, it is however small and open.

8th, 9th. Straits covered with ice, somewhat scattered on the 8th, closing upon the afternoon of the 9th.

10th. Straits covered with tight fields of ice.

11th. S. W. wind seems to be driving the ice towards Salisbury Island, leaving open water to south; in the S. W. loose ice covers the Straits.

12th, 13th, 14th, 15th, 16th, 17th. Ice in large fields of varying compactness swings with the tide and wind on and off the shore, occasionally leaving some large belts of open water along the coast, and other clear spaces which apparently lie in an east and west direction, are sometimes observed to the south.

18th, 19th, 20th, 21st, 22nd. Ice is visible in every direction, but is loose and swings with the tide and wind.

23rd. Foggy weather.

24th, 25th, 26th. Loose ice in all directions.

27th, 28th. Ice is closely packed to the eastward and south.

29th. Foggy weather.

30th. Straits to the eastward completely covered with heavy closely packed ice.

31st. Foggy weather.

August, 1885.

1st, 2nd. Compact and heavy ice to the eastward.

3rd. Dense fog.

4th. Heavy ice is still visible to the eastward.
5th. Ice has all moved east towards Salisbury Island; Straits to south-west completely clear, and clear water extends some miles to the east of this station.
6th. Ice is still closely packed to the south of Salisbury Island, and seems to extend to the southward.
7th. Ice south of Salisbury Island is moving this way; elsewhere the Straits are completely clear.
8th, 9th, 10th. Clear water to south and west; but ice still to south of Salisbury Island.
11th, 12th. Foggy weather.
13th. No ice visible, and none was seen between this date and the 23rd, on which day the "Alert" arrived and the station was relieved.

PORT LAPERRIÈRE (CAPE DIGGES), STATION No. 6.

Ice Record.

October, 1884.

1st. Heavy ice both in bay and straits, with open water channel showing occasionally.
2nd, 3rd, 4th, 5th. Same as 1st.
6th. Foggy all day.
7th. Foggy.
8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th. No ice in sight.
19th. Heavy field ice in the Strait, four miles off coast.
20th. No ice in sight.
21st. Drift ice in the Straits all day as far as can be seen.
22nd. No open water visible in the Strait.
23rd. Same as 22nd.
24th. Bay, Straits and Harbor frozen solid with new formed ice.
25th, 26th, 27th, 28th, 29th, 30th, 31st. All the ice solid; no water to be seen in the Straits. The 23rd seems to have been the last day on which navigation would have been possible.

November, 1884.

1st, 2nd. No water visible.
3rd. Bay and Straits open again; ice seems to move north and south.
4th. Loose drift ice in Bay and Straits.
5th. No open water in Straits, and very little in bay.
6th, 7th, 8th, 9th. Large pan ice in bay and straits.
10th, 11th, 12th, 13th. No open water visible.
14th. A narrow neck of open water, about one-quarter of a mile wide, close to the Island.
15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th. No open water.

December, 1884.

No entries in page for remarks, Observer states that the ice was rigid during this month, that no open water was seen.

January, 1885.

No entries. Ice fast all the time, no open water visible.

February, 1885.

11th. No ice in the Bay all day to-day, a few pans in the Straits, no other ice visible.

12th. All the ice has come back, no open water visible.

March, 1885.

2nd. At midnight the ice on the Bay side parted from the Island and drifted away as solid field towards Mansfield Island. The Straits ice remained intact.

3rd. No ice in the bay. Straits' still compact.

4th. Bay ice returned and took its original place, Straits' ice still compact.

5th. Ice is compact everywhere and remained so to the end of the month.

April, 1885.

15th. At 3 p.m., the ice parted from the Island and left a narrow channel of open water a few hundred feet wide which closed up again about 7 p.m.

16th. No water visible.

17th. Narrow channel of open water on both sides of Island.

18th. Clear water for five or six miles from the Island.

19th. Ice closed on Straits' side, but still a narrow channel on Bay side.

20th. No open water visible.

21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th. No open water in the Straits, ice does not move.

28th. The Bay ice goes off with the tide a few miles and returns.

29th. At 10 a.m. the Bay ice drifted away and did not return; at 4 p.m., the Straits ice parted from the island and drifted off one-half mile and then returned.

30th. No ice in the Bay, but Straits still solid.

May, 1885.

1st, 10:30 p.m. All the ice on the Bay side has drifted back to the Island.

2nd. No open water visible anywhere.

3rd. No open water visible.

4th. Ice on Bay side drifts off and on, floe has broken into two pieces. In the Straits the ice moves half a mile off and then back again.

5th, 6th. Ice is now much broken both in Bay and Straits, very narrow channel of open water on Straits shore.

7th. Very little water in the Straits.

8th. No open water in the Straits, in the Bay the ice drifted out of sight and then back again to within a mile of the shore.

9th, 10th. No open water except narrow belt near Island on Straits' side.

11th. Channel on Straits side a mile wide.

12th. No regular channel open anywhere, but the ice is much broken up, and large pools of water show all through.

13th, 14th. Very little open water anywhere.

15th. Narrow channel in Straits from 5 p.m. to 8 p.m.

16th. No open water seen in the Straits.

17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th. No open water in Straits.

25th. A narrow streak of open water along the Straits shore.

26th. Ice in bay out of sight in a.m. came back within 7 or 8 miles in p m. In the straits, detached ice fields as far as can be seen.

27th, 28th, 29th, 30th, 31st. No water visible in the Straits.

June, 1885.

1st. In the straits the ice seems to be much broken up, large patches of open water showing all over.

2nd. Ice all broken into loose drift ice, about a quarter of the visible surface of the Straits is open water.
3rd. Foggy.
4th. No open water visible in the Straits.
5th. Ice tight still.
6th. Ice in Bay and Straits is now much broken and open, the waters seem quite navigable.
7th. About half the waters of the straits clear of ice.
9th. A channel 5 or 6 miles wide, free of ice, beyond that 3 or 4 large icebergs and broken ice.
10th. In the morning about one-fifth of the visible portion of the Straits is covered with drift ice; in p.m. none visible except one small iceberg.
11th. In a.m. no ice visible in the Straits, but by evening about two-thirds of the visible area was covered with ice.
12th. Ice has closed in, leaving only a channel of a couple of miles in width close to the shores of the Island.
13th, 14th. Only a comparatively narrow channel of open water near the Island to-day.
15th, 16th, 17th, 18th, 19th, 20th, 21st. No open water.
22nd. A narrow channel off the Island all day, which at night widened to about two miles.
23rd. Ice broken and loose for 4 or 5 miles, beyond that is tight.
24th. Streaks and patches of water showing all over.
25th, 26th. Ice compact, no water visible from here. From a point about 4 miles east on the top of a high bluff open water was visible east of Cape Wolstenholme.
27th, 28th. No open water visible.
29th, 30th. No open water visible.

July, 1885.

1st. On the Bay side the ice is packed close, but in the Straits there is a narrow channel of open water about three miles in width.
2nd. Still the same channel, but now only 2 miles wide, all beyond the ice is closely packed.
3rd, 4th, 5th. Same as 2nd, except that the channel of open water varies from 1½ miles to ½ mile.
6th. No open water visible.
7th. Climbed the highest spot on the Island, estimated 2,000 feet, no water visible in the bay except two or three small pools. In the Straits there is apparently a narrow channel off Nottingham Island, and a few pools in the centre of the Straits.
8th. No alteration, ice tight everywhere.
9th, 10th, 11th. Ice still remains solid.
12th. From the Island for five or six miles the ice is broken and drifting, beyond that the pack is close.
13th. Foggy.
14th. No open water in the Straits.
15th, 16th. Some long narrow strips of open water visible in the Straits.
17th, 18th, 19th, 20th. Very little ice visible in either Bay or Straits to-day, and what is seen is small drifting ice.
21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th. Straits clear, a little ice still visible off Nottingham Island.
29th, 30th, 31st. Foggy.

August, 1885.

1st. Foggy.
2nd. No ice in sight.
3rd. A good deal of broken ice drifted to the shores, fog very thick.

4th. Weather thick, could not see any distance.
5th. Ice close in Straits in a.m., but in p.m. ice was broken and scattered.
6th, 7th, 8th, 9th, 10th. No ice in Straits.
11th. Foggy.
12th, 13th. A little drift ice, loose and scattered.
14th, 15th, 16th, 17th, 18th, 19th. No ice in sight.
20th. A little heavy ice in both Bay and Straits.
21st. A little ice in the Straits.
22nd, 23rd, 24th. No ice.
25th. Station relieved.

Ice met with on the Voyage of the "Alert."

In the foregoing pages the accounts given by the observers at the several stations of the formation and movements of the ice have been given. In the narrative portion of the report the ice met with by the "Alert" has also been recorded, but as it has not been described in detail I will here make some further remarks concerning it. Our observations show that during the first half of the month of June, a belt of ice, varying in width from 30 to 50 miles, extended the whole length of the Labrador coast, from Cape Chudleigh to Belle Isle. Off the entrance of Hudson's Straits at this time the field extended from 35 to 100 miles to the eastward of Resolution Island, and on the 16th of June when I endeavoured to enter the Straits the ship was beset in heavy ice about ten miles to the S.W. of Cape Best. This ice was very heavy and some of it in large sheets, but at the turn of the tide the pack generally slacked off a little when the ship was worked on under steam or sail as opportunity offered; this state of affairs continued until the 6th of July, when, owing to the damage done to the ship, we had to return to St. Johns. Except on one occasion no large amount of open water was seen from our masthead, the ice always seeming to be tight to the westward of the ship. I measured the thickness of many of the pans some were 22 feet, but the common kind was floe ice about 10 feet in thickness. On the 4th of August when we got back from St. Johns there was still a great deal of ice in the Straits and some of the pans were of great size many of them being over half a mile in length. There was at this time undoubtedly a run of clear water to the westward, had I taken a more southerly course; but, in the "Neptune," we had found, in 1884, that the ice all lay over on the south shore and this made me decide to try the north shore again this year.

The Hudson Bay officers who navigate the Straits state that the movements of the ice are both irregular and uncertain, that sometimes they find the north shore clear first, and the following voyage the position of affairs may be completely reversed. I consider that the ice met with in August this year was such that had I been simply endeavoring to force my way through the Straits I could have been clear with less than five days' detention, even taking the route which I did, and had I taken a more southerly course I should most likely have got through with a couple of days' delay.

No ice, other than a few bergs, was met with after leaving Stupart's Bay, on 22nd August.

In the "Alert" the height of the topmast head from the water line was 90 feet, which gives a horizon of almost eleven miles.

Notes on the Ice Movements in Hudson Bay and Straits, 1768-1769.

I am indebted for the following notes to the Rev. Abbé Verreau, taken from the manuscript journal, kept by Capt. Wm. Falconer, who was a sloop master in the Hudson Bay Company's service in the years 1768-69. Capt. Falconer states: "In the month of July, when the above Hudson Bay Company's ships commonly get their passage through the Strait outward bound, it is almost blocked with ice, some of which is aground in 100 fathoms of water,.....and this with the large quantities

of floating ice makes the passage dangerous, and detains the ships, some years, till the latter end of August, before they get clear of the Straits."

The ice mentioned in the above quoted paragraph as being aground in 100 fathoms of water is undoubtedly intended to apply to icebergs, some of which I have myself seen aground in from 80 to 100 fathoms. On the north side of the Straits some of these large masses of ice getting aground at high water of spring tides will remain fast for weeks if they do not break up. Capt. Falconer states that the Bay was only navigable from the latter part of July to the middle of October. On 8th August, 1708, he reports heavy field ice off Severn House; yet on that particular year he states that the Hudson Bay ship from England arrived on 11th August, one of the early dates.

Capt. Falconer further gives his opinion as to the dangers off the mouth of the Nelson River, stating: "Nelson River entrance is so dangerous that no vessel cares to come near it."

Dobbs on Hudson Bay, 1744.

The author of the above quoted work was a firm believer in the existence of a practical North-West passage to the Pacific Ocean and was, of course, convinced of the feasibility of navigating Hudson Bay and Straits. He quotes from a journal kept by Capt. James, of the Hudson Bay Company's service, who wintered at Charlton Island in the southern part of James Bay, in 1632, as follows: "15th June, sea still frozen; 19th June, saw open water, but sea to the north full of floating ice till the 22nd of July.

I find also in this book a record that on the 1st October, 1741, the ice was fast for two miles from the shore at Fort Churchill. This, however, broke up again and continued to drift off and on.

Captain Hawes.

I asked Capt. Hawes, of the Hudson Bay Company's service, at present in command of their brigantine "Cam Owen," to give me the benefit of his experience in regard to ice movements in the Straits. Capt. Hawes has made fourteen voyages to Hudson Bay. He says:

"I can give no rule for the ice other than to work through the thinnest, if there is any difference, but keep in the fair way. Some say keep to the north shore, and so say I, if clear of ice. If the Straits seem full of ice, keep in mid-channel, for I have in general found the ice there thinner than near the north shore and more open to work through."

Capt. Hawes further told me that the route which he had found clearest of ice of late years had been to enter the Straits on the parallel of 61° N. Keep on this till 40 miles west of the Buttons and then haul up to the northward, towards Cape Hope's advance, and Long Island, thence along the south shore to the east point of Charles Island, along the north side of Charles Island and thence a mid-channel course between Digges and Nottingham.

It is stated in the report of ice met with in the "Alert" that no ice was met with on the homeward voyage. The "Cam Owen" sailed from York Factory on the 27th September, 1875. On the 3rd of October they came up with the ice between Cape Pembroke and Mansfield Island, and from this date to the 21st she was fast in the pack, getting clear of the ice on the 24th and passing out of the Straits, on 27th October pretty well loaded down with ice.

Capt. Hawes places the probable period of navigation for steam vessels properly fitted for ice work as seldom exceeding three months, 15th July to 15th October.

Lieut. Schwatka, of the United States, who spent two years up in the north-west of Hudson's Bay in search of the relics of Sir John Franklin's expedition, in a letter to me dated 29th January, 1885, says:—

"I was in Hudson Bay and Straits and adjoining countries about two years and a quarter, and during that time saw considerable of the navigation of these bodies of

water, and discussed the subject very often with navigators who had spent very many years therein, principally American whaling captains, their officers and crew. From my experience and their conversation, I thought the Straits and Bay could be considered navigable for at least two months of the year for sailing craft and this would probably be more than doubled for steam. Of course the Bay is navigable much earlier and later than the Straits, and the above estimate is for the latter.

"Again, a ship strengthened for the ice might prolong these times on each end considerably, and a complete hydrographic survey of the straits, giving all possible harbors of refuge, would show that there is less danger than there is generally supposed. Signal stations on prominent points could also materially assist vessels essaying the passage by a simple code expressing the conditions of the ice.

"FREDK. SCHWATKA."

In my report last year I described the ice as consisting of three kinds, viz., icebergs, heavy arctic ice and ordinary field ice. The icebergs are stated to have come from Fox Channel. This conclusion was based on the report from No. 3 station made on the homeward voyage of the "Neptune," that the icebergs passed the bluff from west towards east. This report was made on the strength of the few observations which the party had been able to make in the interval between the two calls of the "Neptune" at the inlet. Further and more perfect observations show conclusively that the current sets in the opposite direction and that the icebergs move from east to west. If further proof of the existence of this set were necessary we have it in the drift of the "Alert" when fast in the ice off Ashe Inlet and invariably carried to the westward.

In considering the question of the sources from which the ice affecting Hudson Straits navigation, comes, we must first begin with the east Greenland ice. All those who have made the voyage from any port in Europe to Hudson's Straits seem to agree in the statement that Cape Farewell must not be approached nearer than seventy miles in order to keep clear of the east Greenland ice which sweeps round the cape in an almost ceaseless stream, after rounding which it turns to the northward, and passes up the south-west shore of Greenland, nearly as high as Gothaab, then turns over to the west side of Davis' Straits, and joining the stream of Davis' Straits ice runs south with the arctic current. The limits of the east Greenland ice field, when rounding Cape Farewell, vary greatly, in some years, it moves as far south as the parallel of 58° north. This ice field can be, and is of course always avoided, the rule in making the passage being to keep to the south of 58° north till in longtitude 58° west, on which meridian the northing should be made.

The stream of Davis' Straits ice flows right across the entrance to Hudson Straits, and varies in width with the season of the year. The first information which I have of it was derived from conversation with Captain Watson, of the whaling barque "Maude," of Dundee, owned by Captain Adams. Captain Watson had been for many years engaged in the Davis Strait whale fishing, and for the last few years has commanded his present vessel. Their usual routine is to leave Dundee in March. and they arrive off the edge of Davis' Straits ice in the early part of April, cruising off the edge of the ice between latitudes 58 N. and 63 N. Captain Watson told me, that he made the ice, in April of this year about 58 N. and 120 miles off the Labrador coast, and up to the date of our meeting with him, 13th June, he had not been able to get nearer to Resolution Island than 35 miles, and as the average southerly set of the current is about 20 miles per day, this stream of ice must have been flowing uninterruptedly up to 15th June, the date on which the "Alert" took the pack. An examination of the records of the stations at Port Burwell and Nachvak Bay shows that at Port Burwell the ice cleared out of the Straits on the 9th of April. They remained clear up to the 14th, when the ice came in sight again, and was present almost constantly thereafter until its final disappearance in August. At Nachvak the ice swung on and off the shore with the winds and tide, but though sometimes out of sight from the ordinary observation point, it was always seen upon going to a higher elevation. It is therefore certain that

during the months of May, June and July, large fields of ice were present in the entrance of the Straits, and the question remains, at what date was this ice in such a condition as to permit the passage of vessels strengthened for meeting the ice, but which could be used as freight steamers. For in all questions as to feasibility of the navigation I am not considering the date at which one of the Dundee whaling or Newfoundland sealing steamers could be forced through, but when a strongly built iron steamer, sheathed and otherwise strengthened, could make the passage.

On June the 15th, when we went into the ice, it was certainly impenetrable by any vessel of the class referred to, and though the ice would slacken at the turn of every tide, and sometimes run abroad so that it would have been possible to work the ship to the westward, distances, varying from two to five miles at each of these slack times, I only tried to hold my own, generally under canvas; as apart from any question of the injury which the ship had received, I deemed it more desirable to watch the ice at the entrance of the Straits than to force the ship through, when I could only have made at the most 10 to 20 miles a day. I am of opinion that the Straits were passable at the eastern entrance about the date that we returned to St. John's for repairs, viz., 5th July, but any ship going in at this date would still have been subject to these delays, but might have made from 25 to 40 miles a day.

Proceeding westward, from this date, 5th July, the observations at Ashe Inlet and Stupart's Bay show that on the north side of the Strait, and from 18 to 20 miles out, that the ice was present almost continuously, much as we found it in August; some of the sheets of enormous extent and of great thickness. Many of these were, in August, over half a mile long and some which we measured were from 20 to 30 feet in thickness. In the middle of July, Mr. Ashe reports that open water is visible beyond the ice, and Mr. Stupart, fog-banks and water sky frequently to the north. The two stations at the western end of the Straits also report that in the middle of July the ice was loose and drifting with the tide. Everything goes to show that though there would have been very frequent delays still it would have been possible for a steamship to have got through the Straits by the 15th or 20th July.

Ice would have been met with again, doubtless, in the bay, but I do not think there would have been any serious delay in reaching either Churchill or York Factory.

Stations on shore for the purpose of watching the movements of the ice, though undoubtedly the best system which we can adopt, cannot tell us with any degree of certainty how soon a vessel might be able to push her way through the Straits, but they do tell when it is sufficiently run abroad, or when a sufficient amount of open water appears, to make the passage a reasonable certainty, and the date for this year I place at from 5th to 15th July, as it is more than likely that a ship could have got through the Straits in ten days. The ice is, moreover, so sensitive to wind that even if telegraph stations were so placed as to be able to convey to ships' news regarding the position of the ice ahead, long before the vessel arrived at the place, the condition of affairs might, and probably would, be totally changed.

As to the closing of navigation in 1884, Mr. Laperrière reports, at Cape Digges, that on 25th October the ice was solid in every direction, and at Nottingham Island a similar entry is made on the 27th. A distinction must be made between the closing of navigation by the formation of young ice, and the presence of a large field of heavy old ice which is cemented together by the formation of young ice between the pans. In the first case any ordinarily powerful steamer could go through without risk, but in the second case the most powerful of the whaling or sealing steamers would be helpless. The western end of the Straits is always subject to incursions of this heavy ice, from Fox Channel, and especially so in the months of September and October, when strong north-easterly and north-westerly gales are frequent, and we have now evidence that in both seasons, 1884 and 1885, this heavy ice came down in October.

As to the length of season for practical navigation, if we regard the presence of field ice as the only barrier, the information which we have got would point to the months of July, August, September and October as being the months in which the Straits are passable. As a rule, in July there will be delays, but to vessels strengthened and sheathed there would be no danger in making the passage.

All the inhabitants of the Labrador, the Straits and the Bay, spoken to on the subject, agreed in stating that the ice movements this year were much later than the average; at Fort Churchill the season was fully a month late, and on the Labrador three weeks, so that I think that it will be found that on the average four months will be the length of the season for practical navigation by steam vessels which would be freight carriers. There have been, I am informed, seasons when the Straits were clear of ice in the month of June, but they are, according to the logs of the Hudson Bay ships, quite exceptional. Capt. Hawes spoke of such being the case only once in his experience of fourteen years, and the dates which I have seen of the arrival of the Hudson Bay vessels at their ports of destination show no arrival earlier than August.

The next important factor in the navigation, is the weather; and the prevalence of fogs, snowstorms, and gales of wind, is shown in the tables appended hereto, for the sake of comparing Hudson's Straits with the Belle Isle route. I have also prepared a table showing the results of the observations at Belle Isle Lighthouse Station for the same period as that for which the observations in Hudson's Straits were taken.

H.M.S. "Terror," Hudson's Straits,

1836—1837.

The following is taken from the records of the cruise of H.M.S. "Terror," in 1836-1837. These records have lately been examined and the observations discussed by Mr. Richard Strachan, and have been published as part of "The Contributions to Arctic Meteorology," a work issued under authority, from the British Meteorological Council, by Mr. R. H. Scott:—

The "Terror" arrived off Hudson's Straits on 30th July 1836, making the edge of the pack about fifty miles to the east of Cape Chudleigh; she worked through, passing close under the south-west shore of Resolution Island, and was, on 7th, August a little to the west of Ashe Inlet, having made good about thirty miles per day, through ice more or less slack the whole time. From this point they worked to the westward up Fox Channel, and passing to the north of Salisbury Island, arrived off Cape Comfort, on 27th October. The ship wintered in the pack, being logged as frozen in, on 1st November, off Smyth Harbor, in lat. 65°, 15' N., and long. 83°, 44' W.

The ship was much damaged by ice pressure, at different times during the winter, and drifted in the ice, from the point at which she was frozen in, to nearly the east point of Charles Island, passing between Nottingham and Salisbury Islands. She was fast in the ice from 1st November to 11th July.

Water is reported as having been seen first on 31st May, in lat. 63°, 14' N, and long. 76°, 39' W., just east of Port De Boucherville, when a lane, ten yards wide, opened in the pack near the ship.

On 19th June, when a few miles to the north of Charles Island, the entry is made for the first time: "a great deal of open water in sight."

The "Terror" is, I believe, the only ship that has ever passed the winter in the pack in Hudson's Straits, and it should be noted that in June and July, 1837, she was in the regular track of vessels, just north of Charles Island.

Although some open water is reported on 19th June, it was not until 11th July that the ship was released, by the breaking up of the floe. From this date, up to 31st July, the ship was working to the eastward along the south shore, in the pack all the time. On the 31st, the day on which the record ends, the ship was in lat. 60°, 59' N., and long. 69°, 18' W., (about half way between Stupart's Bay and Cape Chudleigh) when the report says "ice close."

These records show distinctly that during the entire month of July, 1837, heavy ice was present in large quantities in the Hudson's Straits, that it occasionally ran

abroad, so that the ship could make way through it, and that there were occasional areas of open water met with. I see no reason to doubt that this is the normal condition of the Straits in the month of July; it coincides with my own experience, with all I can learn from those who have navigated the Straits, and it is the conclusion which I have come to from a study of the temperature charts.

TABLE SHOWING Mean Temperature in Hudson Straits, 1836-37, from the observations made on Her Majesty's Ship "Terror," the means are the arithmetical means of a series of bi-hourly observations.

Month.	Temperature.	Remarks.
1836—August	+ 31·6	
September	+ 26·9	Highest temperature, 11th June—59°.
October	+ 16·1	
November	— 4·3	Lowest temperature 2nd December—44·7°.
December	— 22·7	
1837—January	— 18·2	
February	— 25·0	
March	— 10·4	
April	+ 14·2	
May	+ 28·8	
June	+ 35·0	
July	+ 37·5	
Year	+ 9·96	

METEOROLOGICAL OBSERVATIONS.

The meteorological instruments supplied to the stations were all of the same pattern as those supplied to the regular stations reporting to the Meteorological Office. The thermometer readings have had the corrections applied, and the barometer readings have been corrected for temperature and reduced to sealevel. The anemometers were of Foster's down shaft pattern, except in the case of Stupart's Bay, where an anemograph was used.

In every case, I consider that the wind velocities given are below the actual velocities, as it was almost impossible to secure a good exposure, away from the dwelling houses, that could be regularly visited in all weathers. At Cape Chudleigh I constructed a scaffolding for the anemometer on a hill a short distance to the westward of the house, but before it had been up any length of time, it was blown down and the instrument seriously damaged.

Table I is a general table for the station at Belle Isle Lighthouse, giving temperature from mean of three observations daily, taken at the hours of 2.27 a.m., 8.27 a.m. and 4.27 p.m,, also from maximum and minimum, &c. The direction of the wind is tabulated *in number of times reported* on each of the cardinal and quadrantal points. This portion of the table shows the extraordinary prevalence of westerly winds, and also the number and severity of the gales from October to January.

Table II is a general table for the station at Cape Chudleigh. The observations were taken every four hours at 3.08, 7.08 a.m., 11.08 a.m. and p.m., standard time of 75° W. long., this station is in lat. 60°. 22' N. and long. 64° 46' N. The height of the barometer above mean sea level was 30 feet. The thermometers were exposed in the regulation meteorological service shelter, which consists of an outer shed or case, having Louvre sides and door and a double roof, with an air space open at the sides. The bottom of the outer shed is of large mesh (2 in.) wire net, and the back of close half-inch board. The inner screen is louvred on all sides with thin slats of sheet iron. The whole shelter is attached to the north side of a double close board fence, having a free air space of 4 inches between the two sides of the fence and the

shed is held by iron straps, 3 inches clear of the north side of the fence. The thermometers are hung on light metal straps as nearly as possible in the centre of the inner screen.

The site of the thermometer shed at this station was about 40 feet east of the house and aboutthe same distance from the edge of the cliff; to the S.W. of it was a small hill 26 feet high, and about sixty feet off. The height above sea level was 27 feet, the hill tothe S. W. cut off a good deal of the sun during the winter months. The anemometer was put up on the roof of the house, but the exposure was a poor one especially between N.W. and S.W.

Table III is the general table for station No. 2 at Skynner's Cove, Nachvak Bay, situated in lat. 59° 6' N. long., 63° 37' W. Nachvak Bay is a deep fjord running westwards into the interior. Shortly after entering, the fjord widens, forming two coves, one on the north and the other on the south side. The one on north side was the site selected for the house, the little cove runs nearly half a mile back from the general trend of the coast on the north side of the fjord, and gives fair shelter and anchorage. On the north side of the cove the land rose abruptly from the beach to a little platform about twenty feet above the mean sea level. On this platform the house was erected and the thermometers exposed in the same manner as described at the last station.

On either side of the cove the mountains rose almost precipitously to a height of nearly 3,000 feet. The sun was cut off a good deal by the hills on both the sides of the cove, and also during the winter months by those on the south side of the fjord.

The wind observations recorded here are entirely from estimate of velocity; and directions was taken as a rule from the motion of the lower clouds. The anemometer was at first erected on the south-west point of the cove, but in one of the early fall gales the tower was destroyed, and the instrument so damaged that it was rendered useless.

Table IV results at Ashe Inlet. This station is situated on the north side of the Straits in a small inlet, on the large island which forms the south side of North Bay. It is called by Lieut. Schwatka, Turenne Island. The station was in lat. 62° 33' N., Long. 70° 35' W. All the instruments had a good exposure, except the anemometer which was partially sheltered from east and north-east winds.

Table V results at Stupart's Bay. This bay is situated near the north-west angle of Prince of Wales Sound. The sound is itself a deep bay about 30 miles across by 20 miles in depth, with numerous outlying shoals in the line of the coast, but deep water inside. The station at the head of Stupart's Bay was somewhat sheltered from north winds, otherwise the exposure was good. The position of the observatory was lat. 61° 35' N. long. 77° 32' W.

Table VI results at Port De Boucherville, there was not a barometer at this station and the anemometer was somewhat poorly exposed, being sheltered from N. E. to N. W. by the rocks which rose almost perpendicularly behind the house.

The station was situated in a little bay near the S. E. point of Nottingham Island. The house is in lat. 63° 12' N., and long. 77° 28' W.

Table VII results at Port Laperrière. This station is situated at the outer Digges Island and is in lat. 62° 34' N. long. 78° 1' W. The anemometer was sheltered from east and S. E., but the exposure was on the whole good. In all cases, except Port Burwell, the anemometers were five feet clear of the ridge of the roof of the house.

Table VIII results at Churchill. The station here was at the residence of the Chief Factor, Mr. Spencer, who undertook the work of taking observations. The station is in lat. approx, and long. It is about five miles south from the ship's anchorage, and the same distance from old Fort Prince of Wales. The thermometers were exposed on the north wall of the house and read through a small window. There was no fire or heating apparatus in the room and the doors of the shed were opened by cords without opening the window. This exposure admittedly an undesirable one, was the best obtainable under the circumstances,

and as the thermometers were read without opening the window and were constantly screened from direct radiation by the doors of the inner screen, I do not think that the mean temperatures are likely to be affected to any appreciable extent.

Table IX gives the mean temperature, and other results, at York Factory, for the period 1876 to 1883 inclusive. The results for this year have not yet been received.

Table X shows a comparison in duration of snow in Hudson's Straits and the Straits of Belle Isle. This is an element which will be found to vary greatly from year to year, but its bearing on navigation is direct, for in the fall snowstorms, navigation in Hudson Straits will always be dangerous; as it is almost impossible to keep a look out. The snow, when the temperature begins to fall, is not in the ordinary flakes, but drives before the wind in minute particles of ice, which the eye does not perceive in time to protect itself.

The observations of snowfall in the Straits during the months of July, August and September, of 1885, show that none fell in July; and only a passing storm, lasting four hours, visited one station on the north shore in August. In September there was some snow, most of which fell in the last few days of the month, so that, generally speaking, we may state that snow would not have been any obstruction to navigation in these months. In October, of 1884, a great deal fell, amounting in duration, on the average of the five stations in the Straits, to 109 hours. Whether October, 1884, was exceptional in this particular or not, it is impossible to say. Capt. Falconer, in his diary, 1768-69, states "that gales of wind averaged, in September, about two per week, but were not so numerous in October."

In September, 1884, when homeward bound in the "Neptune," we had, generally speaking, fair weather all through, and the returns from the stations show that there were more gales in October, 1884, than in September. It seems, however, to be the general impression amongst those who have traded and fished to the Northern Labrador, as well as amongst the whalers, that October is, in those latitudes, a finer month than September, so that October, of 1884, may prove to have been quite exceptional.

Table XI shows a comparison between Hudson's Straits and the Straits of Belle Isle in regard to the duration of fogs.

In the matter of fogs, the Hudson's Straits route undoubtedly compares favorably with the Straits of Belle Isle.

If we compare the mean of the six Straits stations, excluding Churchill, with the station at Belle Isle Lighthouse, we find that in September and October, 1884, and June, July and August, 1886, the relative duration of fogs in Hudson Straits, as compared with the Belle Isle Station, was in

1884,	September,	40	per cent.
do	October,	10	do
1885,	June,	26	do
do	July,	46	do
do	August,	74	do

Table XII is a comparison table between Hudson's Straits and the Straits of Belle Isle, of the number of days on which the velocity of the wind exceeded forty miles an hour.

Tables XIII to XVII show number of winds reported from each of the sixteen points at the stations, and the average velocity for each direction.

Table XVIII shows mean temperature at Fredericksbaab, 1856-60.

Accompanying the report are maps showing the mean isotherms for the months September, 1884, to August, 1885. In drawing these isotherms, I have used the actual observations, and have, wherever possible, supplemented this by reducing observations taken at other periods, to that in question.

The January map shows: temperatures over the Bay and Straits of —15°, —20° and —25°, the higher temperatures being at the eastern end of the Straits.

In February, the temperature, owing to prevailing easterly winds has risen 20° on the mean, and shows above zero at Cape Chudleigh.

March, again dips down, the mean temperature ranging between —20°, off Mansfield and Southampton Islands, and —5° at the eastern end of the Straits.

In April, the mean temperature is now everywhere above zero, the 5° isotherm passing Mansfield Island about the same place as —20° did in March. Temperature in eastern end of the Straits is 15°, showing a somewhat more gradual rise than in the west.

In May, temperature in the Straits lies between 25° and 30°, whilst over the northern part of the Bay the temperature is still low.

In June, the isotherm of 35° passes just south of the Strait, where the temperature is now probably about the freezing point (32°). The freezing point of salt water being about 28°·5° I regard this month as the first in which there is likely to be any tendency on the part of the ice to break up or waste. The maps shows temperature in Straits of Belle Isle to range now between 40° and 45°.

July, in this, the warmest month of the year, the curve for 40° passes right through the Straits. Ice wastes rapidly, as shown by the reports of Mr. Ashe, who says the harbor ice decreased in thickness from 3 feet 3½ inches, on 2nd July, to 1 foot 9½ inches, on the 8th. All stations report movements of the ice fields, showing distinctly that whether visible or not from the stations there was a considerable extent of open water in the Straits.

August, the temperature is almost precisely the same as in July.

September, in this month, the mean temperature of the Straits is about 32°; but though the ice would form on the fresh water lakes, none would be made on the salt water, and as far as ice is concerned, this is the cleanest month for navigation in the whole year.

In October, the mean temperature of the western end of the Straits has fallen to 17°. Young ice makes rapidly, especially towards the end of this month, when I would consider it a great risk to put a ship into a pack of old ice, and the western end of the Straits will always be liable to incursions of old ice from Fox Channel.

In November, the mean temperature of the Strait, west of Stupart's Bay, has fallen to 5°, which, I consider, practically closes the navigation. It will perhaps be better understood what an average temperature of 5° means, in regard to matters pertaining to navigation, when I point out that this is the mean temperature of the month of January along the north shore of the Gulf of St. Lawrence, from the Saguenay to the Straits of Belle Isle.

In December, the mean temperature ranged from —15° in the western end of the Straits, to —5° at Cape Chudleigh.

NOTES BY OBSERVERS.

Belle Isle, 1884-85.

November, 1884.

15th. SS. "Iceland," last vessel seen in Strait. (Ice closing Strait not given.)

March, 1885.

28th. First snow buntings seen.

May, 1885.

9th. Straits covered with field ice; no clear water in any direction.
16th. Straits begin to clear.
23rd. Ice formed on pools 2 inches thick.

June, 1885.

18th. Good deal of ice still in Straits.
17th. First thunder.
19th. First steamer passed in.
20th. 100 vessels passed north.

PORT BURWELL, STATION No. 1.

August, 1884.

10th. A heavy sea in the Straits.
12th. Grass grows very scantily, only a few spears showing up through the moss. The moss grows wherever there is any soil; it grows to a height of about 7 inches. A few cranberry vines here and there.
15th. Hills to the east covered with snow. A number of whales and sharks in the harbor.
17th. Heavy sea in the Straits.
29th. Harbor covered with ice this morning.
30th. Numbers of sea-birds about to-day.

September, 1884.

1st. Numerous whales feed in the Harbor.
5th. Numbers of gulls and sea-ducks in the Harbor.
9th. First snow at station.
15th. Ship seen in the Straits bound east.
18th. Numbers of mers have been here till now, but they seem all to have gone south.
24th. Large numbers of ptarmigan.
27th. "Neptune" arrived, homeward bound.
29th. "Neptune" left for Nachvak.

October, 1884.

22nd. Almost impossible to measure snow; some places it is 5 or 6 feet deep, and in others perfectly bare.
23rd. A number of white foxes seen.

November, 1884.

2nd. Some of the snow drifts are 20 feet deep.
6th. No seagulls or ducks here now; the ducks assembled in large flocks before leaving.
9th. Much of our snow is blown into the sea; so we have less here on the ground than in the interior.
24th, 25th. Tremendous gale; cups blown off anemometer; at 5:15 p.m., 24th it was registering 84 miles per hour.

November, 1884.

26th. A number of ravens here. Lunar halo at 6:30 p.m.

December, 1884.

6th. Solar halo.
9th. Brilliant meteor at 7:08 p.m.
10th, 11th. Solar halos.

26th. Lunar halo from 5 to 7:30 p.m.
28th. Lunar halo at 5:30 p.m.
29th. Solar halo at 11:45 a.m.

January, 1885.

3rd. Lunar halo 10:30 to 11:30 p.m.
10th. Solar halo and parhelia 1:30 p.m.
25th. Parhelia at 9 a.m.
27th. Large masses of vapor rise from the cracks in the ice field.

February, 1885.

5th. Solar halo 3:30 p.m. Brilliant meteor at 10 p.m.
6th. Solar halo 3 p.m.
18th. Double solar halo and parhelia.
20th. Solar halo and parhelia.
24th. The ptarmigan begin to come back.

March, 1885.

The tops of the hills have remained clear of snow all winter, but the ravines are full of snow.

April, 1885.

5th. Solar halo 10:30 a.m. to 4 p.m.
6th. Thawing in the sun to-day for the first time.
8th. Thawing in the sun.
15th. Some small grey birds have come.
17th. Eskimo tell us that the deer are coming north. They have seen herds of twenty or thirty at a time.
29th. Ptarmigan are very numerous now.

May, 1885.

6th. The snow has been melting very rapidly the last two or three days, many of the slopes are bare.
10th. The snow goes very rapidly, the water running in streams down the hillsides.
20th. Some hawks have been seen lately, and several kinds of small birds.
22nd. A few wild geese have been seen here.
24th. Several caterpillars seen to-day crawling over the snow.
25th. Solar halo.
30th. Solar halo and parhelia. Insects are now putting in an appearance, spiders and flies coming together.
31st. Snow disappearing rapidly, large streams of water now run in the valleys.

June, 1885.

1st. The grass on the hill sides begins to sprout and the moss is tinged with green.
3rd. Small purple flowers show up here and there through the moss, the grass does not make much headway.
4th. Ptarmigan are pairing.
9th. Loons flying north.
27th. Seals very numerous now. Rainbow 8 to 8:15.

July, 1885.

1st. Bright yellow flowers are now in bloom.
5th. Mosquitos very numerous.
6th. Butterflies seen.
7th. A number of different flowers are in full bloom.
20th. The grass seems to have attained its full growth, but is very short.
22nd. Solar halos.
26th. Sea gulls and ducks have their young.
27th. Various kinds of ducks are now numerous, there are also large flocks of birds which look like plover. No codfish in the harbor yet.

August, 1885.

13th. Two large whales in the harbor to-day.
16th. Meteor at 8:55 p.m.
17th. Codfish are now numerous in the harbor.
21st. Parhelia from 5:45 to 6 p.m.
23rd. A small sailing vessel seen in the Straits to-day.
26th. Codfish are in great abundance.

September, 1885.

10th. The mountains are now covered with snow.
29th. Station relieved.

SKYNNER'S COVE, STATION No. 2.

October, 1884.

8th. Lunar halo.
11th. Visited by Eskimo. Some seals shot to-day.
16th. A whale in the Bay to-day.
29th. Black ducks numerous in the Cove.

November, 1884.

9th. Shot a seal to-day.

December, 1884.

3rd. Visited by Eskimo to-day.
4th. White foxes come to the door of the station.
9th. Lunar corona.

January, 1885.

5th. Took the temperature to-day in an Eskimo snow house at the level of the beds; found it to be 28°. Temperature of the air outside—23·4°.
12th. Eskimo houses nearly blown away by the gale, though they were plugging them all night.

February, 1885.

23rd. Shot two ptarmigan.
27th. Five starving natives arrived.

March, 1885.

3rd. Four starving Eskimo at station for the night.
10th. More sick and starving Eskimo.
20th. Saw a raven to-day for the first time this year.

April, 1885.

4th. Snow thawed a little to-day, in the sun; deer tracks freshly made seen within two miles of the station.
6th. A fly seen to-day.
10th. First rain, snow thaws rapidly, ground in low places muddy.
18th. First small bird seen.
22nd. Lunar corona and halo; shot a seal.
28th. Solar halo. A deer passed across our valley to-day.
30th. Fourteen deer seen to-day.

May, 1885.

3rd. Saw four deer to-day.
5th. Snow thaws very rapidly.
7th. Snow slides down the mountains with loud noise.
9th. Got fresh trout from Lane the interpreter.
10th. Six deer shot in the Bay.
16th. The Hudson Bay Officer returned from Mission post to-day; he tells me that they have onions, lettuce and radishes well grown already in a hot-bed surrounded by snow and covered at night.
18th. Eskimo have all gone south to the open water.
20th. A great many flies outside to-day.
23rd. Partial solar halo.
27th. Blowing a hurricane to-day.
30th. Established "Bench Mark" to-day at twelve feet above mean ice level $\frac{\text{W.S.}}{1885.}$ The mark is on a rock at the south-west point of the cove.
31st. Partial halo visible after sunset.

June, 1885.

3rd. Rocks are continually running down the larger ones, getting out on the ice.
17th. Grass now growing; willows budded on 1st June at the Hudson Bay post twenty miles west.
23rd. Trout are now caught with nets at the head of the Bay.
24th. Lettuce, cabbage and turnips are up in the garden at the post.
26th. Various flowers in bloom.
28th. Blew a hurricane last night; small stones and gravel blown against the house.

July, 1885.

4th. Saw fifty seals on the ice to-day, also a large number of bumblebees.
5th. Mosquitoes appeared to-day.
6th. A hot wind to day at 6 p.m.
12th. Black duck and a loon in the cove to-day.
15th. The sides of the mountains are now green in many places with short coarse grass and willows; there is but little snow except high up on the ravines.
18th. A whale in the bay to-day.
20th. Cod-fish are expected by the natives to arrive to-day.

24th. Trout fishing good; no cod yet.
29th. Tigging for cod, no fish.
30th. Hudson Bay trader says the ice is very late this year, is usually all gone 20th July.

August, 1885.

1st. "Alert" arrived at 8.30 p.m. January, and also the Newfoundland schooner "Lassie."
4th. 1 dozen cod caught in the traps, fish not in yet.
7th. Fish in to-day.
8th. The schooner "Vita," of Little Bay, Newfoundland arrived.
16th. Steamship "Labrador" passed on her way to the Post.
18th. Steamship "Labrador" passed bound out for Chimo.
26th. Very heavy surf breaking.
29th. Cod very plentiful.

September, 1885.

3rd. The schooner "Lassie" caught fifty quintals of cod in the traps to-day.
12th. The schooner sailed for Fogo, Nfld., to-day; take, about five hundred quintals. They have taken longer to get their cargo than for years past.
17th. Steamship "Labrador" passed to the Post.
22nd. Cod very plentiful.
26th. Blew a hurricane from 5 to 10 p.m.

October, 1885.

8th. Station relieved.

ASHE INLET, STATION No. 3.

September, 1884.

5th. Velocity of wind 51 miles.
11th. Hair hygrometer though set in the usual way seems to give from 10 to 15 per cent. less humidity than the wet and dry bulbthers.
21st. Anemometer frozen up.
22nd. "Neptune" arrived homeward bound, staid only 3 hours.

October, 1884.

2nd. 9:30 p.m., wind began with a sudden squall, velocity 36 miles per hour, having been previously a dead calm.
18th. Snowgauge put in position for trial. Wind began to blow suddenly from N.W. 34 miles per hour at 2 p.m.
21st. Sudden squall 45 miles per hour N.W. at 8:45 p.m.

November, 1884.

24th. Heavy gale from S.E. all day, 10:30 p.m. 74 miles per hour. Min. ther. broken.

December, 1884.

2nd. Moon at rising surrounded by bright red coloring extending for about 10° from moon; when two hours high still surrounded but color faint.
9th. 11 a.m., parhelia.

January, 1885.

8th. Lunar halo 3 a.m.
23rd. Lunar halo and parselenar.
29th. Ice crystals fell from a hazy sky all day. Eskimo visited the station.

February, 1885.

21st. Lunar halos, ice crystals, hoar frost.
22nd. Lunar halos, hoar frost.
23rd. Hoar frost.
24th. Hoar frost.
28th. Lunar halo.

March, 1885.

16th Partial solar eclipse, estimate of extent of eclipse 0.75. Lower portion of the sun uneclipsed.
22nd. Doors blown off thermometer screen.

April, 1885.

11th. Our first real thaw.
17th. First snow bird seen.
29th. First ducks, a flock of thirty seen.

May, 1885.

2nd. First rain fell.
6th. Frst flies seen, species un known, very like ordinary house fly.
7th. Sea gulls returned to-day.
8th. First caterpillar found.
27th. Placed beacon on highest point of Rabbit Island
31st. First bumblebee seen of a deep orange color in the lower body. Lit signal lamp and kept burning 11 p.m. to 3 a.m.

June, 1885.

2nd. First spider (small black one) seen amongst the moss.
4th. First grey linnet seen and hawk shot.
5th. Eskimo arrived, they have shot a goose. First loon heard to-day.
6th. First sand pipers seen.
18th. Two loons flew past the house to-day, they are the first seen.
22nd. Two butterflies seen, a small white and a medium brown.
24th. Eskimo arrived in two whale boats.

July, 1885.

2nd. First mosquitoes.
6th. A heavy clap of thunder in the west, heard at 9 p.m. The Eskimos seemed terrified and spoke of rain with thunder as being very rare here.
26th. Mosquitoes now very plentiful.

August, 1885.

9th. Eskimo report a brig hove to, outside the ice pack east of the island.
12th. Steamer trying to make the inlet.
13th. Steamer in sight drifting with ice.

14th. Steamer passed out of sight to the westward.
17th. Saw the "Alert" in the ice making for the inlet. American barque, "George and Mary," passed west in the pack.

September, 1885.

19th. "Alert" arrived at 8 a.m., and station was relieved.

STATION No. 4.—STUPART'S BAY.

September, 1884.

1st, 2nd. Fog and rain.
4th. Freezing rain.
6th. Light snow,

October, 1884.

6th. Lunar halo 11 p.m.
7th. Easterly snowstorm.
23rd. Most brilliant aurora.

November, 1884.

12th, Brilliant aurora.

December, 1884.

9th. Auroral arch extending across the sky from west to east, also perfect corona.
19th. A few ducks still remain near the mouth of the bay.
31st. Slight fog nearly all day.

January, 1885.

1st, 2nd, 3rd. Lunar halos.
20th. Very heavy gale.
24th. Ice crystals.
29th. Lunar halo 3 a.m.

February, 1885.

3rd. Fog and drifting snow.
5th. Heavy easterly gale. All instruments having exposed metallic surfaces are covered with ice.
10th. Easterly breeze has raised the temperature wonderfully. At 3 a.m., wind west, 14', hazy, temperature—20°1; at 11 p.m. wind S.E., 26'10' stratuss temperature + 22·4.
11th. Warm all day, maximum 27·9, minimum 21·9.
21st. Brilliant solar halo and parhelia. Two halos rich prismatic colors at times: The arc above the outer circle is occasionally most brilliant. These were vertical and horizontal, with radiants from the sun to the inner halo. At night bright lunar halo and parselenae.
25th. N.W. wind brings the fog in off the Straits, and the moisture falls in a frozen state to the ground. I have called this "frozen fog."

March, 1885.

5th. A clear bright day. Aurora, class I, at 11 p.m.
7th. Parhelia at 3 p.m.

21st. Heavy N.W. gale, 11 p.m. Squalls of hurricane force, from 80 and 90 miles per hour; drift undescribable, the night beggars description.
25th. School of porpoises passed along shore going west. Lunar halo at 11 p.m.
30th. Eskimo report porpoises off the point.

April, 1885.

2nd. Solar halo.
11th. First small bird appeared this afternoon.
17th. A few ducks flew over to-day.

May, 1885.

4th. A few drops of rain fell to-day.
8th. Extraordinary visibility; from Look Out Point, could see an immense distance.
12th. Thickness of ice in Bay, 5 feet 5 inches. This is the first day on which ducks have appeared in numbers; at 5 p.m. hundreds were flying about and swimming in water near the island. Ptarmigan came near the station to-day.
30th. Flock of wild geese seen flying north—first this year.

June, 1885.

3rd. Eskimo report that from a hill, some distance west, open water can be seen to the north.

July, 1885.

25th. Hoar frost at night.

August, 1885.

9th. No ice to be seen in any direction.

STATION No. 5, PORT DE BOUCHERVILLE.

September, 1884.

1st. Geese flying south in large numbers.
17th. Auroral twilight, sky brightest to N.E.
20th. S S. "Neptune" arrived homeward bound.

October, 1884.

9th. Auroral display.
14th. Brilliant auroral arch from N.E. to N.W.
15th. S.E. gale this p.m.

December, 1884.

14th. Very brilliant auroral arches.
21st do do.

January, 1885.

1st. Faint lunar halo. Several brilliant auroras during the month.

February, 1885.

7th. Parhelia at 3 p.m.
18th. Solar halo and parhelia.

March, 1885.

1st. Lunar halo 11 p.m.

April, 1885.

5th. Parhelia at 3 p.m.

May, 1885.

9th. Shower of hail lasting five minutes between 7 and 11 a.m.
30th. Snow is at last melting rapidly.

June, 1885.

18th. First rain fell.

August, 1885.

13th. Straits completely clear of ice.
24th. "Alert" arrived and station was relieved.

STATION No. 6, PORT LAPERRIERE.

October, 1884.

20th. Saw three ships to-day working eastward in the Straits.

April, 1885.

28th. Three sea gulls seen to-day for the first time.
30th. First small land bird seen to-day, the ravens have been here the whole winter.

May, 1885.

1st. An immense number of ducks seen to-day.

June, 1885.

1st. The column for "Total Snow on Ground" has not been filled up, but I think that 4 feet would be a good average for the total fall of snow during the winter. We have never had a heavy snow fall, but always light snow and falling during short period. It always drifts, leaving the ground bare in some places, with large masses in others. This has made it impossible to measure the snow fall and fill up the column headed as above.
3rd. First rainfall of the year.

August, 1885.

25th. "Alert" arrived; station relieved.

YORK FACTORY.

1875—1882.

First rain, 24th March, 13th May. Last rain, 21st September, 29th October.
First snow, 8th September, 28th September. Last snow, 26th May, 18th June.

Snow birds, 17th March, 9th April.
Summer eagle, 19th March, 20th April.

Geese	appeared	21st April, 3rd May.
Plover	"	28th April, 14th May.
Mosquitoes	"	8th June, 21st June.
Swallow	"	11th May, 26th June.
Frogs	"	26th April, 17th May.
Robins	"	27th April, 13th May.
Ducks	"	23rd April, 10th May.
Snipes	"	25th April, 17th May.
Fire-flies	"	July and August.

The two dates are the earliest and latest records in the group of years.

FORT CHURCHILL.

September, 1884.

21st. Snow showers during day.
30th. Snow showers throughout day.

October, 1884.

8th. First appearance of ice forming on shores of river.
10th. Began wood hauling with dogs and sled. Ice still forming.
13th. Thin ice drifting on river.
15th. No ice on river.
19th. Large quantities of ice are drifting about in the river.
21st. Ice still floating.

November, 1884.

6th. Churchill River frozen over as far down as the Old Fort.
11th. Churchill River opened again to-day.
21st. River entirely frozen over.

December, 1884.

24th. Eight inches of snow on ground.

January, 1885.

5th. Sixteen inches of snow on ground.
16th. Total depth of ice in channel of river, 3 feet 10 inches.
26th. Mercury frozen.
30th. Mercury frozen.

February 1885.

7th. Mercury frozen.
18th. 8 inches of snow on ground.

April, 1885.

1st. Snowbird seen to-day.
2nd. Rain during night, first of season.

May, 1885.

28th. First thunderstorm in west at 6 p.m.

June, 1885.

10th. Channel of river open opposite the Fort.
27th. River open for a little, but below the fort.
30th. River opened out to-day.

July.

11th. Ice came up the channel with evening tide.
30th. Light frost this morning.

August.

10th. Light frost this morning.

SEA TEMPERATURES.

Table XIX gives the daily mean temperature of the sea surface. The positions given are the noon positions each day.

From May 27th to July 31st, the result entered is the mean of a Bihouly series of observations extending from midnight to midnight. From August 1st to October 18th, observations were only made every four hours.

LABRADOR COAST 55°N. 56°W.

An examination of the table, by charting the temperatures shows, for the Labrador coast, say in lat. 65° N., long. 56° W., that the surface temperature, which, when clear of the ice pack in the early part of June, was 37° nearly. It had by the second week of July, got heated up to 41°; and by July 30th, notwithstanding the presence of numerous icebergs, the temperature had risen to 50°, falling again by Oct. 10th, to 34°.

HUDSON'S STRAITS.

In Hudson's Straits, for the first 20 days of August, the ship was always in the ice; the average surface water temperature for this period is 31° 3. On the 21st, the ship got clear, and when clear of the pack, we found the temperature on the south shore, and west to Nottingham and Digges, up to 36° and 35°. In September the temperature of the western end of the Straits, 33', and at the latter end of the month, in the eastern half, no mean of a day, while at sea, was as high as 32°.

The sea temperature conditions observed in Hudson's Straits this year, are exactly the reverse of those found, in 1884, on the voyage made in the "Neptune." In 1884 the ice met with was heaviest on the south shore and in the west end of the Straits. In 1885 all the ice was on the north shore and the east end of the Straits. Similarly, in regard to temperature on p. 12 of the report of the H. B. Expedition, 1884, the fact is recorded, that the highest temperatures were found in the eastern end of the Straits, in 1885, both going out and coming home, the surface temperatures were higher at the west end of the Straits.

HUDSON'S BAY.

In Hudson's Bay the last few days of August, and the 7th to 10th of September, the temperature was 38° 7 to 38° 4, the observations both going and returning, showing slightly higher temperatures on the eastern than on the western shores.

On Hudson's Bay soundings were taken every four hours, both going out and returning; and a Nigretti & Zambra automatic registering thermometer was used to get the temperature at the bottom. The highest bottom temperature recorded was 41°, and the lowest 37° 5.

SURVEYING WORK.

Owing to the exceptional delays experienced this year, I was able to do very little in the way of adding to our knowledge of the hydrography of the Bay and Straits.

The following work was, however, accomplished:—

(1.) Track survey from steam launch, of Outer Digges Island, by Dr. Bell and Mr. Tyrell, P.L.S. I also got good observations for position at the observing station in Port Lapierrière, the longitude results agreeing within 4 seconds of that determined last year. I obtained observations here both going out and returning, at an interval of eighteen days, the assumed rates for the chronometers agreeing most satisfactorily with that found by observation.

(2.) Running survey of the west side of the northern group of Ottawa Islands.

(3.) Tidal observations in Churchill Harbor.

(4.) I also took a series of soundings across Hudson's Bay. Maximum depth found was 94 fathoms.

Copies of the plans and results will be forwarded hereafter.

THE RESOURCES OF THE BAY AND STRAIT.

Apart altogether from the question of the navigability of the Straits as a practicable commercial route for the transport of produce from the North-West Territories of Canada, the resources of the Bay and Straits are well worthy of attention, and will, in my opinion, amply repay those who undertake their development.

In my report of last year I drew attention to the fact, that the whole of the fishing and trading done in the Hudson's Bay region is at present in the hands of the Hudson's Bay Company and the New England whalers.

The whale fishing, walrus hunting and porpoise fishing are capable of great extension, and are certainly profitable pursuits, since our neighbors to the south of the boundary line can afford to keep ships in commission for eighteen months in order to fish for less than four. The waters of Hudson's Bay are wholly within the Dominion, and the right of Canada to protect these waters and keep them for her own citizens is, I think, unchallenged. In the case of the White Sea in Northern Russia, the Russian Government charge high licenses for the privilege of fishing, and prescribe the methods to be used in capturing the fish. I would strongly urge the advisability of protecting these fisheries; and in any negotiations with the United States Government in reference to right of United States citizens to fish within the territorial waters of Canada, the value of the Hudson's Bay and Straits region as a fishing ground should be strongly insisted on; and under any circumstances, our Government should retain the right to prescribe the methods which may be used.

The salmon and trout fisheries continue to be prosecuted by the Hudson's Bay Company; their refrigerator vessel, the "Diana," taking home this year upwards of thirty tons of fresh salmon and several tons of trout. The Company have evidently in view the development of this branch of their trade, inasmuch as they have this year brought out a small vessel, of some twenty tons, to carry on the coasting trade between their stations in Ungava Bay.

The mineral resources of the Bay, as well as the natural history, have been treated of by Dr. Bell, who has both years accompanied the expedition as medical officer and geologist, and who had also, on previous years, visited both the east and west coasts of the Bay. Dr. Bell's report shows the extent of these resources, and if railway communication were established with any part of the Bay, it would be possible to prosecute the whale fishery, porpoise fishing, salmon fishing and walrus hunting much more advantageously than can at present be done. Suitable vessels, such as strongly built schooners, could winter in the Bay, and the crews be sent up in the spring of each year.

Every U. S. whaler which goes into Hudson's Bay is also an unlicensed trader, competing with the Hudson's Bay Company for the trade with the Esquimaux, the

Company paying full duty on all articles imported for trade, whilst their competitors from New England take, duty free, goods from bonded stores or goods manufactured in the U. S., as best suits their business.

The following is Dr. Bell's report on the Geology of the Hudson's Bay Region :—

THE GEOLOGY OF HUDSON'S BAY AND STRAIT.

By Robert Bell, B.A. Sc., M.D., LL.D.

Assistant Director of the Geological Survey, Medical Officer to the Hudson's Bay Expeditions.

In the following chapter I propose to give the geological results, not only of the expeditions of 1884 and 1885, but also of the various journeys which I have made to these regions in previous years. The description will include references to all the useful minerals which have been discovered around the shores of the Bay and Strait, with their geological relations, and it will be followed by a brief account of the economic minerals of the Hudson's Bay territories generally, which it is believed will prove useful in the present report. James' Bay, the southern prolongation of Hudson's Bay, will be included in the description of the latter.

The opposite sides of Hudson's Bay differ from each other, both in physical characters and geological structure. As a rule, the eastern side, or Eastmain coast, as it is called, is rocky, and much of it is bold and high, while the western shores are mostly free from solid rocks and low, with shallow water extending out considerable distances. In the north, a group of large islands, lying between the Bay and Fox Channel and Hudson's Strait, consists partly of Silurian limestones, and partly of older rocks, apparently Laurentian.

EAST SHORE OF HUDSON'S BAY.

The following description of the geology of the Eastmain coast will begin in Rupert's Bay, at the southern extremity, and proceed northward. I made a geological reconnaissance of this bay in 1875, and in 1877 the exploration was extended to Cape Dufferin, the western extremity of the Portland Promontory, a distance of 600 miles in a straight line from Moose Factory, at the head of James' Bay. A rough survey was made in the interval between Cape Jones and Cape Dufferin, about 300 miles in length, and a map showing this part of the coast, with the adjacent islands, was published with my report for 1877.

The first high ground met with on the eastern side of James' Bay is Sherrick's Mount, a large elevated peninsula or island. At low tide it is connected with the mainland, but when the tide is high it is separated from it by marshes and a strait of shallow water in its rear. On the north-west shore of Rupert's Bay, between the river of the same name and this island, Laurentian gneiss is exposed at several points. The color is generally gray and the texture rather coarse. It is composed of quartz and felspar with only small quantities of hornblende and mica. The general run of the bedding varies from N. 45° W. to N. 60° W. (magnetic). A small island, about 80 feet high, in the middle of Rupert's Bay, called the Stag Rock, consists of reddish grey, rather coarse gneiss, running east and west. (Geological Survey Report, 1875, page 323.)

Viewed from a distance, the outline of the land on the east side of James' Bay is undulating and rather low. The coast is fringed by 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. The shingle is arranged in conspicuous terraces, marking the recession of the waters of the Bay, a subject which will be again referred to. No regularity can be detected in the general arrangement of these islands, points and peninsulas. They present a kind of labyrinth which it would be very difficult to map with accuracy, and which is not unlike that of the north-eastern shore of the Georgian Bay, Lake Huron, except that on the east coast of James' Bay the water is shallow and shows the above-mentioned evidence of receding rapidly, whereas the islands of the Georgian Bay labyrinth are mostly rock, with deep water in front. (Geological Survey Report, 1877, p. 11c.)

In going from Rupert's Bay to Cape Jones, where we enter Hudson's Bay proper, the rocks, as far as observed, 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 characters in this distance, which it would be tedious to give in detail, especially as these rocks appear to be almost destitute of economic minerals, as far as we know at present. At Rupert's Bay the average strike is west north-westward, but in going towards Cape Jones it gradually changes to north-west and north north-west.

All along the east side of James' Bay, dykes of dark-colored compact trap were observed in numerous places cutting the gneiss. They were of all dimensions, up to 80 feet or more in width. In every case where their course was taken it was found to be due north and south (magnetic), or nearly parallel to the shore. This course also corresponds with the general direction of the great dykes which are so prominent along the Mattagami River. (Geological Survey, Report, 1875, p. 315.) Such dykes have, no doubt, had something to do with shaping the topographical features of this region. It is worthy of remark in this connection that the whole east coast of Hudson's Bay runs, in a general way, nearly due north, and that if we trace its meridian on northward we will find that it follows a water-way or a series of north and south breaks in the land all the way to the north pole, or as near to it as our knowledge extends.

HURONIAN ROCKS OF THE EAST COAST.

Belts of rocks which may be classified with this series occur at Cape Hope, the Paint Hills and apparently on the southern side of Richmond Gulf. The western extremity of Cape Hope consists of dark grey hornblendic schists with some lighter and more silicious belts. These rocks are mostly divided into small lenticular forms, with granular white calcspar in the interstices. They are cut by numerous irregular straggling veins of mixed calcspar and quartz, intercalated with schists. No metallic ores were noticed in any of them.

The Paint Hills are situated on a point with several islands lying off it at a distance of about 39 miles north of Cape Hope. The name appears to have originated from the circumstance, that here the smooth rounded rocks are stained to reddish and brownish colors by iron oxide. The rocks 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 have given rise to the stains just referred to, and they also contain a good deal of white calcspar in the form of partings in the joints and cleavage-planes and as isolated patches. 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 several varieties of silicious schists. The pebbles are mostly small, but some of them measure about eight inches in diameter. The cleavage runs east and west, but the bedding, which is very distinct, strikes N. 10° W. A vein of pegmatite, in which the quartz is reddish-white and the felspar takes the form of a very large white crystals, traverses the islet parallel to the strike. A greenish schist occurs on another islet about six miles northward of the Paint Hills. The breadth of the

Huronian band of this locality may be two or three miles. 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 hornblende schist, with compact silicious portions. Small veins of whitish granite also occur following the stratification which runs N. 30° W.

UNALTERED ROCKS.

The Intermediate Formation. Between Cape Jones and Cape Dufferin, the islands and a considerable portion of the mainland are occupied by newer rocks resting on the Laurentian. They consist of two series, uncomformable to each other. The upper, which I have called the Manitounuck group, after the chain of islands of the same name in this neighborhood, appears to be equivalent to the Nipigon formation of the Lake Superior region. The lower series is made up of hard, coarse grey sandstones and conglomerates, in which the pebbles are mostly of white quartz, and reddish-grey quartzites or sandstones which are generally thinly bedded. This series had been somewhat disturbed before the deposition of the upper, which is remarkably free from disturbance. The former may be equivalent to the upper part of the Huronian series of more southern latitudes.

At the first fall on the Little Whale River, the hard grey quartz conglomerate of the lower series is well displayed. On the south side of the stream, near the mouth, where the hills are upwards of a thousand feet high, about 150 feet at the base of one of them consists of coarse grey and reddish-grey somewhat altered sandstone, with conglomerate layers, and conglomerate with sandstone layers, in both of which the pebbles are mostly quartz. These form part of the lower series, which is, no doubt, much thicker than the section exposed. In the south-western part of Richmond Gulf and on the north side of its narrow outlet, a remarkable castle-like peninsula runs to a height of 700 or 800 feet. The lower part consists of the coarse grey sandstone, passing into conglomerate with white quartz pebbles and belongs to the older series, while the upper part consists of limestones, slightly unconformable to the sandstones and all capped with columnar trap which resembles the walls of a castle. On the south side of the outlet of the gulf, a section of nearly a thousand feet is exposed, of which the lower four hundred or so consist of the coarse greyish sandstones of the lower group. Reddish-grey and mostly thinly bedded quartzites of this group, occur upon some of the islands and on the south-eastern shores of the gulf. I have proposed to give to this lower group the name of the Intermediate Formation. (See Transactions of the Royal Society of Canada for 1884, p. 242.)

The Nipigon Formation.—The islands from Cape Jones to Cape Dufferin and the shores of the mainland from Manitounuck Sound to a point thirty miles north of the entrance of Richmond Gulf consist of a series of unaltered stratified rocks, in none of which could fossils be found. They are probably of the same age as the Nipigon formation, but until this point is definitely determined I proposed, in 1877, to call them, for convenience, the Manitounuck Group—(See Geological Survey Report for 1877, p. 11). They are made up principally of limestones, sandstones and quartzites, shales, ironstones, amygdyloids and basalts. The limestones are mostly magnesian and a large proportion of them are silicious and argillaceous. The strike corresponds with the general course of the shore and of the chains of islands near to it. The dip is at a low angle towards the sea. Glaciation has taken place from the eastward, and as a consequence of these two circumstances, all the escarpments of the islands are on the landward side, and those on the main shore all face inland. Many of the latter rise to heights of 700 feet or more above the level of the sea. The limestones, which are mostly bluish-grey, are generally found 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 they also occur in massive beds. Their color varies from light to very dark grey, and a few beds are reddish. Associated with and overlying the quartzites is a series of cherts and shales which are 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, near Cape Jones, 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, while the underlying basalts, shales, quartzites and limestones appear in the cliffs at a greater or less distance inland.

Further north, 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. Under the powerful glacial denudation, to which the whole of these shores have been subjected, the effect of this structure has been to allow of the cutting out of the channels which separate the islands from one another, and also to give to each of them its crescent-like form with its convex side towards the main land. The gaps through which Little Whale River and other streams in the vicinity find their way to the sea, and the outlet of Richmond Gulf, have also had a similar origin. There are also many similar gaps in the hills, which were occupied by water, when the sea stood at higher levels, but which are now more or less filled up with sand or shingle and some of them are elevated to considerable heights above the water.

The following approximate section of the rocks on the south side of the outlet of Richmond Gulf, measured from the level of the sea upward, may be taken as a fair representation of the rocks which form the high and narrow tongue of land which separates the gulf from the open sea and also of the first ridge or range of hills all along the coast to the southward as far as the head of Manitounuck Sound:

	Feet.
Coarse grey sandstones, of the Intermediate Formation, upwards of	400
Amygdaloids	150
Bluish-grey and drab dolomites	60
A band of bluish drusy dolomite, carrying galena	20
Thick-bedded bluish dolomite	30
Grey quartzites and argillites	100
Basaltic diorite (followed elsewhere by amygdaloids)	200
	960

Everywhere on this part of the coast, the Manitounuck, series dips to the westward at a uniform angle of about 5°. The upper beds, which slope under the water all along the outside shore of the narrow peninsula between Richmond Gulf and the Bay, consist of amygdaloids, and the same rocks continue along the coast to the southward nearly to Manitounuck Sound. They are usually thickly studded with coarse agates, many of which are very large. A striking feature of these amygdaloids consists in the frequent occurrence in them of large isolated masses of green epidosite, from two to twenty feet in diameter. These masses appear to be of a seggregated or concretionary character. The proportion of the epidote which they contain, and the intensity of the green color gradually increase from the periphery 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, in which frost, no doubt, plays an important part, leaving round pits or holes to mark the former positions of the epidotic masses.

The lead-bearing band of dolomite in the above section is worthy of notice. In the cliffs about three miles to the north-east of the Hudson's Bay Company's post at the mouth of Little Whale River it is about thirty feet thick. Here a quantity of galena had been extracted from it long ago by unknown persons and about nine tons of the dressed ore were sent to London and sold by the company in 1858-59.

The ore occurs in the form of isolated bunches in the dolomite. On the south side of the river and near the Hudson's Bay Company's post, this band appears to be richer in galena than where it has been worked. It is traceable thence to Richmond Gulf, at the entrance to which, on the south side, I found bunches of galena in it which would weigh upwards of one hundred pounds. The same band appears to be exposed in the cliffs along the west side of the Gulf. Although comparatively thin, it is probably continuous between the localities which have been mentioned, as both it and the associated beds are very regular, and from its richness in lead ore it may in some parts of its course, prove of economic importance. Dr. Harrington found specimens of the ore from the old "mine" near the Little Whale River post to contain 5.104 ounces of silver to the ton of 2,000 pounds, while that from the entrance to Richmond Gulf yielded him 12·03 ounces to the ton.

The Manitounuck rocks are continued northward in the Nastapoka chain of islands, which begins near Little Whale River and runs northward, 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 and arranged in a single row, lying at a distance of from two and one half to five miles from the coast. Four of the larger islands are each ten miles long. They all present nearly the same structure, with cliffs on their eastern sides facing the mainland, and the strata of which they are composed dip westward or towards the open sea at angles varying from 3° to 6°. The following ascending approximate section of the beds on the southernmost large island of the chain and which we called Bélanger's Island, may be taken as representing, in a general way, the rocks of the whole chain. (See Geological Survey Report for 1877, p. 6 C.)

	Feet.
Bluish dolomite, weathering yellow, fall in large concentric masses, with olive green slate between. These large masses are themselves formed of small concentric concretions from 2 to 6 inches in diameter	10
Olive green silicious slate	20
Interval of coarse shingle, 30 or 40 chains wide, between the eastern edge of the island and the base of an east-facing cliff, in which the rest of this section is exposed. The strata concealed would be about	200
Greenish silicious shale with grey quartzose sandstone	150
Single band of light grey sandstone	10
Grey quartzose sandstone, interstratified with greenish silicious shales	105
Black slate, some of which splits into good flags	15
Highly ferruginous impure dolomite band	10
Drab-colored manganiferous spathic ironstone in thin bands, some of which weather to a brown color, others to a black. These form much of the surface of the island	18
	538

The greater part of this section is seen in a cliff rising nearly perpendicularly to the height of 348 feet above the sea. The manganiferous iron-stone band, which forms the upper member of this section, is of great economic importance. It also appears to form the summits of nearly all the other islands of the chain. On Flint Island, the small southernmost member of the group, this band is 30 feet thick, but it is here interstratified with beds of greenish argillaceous sandstone. On Davican's Island, about sixty miles north of the inlet of Richmond Gulf, the ore band is about 20 feet thick.

Analyses of specimens from this spathic ironstone band made by Dr. B. J. Harrington, show that it contains valuable ores of iron and manganese. An average specimen of a compact variety from Flint Island was found to contain 25·44 per

cent. of metallic iron and upwards of 24 per cent. of carbonate of manganese. A crystalline variety from Davicau's Island gave 27·83 per cent. of metallic iron. The average thickness of the iron band is probably not less than twenty feet, and it appears to run through all the islands of the group, a distance of about 90 miles, exclusive of the more northern members which are more widely separated. The band is made up of layers a few inches in thickness. The color, on fresh fracture, presents various shades of drab, buff and brown, and the weathered surfaces are either black or some shade of brown. The ore beds may not be all equally rich, but the greater part of them on the various islands visited appear to be sufficiently so to constitute a valuable ore for the manufacture of spiegeleisen. The 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 ironstone beds are spread over the greater part of their areas, which in the aggregate amounts to many thousands of acres. The islands being destitute of timber and the rocks much shattered by the surface water and the frost, 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.

In connection with the subject of iron ores on the Eastmain coast, it may be here stated that along the south-east or landward side of Long Island, for a distance of 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 one higher, 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. These 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 eastmain coast, such as Great and Little Whale Rivers, near Little Cape Jones and Langlands River. (Report Geological Survey for 1877, p. 21 C.)

The thickness of the strata of the Manitounuck group of rocks on the mainland and islands in the vicinity of Nastapoka Sound, may be approximately computed from their angle of inclination and their horizontal width at right angles to the strike. As the strata of the Nastapoka Islands and of the mainland opposite are almost undisturbed, and as both have the same moderate dip, the average strike being parallel, it may be assumed that the measures concealed under Nastapoka Sound are conformable to both, and they would, therefore, amount to about 1,000 feet in vertical thickness. This, with a minimum of 1,200 feet to represent the strata around Richmond Gulf (exclusive of the underlying Intermediate Formation) and 600 feet 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.

The Nastapoka chain of islands is continued northward by an island over seven miles long, the south end of which is a short distance beyond the mouth of the Langlands River, and by a somewhat smaller island some fifteen miles further north, both islands lying about two miles off the shore. These two islands and the northern half of the most northern one of the Nastapoka chain proper, 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 islands to the southward.

In going northward, the rocks of the Manitounuck group, above described, terminate on the mainland about thirty-one miles north of the entrance to Richmond Gulf, and beyond this point the Laurentian gneiss forms the main shore all the way to Cape Dufferin.

Hopewell Point, which is situated at a distance of about thirty-one miles northward of the last two islands just described, is a much less conspicuous geographical feature than was formerly represented on the imperfect charts of this coast. The

Hopewell chain of islands consists of ten principal members, lying between this point and Cape Dufferin. They resemble the Nastapoka Islands in geological structure and in their forms and general appearance, but they are not so high and most of them lie closer to the mainland, the narrow channel behind them being called Hopewell Sound. They are composed of a single group of rocks which runs through the whole chain and appears to be equivalent to the upper strata of the Nastapoka Islands. The following approximate ascending section which is exposed on the landward side of the first large island of the series, at a point two miles north-west of the extremity of Hopewell Point, will serve as an example of the character and superposition of the rocks of the entire chain :

	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 iron-stone	40
Fine-grained dark greenish-grey trap (maximum of this locality)	40
	150

All the islands of the group have a structure resembling the above section, but the relative proportions of the different strata vary somewhat in passing from one to another.

The remainder of the east coast of Hudson's Bay, from Cape Dufferin to within about thirty miles of Cape Wolstenholme, has not yet been examined geologically. I have seen numerous pots and lamps made from a greenish-grey compact steatitic rock, in the hands of the Eskimo, which they said they obtained in the neighborhood of Mosquito Bay. This circumstance indicates the probable existence of a band of Huronian rocks in that part of the coast. The description of the shore from Cape Dufferin to Mosquito Bay, by those who have seen it, leaves little doubt that it consists mainly of Laurentian rocks.

Last September, while the "Alert" was lying in Laperriere's Harbor in Outer Digges Island, I was afforded an opportunity of coasting southward in a whale boat to a point about thirty miles from Cape Wolstenholme. From the tops of the rocky hills at this distance I could see the nature of the land for at least ten miles further south. The whole country from the cape consists of barren hills of Laurentian gneiss of the commoner varieties, with patches of fine-grained red granulite, of limited extent, in some parts. Large veins of white quartz and red felspar were noticed occasionally. Judging from the appearance of the land still further south, as seen from the "Neptune" in 1884 and from the "Alert" last year, the coast would appear to maintain the same character all the way to Mosquito Bay; so that we have reason for believing that the Laurentian rocks prevail along the entire coast, between Capes Dufferin and Wolstenholme. As stated in my report of last year, Nottingham Island and the Digges Islands also consist of Laurentian gneiss, as well as both shores of Hudson's Strait at every place where they were examined.

In the eastern part of Hudson's Bay, a number of groups of islands occur between the latitudes of 56 and 60 degrees, and at distances varying from 70 to 100 miles from the Eastmain coast. I have obtained, through the Eskimo, a few rock-specimens from the islands opposite to Little Whale River, from which I infer that trappean rocks occur there. One of the specimens is a large piece of calcite from a vein.

The most northerly group of the islands referred to lies in a north-easterly and south-westerly direction, and mostly between latitudes 59° and 60°. We visited them last autumn, in the "Alert," and a rough survey was made of a part of the group, which was named the Ottawa Islands, in order to avoid confusion in reference to the

two groups called the North Sleepers and the South Sleepers which are the next islands to the south of them. The Ottawa Islands are all of a bare mountainous character and rise to heights of between one and two thousand feet above the sea.

I landed upon one of the outermost of this group and found it to consist entirely of a greenish trappean rock, apparently diorite. The rocks of most of the islands in the northern part of the group had exactly the same appearance and they are, no doubt, of the same geological character, but the most westerly of the larger of these islands to which we approached close enough to see it plainly, consisted of stratified masses in distinct layers of great thickness and of different colors and external appearance, all dipping westward or towards the centre of the bay. The trap of the island on which I landed was cut by small veins of quartz containing copper pyrites, and it also held thin short seams of asbestus.

In 1884 I had opportunities of landing from the "Neptune" at two places on the eastern shore of Mansfield Island, and the greater part of this side of the island was seen sufficiently closely to ascertain that it consisted of greyish limestone in horizontal beds which were mostly thin. Although the fossils collected on the above occasions are neither numerous nor good, they are sufficient to show that these limestones belong to the Silurian system and are probably of the age of the Niagara formation.

As stated in my report for 1884, I had an opportunity of inspecting the south-eastern side of the southernmost island of the Southampton group for a considerable distance northward from Cape Southampton. In this interval the rocks consist of limestones, like those of Mansfield Island on the opposite side of the ship channel. Last season, Captain Wm. Hawes, of the Hudson's Bay Company's brig "Cam Owen," informed me that the northern end of this island, for a distance of 25 to 30 miles southward from Cape Pembroke, consists of rugged rocks, forming dark-looking hills, which he could not distinguish from those of Laurentian gneiss on both sides of Hudson's Strait.

WEST SHORE OF HUDSON'S BAY.

From what has been ascertained in regard to the geology of the western shores of Hudson's Bay, including James' Bay, it appears probable that they are everywhere bordered by rocks newer than the Laurentian, except, perhaps, in the vicinity of Cape Henrietta Maria, where there is an interval concerning which but little is yet known, and in which the latter system may come to the coast.

A large area, lying immediately to the south-west of James' Bay, is occupied by almost horizontal fossiliferous strata of Devonian and Silurian age. These rocks form a flat country, which rises very gradually as we advance into the interior. They extend further inland on the Albany River and its great southern branch, the Kenogami, than in any other part, the margin of the basin being 200 miles from the bay on the former, and 230 on the latter. The dip is north-eastward or towards the bay at a low angle. On the southern side of this basin, which begins about Hannah Bay, the Devonian rocks come into direct contact with the Laurentian and Huronian, but in the valley of the Albany a considerable breadth of Silurian limestones and marls is interposed. The late Mr. Billings considered that the fossils, which I collected in this valley, indicated the Niagara formation.

The Devonian rocks are exposed along the main Moose River and the lower parts of its branches, the Abittibi, the Mattagami and the Missinaibi, as well as on the Albany and the Attawapishkat. The late Mr. George Barnston collected and presented to the Geological Survey a number of well-preserved fossils from the two streams last named; and others have been brought by myself from the Moose and its branches, which Mr. Whiteaves considers to indicate the Corniferous formation, while the fossils from the Albany and the Attawapishkat, he finds, belong to the Hamilton group. These Devonian rocks include greyish limestones with ironstone, bluish-grey shales with gypsum, and reddish marls. Agoomska Island, and some

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CHART

OF THE

OTTAWA ISLANDS.

HUDSON'S BAY

From an approximate Survey by Lieut. A. R. Gordon R. N.

of

H.M.S.S. ALERT

1885

Scale - 4 Knots - 1 Inch

Scale of Statute Miles

0 1 2 3 4 5 10

Soundings in Fathoms

68 Mud

65 Mud

65 Mud

70 Mud

1.30 P.M.

12.30 P.M. Sept. 10th. 1885

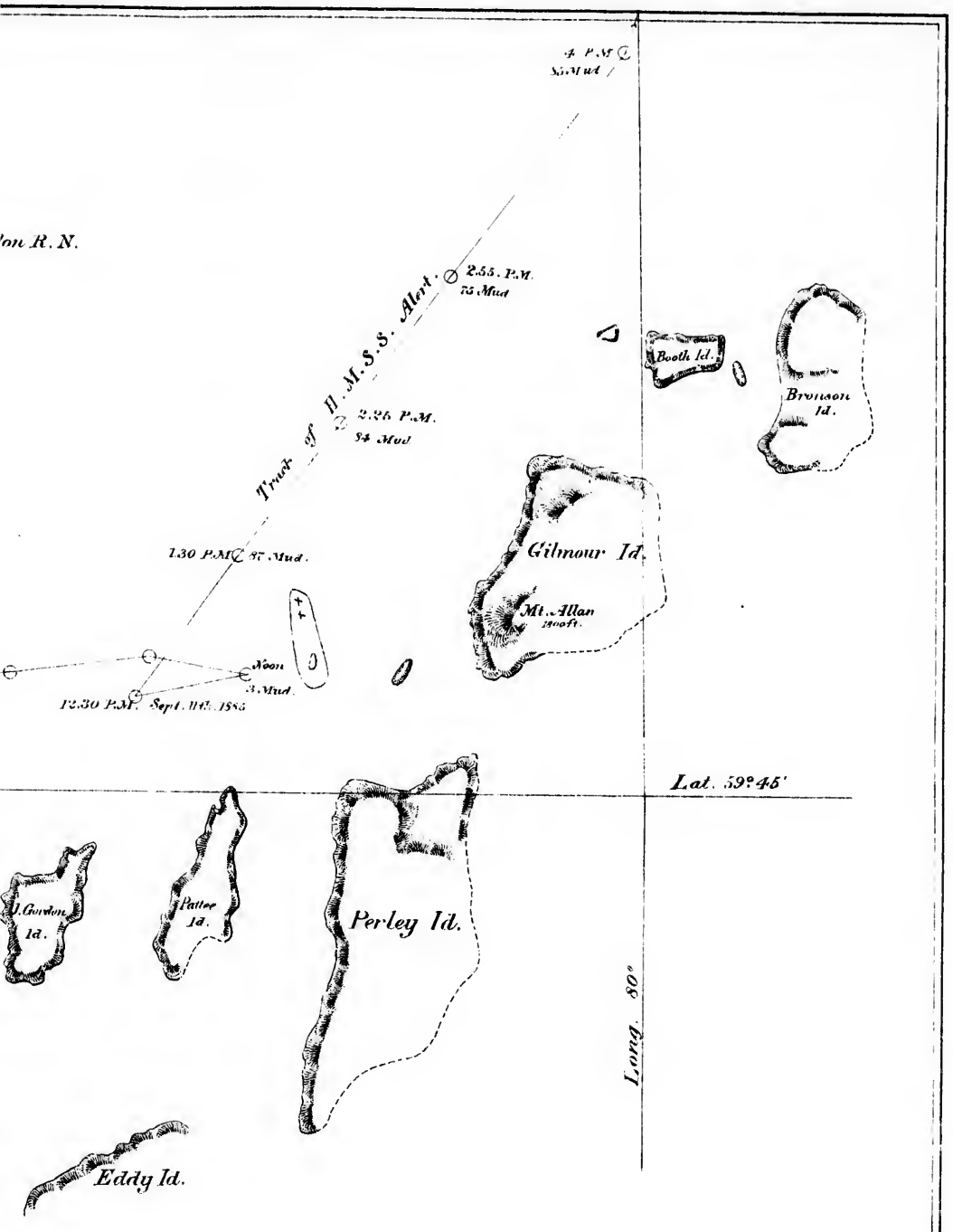
4 P.M. Sept 10th. 1885

85 Mud

J. Gordon Id.

Patten Id.

Eddy Id.


4 P.M.
55 Mud
on R. N.
2.55. P.M.
75 Mud
Booth Id.
Bronson Id.
Track of H.M.S.S. Alert.
2.26 P.M.
84 Mud
1.30 P.M.
87 Mud.
Gilmour Id.
Mt. Allan
1400 ft.
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3 Mud.
12.30 P.M. Sept. 11th. 1883
Lat. 59°45'
J. Gordon Id.
Patter Id.
Perley Id.
Long. 80°
Eddy Id.

smaller islands in James' Bay, probably consist of Devonian strata also, as the general dip is in their direction, and it is possible somewhat higher measures may occur on these islands. A large deposit of good clay ironstone, passing into limonite, which occurs in the Devonian rocks at the foot of the Grand Rapid on the Mattagami River, and the probable occurrence of other deposits in these strata will be described in a separate chapter on the Economic Minerals of Hudson's Bay. The gypsum associated with these rocks at the "White Banks" on the main Moose River, from 31 up to 38 miles above Moose Factory, will also be described in the same chapter.

Westward from Cape Henrietta Maria, or following the south side of Hudson's Bay proper, the Indians describe the country, a short distance back from the shore, as being somewhat hilly to a point, a few miles east of the Wainusk River, where it becomes level, and continues so all the way to the Nelson River and beyond. In 1880, the Bishop of Moosome brought me a specimen of light-colored fossiliferous limestone from the rock *in situ* in the bed of the River Severn, at a point about twenty-five miles above the Fort of the same name. He reported this limestone as abundant in this part of the river, and, from his description of the character of the stream and of the surrounding country, it appears probable that this rock may extend to twice the above distance or more from the sea. In following the boat-route inland, from York Factory, by way of Hayes, Steel and Hill Rivers, the Laurentian rocks are first met with at about six miles below "The Rock," which is the first chute on Hill River, and is situated at a distance of 109 miles, in a straight line, from York Factory. The intervening country is level, and it has all the characters of the regions along the lower stretches of those other rivers of Hudson's Bay, on which the Palæozoic rocks are known to occur. The river in its three sections just named, is broad, and flows with a swift and almost uniform current over limestone shingle, which is no doubt derived from flat-lying Silurian rocks under the drift, out of which the bed of the stream is excavated. On this boat-route, therefore, it may be inferred that the Silurian rocks extend inland to a distance of about 103 miles, in a straight line from York Factory, or about 108 from the extremity of the point between Hayes and Nelson River. (See Report Geological Survey for 1878, p. 8 C. C).

On the Nelson River the flat-lying Silurian rocks were ascertained to extend inland to a distance of eleven miles above the Third Limestone Rapid, or as nearly as possible 108 miles in a straight line from the extremity of the point between the Nelson and Hayes Rivers, called Beacon Point or "Point of Marsh." The beds highest up the river contain abundance of fossils which prove them to be of Lower Silurian age, but those nearest the sea are probably Upper Silurian. The latter consist of dolomites, and in ascending the river they were first found about two miles above the Puck-wa-ha-gun branch, or at sixty-two miles in a straight line from Beacon Point, where they are exposed at low water on both sides of the stream. The same rock was also met with on the south-east side of the river at two and six miles further up. At the latter place a perpendicular escarpment of it rises out of deep water to a height of thirty feet above its surface. At all of the foregoing localities the rock has a yellowish-grey color, is rather fine grained, soft and generally earthy, although some of the beds appear to constitute a tolerably pure dolomite. It is thinly bedded, with the exception of a few bands, a foot or more in thickness, at the last locality. The only fossil observed was a *Pentamerus*, which was abundant in one of the beds, but none of the specimens were sufficiently well preserved to identify the species with certainty. (Geological Survey Report for 1878, p. 12, C. C.)

The foot of the First or Lowest Limestone Rapid on the Nelson River, which may be considered the head of steamboat navigation, was found to be about 77 miles in a straight line from Beacon Point, or about 90 miles by the river, and to be in latitude 56° 36′ 6·1″ Here on the north-west side is a cliff of buff colored fossiliferous dolomite in nearly horizontal beds. It is shaly at the base, but at the top some of the beds are two feet thick and the latter hold flinty and white chalky nodules. The fossiliferous rocks crop out here and there on the sides of the river for a distance of 23 miles above the foot of the First Limestone Rapid, or to a point

three miles above the Third Limestone Rapid. On the south east side, just below the Second Limestone Rapid, nine miles above the first, a cliff, twelve feet high, at the edge of the river, is formed of horizontal beds of crumbling buff and greyish dolomite. At about a mile below this locality these beds were observed to be slightly undulating. At the Third Limetone Rapid the rock is exposed in horizontal beds at the foot of the clay bank along the south-east side of the river, and consists of bluish grey, drab and buff somewhat arenaceous dolomite. The Limestone River, a considerable stream from the northward, enters the Nelson just below the foot of this rapid. The last exposure of fossiliferous rock which was seen in ascending the river occurs on the south-east side at the foot of the Broad Rapid, about eleven miles above the Third Limestone Rapid, or 108 miles from Beacon Point. It consists of a finely arenaceous dolomite of a mottled light bluish-grey color. The fossils collected at the three Limestone Rapids were examined by Mr. Whiteaves, who found them to comprise most of the species characteristic of the dolomite which occurs along the Red River in Manitoba, and which he regards as equivalent to the lead-bearing limestone of the Western States, or about the horizon of the Niagara formation of the Lower Silurian system.

In descending the Churchill River, the Silurian basin is entered upon at a distance of 80 miles, in a straight line, from the mouth of the stream. The beds first met with consist of rather coarse greyish rusty-looking sandstone, which is seen here and there in the banks of the river, resting on coarse syenitic gneiss, for a space of three miles, or to the seventy-seventh mile from the sea, where we come to Portage Chute, the strongest rapid on the river below the junction of the Little Churchill. The greatest thickness of this sandstone exposed in any one place amounts to about thirty feet. It was not observed to contain any fossils. From Portage Chute, for the next forty-two miles, or to within thirty-five miles of the mouth of the river, Silurian strata are met with, either continuously or at short intervals in the banks or bed of the stream. The last of the red syenitic gneiss, which prevailed higher up the river, is seen in its bed at a distance of eight miles below Portage Chute, but on the left or west bank, a cliff of greyish-buff very crumbling earthy limestone or calcareous marl, varying from thirty to fifty feet in height, extends all the way from the Chute to this exposure of gneiss, and the same rock is also seen at intervals beneath the drift clay in the opposite bank. Similar dolomites, but becoming less earthy as we descend the river and rise in the measures, continue to a point five miles below the commencement of the last or forty-five mile reach of the river, or as above stated, to within thirty-five miles of the mouth. Some of the more strongly dolomitic or least marly of the beds are mottled with white chalky nodules like those already referred to in the dolomites of the Nelson River, while others have straggling dark-colored patches running over their surfaces. The dolomites of the last five miles are more evenly bedded and of a lighter grey or buff color than those further up. The few fossils which were observed in the dolomites and marls of the Churchill appear to belong to Lower Silurian species. (See Report Geological Survey for 1879. C.)

Below the last exposure of these dolomites (at thirty-five miles from the sea) no fixed rocks were observed until approaching Mosquito Point on the west side at the head of tide-water; where, at a short distance back from the river, massive dark grey argillaceous quartzites are exposed in a ridge running in a southerly direction. These Churchill quartzites contain no fossils and they evidently belong to a much older series than the dolomites. They bear a strong resemblance to the auriferous "whin-rocks," of Nova Scotia, and, like them, contain veins of quartz, which, however, did not show any gold in half a dozen specimens assayed by Mr. Hoffmann. The fine harbor in the mouth of the Churchill River owes its existence to these quartzites, which form the sea coast on either side of it. They were also traced for several miles to the eastward. The Silurian dolomites are, however, again met with on the coast several miles south of Cape Churchill.

Northward of Churchill River I have explored the shore of Hudson's Bay for a short distance beyond Button's Bay and have seen the land in places on the north-

west side, but Marble Island was the only part in this direction of which I have personally made a geological examination. I have, however, been furnished with descriptions of the whole coast as far as Chesterfield Inlet, by friends who have travelled along it, and have also received from them considerable collections of specimens of the fixed rocks from a number of places between Eskimo Point and Chesterfield Inlet. Professor James Tennant has also described some rock-specimens from the same part of the coast and Repulse Bay. From these data some idea may be formed of the geology of the whole north-western side of Hudson's Bay.

It would appear that from Seal River to Eskimo Point, a distance of 140 statute miles, the coast is low with the exception of an occasional isolated hill, probably of drift. There is much limestone in the shingle of the beach, and it is not improbable that behind this section of the shore, the flat-lying Silurian rocks form a considerable area similar to those which have just been described further to the south-east. The unbroken or even trend of the shore, like that from Cape Churchill to the Severn River, as well as the low character of the land would, from analogy, indicate the presence of these rocks rather than of the older formations, which would probably give rise to a hilly country and a broken coast line.

From Eskimo Point to Chesterfield Inlet the rocks would appear to consist principally of a variety of schists, which cannot be distinguished from those we have classed as Huronian. Among the specimens from this region are amygdaloids and other trappean rocks, and likewise one of red sandstone which has the peculiarities of that of the Intermediate Formation mentioned in a previous part of this chapter as occurring in Richmond Gulf. The geology of Marble Island is described in my report for 1884. Glossy mica schists, like those associated with the quartzites of which the island is mainly composed, are also found on the mainland opposite. Between Eskimo Point and Chesterfield Inlet, the natives report the occurrence of numerous large veins of granular iron pyrites, of which I obtained a dozen freshly broken angular specimens, having a total weight of about fifty pounds. The only rock associated with the pyrites is a very small quantity of dark greenish soft schist. A specimen of this kind of pyrites which I obtained from Iñari on this coast in 1879 had adhering to it a small quantity of light bluish-grey magnesian limestone. In my report for 1884, I stated my belief that "a set rocks very like those of the Township of Ascot (celebrated for its mines) in the Province of Quebec, and holding similar pyrites veins, which are of great economic value, will be found in this part of the western coast of Hudson's Bay." Similar pyrites veins in rocks such as these, have, on working them, been frequently found to contain a profitable percentage of copper, which has generally had a tendency to increase in amount in proportion to the depth from the surface. The specimens from Repulse Bay, described by Professor Tennant, belong to the commoner varieties of the Huronian series, and it would not be surprising if these rocks prevailed all along the coast from Chesterfield Inlet to this bay. The occurrnce of specks of gold in quartz from Repulse Bay, mentioned by Tennant is interesting. The Eskimo report finding mica in wide sheets in the interior of the country opposite to Marble Island, and some years ago it was said that an American vessel took a large quantity of this mineral from Chesterfield Inlet. From the foregoing data and the fact that the Huronian rocks, or such as the specimens from this region indicate, are pre-eminently the metalliferous series in the Dominion, I am convinced, as I have frequently stated elsewhere, that we have on the north-western side of Hudson's Bay a promising region for economic minerals.

THE ECONOMIC MINERALS OF THE HUDSON'S BAY TERRITORIES IN GENERAL.

The useful minerals which have as yet been discovered near the shores of Hudson's Bay or Strait have been already mentioned in describing the geology of these regions in a previous chapter. But in connection with the subject of this report, it is

believed that a very brief account of what is known of the mineral resources of the Hudson's Bay Territories, generally, will prove interesting. These notes have been gathered partly by myself in the course of the geological explorations which I have made in various parts of these territosies, and part of them are derived from the published observations of other travellers who have visited these regions. The Hudson's Bay Territories include the greater portion of the Dominion of Canada north of the watershed of the St. Lawrence and east of the Rocky Mountains. It will be seen that notwithstanding the small amount of exploration which has been made for valuable minerals in this vast region, we have indications of great wealth in various directions. A few words on the outlines of the geology of the territories under consideration will assist in explaining the distribution of the economical minerals.

The Laurentian nucleus of the continent is the principal feature of the geological map of the Dominion. It stretches from Lake Superior to Baffin's Bay, and from Great Bear Lake to the Straits of Belle Isle. Hudson's Bay itself, which is half the size of the Mediterranean Sea of the old world, lies in the centre of this area. Its shores are bordered in places with newer rocks. On the west side of James' Bay (its southern prolongation) these extend inland over 200 miles, and consist of fossiliferous Devonian and Silurian strata. On the western and north-western side of Hudson's Bay, proper, altered rocks are met with, some of which resemble the gold-bearing strata of Nova Scotia, some the Huronian of Lake Huron, some the older Huronian, and others the crystalline series of the neighborhood of Sherbrooke, in the Province of Quebec.

Along the east coast (called the Eastmain), and among the islands lying off it, there is an interesting set of volcanic and sedimentary rocks, which appears to be identical with the Animikie and the Nipigon series of Lake Superior.

The area which I have spoken of in a general way as being Laurentian includes tracts and belts, more or less extensive of the Huronian series. Such areas appear to be most common, and they have been best explored in the country between the Great Lakes and Hudson's Bay.

Most of the islands of the Arctic Sea consist of Silurian strata. On some of the north-western of them, Carboniferous rocks are supposed to be developed, but, possibly, on further examination, these may prove to be Devonian and Cretaceous; and still further north, strata supposed to be of Liassic age have been found.

Between the Laurentian nucleus and the Rocky Mountains, there is a great basin of Silurian, Devonian, Cretaceous and Tertiary rocks, which, towards the Arctic Ocean, becomes, to a great extent, replaced by non-fossiliferous limestones, probably of Nipigon age. On the shores of the Arctic Ocean, similar limestones, associated with trap, are the prevailing rocks between the Mackenzie and Copper Mine Rivers. The copper-bearing rocks of the latter river appear to correspond with those of Lake Superior.

In the following brief account of the economic minerals, I shall begin with the metallic ores, and in order to make this part of the subject as complete as possible, I shall include in it short notices of any valuable minerals which may have been already referred to from a geological point of view in a previous part of this report.

Iron.—A fine variety of magnetite, of which I procured specimens, is said to occur in large quantities near the entrance of Black Bay on the north side of Athabasca Lake. On Knee Lake, between Lake Winnipeg and Hudson's Bay, I have examined a large deposit of a laminated finely granular magnetite which however, Mr. Hoffmann finds to contain only 45.86 per cent. of metallic iron; but it is perfectly free from titanic acid. Magnetic iron ore is reported to occur on the north side of Hudson's Strait, and small deposits of it are not uncommon among the Huronian bands in various parts of the territory.

Hæmatite in bands associated with sandstones, shales and trap, is found on Long Island, Hudson's Bay; and loose pieces of this ore are often met with on the Eastmain coast. A promising deposit of hæmatite has been opened on Big Island in Lake Winnipeg. Two years ago Captain H. P. Dawson, R.A., sent me a fine

specimen of foliated specular iron from a vein on the northern bay on Great Slave Lake.

Clay-ironstone is found on Melville Island, according to Mr. Charles König (in the Supplement to the Appendix of Captain Parry's Voyage of 1819-20). Small quantities of it in the form of nodules and thin layers occur in many places in the Cretaceous and Tertiary marls of the North-West Territories. In 1875, I discovered a large deposit of this ore passing into limonite, at the foot of the Grand Rapid of the Mattagami River, a short distance south-west of the head of James' Bay. There are indications of its existence in considerable quantities in various places among the Devonian rocks to the south-west of this bay.

But probably the most extensive deposit of iron ores in the territories under description is that of manganiferous spathic ironstone on the Nastapoka Islands, on the east side of Hudson's Bay, described in my report for 1877. As stated in a previous part of the present report, the ore occurs as a thick band, divided into layers of a few inches overlying the quartzites and shales, and running through all the islands of the southernmost ninety miles of this chain. The dip of the strata is low and the ore, broken up by the frost, forms much of the surface of these islands, there being no timber or soil. Dr. Harrington has analyzed specimens of the ore from different islands, and found it to contain on an average about 50 per cent. of carbonate of iron and 25 per cent. of carbonate of manganese. It would, therefore, be a valuable ore for the manufacture of spiegeleisen.

Copper.—The native copper of the Copper Mine River is described as occurring in amygdaloid, and from private accounts, which I have heard, it would appear to exist in large quantities. I have found small veins containing copper pyrites on Long Island and one of the Ottawa Islands in the north-eastern part of Hudson's Bay. As a set of rocks resembling the copper-bearing series of Lake Superior are largely developed on these islands and the Eastmain coast, copper may be here looked for with a prospect of success. Some of the specimens of granular iron pyrites, which I have obtained from the north-west shore of the bay, look as if they contained a small percentage of copper. The quartzites of Marble Island are stained with the green carbonate in some places. Copper pyrites, generally in small quantities, has been found in the Huronian rocks in various parts of the territories. It occurs mostly in quartz veins, resembling those of the Bruce mines on a small scale. At this locality, which is on the north shore of Lake Huron, two quartz veins in Huronian greenstone yielded sulphuretted ores to the value of $3,300,000 between the years 1847 and 1875. On the Mattagami River, about 25 miles below Kenogamissee Lake, I have found calcspar veins from three to ten inches thick cutting similar dioritic and containing specks of copper pyrites. A promising deposit of the latter was described by the late Mr. James Richardson some miles southward of the now celebrated Lake Mistassini. Captain Sir John Ross says he "found copper ore near Agnew River and Lord Lindsay River," but he does not state what variety of ore it consisted of.

Lead.—Among the rocks of the Manitounuck series, on the east side of Hudson's Bay, a band of drusy bluish grey dolomite, about twenty-five feet thick, was found on both sides of Little Whale River and at Richmond Gulf. This band contains a good deal of galena in the form of bunches, some of which would weigh about 100 pounds. Galena has been found by Mr. E. B. Borron in veins in Huronian rocks at Lake Mattagami, in the southern part of the basin of Moose River.

Zinc, in the form of blende, is found in small bunches among some of the rocks of the Manitounuck series. Large workable masses of blende occur north of the Battle Islands, Lake Superior, in hornblende schist.

Molybdenum.—A specimen of molybdenite was presented to me at Great Whale River, which was said to have been found in the neighborhood. Specks and scales of this mineral are not uncommon in veins in the Huronian series.

Silver.—The galena of Richmond Gulf was found by Dr. Harrington to contain twelve ounces of silver to the ton of 2,000 pounds of ore. The same gentleman found silver in small quantities in the iron pyrites from a vein in gneiss near the mouth of Great Whale River, and in the same mineral from another vein cutting dolomite

near Cape Jones. Nuggets of native silver have been found, with those of gold, in some of the upper branches of the Peace River. Copper ores, which have been discovered three or four years ago in the Rocky Mountains, near the line of the Canadian Pacific Railway contains a notable quantity of silver.

Gold.—Traces of this metal were found, along with the silver, by Dr. Harrington, in the pyrites of the two localities which have just been referred to. Specks of gold are mentioned by Professor Tennant as occurring in quartz which had been brought from Repulse Bay, which lies to the north of Hudson's Bay. At the Huronian Mine, north of the height-of-land, and west of Thunder Bay, Lake Superior, gold is found in promising quantities in a large quartz vein cutting Huronian schists, which has been worked to some extent, and a stamp-mill has been erected at the mine. It is met with as specks and small nuggets, also in a quartz vein, at Partridge Lake, a short distance northward of the last named locality. Gold has been known for several years to exist in quartz veins on Lake of the Woods and elsewhere in that section of the country. Openings have been made on some of these veins, and with a prospect of ultimate success. The most promising veins appear to be those which cut the diorites near the large masses of granite about the eastern parts of the lake. There is reason to believe,that to the west of the lower part of the Mackenzie River, a promising region for gold and silver exists. From private sources it has been ascertained that gold has been washed from the sand and gravel of some of the upper branches of the Youkon and the western tributaries of the Liard; and also of the Rat River, which enters the west side of the delta of the Mackenzie. The fine gold found in the bed of the North Saskatchewan, especially about Edmonton, is washed out of the drift, and it may have had its original source in the auriferous upper parts of the Peace or Liard valleys, having come thence during the glacial period.

Although it is probable that it will be many years before the cheaper and more bulky of the non-metallic minerals of this vast wild region will be sought after, still as we never know what circumstances may arise to make them valuable, any facts concerning them are worth recording in advance of the settlement of the country. The knowledge of their existence may sometimes prove a factor in the projecting of railways, or in otherwise promoting the development of the country.

Gypsum.—Banks of gypsum, from ten to twenty feet high, occur on both sides of the Moose River, between thirty-one and thirty-eight miles above Moose Factory, which is situated at the south-western extremity of James' Bay. The upper part is mixed with marl, and only the lower ten feet consist of solid gypsum, which is mostly of a light bluish-grey color. A small proportion is nearly white. A similar deposit of gypsum is reported to occur near the shore of James' Bay, between Moose Factory and Fort Albany. I found a fragment of the mineral last summer among the volcanic rocks of the Ottawa Islands, in the north-eastern part of Hudson's Bay. Sir John Ross reports its occurrence at North East Cape. In Manitoba an impure variety has been found in thin layers in the Cretaceous marls of the Riding Mountains, and nodules and crystals of selenite may be found in these rocks in almost any part of their distribution in this Province and the North-West territories. On the Peace River, at a place called Peace Point, about sixty miles from Fort Chipewyan, at the west end of Athabasca Lake, the cliffs, which are of Devonian age, are largely made up of gypsum. It is also said to occur in considerable quantities, a short distance westward of the natural salt deposits of Salt River, a small western tributary of the Slave River, about mid-way between Lake Athabasca and Great Slave Lake.

Salt.—At the locality, which has just been referred to, salt of excellent quality, resulting from the evaporation of brine flowing on the surface, is found in considerable quantities in crystals about the size of those of Liverpool salt. It is shovelled directly into the bags in which it is taken to all parts of the district. At a place called La Saline, about half a-mile east of the Athabasca River and thirty-five miles below its junction with the Clearwater River, a white incrustation of salt is deposited from brine flowing over a bank composed of a black indurated mixture of sand and asphalt. Excellent salt was formerly manufactured from brine issuing from Devonian

rocks at the north-western and also at the south-western extremity of Lake Winnipegosis. Springs of weak brine issue from the banks of the White Mud River above Westbourne, in Manitoba. The Devonian rocks are extensively spread in the North-West Territories, and it is to be expected that when the time comes to require it, salt will be found by boring in many localities.

Soapstone.—The Eskimo both of the north-western and the eastern sides of Hudson's Bay, as well as those of Hudson's Strait and the coast of Labrador, have been accustomed from time immemorial to make their pots and lamps out of this rock, which they find in various places among the gneisses and crystalline schists of these regions. It occurs in abundance at Red Lake, east of Lake Winnipeg and again near Falcon Island on Lake of the Woods. I have also met with it on the Mattagami River, about twenty miles below Kenogamissee Lake.

Lignite is well known to occur extensively in the Cretaceous and Tertiary strata of our North-West Territories, all the way from the United States boundary line to the mouth of the Mackenzie River. The most easterly localities are on the Souris River in Southern Manitoba, and on the Swan River near the north-west extremity of Lake Winnipegosis. The quality of these lignites varies greatly. As a general rule the nearer we approach the Rocky Mountains the better they become. Whenever the beds are disturbed or tilted, the quality is improved. Beds of lignite are found in the drift on the Mattagami, Albany and Rainy Rivers, and on the south-west side of the Lake of the Woods.

Anthracite.—In the Rocky Mountains, two beds of anthracite have been found near the line of the Canadian Pacific Railway. When on the east coast of Hudson's Bay, I was presented with a number of small specimens of a very fine variety of anthracite, said to occur on Long Island, about four miles from its southern extremity. Judging from its appearance and from the very small percentage of ash which it contains it has probably resulted from the alteration of a mineral like Albertite. (See Report of Geological Survey of Canada, 1877-78, page 24 C.) It has a bright lustre and a highly conchoidal fracture. Mr. Hoffmann found it to contain, fixed carbon 94·91, volatile and combustible matter 1·29, water 3.45, ash 0·35, in 100 parts. Some one has remarked that this anthracite has been "probably washed on shore from some vessel." Among the reasons why this could not have been the case, I may mention that up to the time of its discovery, no vessel had ever carried any anthracite into Hudson's Bay; anthracite, if thrown into the sea would sink; the composition of this mineral is different from that of any other known variety; and lastly, it does not occur on the sea-shore at all, but in the interior of the island.

Petroleum and Asphalt have long been known to occur in abundance along the Athabasca and Mackenzie Rivers. Their mode of occurrence was investigated in 1882 by the writer and described in the Annual Report of the Geological Survey of Canada for that year, pages 14 to 23 C C. The petroleum appears to come up from the Devonian limestones, and it saturates and blackens a great thickness of sandy Cretaceous strata, which immediately overlie the former, through a wide extent of country. On the Athabasca, these black asphaltic sands form banks, sometimes nearly 200 feet high, from which "tar" is constantly oozing. Thickened petroleum or asphalt has been found in various places on Great Slave Lake, along the Mackenzie River and on the Upper Peace River. It is said to have been noted also on one of the upper branches of the South Saskatchewan. The bituminous Devonian limestones of the Abitibi River, near the head of James' Bay, contain indications of petroleum.

Mica of good quality and in fair-sized sheets is found on the north side of Hudson's Straits, and specimens of it are brought by the Eskimo to every passing visitor. These people also report the existence of sheet-mica on the north-west side of Hudson's Bay, and it was said that some years ago a vessel was loaded with it at Chesterfield Inlet.

Graphite.—Eskimo from the north side of Hudson's Straits brought over specimens both of good amorphous and pure foliated graphite, and reported it to exist there in abundance. (See Report for 1884, p. 24 D D.) A fine grained variety of graphite is found near Fond du Lac, on Lake Athabasca. Plumbaginous schists, con-

taining a large proportion of graphite, have been met with among the Huronian rocks near the north shore of Lake Superior.

Asbestus.—This mineral occurs in small quantities near Little Whale River and on the Ottawa Islands in the north-eastern part of Hudson's Bay. Fine specimens of it are found in hornblende schists at Rat Portage, where the Winnipeg River leaves the Lake of the Woods, but the quantity seems too limited to be worth working. I have also obtained specimens of it from both sides of Lake Nipigon.

Chromic Iron is mentioned by Richardson as among the minerals of the northern Mackenzie River country.

Apatite has been detected near the Copper Mine River and on Trout Lake in the southern part of the baisin of Moose River. (See Geological Survey Report for 1881, page 6 C.)

Iron Pyrites.—The Eskimo of the west side of Hudson's Bay have brought me numerous specimens of granular pyrites which appear to be derived from large veins. They state that they find it in different places between Chesterfield Inlet and Nevil Bay. A mass of this mineral, apparently of workable extent, occurs on Scottie Island, in Lake of the Woods, and good specimens have been sent me from a rapid in the Mattagami River. It has been noticed in small quantities in hundreds of localities throughout the territories.

Lime.—The Devonian and Silurian limestones of the western, and the dolomites of the Manitounuck or Nipigon formations of the eastern side of Hudson's Bay, afford abundance of good stone for burning into lime. Good material for this purpose is also obtainable everywhere among the Silurian and Devonian rocks, which fringe the Laurentian nucleus all the way from Minnesota to Great Bear Lake. Irregular beds or masses of dolomites, often of considerable thickness, are found among the Huronian strata of Lake of the Woods, of Red Lake to the north of it, and elsewhere.

Hydraulic Cement.—Beds of ferruginous and argillaceous dolomite occur on some of the islands on the east side of Hudson's Bay near Great and Little Whale Rivers, which would evidently answer for calcining to form hydraulic cement.

Building Stones are abundant among the rocks which have been already mentioned as suitable for burning into lime. The walls of Fort Prince of Wales, at the mouth of the Churchill River, were faced with blocks, four feet long, by two feet thick, cut out of the grey argillaceous quartzite of the neighbourhood. The harder quartzites of Marble Island on the west, and of the Manitounuck group on the east side of the bay, occur in blocks of good shape and size for building. A handsome red granite or granulite occurs on Nottingham Island and on the east shore of Hudson's Bay, south of Cape Wolstenholme.

Glass Sand.—The pure white varieties of the quartzites last referred to would answer for glass-making. A beautiful white sand is abundant at the Methy Portage and along the Clearwater River, Athabasca district.

Fire-clays and clays for brick-making, moulding sand, shell marl for manure, ochres, peat, flagstones, roofing slates and other substances found in various parts of the Hudson's Bay Territories might be added to the foregoing list as well as various ornamental stones and rare minerals of scientific interest.

MAGNETIC WORK.

A magnetic observatory was established at Stupart's Bay station; the British Government having kindly placed at my disposal the instruments used by Captain Dawson at Fort Rae. To Mr. Whipple and the members of the Kew Committee, my warmest thanks are due for their prompt action in obtaining for us the use of these instruments.

Besides the regular series of observations carried on at Stupart's Bay, I have, whenever possible, myself taken observations to determine the absolute values of the magnetic elements.

Mr. Carpmael, Superintendent of the Meteorological Service and Director of the Magnetic Observatory, Toronto, has kindly undertaken the examination of these observations, and the following is his report:—

MAGNETIC OBSERVATIONS.

It was considered advisable that in addition to the meteorological observations taken at the various stations, a series of magnetic observations should be taken at one of the stations; with this object in view Mr. R. F. Stupart, who had had several years' experience in magnetical work, was selected to take charge of one of the stations, and he was provided with an assistant in Mr. H. Bennet. In order to obtain a set of instruments at short notice, Mr. G. M. Whipple, Director of the Kew Observatory, London, England, was written to with a view to get a loan of the instruments that had been used by Captain Dawson at Fort Rae in connection with the International Arctic explorations. Mr. Whipple promptly obtained the necessary sanction for loaning these instruments, but reported that the balance magnetometer was so defective as to be absolutely useless without a considerable amount of repairs for which there was no time. An inclinometer which had been recently invented by myself was hastily constructed in Toronto and added to the equipment, which in some measure supplied the want of the balance magnetometer.

As has already been stated in a previous portion of this report, Mr. Stupart with Messrs. Bennet, McDaniel and Chapman was located in Prince of Wales Sound in latitude 61° 34' 23" north, longitude 71° 31' 42" west.

The differential instruments were placed on pillars of artificial stone sunk four feet in the earth in a detached building, 16 by 12 feet, at a distance of about thirty yards south of the dwellinghouse, and a second house was provided in the shape of an octagon, each side three feet six inches, inside measurement, in which to make the absolute determinations. This second house was about twenty-five yards south-west of that for the differential observations.

The arrangement of the differential instruments was as follows:—

The declinometer was placed a short distance in front of the centre of the wall opposite to the door, and the bifilar magnetometer and induction inclinometer were placed near the two corners at the opposite side, so that the three instruments were at the angles of an isosceles triangle. The distance from the declinometer to either the bifilar or inclinometer was about nine feet, whilst that between the bifilar and inclinometer was about eleven feet.

The building was so placed that a line joining the declinometer and the bifilar lay almost in the magnetic meridian with the declinometer to the north, and a line from the declinometer to the inclinometer pointed south of west, magnetic.

The declinometer consisted of a magnet (cylindrical, 3 inch by 0·3 inch) with a mirror attached, suspended by a silk thread, with the reading telescope and scale all on one stand.

The bifilar magnetometer was similar to the declinometer, except that it was provided with a bifilar instead of a unifilar suspension. Both these instruments were used by Capt. Dawson at Fort Rae.

The inclinometer was a bifilar magnetometer, with this modification that instead of the magnet being retained in position nearly at right angles to the magnetic meridian by the longitudinal tension and torsion of the suspension threads, it was so adjusted that when in a position nearly at right angles to the meridian the couple, caused by the tension and torsion of the threads, vanished, with the inclination at nearly its mean value; but the magnet was maintained in this position by the action of two vertical soft iron bars, one placed magnetic north and the other magnetic south of the centre of the magnet, with the north pole of one and the south pole of the other in the same horizontal plane with and equidistant from the magnet.

The adjustments of this inclinometer were effected as follows:—

(1). With the soft iron bars away, the times of vibration T_1 and T_2 of the magnet suspended with the bifilar suspension, in the meridian, with the N end pointing north, and with the N end pointing south, respectively, were determined. The horizontal component X_1 and X_2 of the earth's magnetism as determined by the bifilar Magnetometer at the times when these vibrations were taken, being noted.

(2). An unmagnetized brass bar was substituted for the magnet and the torsion circle turned through a right angle; the mirror was then turned to a convenient reading I_0 near the centre of the scale.

(3). The magnet was then replaced in the carriage with its north end in that direction, which caused a decrease in scale reading from the position with the non-magnetic bar.

(4). The soft iron bars were then placed one to the north and one to the south of the magnet, so that the line joining the lower pole of that to the north and the upper pole of that to the south, was in the magnetic meridian and passed through the centre of the suspended magnet, and were adjusted to such equal distances from the magnet as brought the reading of the scale to nearly I_0. When E, θ were total force and dip respectively suppose I_1 be the scale reading, α the angular value of one division of the scale. The intensity of the induced magnetism is proportional to E sin θ and the couple due to it, acting on the suspended magnet, is proportional to M E sin θ, where M is the magnetic moment of the magnet. Let us call this couple μ M E sin θ. The horizontal couple due to the direct action of the earth's magnetism on the suspended magnet is—M E cos θ.

The couple due to the suspension* is proportional to $I_0—I_1$, let us call it, —G α $(I_1 \ I_0)$; also let m M be the couple due to permanent magnetism in the induction bars.

*The magnet, except when the reading is i_0, will also induce magnetism in the bars. The couple due to this cause will, if $I—I_0$ is small, be proportional to $I—I_0$, and might have been included with $\mathfrak{Z}$, had the time of vibration, in the final position, been observed, which, however, was not done.

Then for equilibrium we must have μ M E sin θ—M E cos θ—G α $(I_1—I_0)$ + m M =0. Let the two bars be inverted, and at the same time interchanged, we thus reverse the sign of m. Hence if I_2 be the new reading

$$\mu \text{ M E sin } \theta—\text{M E cos } \theta—\text{G } \alpha \ (I_2—I_0)—m \text{ M}=0.$$

If M, E, and θ have remained unchanged, we have therefore

$$\text{M } m=\frac{I_1—I_2}{2} \text{ G } \alpha= k \text{ G } \alpha \text{ suppose.}$$

The constant k was determined accurately by frequent reversal; then with the bars in their original position, the equation for equilibrium was

$$\mu \text{ M E sin } \theta—\text{M E cos } \theta—\text{G } \alpha \ (I—k—I_0)=0 \text{ (i).}$$

From (i) we see that if β be the dip when the scale reading was $k + I_0$, then μ sin β—cos β=0 or μ=cot β. Substituting this value of μ in (i), we get

$$\text{M E cosec } \beta \text{ sin } (\theta—\beta)—(I—k—I_0) \text{ G } \alpha=0 \text{ (ii).}$$

The value of G÷M was found from the formula

$$\frac{\text{G}}{\text{M}}=\left(\frac{X_1}{T_2^2}+\frac{X_2}{T_1^2}\right)\div\left(\frac{1}{T_1^2}-\frac{1}{T_2^2}\right)$$

and the value of β was determined by noting the reading I of the Inclinometer, whilst the dip of the needle was being determined in the usual way. This gave by

$$\text{(ii)} \quad \sin(\theta—\beta)=\frac{\text{G}}{\text{M}}\frac{\sin\beta}{\text{E}} \ \alpha \ (I—k—I_0)= \text{C } (I—k—I_0) \text{ nearly.}$$

The value of the co-efficient C was calculated to be 0·265, but this must have been too large owing to no account having been taken of the induction in the bars, due to the magnet itself. Accordingly, in reducing the observations the value 0·25 has been adopted, which cannot be very far from the true value.

The temperature co-efficient was determined by experiments with hot water.

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Bifilar.—The scale co-efficient of this instrument was determined from the times of vibration of the magnet with bifilar suspension in three positions, viz.: In the meridian with north end north; in the meridian with north end south, and in final adjustment nearly at right angles to the meridian.

ABSOLUTE DETERMINATIONS.

The absolute determinations of the magnetic declination were made with a unifilar magnetometer by Elliott Bros., Strand, London, England. They were referred to an azimuth mark, which was a small cross cut in the rock at about sixty yards from the instrument. The magnetometer itself was on an artificial stone pillar. In making a determination the differential declinometer was read by an assistant simultaneously with the absolute instrument, and every reading of the latter was reduced to a standard reading of the former. The coincidence in the time of reading was secured by signals transmitted from the one house to the other by a string stretched between them. By this arrangement, although the changes in declination between a reading with scale direct and with scale inverted were often considerable, the results were good and the variations were little, if any, greater than were likely to occur from varying torsion, when the total directive force was so small.

Table A, p. 74, shows the result of the individual determinations of absolute declination reduced to standard reading of the declinometer and the adopted values.

The azimuth of the field mark was determined by comparison with numerous time azimuths of the sun and one time azimuth of the planet Jupiter. These azimuths were determined with the magnetometer, which is provided with an arrangement for that purpose. The various separate determinations as well as adopted azimuths are given in Table B.

The absolute horizontal force was obtained with the same magnetometer. Whilst the time of vibration was being determined, the bifilar was read at short and equal intervals, so as to ascertain the mean reading which corresponded to the mean time of vibration obtained, and the time was reduced to what it would have been at the standard reading of the bifilar; also, simultaneously, with every reading in the determination of the angle of deflection the declinometer and bifilar were read, and each reading was reduced to a standard reading of the declinometer, and the mean angle of deflection thus corrected was employed in determining the ratio of the magnetic moment of the magnet to the horizontal component of the earth's magnetism; and this ratio was reduced for the difference between the mean of the bifilar readings and the standard reading. From these, the value of the force indicated by this standard reading of the bifilar, was determined. The resulting values are shown in Table C. They indicate that the bifilar zero was satisfactorily constant, and that the observations were exceptionally well taken, considering the difficulties where the changes of declination were so rapid as was often the case.

The absolute determinations of dip were made with a Barrow dip circle, simultaneous readings of the inclinometer and bifilar being taken at equal intervals of time during the observation, and the value of the dip corresponding to a standard reading of the inclinometer deduced, the results are embodied in Table D.

Tables E, F, G, show the mean monthly and annual averages of the declination, horizontal force and dip respectively corresponding to each observation hour taken from the readings of the differential instruments.

Table H gives results of magnetic observations at sundry stations therein named.

The present report gives only the mean results, but I propose to give the results of the observations in more detail, and to further discuss them in connection with the report of the Magnetic Observatory, Toronto. It may, however, be of interest to note that during one of the magnetic disturbances the declinometer magnet oscillated through an arc of over 10°.

C. CARPMAEL.

TABLE A.

Observations of Absolute Declination for Zero of Declinometer, scale reading 350.

Date.	Declination observed.			Declinometer at observation.	Difference.			Declination at 350 West of North.			Remarks.
	°	′	″		°	′	″	°	′	″	
Sept. 27...	54	5	45	308·2	0	42	19	53	23	26	} Adopted value 53° 22′·4 W.
Oct. 7...	54	42	57	270·0	1	21	00	53	21	57	
do 14...	54	42	10	270·0	1	21	00	53	21	10	
do 14...	54	39	43	272·35	1	18	37	53	21	06	Re-adjustment.
Nov. 7...	54	06	15	460	1	51	22	55	57	37	} Adopted value 55° 56′·0 W.
do 8...	54	02	42	460	1	51	22	55	54	04	
do 11...	54	35	31	430	1	21	00	55	56	31	
Dec. 24...	53	55	29	370		20	15	54	15	44	Re-adjustment.
do 29...	54	23	20	360		10	07	54	13	13	Adopted value 54° 15′·5 W.
1885											
Jan. 24...	54	13	19	350		00	00	54	13	19	
do 24...	54	12	48	350		00	00	54	12	48	
do 26...	54	19	40	350		00	00	54	19	40	
do 26...	54	19	30	350		00	00	54	19	30	
do 26...	54	17	13	350		00	00	54	17	13	
do 27...	54	14	07	350		00	00	54	14	07	
do 28...	53	54	4	370		20	15	54	14	19	
do 30...	54	7	53	360		10	08	54	18	01	
Feb. 4...	54	16	36	350		00	00	54	16	36	
do 5...	54	14	33	350		00	00	54	14	33	
do 5...	53	57	39	370		20	15	54	17	54	
do 16...	53	34	40	390		40	30	54	15	10	
do 17...	54	22	09	340		10	08	54	12	01	
do 20...	54	24	12	340		10	08	54	14	04	
do 26...	54	15	36	350		00	00	54	15	36	
Mar. 5...	54	07	25	360		10	08	54	17	33	
do 7...	53	55	31	370		20	15	54	15	46	
do 14...	53	54	53	370		20	15	54	15	08	
do 23...	53	45	17	380		30	22	54	15	39	
do 28...	54	15	10	350		10	07	54	15	10	
April 4...	53	46	36	380		30	22	54	16	58	
do 14...	54	16	11	350		00	00	54	16	11	
do 21...	55	57	53	370		20	15	54	18	08	
do 21...	53	55	46	370		20	15	54	16	01	
do 23...	54	16	24	350		00	00	54	16	24	
do 23...	53	53	22	370		20	15	54	13	37	
do 29...	54	19	29	350		00	00	54	19	29	
do 29...	54	38	01	330		20	15	54	17	46	
May 12...	54	08	44	360		10	07	54	18	51	
do 14...	54	16	54	350		00	00	54	16	54	
do 15...	54	16	12	350		00	00	54	16	12	
do 16...	53	24	13	400		50	37	54	14	50	
do 18...	54	16	02	350		00	00	54	16	02	
do 18...	54	25	19	340		10	07	54	15	12	
do 22...	54	15	21	350		00	00	54	15	21	
do 29...	53	43	30	380		30	22	54	12	52	
do 29...	52	52	23	430		80	60	54	13	23	
June 3...	53	14	09	410		60	45	54	14	54	
do 5...	53	54	33	370		20	15	54	14	48	
do 12...	54	14	13	350		00	00	54	14	13	
do 16...	54	15	35	350		00	00	54	15	35	
do 17...	53	55	38	370		20	15	54	15	53	
do 23...	54	15	22	350		00	00	54	15	22	
do 23...	54	15	31	350		00	00	54	15	31	
do 30...	54	15	23	350		00	00	54	15	23	
do 30...	54	14	02	350		00	00	54	14	02	
July 8...	54	04	08	360		10	08	54	14	16	
do 16...	54	04	31	360		10	08	54	14	39	
do 20...	53	33	52	390		40	30	54	14	22	
Aug. 5...	53	23	56	400		50	37	54	14	33	
do 19...	53	45	8	380		30	22	54	15	30	

TABLE B.

Observations for Azimuth of Fixed Mark.

Date.	North Reading.	Reading of Fixed Mark.	Azimuth of Mark.	Remarks.
	° ′ ″	° ′ ″	° ′ ″	
Sept. 27	345 18 15	162 28 30	S. 2 49 45 E.	Sun.
do 29	345 15 43	162 28 30	S. 2 47 18 E.	do
Oct. 7	345 19 13	162 28 22	S. 2 50 15 E.	do
do 9	345 20 10	162 28 40	S. 2 52 0 E.	do
do 10	345 18 39	162 28 30	S. 2 49 59E.	do
Dec 10	345 18 50	162 28 10	S. 2 50 40 E.	Planet Jupiter.
July 20	345 49 7	162 58 0	S. 2 51 7 E.	Sun.
do 22	345 48 40	162 58 0	S. 2 50 40 E.	do

Azimuth adopted, S. 2° 50′ 40″ E.

TABLE C.

Absolute Determinations of the Horizontal Force.

Date.	Horizontal Force at Bifalar Standard Reading.	Logarithm of Magnetic moment of Magnet.	Date.	Horizontal Force at Bifalar Standard Reading.	Logarithm of Magnetic moment of Magnet.
		—			—
Oct. 18	0.6218	3·9145	March 18	0·6237	3·9134
Nov. 5	0·6224	·9140	do 26	0·6230	·9128
do 10	0·6219	·9136	April 24*	0·6234	·9126
do 20	0·6223	·9139	do 25	0·6239	·9127
do 28	0·6232	·9139	do 30	0·6236	·9125
Dec. 12*	0·6246	·9136	May 19	0·6236	·9125
do 13	0·6244	·9135	June 1	0·6233	·9125
Jan. 16*	0·6241	·9133	do 2	0·6233	·9125
do 21	0·6231	·9132	do 9	0·6233	·9122
Feb. 2	0·6228	·9131	do 18 & 19	0·6234	·9123
do 23*	0·6239	·9128	do 22	0·6234	·9120
do 24	0·6244	·9131	July 3	0·6237	·9123
March 10	0·6236	·9130	Aug. 14	0·6217	·9124
			do 18	0·6230	·9123

* Re-adjustment. Adopted values at standard reading.

From beginning to Dec. 3	0·62232
" Dec. 9 to Dec. 29	0·62448
" Jan. 6 to Feb. 5	0·62333
" Feb. 16 to April 4	0·62371
" April 18 onwards	0·62350

TABLE D.

INCLINATION.

Date.	Observation Dip.	Inclinometer at Observation.	Difference.	Dip at Reading 50.	Observer.	Date.	Observation Dip.	Inclinometer at Observation.	Difference.	Dip at Reading 50.	Observer.
1884.	° ′	′	′	° ′		1885.	° ′	′	′	° ′	
Dec. 17...	84 7·10	43·98	1·50	84 8·60	B	April 4...	84 1·90	99·85	12·46	83 48·44	S
do 17...	7·28	41·40	2·15	9·43	S	do 10...	8·21	82·84	8·41	84 0·00	B
do 22...	8 06	46·26	0·92	9·00	B	do 21...	83 58·24	75·53	6·38	83 51·84	S
do 22...	10·08	53·00	0·97	9·11	S	do 22...	84 3·15	85·03	8·76	54·39	B
do 29...	9·08	43·[illegible]	1·71	10·79	S	do 29...	6·88	85·46	8·86	58·02	B
do 29...	6·84	47·11	0·72	7·56	B	May 2...	4 04	92·17	10·54	53·50	S
1885.						do 2...	0·75	69·98	7·49	53·26	B
Jan. 7...	9·67	52·22	0·55	9·12	B	do 8...	1·32	88·96	9 74	51·58	S
do 7...	5·37	44·91	1·27	6·64	S	do 8...	2·63	77·60	6 90	55·73	B
do 12...	6·15	56·42	1·60	4·55	B	do 9...	1·01	75 30	6·33	54·68	S
do 12...	7·80	50·58	0·14	7·66	S	do 15...	2·73	92·40	10·60	52·13	S
do 23...	9·57	54·70	1·17	8·40	B	do 15...	8·66	91·30	10·32	53·34	B
do 24...	6·37	58·43	2·11	4·26	B	do 23...	2 30	81·90	7·97	54·33	S
do 28...	1·24	61·93	2·98	83 58·26	B	do 23...	0·49	72·50	5·62	54·87	B
do 30...	5·43	51·22	0·30	84 5·13	S	June 3...	0·42	73·60	5·90	55·53	B
do 30	7·67	56·80	1·70	5 97	B	do 4...	4·97	96·10	11·52	53·45	S
Feb. [illegible]	1·21	55·92	1·48	83 59·73	S	do 15...	4·12	88·70	9 67	54·45	B
do 6...	5·75	51·02	0·25	84 5·50	B	do 15...	83 55·35	62·05	3·01	52·34	S
do 9...	3·88	45 02	1·24	5·12	B	do 24...	84 1·20	84·70	8·67	53·53	B
do 19...	2·96	80·71	7·68	83 55·28	S	do 24...	0·10	77·40	6·85	53·25	S
do 19..	2·75	78·43	7·11	55·64	B	July 2...	0·56	81·43	7·86	52·76	S
do 26...	2·48	82·76	8·19	54·29	S	do 2...	4·27	81·66	7·91	56 36	B
do 26...	4·87	79·17	7·29	57·58	B	do 9...	10·15	104·00	13·50	56·65	B
March 5	5·30	79·50	7·37	57·93	B	do 9...	83 58·18	74·19	6·05	52 13	S
do 7...	4·50	91·48	10·37	54·13	S	do 14...	84 0·87	80·68	7·67	53·00	S
do 20...	3·56	108·41	14·10	49·46	S	do 20...	8·27	95·27	11·32	56·95	B
do 20...	4 98	98·95	12·24	52·74	B	Aug. 8...	4·10	87·90	9·47	54·63	B
do 28...	5·17	104·38	13·58	51 58	S	do 8...	83 58·51	79·04	7·26	51·25	S
do 28...	8·98	85·62	8·90	55·06	B						

Values adopted for scale reading 50—To Feb. 11th, 84° 6·33′; Feb. 11th to Aug. 20th, 83° 54·11′.

TABLE E.

SHOWING monthly and annual averages of Westerly Declination for each observation hour, and for the average of the six hours.

Month.	3 A.M.	7 A.M.	11 A.M.	3 P.M.	7 P.M.	11 P.M.	Means.	Remarks.
1884.	° ′	° ′	° ′	° ′	° ′	° ′	° ′	
September.....	54 11·1	54 27·0	54 22·0	53 56·5	54 35·7	54 31·6	54 20·7	18 days.
October.....	54 12·3	54 17·6	54 15·7	54 7·5	54 26·4	54 30·3	54 18·1	
November.....	54 17·0	54 26·3	54 11·3	54 11 7	54 32·2	54 40·1	54 23·1	
December	54 16·6	54 21·7	54 17·3	54 13·8	54 26·4	54 30·8	54 21·1	
1885.								
January..	54 17·9	54 22·7	54 16·3	54 12·7	54 27·3	54 38·2	54 22·7	
February.	54 10·6	54 23 4	54 12·3	54 1·0	54 33·5	54 39·8	54 20·1	
March..	54 7·4	54 13·8	54 6·6	54 3·3	54 18·6	54 21·3	54 11·8	
April.....	54 2·8	54 16·4	54 1·3	53 46·5	54 16·2	54 11·9	54 5·9	
May..	53 57·6	54 8·2	53 55·6	53 26·4	54 25·0	54 4·7	53 59·6	
June.....	54 3·6	54 4·6	53 54·1	53 49·6	54 24·6	54 15·2	54 5·3	
July.	54 1·2	54 9·7	54 5·5	53 25·3	54 4·8	54 12·5	53 59·8	
August.....	54 2·1	54 1·8	54 8·8	53 18·4	54 16·5	54 11·1	53 59·8	20 days.
Means..	54 8·3	54 16·1	54 8·9	53 52·7	54 23·9	54 24 0	54 12·3	

TABLE F.

SHOWING monthly and annual averages of Horizontal Force in Gaussian units for each observation hour and for the average of the six hours.

Month.	3 A.M.	7 A.M.	11 A.M.	3 P.M.	7 P.M.	11 P.M.	Means.	Remarks.
1884.								
September.....	.....	.....	....	.....	....	....	.....	
October	0·62255	0·61978	0·62338	0·62700	0·62524	0·62514	0·62385	8th to end of month—24 days.
November	0·62126	0·61717	0·62297	0·62583	0·62462	0·62334	0·62254	
December	0·62135	0·61895	0·62376	0·62530	0·62412	0·62486	0·62331	10th to 28th—19 days.
1885.								
January..	0·62250	0·61958	0 62384	0·62615	0·62339	0·62336	0·62314	7th to end of month—25 days.
February.	0·62201	0·61923	0·62285	0·62759	0·62277	0·62346	0·62299	17th to 28th—12 days.
March.	0·62348	0·61881	0·62255	0·62808	0·62648	0 62566	0·62417	
April.....	0·62339	0·61658	0·62316	0·62967	0·62652	0·62628	0·62427	18th to end of month—13 days.
May.....	0·62429	0·61268	0·62394	0 62894	0·62859	0·62768	0·62436	
June.	0·62447	0·61350	0·62349	0·62924	0·62960	0·62719	0·62458	
July.	0 62460	0·61377	0 62294	5·63146	0·62829	0·62746	0·62475	
August.	0·62504	0 61629	0·62610	0·63178	0·62842	0·62679	0·62552	
Means..	0·62318	0.61694	0·62354	0·62828	0·62619	0·62557	0·62395	

TABLE G.

SHOWING averages of Inclination from the Inclinometer readings at each observation hour and the average of the six hours.

Months.	3 a.m.	7 a m.	11 a.m.	3. p.m.	7. p.m.	11. p.m.	Mean.	Remarks.
1884.	° ′	° ′	° ′	° ′	° ′	° ′	° ′	
December 31..	84 5·25	84 7·30	84 4·66	84 3·63	84 4·34	84 4·91	84 5·18	
1885.								
January.....	9·13	10·15	8·35	7·10	8·37	8·70	8·79	
February	9·65	12·44	8·79	7·04	7·58	9·55	9·18	
March	5·50	9 07	7·13	3·79	4·47	5·17	6·03	
April..	5·45	10·29	5·32	1·57	2·76	3·08	4·74	
May.....	3·81	8 65	4·21	0·68	0·39	1·84	3·26	
June	3·15	9·86	3·72	59 73	59·26	1·37	2·85	
July.....	3·62	9·98	4·17	59·05	0·59	1·72	3·19	
Aug., 20 days.	3·95	9 02	3·70	59·38	1·12	2 61	3·29	
Means.	84 5·725	84 9·75	84 5·55	84 2·44	84 3·21	84 4·22	84 5·17	

Inclinometer was not started until December 6.
In October, 1884, the mean inclination from six observations, with dip circle, was 84° 7·88′.
In November do do eight do do 84° 9·01′.

TABLE H.

MAGNETIC OBSERVATIONS at certain places on the Labrador and Hudson's Straits.

Date.	Place.	Lat.	Long.	Declination W.	H. F.	Dip.	Observer.
		° ′	° ′	° ′	C.G.S. Unit.	° ′	
July, '84.	Nain.....	61 40·7W.	56 32·7 N.	—	—	78 24	Stupart.
	do	.....	.....	—	—	78 20·2	Gordon.
Aug. 2, '84	Port Burwell.....	60 22·2 N.	64 46·4W.	49 26 W.	.....	82 27·7	do
	do	.....	.....	49 30 W.	.....	82 20·3	Stupart.
do	Ash Inlet.....	62 32·7	70 35·2	.....	.....	84 16	Gordon.
do	Port DeBoucherville....	63 11·7	77 28 W.	52 30 W.	0·0434	86 1·7	do
Sept., '84.	Port Laperrière.....	62 34·2	78 1·4W.	.....	.....	85 54	do
Sept., '85.	do	.....	.....	.....	.....	85 56	Bell.
Aug., '84.	Marble Island.....	62 41·8	91 8·6	8 40 W.	.....	84 20	Gordon.

WORK PROPOSED FOR THE EXPEDITION OF 1886.

Before entering upon the question of the work proposed for the voyage of 1886, I would point out briefly the results that seem to me to be established by the experience already gained.

1. I consider that *the temperatures* proved to exist in the straits preclude the possibility of practical navigation from November to April, inclusive.

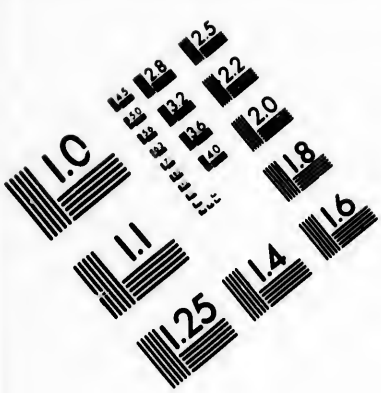
2. It seems a reasonable certainty that in ordinary years the ice will not be sufficiently broken up to permit of the passage of vessels suitable for freight steamers before July 1st.

3. That while making the passage in July will be not attended with any serious risk to the ship, there will usually be delays more or less considerable in different years.

I would therefore propose that the "Alert" should leave Halifax about June 23rd, and endeavor to push through the straits without calling at any of the stations unless opportunity offers. To this end I arranged with the officers now in charge of the stations that they were not to expect the ship to call at their stations on the outward voyage. If successful in getting through the straits without serious delay, I would propose visiting the north-west of the Bay, partly with the view to its geological exploration, but also to examine the fishing ground of the American whalemen. I also propose to visit York Factory and examine the lead of the North River to determine the depth of water which we can carry up to Seal Island, the proposed terminus of the railway. If our supply of coal lasted, we could also visit the eastern shores of the bay. I would endeavor to make the western end of the straits, homeward bound, the first week of September, and, relieving the stations, would return to Halifax early in October.

All of which is respectfully submitted.

ANDREW R. GORDON, Lieut. R.N.,
Commanding Hudson's Bay Expedition.



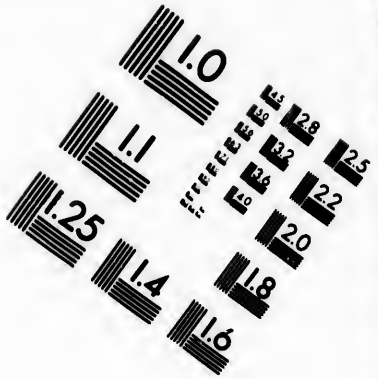
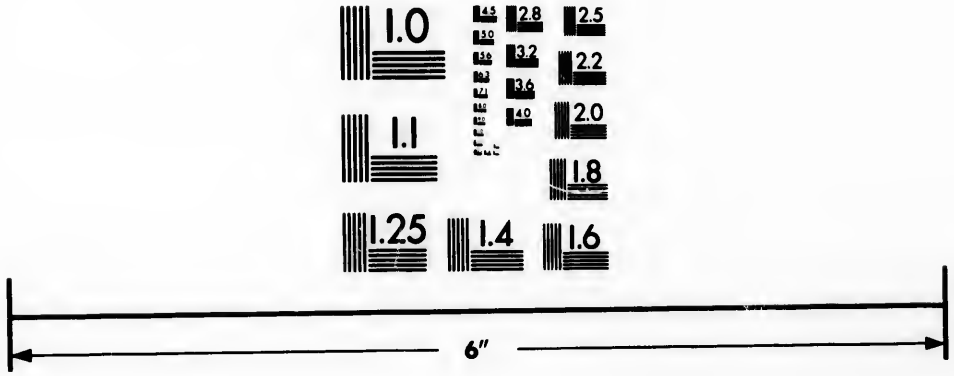


IMAGE EVALUATION TEST TARGET (MT-3)



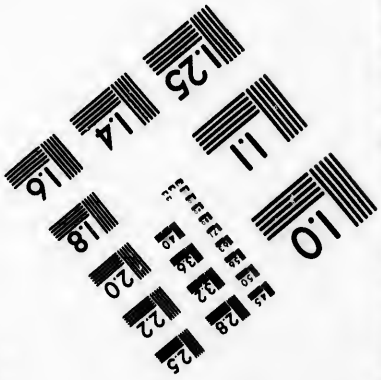


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TABLE I.—ABSTRACT of Meteorological Observations at Belle Isle, Labrador,

Months.	Temperature.					Amount of Sky Clouded 0-10.	Rain.		Days of Snow.	Direction		
	Mean of Tri-Daily Observation.	Mean of Max. and Min.	Highest Temperat	Lowest Temperat.	Mean Daily Range.		Amount.	Days of		Whole No. of Observations.	N.	N.-E.
1884.												
October	35·23	35·17	46·0	23 0	6·36	6·8	12·69	9	6	90	3	6
November	24·65	25·15	40·0	9·0	7·07	6·3	0·11	5	11	90	18	7
December	10·69	11·11	40·0	—13·0	6·68	5·9	0·08	2	6	93	18	5
1885.												
January	6·39	6·65	39·0	—19·0	6·50	6·4	0·12	2	8	93	8	9
February	17·68	18·00	33·0	— 9 0	7·64	6·7	0·00	0	6	84	21	22
March	15 70	15 39	35 0	— 9 0	8 90	5·8	0·24	3	5	93	5	7
April	27 99	27·12	34·0	3·0	6·23	6·9	1·17	4	13	90	24	14
May	34·06	34·06	45·0	18·0	5 87	7·6	2·42	12	14	93	2	9
June	40·54	41 89	60 0	26 0	6 97	7·9	3·41	11	3	90	5	9
July	52·47	53·58	69·0	42·0	7·04	6 9	2 02	15	....	93	3	14
August	54·52	55·69	68·0	46 0	7 32	6·1	1·28	9	.....	93	0	8
September	47·71	46·77	59·0	30·0	5 67	7·0	7·71	14	.....	90	6	3
Year	30·64	30·88	69·0	—19·0	6·85	6·7	31·25	86	62	1092	113	113

Lat. 51° 53′, Long. 55° 22′, from October, 1884, to September, 1885, inclusive.

Direction of Wind.							Velocity of Wind.						Fogs.	
								No. of times the Velocity was						
E.	S.-E.	S.	S.-W.	W.	N.-W.	C.	Average Velocity.	20 miles.	30 miles.	40 miles.	50 miles.	60 and upwards.	No. of Days	Average No. of days, 1872-1883.
9	4	2	17	22	27	0	20 0	9	11	9	6	5	8	11
6	5	1	15	17	21	0	24·0	31	23	5	1	4	6	11
7	2	2	10	21	26	2	21·0	32	6	4	10	5	5	7
5	1	4	14	27	25	0	24 0	14	6	12	10	10	9	8
11	7	1	1	10	10	1	14·0	30	14	2	2	0	6	8
9	13	11	14	27	6	1	14 0	27	3	8	1	1	8	9
9	9	0	9	16	8	1	12·0	12	9	5	2	0	7	10
23	16	7	12	18	4	2	10·2	19	7	2	0	0	12	13
7	15	0	11	34	6	3	11·4	14	2	2	1	3	19	15
13	6	1	8	34	12	2	6·0	7	1	0	0	0	17	15
15	6	0	20	28	16	0	6·8	10	3	0	0	0	11	15
0	4	3	36	16	21	1	14 4	20	5	6	2	1	5	14
114	88	32	167	270	182	13	14·82	225	90	55	41	29	113	136

TABLE II.—PORT BURWELL STATION, "No. 1,"

Months.	Barometer at 32° and Sea Level.				Temperatures.							
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean. Max.	Mean. Min.	Range.
1884.												
August.....	29·743	30·078	29·049	1·029	37·69	47·9	31·9	44·0	34·2	42·4	33·8	8·6
September	29·702	30·194	29·180	1·014	32·85	41·0	27·3	38·8	28·9	35·3	29·5	5·8
October	·719	·272	28·941	1·331	25·70	36·3	12·0	34·7	15·3	28 5	22·0	6·5
November.....	·726	·426	29·018	1·408	10·14	31·9	— 9·3	24·3	— 4·5	14·6	4·8	9·8
December	·832	·272	28·922	1·350	— 7 80	18·8	—29·8	12·0	—25·1	— 2·8	—13·9	11·1
1885.												
January	·631	·389	29·096	1·293	—17 70	5·7	—33·2	0·1	—29·4	—12·5	—23·2	10·7
February	30·061	·632	·385	1·247	2·30	29·9	—19 9	27·1	—16·0	7·8	— 5·2	13·0
March	29·771	·355	28·860	1·495	— 7·25	18·8	—21·9	12·1	—16·0	— 1·8	—14·6	12·8
April.....	·907	·246	29·261	·985	16·24	34·6	— 9 0	33·9	— 5·2	21·0	9·4	11·6
May.....	·912	552	·268	1·284	28·05	40·1	14·4	36·1	19·3	31·8	23·3	8·5
June	·743	·212	·191	1·018	33·42	46·5	25·1	40·7	30·2	36·5	29·1	7·4
July	·762	·265	·084	1·181	41·85	63·1	33·9	47·3	35·2	49·0	35·6	13·4
August.....	·780	·327	·320	1·037	41·69	62·0	31·9	53 7	33·9	47·4	36·9	10·5
Year.....	29·795	30·632	28·860	1 772	16·62	63·1	—33·2	53·7	—29·4	22·23	11·14	10·09
September	29·729	30·037	29·018	·956	35·41	42·8	28·9	40·4	30·4	37·9	32·1	5·8

10th August, 1884, to 27th September, 1885, inclusive.

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to Tenths.	Rain.		Snow.		Number of Days Auroras Reported.
			Mean Hourly Velocity.	Highest Daily Mean.	Highest Velocity		Duration in Hours.	Depth in Inches.	Duration in Hours.	Depth in Inches.	
·202	90·0	34·9	15·6	33·1	42·5	7·8	56·30	1·21	25·30	0·45	3
·185	93·3	32·4	15 4	30 8	46·0	8·5	79·00	0·97	64·40	2·68	3
·167	99·7	29·9	16·9	33 0	42·0	8·1	.....	.....	67·35	44·8	11
.....	.....	.....	16·5	51·7	84·0	8·4	.....	.....	234·00	66·50	5
.....	.....	.....	16·8	35·0	41·0	5·5	.....	.....	131·00	49·00	22
.....	.....	.....	14·8	31·5	50·0	4 7	.....	.....	73·25	34·90	14
.....	.....	.....	14·2	56·0	70·0	6·3	.....	.....	146·00	35·71	9
.....	.....	.....	16·4	29 5	48·0	5·2	.....	.....	116·30	26·60	7
.....	.....	.....	16·2	39·5	54·0	8·3	.....	.....	119 50	24·66	1
·147	93·9	26·5	15 8	34·8	44·0	8·3	38·10	0 09	177·55	16·30	1
·174	90·9	31·0	11·7	21·3	30 0	7·8	73·10	0·84	53·35	1·53	.....
·225	84·9	37·4	6·6	17·2	36 0	6·5	61·25	2 03	.....	.....	.....
·230	87·1	37·8	8·9	21·2	36 0	7·5	74·30	1·14	.....	.....	6
·188	92·5	32·5	14·2	33·8	48·4	7·05	326 15	5·07	1,384·30	302·68	79
·189	90·0	32·9	16·2	44·0	34 8	7 7	59·40	0·18	41·40	5·17	8

TABLE III.—SKYNNER'S COVE—6th October, 1884,

Months.	Barometer at 32° and Sea Level.				Temperature.							
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Maximum.	Mean Minimum.	Range.
1884.												
October	29 616	30·248	29·956	1·292	25·73	37·0	11·0	35·2	16·0	29·60	25·65	3 92
November	·725	·409	·749	1 660	13 08	31·5	— 0·5	26 6	4·8	17·23	7 92	9 31
December.....	·813	·486	·722	1 764	— 3·20	15·2	—21·8	11·8	—16·8	2·40	— 7·20	9·60
1885.												
January.....	·569	·393	·925	1·468	— 10·57	9·9	—27 8	5 4	—23 3	—3·39	— 17 15	13·76
February.....	30 048	·633	29·363	1·269	0 92	30·8	—25·3	27 8	—21·3	10·50	— 6 80	17·30
March.....	29 739	·363	28 655	1·708	— 2·78	18·0	—18·3	9·7	—12·1	6·76	— 9·60	16·36
April.....	·849	·320	29·214	1·106	19·17	39 0	— 4 7	34·4	— 1·0	28·00	12·60	15 40
May	·913	·520	·287	1·233	31·10	44·5	17·5	38 0	23·1	37·40	26 40	11·00
June.....	·740	·207	·142	1 065	38·70	67·0	25·5	55·6	29·1	44·90	32·50	12·40
July	·759	·252	·087	1·165	46 20	77·0	31·0	59 0	39·0	54·10	38·70	15·40
August.....	·785	·350	·286	1·064	46 02	71·5	35·0	60·8	39·5	53·20	39·20	14·00
September.....	·724	·075	·033	1·042	37·80	60·5	29·0	45·2	34·1	42·60	33·40	9·20
	29 773	30·632	28 655	1·977	20·19	77·0	—27·8	60·8	23·3	26·90	14·60	12·3

NOTE.—Mean Temperature for October being for last 26 days of the month a correction of approximate 0·7° should be added to the Mean for that month—given above.

to 31st December, 1885, Station "No. 2."

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind. Highest Velocity	Wind. Highest Daily Mean.	Wind. Mean Hourly Velocity.	Mean Cloudiness to tenths.	Rain. Duration in Hours.	Rain. Depth in Inches.	Snow. Duration in Hours	Snow. Depth in Inches.	No. of Auroras.
·109	75·8	19·2	50·	30 0	7·60	5·09	19·30	0 02	73·35	17·04	26
·063	77·4	7·3	40·	29·1	9·36	5 03	.....	.....	64·00	11·10	14
·032	78·4	— 7·6	45·	29·5	7·76	3 83	.....	.....	88·30	6·40	9
.....	.....	.....	60·	26 6	8·04	3 76	.....	.....	157 00	15·10	10
.....	.....	.....	40·	26·7	5·65	5·10	.....	.....	201·00	12·70	9
·035	85 0	— 5·8	40·	35·0	10·20	4·70	.....	.....	158·00	10 60	15
·096	84.4	15·4	30·	18·8	7·18	6·30	.....	.....	146·30	27·20	6
·144	81·0	25·7	45·	22·5	9·23	6·79	108·00	0·23	100·00	9 70	.....
·170	73·8	30·1	50·	25·8	9·22	6·89	70·30	1·14	43·00	19 20	.....
·240	77·9	38·9	40·	19·2	6·95	6·12	99 00	1·93	.....	.....	2
·237	76·8	38·4	40·	19·7	6·80	6·63	155·30	4·26	.....	.....	10
·189	78·0	31·2	50·	26·6	8·83	7·07	135·30	2·80	43·00	6·10	11
·117	86·4	16·0	44·16	25·8	8·07	5 61	578·00	10·38	1074·35	135·14	112

TABLE IV.—ASHE INLET STATION No. 3.—

Months.	Barometer at 32° and Sea level.				Tempera				
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Highest Daily Mean.	Lowest Daily Mean.
1884.									
August, 13 days.....	29·741	30 055	29·137	·918	36·36	47·0	32·0	41·3	33·0
September.....	29·751	30·238	·214	1·024	31·35	46·5	19·0	41·3	24·6
October.....	·695	·310	28·891	1·419	20·25	34·2	2·4	33·2	5·6
November.....	·575	·399	·710	1·689	9 08	31·0	—13·5	30·0	—10·4
December.....	·812	·499	29·199	1·300	-11·05	8·2	—28·2	4·4	—25·0
1885.									
anuary.....	·604	·202	28·977	1·225	-19·22	—4·2	—30·1	—5·9	—29 0
February.....	30·054	·604	29·302	1·302	1·60	29·0	—14·2	28·4	—11·5
March.....	29·747	·306	·144	1·162	-12·59	—0·3	—24·6	1·8	18·8
April.....	·919	·368	·349	1·017	10·36	35·4	—20·6	32·8	11·2
May.....	·922	·600	·277	1·323	26·66	40·9	4·8	36·9	19·7
June.....	·750	·173	·156	1·017	33·80	46·0	26·8	38·8	31 0
July.....	·734	·159	·129	1·030	40·25	54·3	31·4	45·9	36·4
August.....	·734	·294	·171	1·123	39·22	48·4	32·7	45·3	34·7
Year:.....	29·775	30·604	28·126	2·478	14·14	54 3	—30·1	45 9	—29·0
September, 18 days	29·890	30 045	29·702	·343	35·87	43 9	26 9	41·1	31·0

No. 3.—

18th August, 1884, to 18th September, 1885.

Tempera ture.			Wind.			Relative Humidity.	Cloudiness to Tenths.	Rain.		Snow.		Days Auroras Reported.
Lowest Daily Mean.	Mean. Max.	Mean. Min.	Range.	Mean Velocity.	Highest Daily Mean.	Highest Obs.			Duration in Hrs.	Depth in Inches.	Duration in Hrs	Depth in Inches.	
33·0	39·97	32·07	7·90	13·1	24 0	37·5	91·4	7·1	.....	·75	2·7	·29	3
24·6	34 49	26·47	8·02	12·4	24 8	34·0	80·2	6·7	.....	·97	.....	6·85	11
5·6	23·73	15 41	8·32	15·5	32·7	45·0	76 8	7·2	.....	·18	.....	8·60	8
—10·4	13 83	4·63	9·20	17·3	49·2	68 0	78 9	8·0	.....	.....	.....	11·20	5
—25·0	—7·10	—14 51	7·41	11·1	31·3	40·0	85·2	4 5	.....	.....	.....	·90	12
—29 0	—16·00	—22·52	6·52	12 5	3·60	48·0	.....	3.3	.....	.....	.....	1·80	15
—11·5	7·44	—3·97	11·41	12·2	43·2	48 0	.....	6·8	.....	.....	.....	16·80	8
18·8	—7·99	—17·25	9·26	13·5	31·7	46 0	92·4	4·3	.....	.....	.....	3 80	7
11·2	16·44	4·27	12 17	15·7	38·3	44·0	93·2	7 3	.....	.....	.....	24·32	2
19·7	30·59	22·33	8·26	15·9	36·7	60·0	90·8	8·1	.....	·02	.....	23 95	.....
31 0	37·47	30·17	7·30	13·7	26·0	48·0	87·1	7·3	.....	·02	.....	9·00	.....
36·4	45·89	36·01	9 88	12·8	34·0	40·0	86·3	7·0	.....	2 86	.....	.....	.....
34·7	44·76	35·08	9·68	15·1	36·3	42·0	83·0	3 6	.....	3·16	.....	·02	.....
—29·0	18·63	9 68	8·95	14 0	35 0	47 0	85·4	7·2	.....	7·21	.....	107·24	68
31·0	39·4	32·4	7 0	10·2	22·3	38·0	79·7	6·4	.....	·01	.....	·21	4

TABLE V.—STUPART'S BAY, Station No. 4.—

Months	Barometer at 32° (sea level).				Temper				
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.
1884.									
September	29·728	30·215	29·150	1·065	32·1	42·1	21·1	37·3	27·8
October	29 684	30·309	28·805	1·504	19·9	35·9	— 1·9	33·2	2·5
November	29·678	30·414	28·592	1·822	5·1	29·9	—13·4	23·6	— 8·0
December	29·822	30·445	29·178	1·267	—12·4	7·8	—32·2	6·6	—29·5
1885.									
January	29 614	30·192	29·138	1·054	—22·6	— 5·0	—34·6	— 7·9	—32·0
February	30·023	30·581	29·176	1·405	— 3·9	29·2	—26·6	26·8	—20·7
March	29 752	30·266	29 126	1·140	—15·5	— 1·1	—31·5	— 7·6	—23·0
April	29 692	30·354	29·305	1·049	9·1	32·2	—18·4	29·3	—10·0
May	29 895	30·531	29 310	1·221	25·2	39·7	— 2·8	34·5	16·7
June	29 731	30·119	29·165	0 954	33·9	49·8	24·6	43·6	30·2
July	29·692	30·146	29·087	1 059	42 6	64·6	32·9	55·0	36·4
August (20 days)	29 633	30·224	29 145	1·079	42·7	62·4	32·9	53·4	38·1
Year	29·7628	30·581	28 592	1·989	13·02	64·6	—34·6	55·0	—32.0

1st September, 1884, to 20th August, 1885.

ature.			Relative Humidity.	Wind.			Cloudiness to tenths.	Rain.		Snow.		Aurorae, No. of days.
Mean Maximum.	Mean Minimum.	Range.		Mean Hourly Velocity.	Highest Daily Mean.	Highest Velocity.		Duration in hours.	Depth in inches.	Duration in hours.	Depth in inches.	
35·3	28·5	6·8	.....	9·5	21·2	30	8·4	70	1·44	26	3·1	9
24·4	14 8	9·6	.....	11·7	22·8	36	7·8	.....	.....	100	41·8	16
11·0	— 1·1	12·1	.....	11·5	40·0	49	7·7	.....	.....	163	46·3	12
— 7·8	—17·1	9·3	.....	7 1	19 9	40	6·3	.....	.....	42	6·3	17
—18·6	—27·3	8·7	.....	8·2	38 9	52	4·7	.....	.....	18	2·1	22
3·3	—10·4	13·7	.....	8·9	34·2	45	7·1	.....	.....	65	31·7	14
— 9·9	—22·6	12·7	.....	12·2	43·0	61	5·2	.....	.....	3	0·2	11
16·0	0 0	16 0	.....	11·7	29·2	48	7·0	.....	.....	63	15·9	4
30·1	18·2	11·9	89 5	10·9	21·9	34	8·3	2	0·01	57	16 9	3
38·1	29·1	9·0	86·4	9·2	22·8	40	8·0	3	0·27	87	4·7	.....
50·0	36·1	13·9	84·1	5 9	23·5	44	7 2	98	4·42	.....	.....	.....
49·4	37·3	12·1	85·6	8·1	13·0	24	7·6	53	3·00	.....	.....	.....
18·4	7·1	11·3	.....	9·6	43·0	61	7·1	226	9·14	624	169·05	108

TABLE VI.—PORT DEBOUCHERVILLE, Station No. 5.—

Months.	Temperature.							
	Means.	Lowest Obs.	Highest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Maximum.	Mean Minimum.	Range.
1884.								
September	31·20	24 8	39 0	35 8	26·0	33·26	29·19	4·07
October	16·00	— 9·8	31·2	32·0	— 2·7	18·96	12 60	6·36
November	5·21	—14 8	29·2	24 9	— 7·2	10 05	— 1·08	11·13
December	—15 52	—32·5	13 8	7·3	—28·1	—11·90	—19·50	7·60
1885.								
January	—26·29	—35 0	—10·8	—13·7	—33 5	—22·59	—29·34	6·75
February	— 5·43	—29·9	29·6	28·4	—24·5	·10	—11·30	11·40
March	—18 69	—30·1	— 7·5	—10·1	—24·5	—13·80	—23 80	10·00
April	6·74	—23·1	20·0	20·7	—14·3	11·21	1·26	9·95
May	24·67	10 0	37·6	34·7	17·4	37 85	20·34	7 51
June	33·13	25·2	40·3	36·6	28·5	36·12	30·05	6·07
July	39·13	33·1	56·9	47·4	35·4	43·42	35·13	8·29
August 23	37·67	33·1	45·0	42·3	30·7	40·30	35·55	4·75
Year	10·65	—35·0	56·9	47·4	—33 5	14·41	6·59	7·82

1st Septe..... , 1884, to 23rd August, 1885.

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to tenths.	No. of days Aurorae reported.	Rain.		Snow.	
			Mean Velocity.	Highest Daily Mean.	Highest Obs.			Duration in hours.	Depth in inches.	Duration in hours.	Depth in inches.
·148	83·3	27 6	8·9	27·3	41.	9·3	2	.....	.....	9·00	·1
·088	85·1	12·8	10·3	22 0	34·	7·4	3	5	·31	111·50	23·2
·052	84·6	2·6	10·8	34 0	40·	3 2	3	.....	.....	54 30	10·7
·021	91·3	—16·8	5·7	22·5	31·	4·7	11	.....	.....	42·30	1·3
·09	72·5	—26 9	5·6	27·8	32·	3 8	11	.....	.....	1·55	1·7
·037	90 4	7·1	9·2	31·5	40·	6 1	7	.....	.....	62·30	9·2
·016	91·4	20·2	6·5	25 8	27·	4·5	7	.....	.....	.....	.....
·060	91·6	4:7	8·2	18 6	28·	6·9	3	.....	.....	91·30	9·2
·111	86·1	21·1	10·6	22 5	32·	7 7	2	.....	.....	5 20	·7
·137	72·3	28 3	10·9	26·5	34·	7·0	.....	.....	.....	6·15	·2
·201	84·6	34·5	11·1	23·6	34·	6·9	.....	35·	1·08	.....	.....
·199	88 6	34·5	13·8	19 8	28·	7·9	.....	51·	2·36	.....	.....
·0896	85·15	12·4	9·3	23·5	33·4	6 29	49	91·	3·75	386·20	56·3

TABLE VII.—LAPERRIÈRE'S HARBOR—1st October, 1884,

Months.	Barometer at 32° and Sea Level.				Temperature.							
	Mean.	Highest Obs.	Lowest Obs.	Range.	Mean.	Highest Obs.	Lowest Obs.	Mean of Warmest Day.	Mean of Coldest Day.	Mean Maximum	Mean Minimum.	Range.
1884.												
October.....	29·690	30·395	29·019	1·376	19·60	38·0	1·7	35·7	4·2	22·7	15·8	6·9
November.....	·670	·375	28 656	1·719	5·40	30·0	—13·6	18 8	—6·4	11·3	—·3	11·6
December.....	·835	·366	29·122	1·244	—13·56	9 6	—34·5	5·5	—29·5	—10 0	—18·4	8·4
1885.												
January	·654	·270	·223	1 047	—27·40	—8·0	—36·7	—12·0	—36·0	—23 6	—31·8	8 2
February	30·000	·529	·029	1·500	—6·01	29 0	—31·2	20 0	—24·7	— 0·6	—13 9	14·5
March.....	29·779	·248	·146	1·102	—19·17	—8·4	—32·0	—11·3	—27·8	—14·3	—23·9	9·6
April.....	·894	·355	·019	1·336	6·12	25 6	—18·0	21·7	—15·2	12·0	— 0·4	12·4
May.....	·913	·486	·358	1·128	23·80	35·6	9·2	33·3	14·9	29·2	18·4	10·8
June.....	·747	·067	·290	·777	35·23	42·5	22·6	36·5	27·1	38·1	29·2	8·9
July.....	·627	·926	·186	·840	40·20	62·2	30·9	53·3	34·5	48·2	34·7	13·5
August.....	·596	29·911	·116	·795	39·63	60·8	32·1	51·3	34·5	46·5	35·2	11·3
11 mos. nearly	29·766	30·529	28·656	1·873	9·44	60·8	—36·7	53·3	—36·0	14·60	4·05	10·55

to 24th August, 1885, Station No. 6.

Pressure of Vapour.	Relative Humidity.	Dew Point.	Wind.			Cloudiness to Tenths.	Rain.		Snow.		No. of Days Auroras.
			Mean Velocity.	Highest Daily Mean Velocity.	Highest Obs.		Duration in Hours.	Depth in Inches.	Duration in Hours.	Depth in Inches.	
·104	90 0	....	16·2	38·5	48·0	8·3	8 30	·5	44·	10·5	2
·056	91·5	....	16 5	40 9	60·0	7·7	....	.....	44·45	13·5	7
·032	90·5	.....	11·2	23·8	60·0	5·0	....	.....	10·30	3·5	15
·010	85·5	.....	12·6	29·9	39·0	4 6	.....	.....	9·30	·1	18
·036	86 0	.....	14·1	32·2	52·2	6 4	.....	.....	.. ..	....	9
·015	82·0	.....	11 8	27 3	36 6	5·1	.....	.....	.....	.....	13
·061	82·0	....	14 9	34 5	41·4	7 9	.....	.....	11·00	3 5	4
·124	73·0	....	14·2	27·0	36·6	8 8	....	.....	74·40	0 1	0
·168	79 0	.....	11·3	21·5	32·4	8·8	12·	2 8	33 45	2·25	0
·218	79 0	.....	11·1	22·8	37 8	7·4	36·	1·58	.....	.....	0
·224	89 0	.....	16·1	32·8	39 6	8 5	60 15	2·09	.....	.....	0
·095	84·3	.....	13·5	30·1	44 0	7·1	116·45	6 97	231·10	33·45	68

TABLE VIII.—ABSTRACT of Meteorological Observations at Fort Churchill, August, 1885,

Month.	Barometer at 32°.				Temperature.				
	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Average of Warmest Day.	Average of Coldest Day.
1884.	Inches.	Inches.	Inches.	Inches.	°	°	°	°	°
October	29·931	30 528	29·005	1·523	24·44	60·0	4·0	53 00	7·67
November	29·890	30·500	29·030	1·470	4·96	34·0	—25·0	31·67	—21·33
December	29·991	30 509	28·800	1·709	—16·45	29 0	—37·0	23·33	—35·67
1885.									
January	29·799	30·358	29·191	1·167	—24·79	— 4·0	—40·0	—6 67	—36·00
February	29 961	30·441	29 211	1·230	—16·51	12·0	—40·0	6·33	—34·00
March	30·055	30·500	29·386	1·114	—14·36	16·0	—35 0	—4·00	—28·33
April	29·958	30·390	28 998	1·392	9·02	34·0	—16·0	26 67	— 8·33
May	29·964	30·403	29·407	0 996	22·48	44·0	— 8 0	39·33	2·67
June	29·893	30·228	29·512	0·716	40·47	75·0	28·0	69·00	30·67
July	29 611	29·932	29·201	0·731	55·99	84·0	35·0	76·33	37·33
August	29·721	30 225	29·306	0 919	47·20	68·0	37·0	60·33	39·67
Sept. (estimated)	.....	.....	.....	.....	36·70	.....	.....	.....	.....

Mean temperature for year, 14·1°.

H.B., Latitude 58° 43′ N., Longitude 94° 10′ W., from October, 1884 to inclusive.

Wind.					Rain.						
Prevailing Direction.	Total Mileage in Month.	Average Hourly Velocity.	Average of Most Windy Day.	Average of Least Windy Day.	Amount.	Days.	Days of Snow.	No. of Fogs.	No. of Auroras.	No. of Thunder Storms.	Average Cloudiness.
		Miles.	Miles.	Miles.							
N.W..... ...	10,313	13·86	31·04	2·17	2·000	2	8	1	4	.....	6·5
N.W., S.W...	10,112	15·05	36·87	2·42	.....	.....	13	0	3	.....	6·4
N.W.....	6,301	8·47	16·71	0·25	.....	.....	5	0	9	.....	4·2
N.W.....	10,084	13 55	30 42	0·42	.....	.....	11	0	10	.....	3·9
N.W., S.E....	6,551	9 75	32 67	0·29	.....	.....	10	0	8	.....	4·8
N.W..... ...	8,166	10·98	31·38	0·67	.....	.....	14	0	10	.....	2·9
N.E..... ...	4,535	6·75	28·45	0·33	R	1	7	0	6	.....	4·3
N.W., N.E...	7,159	9·94	33·17	0·62	.....	.....	9	1	2	1	6·5
N.W., N.E...	5,044	7·01	14·08	1·71	0·74	6	6	2	0	0	6·7
N.W., S.....	6,160	8·28	20·42	1·46	3·07	14	9	4	0	2	7·4
N.W.....	5,534	8·54	17·00	1·54	1·89	15	0	4	5	1	7·2
.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE IX.—ABSTRACT of Meteorological Observations at York Factory, H.B., of Years,

Months.	Barometer	Temperature.					
	Monthly Average.	Monthly Average.	Average of Highest Temperatures.	Average of Lowest Temperatures.	Range.	Highest in Series.	Lowest in Series.
	inches.	°	°	°	°	°	°
October	29·910	27·60	45·1	5·1	40·0	56 0	— 2 0
November	29·944	7 46	34·3	—24·8	59 1	38·0	—40·0
December	29 915	—13·23	18·2	—34 9	53·1	29 0	—50·5
January	30·008	—20 74	7·3	—45·3	52·6	26·5	—51·0
February	29·926	—14·26	19 2	—42 0	61·2	44 0	—53 0
March	30·164	— 6·48	31·9	—33·1	65 0	40·0	—48·0
April	30·038	+19·36	47·5	—16·1	63·6	54·0	—22·5
May	29·962	35·86	73·5	2·9	70 6	82·0	—15·5
June	29·942	53·64	93 0	27 9	65·1	101·0	32·0
July	29·876	63·30	98 5	40·9	57·6	106 0	37·0
August	29·867	53·91	85·1	35·4	49·7	99·0	29·0
September	29 9:0	42·33	68·4	30·4	38·0	83·0	24 0
Year	29 957	20 73	98·5	—45·3	143 8	106·0	—53·6

Lat. 57° 0′, Lon. 92° 28′, Height above Sea Level 55 feet, Derived from a group 1876 to 1883.

Wind.			Mean Relative Humidity.	Amount of Cloudiness.	Rain.		Snow.		No. of Fogs.	No. of Auroras.
Prevailing direction from—	Average Total Mileage in Month.	Average Hourly Velocity.			Amount.	Days of.	Amount.	Days of.		
				0—10	inches.		inches.			
N.W. & N.E.	9 217	12·38	94	5 7	1 22	2	9·1	12	3	8
N.W., S.W..	9·420	13·08	92	5·4	0·03	1	15·1	14	2	9
N.W.....	8·497	11·54	85	5·5	0·00	0	11·3	15	2	10
N. & N.W...	8·953	12·04	91	3·7	0·00	0	7·1	12	3	12
N.E. & S.E...	8·797	13 04	85	4·3	0·00	0	4 5	10	3	11
N.E.....	9·603	12 92	80	4·1	0 00	0	7·3	13	3	12
N.E.....	8·410	11·67	88	4·8	0·12	1	4·8	6	3	9
N.N.E.....	9·397	12·62	90	5·0	2·34	4	9·2	6	4	6
N.N.W.....	8 617	11 96	83	4·2	3·40	8	0 8	2	5	3
N., S.W.....	8·775	11 92	77	4·4	7·69	10	.....	.....	3	3
N.E., N.W...	9·565	12·87	87	4·7	6·47	10	.....	.....	4	6
N.W., N.E...	8·603	11 96	84	4 6	3·83	8	0·9	5	2	8
N.W., N.E...	.....	12·33	86	4·7	25·10	44	70·1	95	37	97

TABLE X.—Table showing number of hours of Snow observed at Hudson Straits Stations and at Belle Isle Island Lighthouse.

Months.	Skyuner's Cove, Nachvak.	Port Burwell.	Ashe Inlet.	Stupart's Bay.	Port DeBoucherville, Nottingham Island.	Port Laperrière.	Belle Isle.
1884.							
August	—	25	—	—	—	—	0
September	—	64	104	28	9	—	24
October	73	67	160	100	111	44	76
November	64	234	252	163	54	44	82
December	88	131	60	42	42	10	44
1885.							
January	157	73	36	18	1	0	76
February	201	146	200	65	62	9	52
March	158	116	92	3	0	0	30
April	146	119	236	63	92	11	119
May	100	177	171	57	5	27	19
June	43	53	100	87	6	36	53
July	0	0	0	0	0	0	0
August	0	0	4	0	0	0	0
September	43	41	—	—	—	—	0

The —— when entered in the tables signifies that there were no observations at the stations during the month, or that the observations were for a broken period.

TABLE XI.—Fog Comparison.

Months.	Nachvak, Skyuner's Cove.	Chudleigh, Port Burwell.	Ashe Inlet.	Stupart's Bay.	Nottingham Island, Port De-Boucherville	Digges Island, Port Laperrière.	Churchill.	Belle Isle.
1884.	hours.	hours.	hours.	hours.	hours.	hours.	hours.	hours.
August	—	76	½ month 16	—	—	—	—	184
September	—	48	.....	48	28	—	—	76
October	.....	.....	.....	.....	12	24	8	60
November	.....	.....	.....	.....	.....	.....	.....	56
December	.....	.....	.....	.....	.....	.....	.....	64
1885.								
January	.....	.....	.....	.....	.....	.....	.....	96
February	20	4	4	24	8	4	.....	72
March	.....	.....	8	.....	8	.....	.....	32
April	12	.....	.....	.....	.....	.....	.....	72
May	.....	.....	20	32	.....	24	8	152
June	36	32	8	152	12	124	16	248
July	92	100	40	220	132	224	32	288
August	100	148	120	20 days 33	152	116	32	171
September	136	88	18 days. 32	—	—	—	—	40

The above table gives the actual number of hours of Fog observed at the Hudson's Bay and Straits Stations, and at Belle Isle Lighthouse. The entries for Ashe Inlet, in August, 1884, cover only the last half of the month; those for Stupart's Bay, in August, 1885, only include the period from the 1st to 20th of the month; and those for Ashe Inlet, September, 1885, only include from the 1st to the 18th of the month.

TABLE XII.—Showing the number of days in each month on which the wind reached the force of a gale at Belle Isle and at the Stations in Hudson's Straits, 1884 85.

Month.	Belle Isle.	No. 1. Port Burwell.	No. 2. Skynner's Cove.	No. 3. Aeh Inlet.	No. 4. Stupart's Bay.	No. 5. Port DeBoucherville.	No. 6. Port Laperrière.
1884.							
August	5	1	—	—	—	—	—
September	10	1	—	0	0	0	—
October	10	1	2	3	0	0	4
November	7	1	2	3	4	2	2
December	8	0	3	1	2	0	1
1885.							
January	15	4	2	3	4	4	0
February	1	4	3	4	4	2	2
March	7	2	6	2	2	0	0
April	5	4	0	2	2	0	3
May	2	1	2	2	0	3	6
June	3	0	4	1	1	0	0
July	0	0	1	1	1	0	0
August	1	0	1	2	0	0	2
Sum for year, September to August.	69	18	26 11 mos.	24	20	11	14 11 mos.

NOTE.—The dash entered in the columns signifies that no observations were taken or that the period was incomplete.

TABLE XIII.—PORT BURWELL, Station "No. 1,'

Months.	No. of Observations.	No. of Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S E.	
			Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
1884.																
September	180	9	2	6 50	6	8·84	31	13·81	7	23·15	25	19·24	1	7·00	11	25 09
October.....	186	8	5	12·80	1	5 00	4	11·50	7	7 72	22	13·91	—	—	7	7 85
November	180	19	8	13·64	2	3·00	3	14·00	3	24·33	9	47·67	3	4·66	5	6·40
December.....	186	19	4	19 00	1	18·00	16	15·00	7	15·86	7	16 6	—	—	—	—
1885.																
January	186	38	5	30·40	1	16 00	7	26·86	5	16·40	—	—	—	—	—	—
February	168	41	1	18 00	5	10·20	29	21·00	8	24 75	22	33·63	3	5 66	5	12·20
March	186	23	4	31·25	1	3·00	11	21·81	1	23 00	14	12·37	2	17·00	3	5·66
April.....	180	8	11	9·45	3	4·33	13	20·31	18	23·28	26	25·08	9	13 78	5	7·80
May	186	11	3	10 33	—	—	11	11·27	30	18·03	26	19 81	2	5·50	2	7·50
June	180	16	6	9 67	—	—	12	12·17	23	18·04	23	12·30	—	.....	13	6 76
July	186	61	2	9·00	1	10·00	2	10 00	4	22·25	24	16·58	3	11·00	21	7·95
August	186	29	4	11·75	2	13·00	8	12·00	5	16·80	31	14·42	6	13·17	14	6·43
Year	2190	282	55	14·82	23	8·70	147	16·62	118	19·08	229	20·29	29	10·66	86	9 84

Year, 1st September, 1884, to 31st August, 1885.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
1	35·00	2	8·00	4	9·25	11	12·18	5	14·20	18	18 88	8	16 75	25	18 72	14	10·21
4	7·75	5	20 00	12	13 60	35	19 03	8	20·63	17	19 00	16	24 44	31	22·32	6	17 33
5	7·80	8	18 00	10	17 00	48	24 06	3	16·00	14	16·07	3	15 00	23	15 52	12	16·58
1	19 00	12	14 08	18	15·06	68	21·75	7	21 00	15	18·47	5	13·00	4	15·75	2	28 50
1	9·00	18	9·94	23	13·42	63	23·08	1	31·00	7	17·28	12	10·40	4	15·25	1	28 00
4	4·75	22	11 00	9	15·00	12	14·75	2	20·00	3	16·33	1	6 00	—	—	1	12·00
2	7·00	13	11·31	21	17 38	56	21·94	9	24·22	11	18·55	2	8·00	4	24·50	9	15 22
1	3·00	6	8·83	10	15·20	31	17·61	15	16 26	3	11·00	8	15 88	8	11·62	5	9·40
3	13·66	3	8·33	5	21·20	33	18·12	14	24·43	15	15·60	12	14·92	8	12·25	8	8·75
2	4·00	3	10·00	2	9·50	21	10·67	20	16 40	18	13 77	12	14 21	2	16·50	7	7·29
17	5·23	8	3·89	7	5·56	18	10 89	6	9·67	6	6·50	3	3·66	1	10 00	2	10 00
7	9 57	10	6 30	12	6·25	25	8 00	11	10·18	8	12·25	4	13·25	3	10 00	7	10 00
48	9·31	108	11·10	133	13 90	421	15·72	101	17·85	135	16·22	86	14·32	113	14·86	74	12·70

TABLE XIV.—ASHE INLET, Station "No. 3,"

Months.	No. of Observations.	No. of Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
1884.																
September.....	180	22	28	10·01	8	7·95	16	6·94	4	13·50	9	14·56	3	13·33	25	21·12
October.....	186	20	37	16·65	9	11·22	16	12·69	4	8·75	2	7 00	4	9·00	34	22·97
November.....	180	19	29	14·86	14	17·14	39	15·49	—	—	4	19·50	4	14·00	31	30·86
December	186	24	25	11·00	17	7·00	8	7·25	—	—	5	8·40	6	12·50	—	—
1885.																
January	186	27	30	5·63	—	—	2	6·50	—	—	8	15·63	—	—	10	12·60
February.....	168	32	19	6·05	14	11·71	9	8·88	3	10·00	19	19·95	25	30·72	15	13·46
March	186	35	14	6·89	4	12·50	6	8·83	1	6·00	4	5·75	4	13·75	9	10·88
April.....	180	20	11	8·00	3	5·66	5	12·80	9	21·55	20	26·50	16	16·19	11	20·55
May.....	186	16	7	8·57	5	10·00	4	14·00	11	20·10	33	24·70	14	13·07	16	14·83
June	180	9	1	4·00	4	8·25	1	6·00	3	11·33	22	12·27	17	12·18	24	8·93
July	186	20	2	7·00	1	6·00	—	—	2	16·00	37	16·81	41	15·84	35	9·06
August.....	186	9	4	6·75	—	—	6	9·67	4	15·50	70	23·33	15	8·33	12	5·50
Year.....	2190	253	207	10·52	79	10·68	112	11·66	41	16·29	283	20·33	149	16·47	212	16·97

Year, 1st September, 1884, to 31st August, 1885.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
4	16·25	2	13·00	1	4·00	1	1·00	—	—	2	9·00	2	32·00	29	18·52	24	13·33
10	19·20	11	20·64	—	—	2	7·50	2	17·50	7	10·57	6	18·00	13	22·69	9	18·22
5	38·80	2	10·50	—	—	10	12·90	1	34·00	3	15·00	2	25·00	9	17·22	8	15·88
2	7·00	5	9·20	1	4·00	4	5·50	—	—	7	10·72	12	17·75	51	18·08	19	9·35
—	—	1	4·00	—	—	—	—	1	10·00	13	25·00	14	14·78	68	18·45	12	8·58
3	13·66	2	7·00	—	—	1	4·00	—	—	2	7·50	2	10·00	17	11·30	5	7·00
13	19·70	3	10·00	1	5·00	3	14·00	7	13·57	10	16·50	13	16·50	46	23·37	13	16·07
2	10·50	2	12·00	—	—	1	12·00	5	8·60	24	12·25	3	16·66	41	21·54	7	13·29
4	10·00	6	9·83	—	—	3	10·00	3	11·00	21	19 90	20	18·85	30	16·33	3	8·00
2	5·00	5	6·00	—	—	10	7·90	5	13·60	26	20·65	26	20·73	22	18·18	3	13·66
—	—	3	5·33	—	—	—	—	—	—	8	11·25	5	17·60	28	13·43	4	10·25
2	4·00	1	4·00	2	7·00	3	5·00	6	8·00	15	15·33	14	15·78	21	12·38	2	9·00
47	17·55	43	11·65	5	5·40	38	9·18	30	12·18	138	18·00	119	18·14	375	18·24	109	12·41

TABLE XV.—STUPART'S BAY, Station No. 4.—

Months.	No. of Observations.	No. of Calms.	N.		N.E.	
			Observation.	Velocity.	Observation.	Velocity.
1884.						
September	180	20	43	12·23	12	9·83
October	186	11	5	7·80	1	14·00
November	180	22	3	12·60	—	—
December	186	35	6	5·83	1	1·00
1885.						
January	186	37	1	20·00	—	—
February	168	46	9	10·44	2	8·00
March	186	34	3	11·33	—	—
April	180	21	14	11·07	13	11·23
May	186	17	23	11·78	18	8·44
June	180	21	25	8·28	22	7·50
July	186	66	13	10·77	3	10·00
August (20 days)	120	22	12	9·67	4	7·00
Year	2,124	352	157	10·46	76	8·61

No. 4.—

1st September, 1884, to 20th August, 1885.

N.E.		E.		S.E.		S.		S.W.		W.		N.W.	
Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
9·83		24	10·08	5	4·00	—	—	—	—	11	10·63	65	12·65
14·00		16	14·56	15	10·20	10	11·20	7	9·10	50	9·16	70	17·53
—		14	29·36	6	10·50	6	10·30	5	16·60	67	8·40	57	16·50
1·00		4	7·50	—	—	1	4·00	10	7·30	63	7·92	66	12·72
—		—	—	—	—	—	—	5	9·80	89	8·10	54	18·52
8·00		27	19·93	9	15·55	5	4·60	3	5·33	16	8·19	51	12·41
—		—	—	1	9·00	7	9·14	14	11·86	59	9·41	68	22·30
11·23		16	13·63	5	10·60	8	7·18	16	7·06	28	9·08	59	20·53
8·44		26	12·73	5	6·60	1	2·00	10	12·30	35	12·66	51	12·94
7·50		23	6·83	12	4·75	3	3·00	9	4·22	19	14·63	46	14·80
10·00		25	5·24	9	2·33	10	3·10	12	8·67	25	7·52	23	19·74
7·00		30	9·70	5	4·20	8	3·00	3	6·00	26	12·62	10	11·70
8·81		205	12·60	73	7·94	59	6·58	94	10·08	488	9·34	620	16·26

TABLE XVI.—PORT DE BOUCHERVILLE, Station No. 5

Months.	Observations.	Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
1884.																
September.	180	15	4	8·00	13	8·93	42	8·40	1	23·00	7	19·00	2	8·50	2	5·50
October.	186	21	27	13·63	4	5·25	12	11·17	...	.....	16	12·62	2	14·00	4	22·50
November.....	180	39	7	14·58	3	10·00	28	16·36	...	.....	8	24·63	...	.....	13	5·54
December.....	186	84	1	21·00	2	10·50	6	13·17	...	.....	4	10·00	1	4·00	12	9·25
1885.																
January.	186	107	.....	.....	...	.....	.....	.....	...	.....	1	7·00	...	.....	2	1·50
February	168	29	17	7·42	7	7·00	25	14·08	2	31·00	20	20·95	...	.....	3	14·60
March.	186	87	10	11·30	3	13·33	8	9·88	...	.....	6	7·84	...	.....	...	.....
April..	180	44	12	10·83	10	9·60	14	13·21	...	.....	7	11·00	...	.....	6	9·33
May..	186	28	14	13·07	9	6·66	34	11·35	2	21·00	10	10·90	3	14·33	2	10·56
June	166	2	19	10·00	11	10·18	28	8·28	...	.....	10	4·00	1	4·00	5	6·40
July.	186	5	4	7·50	5	10 00	36	11·14	1	4·00	17	4·77	3	3·33	14	6·86
August.....	132	5	1	4·00	2	12·00	30	12·46	...	.....	17	11·88	4	12·50	4	10·25
Year	2122	466	116	11·19	69	8·97	263	11·60	6	21·83	123	13·77	16	9·65	67	10·55

June fourteen observations missed. August observations to 22nd only.

Station No. 5

S.S.E.		S.E.	
Velocity.	Observation.	Velocity.	
8·50	2	5·50	
14·00	4	22·50	
.....	13	5·54	
4·00	12	9·25	
.....	2	1·50	
.....	3	14·60	
.....	...	.....	
.....	6	9·33	
14·33	2	10·56	
4·00	5	6·40	
3·33	14	6·86	
12·50	4	10·25	
9·65	67	10·55	

—1st September, 1884, to 22nd August, 1885.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
.....	.....	7	7 72	1	13·00	27	8·78	4	7 25	26	9·77	3	17·00	26	11·69	...	.....
5	21·20	5	12·40	.....	.....	11	11·34	6	15·50	27	12·36	5	4·40	41	7·58	...	.....
.....	.....	11	17 09	1	4·00	29	13·31	2	8·00	22	8·27	3	4·66	14	8·43	...	.....
.....	.....	2	12·50	.....	.....	34	12·64	11	12·64	27	6 63	...	.....	2	7·00	...	.....
.....	.....	2	14·00	2	11·50	51	15·66	2	20·50	19	7·05	...	.....	....	.....	...	.....
.....	.....	.....	.....	.....	.....	28	9·75	6	8·50	15	6·94	4	2·75	11	10·91	1	14·06
.....	.....	2	19·00	2	9·50	34	13 35	2	18 50	24	11·28	...	.....	7	11·15	1	8·00
.....	.....	6	7·83	11	15·82	42	10·33	2	10·50	21	9·91	1	23·00	2	6·00	2	7·50
.....	.....	5	11·00	3	16·33	27	16·70	.....	.....	26	13·00	5	12·20	17	11·88	1	3·00
.....	.....	13	9·23	4	13·50	36	18·33	....	.....	19	16·26	4	14·75	14	7·79	...	.....
.....	.....	18	7·17	14	11·00	55	15·60	.....	.....	6	14·17	1	6·00	7	17·00	...	.....
.....	.....	7	12·86	4	16·85	44	14·13	.....	.....	9	14·00	1	14·00	4	21·75	...	.....
5	21·20	78	10·89	42	13·21	418	13·73	35	12·20	241	10·47	27	9·66	145	8·81	5	8·00

TABLE XVII.—PORT LAPERRIÈRE, Station No. 6.—

Months.	Observation.	Calms.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.	
			Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
1884.																
October	186	9	4	13·25	2	12·00	3	17·00	2	10·00	16	13·00	5	20 80	29	21·20
November	180	8	4	14 00	10	15·20	15	22·20	12	23·59	6	7·50	9	19 33	25	20·76
December	186	9	2	12 00	5	13·40	17	13·35	11	16 82	5	15·80	2	4·50	35	6 86
1885.																
January	186	19	4	7·25	3	6·00	6	7·50	4	10·50	.....	.....	3	5·66	29	7·72
February	168	19	7	9·86	4	15·50	7	22·14	31	20·77	12	19·17	18	19·22	14	12·36
March	186	17	5	19·20	8	18·13	3	19·67	1	10·00	14	18·79	1	3·00	11	9·09
April	180	7	9	20·33	6	16·67	11	8·17	4	17·50	15	22·87	...	.....	1	20·00
May	186	22	16	14·66	2	9·00	4	17·25	16	12·56	33	18·39	5	12·20	6	14·50
June	180	10	22	9·86	9	10 33	9	10·88	15	15·00	21	20·48	1	5·00	3	12·66
July	186	10	7	12·29	2	4·00	3	6·00	2	16·50	9	18·78	6	20·83	6	15·17
August	186	6	15	14·73	4	20·50	1	8 00	2	16·00	19	25·68	2	8 00	14	13·57
Year	2010	136	95	13·34	55	13·36	79	14·60	100	17·45	150	19·14	52	17 98	173	13·28

Station No. 6.—

leven months, 1st October, 1884, to 31st August, 1885.

S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.	
Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.	Observation.	Velocity.
8	14·13	4	21·00	4	11·50	17	12·48	10	11·90	24	17·42	16	19·62	28	17·43	5	14·20
6	17·33	11	13·18	13	18·40	11	12·91	12	8·25	13	8 39	12	16 92	5	21·80	8	10·50
27	10·93	19	17·58	14	16·43	12	8·50	5	10·60	4	7·75	2	9 00	11	10·64	6	14 67
47	12·89	56	18·89	4	13 50	7	22·86	...	.....	...	.....	1	6·00	1	3·00	2	10·50
20	14·05	21	11·30	2	11·00	5	7·60	1	10·00	1	2·00	2	15·50	1	13 00	3	10 66
47	8·51	37	13·73	18	13 77	6	13·83	3	10·34	6	13 67	2	19·50	2	16 00	5	15·60
24	11·42	23	17·65	24	21·79	9	13·44	12	12·25	11	12·18	5	11·20	11	9 91	8	16 38
3	22·00	7	24·71	7	14 57	9	16·22	13	16·68	11	14·00	12	13·83	12	14·58	8	16 00
.....	.....	5	7·40	6	13·33	19	12·37	12	9·17	15	7 73	7	14·57	15	8 73	11	10 82
15	11 00	31	16·13	49	12·24	35	10 23	2	5·50	...	.....	.....	.....	3	9·66	6	12 00
8	15·13	14	15·85	23	12·26	45	11 91	6	12·83	6	8·67	1	3·00	10	10·20	10	18·50
205	11 83	228	17·34	164	14·50	175	12·19	78	11·50	91	12·06	60	15·23	99	13 21	72	12·28

TABLE XVIII.—Table showing the Mean Temperature of the Air at Frederikshaab, in Greenland, taken from Mean of Observation, at 7 a.m. and 6 p.m., as published in Part I of "Contributions to Arctic Meteorology," issued by the British Meteorological Council. Observations taken by Mr. F. F. Barfoed.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1856.....	.....	.....	.....	.....	.....	.....	.....	.....	39·7	28·5	33·3	23·9
1857.....	19·0	6·8	20·5	28·9	35·6	41·4	42·5	43·5	39·5	27·3	21·0	15·4
1858.....	12·7	19·35	26·3	30 7	33·6	39·5	43·8	41·4	35·6	29·6	26·3	15·7
1859.....	11·5	16·00	15·7	29·9	36·0	39·0	41·0	38·2	37·5	30·5	23·1	21·4
1860.....	12·9	20·30	16·5	25·9	36·3	42·3	44·3	.....	38·5	28·5	.....	.....
Means.....	14·02	15·61	19·75	28·85	35·3	40·55	42·9	41·0	38·15	28·88	26·05	19·1

Mean of year from above table is 29·18.

TABLE XIX.—Mean daily Temperature of Sea Water at the surface, with corresponding position of Ship.

Date. Months.	Sea Temperature.	Position. Lat. N.	Long. W.	Date. Months.	Sea Temperature.	Position. Lat. N.	Long. W.
	°	° ′	° ′		°	° ′	° ′
May 27...	.....	Left Halifax.		June 17...		61 8	65 32
do 28...	43·8	44 59	61 09	do 18...		61 12	65 24
do 29...	38 8	47 01	59 34	do 19...		61 8	65 56
do 30...	35·3	49 03	58 55	do 20...		61 14	66 18
do 31...	31 0	50 16	58 42	do 21...		61 16	66 26
June 1...	34·8	} Blanc Sablon.		do 22...		61 14	65 35
do 2...	35·8			do 23...		61 21	66 26
do 3...	35·3			do 24...		61 22	65 45
do 4...	31·8	51 48	55 48	do 25...		61 19	65 37
do 5...	32·1	53 59	54 42	do 26...		61 20	65 24
do 6...	31·0	55 01	54 56	do 27...		61 20	65 29
do 7...	36 8	55 58	55 11	do 28...		61 17	65 2
do 8...	37·5	57 43	57 27	do 29...		61 8	64 33
do 9...	36·1	58 42	58 54	do 30...		61 14	64 54
do 10...	31 0	58 49	60 13	July 1...		61 15½	64 54½
do 11...	30·9	58 45	60 39	do 2...	In close field ice.	61 15	64 27
do 12...	30 7	59 18	60 47	do 3...		61 7	64 27
do 13...	31·2	60 30	61 6	do 4...		61 11	64 42
do 14...	30·8	60 44	62 1	do 5...	29 8	61 15	64 38
do 15...	31·5	61 36	62 29	do 6...	30·0	61 15	64 37
do 16...	29 8	61 11	64 40	do 7...	33 0	61 1	63 20

TABLE XIX.—Mean daily Temperature of Sea Water, &c.—*Concluded.*

Date. Months.	Sea Temperature.	Position. Lat. N.	Long. W.
		° ′	° ′
July 8...	35·6	60 56	61 41
do 9...	37·6	59 20	59 59
do 10...	40·8	57 45	58 51
do 11...	40 5	56 2	56 40
do 12...	46·6	53 28	55 17
do 13...	48·7	52 22	54 54
do 14..	49.4	50 55	53 47
do 15...	53·8	48 21	52 38
do 16...	....		
do 17...	....		
do 18...	.....		
do 19...	.....		
do 20...	.....		
do 21...	.....	In St. Johns, Nfld.	
do 22...	.....		
do 23...	.....		
do 24...	....		
do 25...	.....		
do 26...	.....		
do 27...	50·0		
do 28...	52·1	49 9	52 57
do 29...	51·8	51 29	54 35
do 30...	50·7	54 5	56 8
do 31...	41·5	56 21	59 22
Aug. 1...	34·2	58 48	10' off shore.
do 2...	35·2	59 10	63 15
do 3...	30·7	60 32	64 30
do 4...	32·0	60 24	64 46
		In Burwell.	
do 5...	31·4	60 36	64 48
do 6...	31·3	61 23	65 29
do 7...	31·0	61 17	66 46
do 8...	31·1	61 46	68 04
do 9...	33 6	61 46	68 16
do 10...	30·8	62 00	68 36
do 11...	34·2	62 07	68 45
do 12...	30·6	Off Ashe Inlet.	
do 13...	29·9	Drifted 18' west.	
do 14...	29·8	Ship a little farther west.	
do 15...	29 9	62 37	71 34
do 16...	30·0	63 00	71 27
do 17...	30·3	7' west of Bluff.	
do 18...	30·0	14' do	
do 19...	29·9	62 47	71 17
do 20...	29·8	20' farther west.	
do 21...	36·7	60 59	72 7
do 22...	36·7	Noon in Stupart's Bay.	
do 23...	35 9	62 50	74 6
do 24...	34·5	Off S.E. part of Nottingham.	
do 25...	35·0	Diggs.	
do 26...	34·8	In Port Laperrière.	
do 27...	35·5		
do 28...	33·7		

Date. Months.	Sea Temperature.	Position. Lat. N.	Long. W.
		° ′	° ′
Aug. 29...	38·8	61 21	80 52
do 30...	38·7	60 40	85 2
do 31...	38·7	59 58	90 40
Sept. 1...	42·8	Off Churchill.	
do 2...	44·5		
do 3...	43·6		
do 4...	45 0	In Churchill Harbor.	
do 5...	43 7		
do 6...	44·8		
do 7...	39 9	59 12	93 32
do 8...	38·3	59 23	88 34
do 9...	38·4	59 12	83 35
do 10...	40·1	59 48	81 20
do 11...	41·5	59 48	80 10
do 12...	37·6	62 00	78 5?
do 13...	32·5		
do 14...	31·8	In Laperrière's Harbor.	
do 15...	34·2		
do 16...	33·3		
do 17...	35·2	P.M. left Diggs.	
do 18...	33 0	A.M. at Nottingham, lat. 63° 11'; long 76° 20'.	
do 19...	32·0	In Ashe Inlet.	
do 20...	33 8	Off Stupart's Bay.	
do 21...	38·7		
do 22...	33 5	In Stupart's Bay.	
do 23...	31·0		
do 24...	31·7	61 29	70 21
do 25...	31 6	60 53	65 37
do 26...	31·4	61 2	64 41
do 27...	31·7	61 1	63 50
do 28...	30·5	60 30	64 4
do 29...	33·4		
do 30...	32·2		
Oct. 1...	32·5		
do 2...	32·2		
do 3...	31 9	In Port Burwell.	
do 4...	31·1		
do 5...	31·5		
do 6...	31·6		
do 7...	31·2		
do 8...	32·0	In Nachvak.	
do 9...	32·8	58 4	59 48
do 10...	33 6	55 17	56 54
do 11...	36 8	52 27	53 40
do 12...	35·7	51 12	52 2
do 13...	40 4	49 14	51 34
do 14...	44 6	In St. Johns.	
do 15...	46 9	47 11	52 42
do 16...	49·4	45 43	57 14
do 17...	51·3	Cranberry Island, N. ¼ W. 5'.	
do 18...	.....	Halifax.	

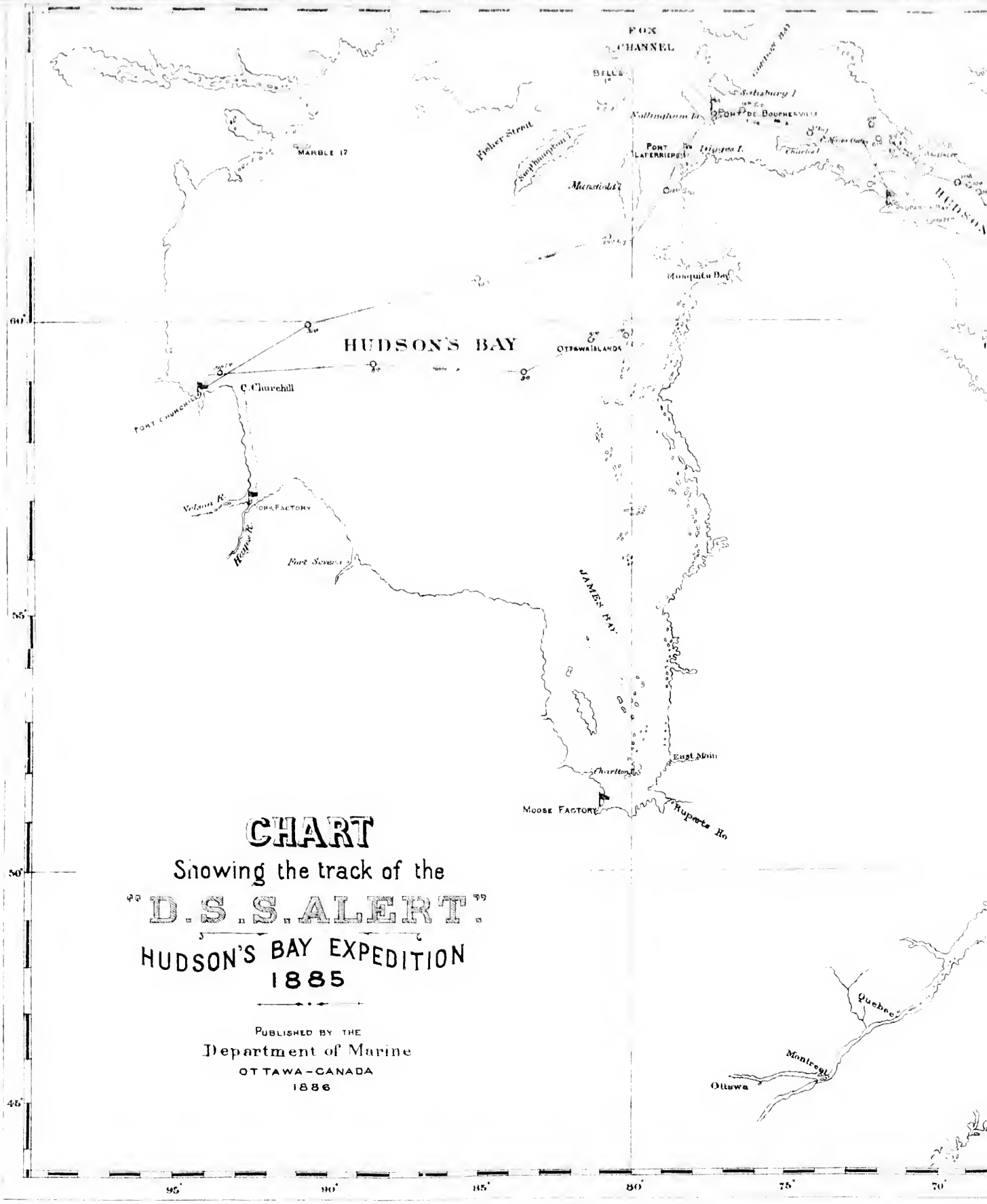
TABLE XX.

WEEKLY Results of Meteorological Observations taken on board Dominion Steamer "Alert," 1885.

Week ending	Barometer at 32°.			Temperature.				Hours Snow.	Hours Fog.	Hours Wind, 25 miles and over.
	Highest.	Lowest.	Range	Mean.	Max.	Min.	Range			
June 3	30 188	29·839	·347	40·52	50·7	31·9	18·8	.....	2	4
do 10	·068	·405	·663	36·12	43 0	30·2	12 8	4	6	74
do 17	29·897	·135	·762	34 00	42·5	30·5	12·0	8	16	8
do 24	·887	·428	·459	33 55	42·1	27·0	14·1	40	12	.....
July 1	30 282	·459	·823	34 88	40 8	30·1	10·7	18	8	6
do 8	·131	·749	·382	36·59	43 5	31·0	12'5	.....	24	2
do 15	·117	·139	·978	48 05	62·8	38·5	24·3	.....	6)	2
Aug. 1	29 989	·457	·532	52 70	68·7	40·5	28·2	.....	.....	14
do 8	30·361	·856	·505	45·67	60·0	31·2	28·8	.....	29	.....
do 15	·008	·152	·856	36·75	43·0	31·3	11·7	4	40	4
do 22	29·982	·379	·603	38 81	43 0	32·9	11·1	.....	16	8
do 29	30 056	·885	·171	40·24	57·1	34 0	17·1	.....	4	.....
Sept. 5	·078	·465	·613	41·94	48·0	37·2	10·8	4	.....	8
do 12	·253	·827	·426	40 12	46 0	34·0	12 0	4	16	16
do 19	·205	·747	·458	33·10	39·0	31 0	8 0	.....	12	40
do 26	·205	·034	1·171	32·49	39·8	21 0	18·8	56	.....	80
Oct. 3	·182	·342	·840	33 06	45·0	29·3	15·7	16	.....	92
do 10	·418	28 956	1·462	32·70	37·0	30·0	7·0	40	.....	32
do 17	·411	·728	1·683	41·75	54·0	34·0	20·0	32	.....	92
Season	30·418	28·728	1·690	.....	68·7	21·0	47·7	226	348	482

inion Steamer

ge	Hours Snow.	Hours Fog.	Hours Wind, 25 miles and over.
8	.....	2	4
8	4	6	74
0	8	16	8
1	40	12	.....
7	18	8	6
5	.....	24	2
3	.....	6	2
2	.....	.....	14
	.....	28	.....
	4	40	4
	.....	16	8
	.....	4	.....
	4	.....	8
	4	16	16
	.....	12	40
	56	.....	80
	16	....	92
	40	.....	32
	32	.....	92
	226	348	482



CHART

Showing the track of the

"D.S.S.ALERT."

HUDSON'S BAY EXPEDITION

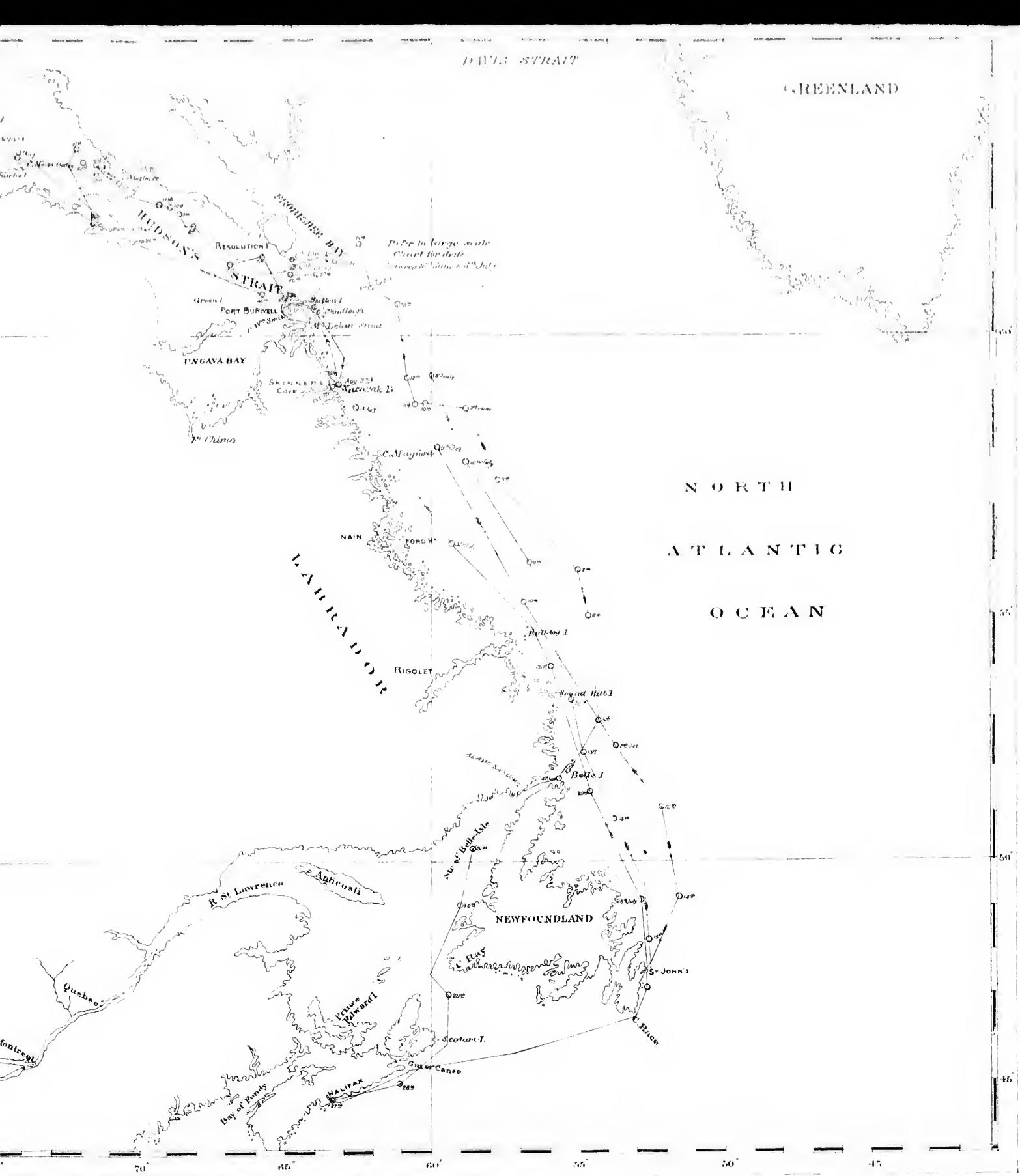
1885

PUBLISHED BY THE

Department of Marine

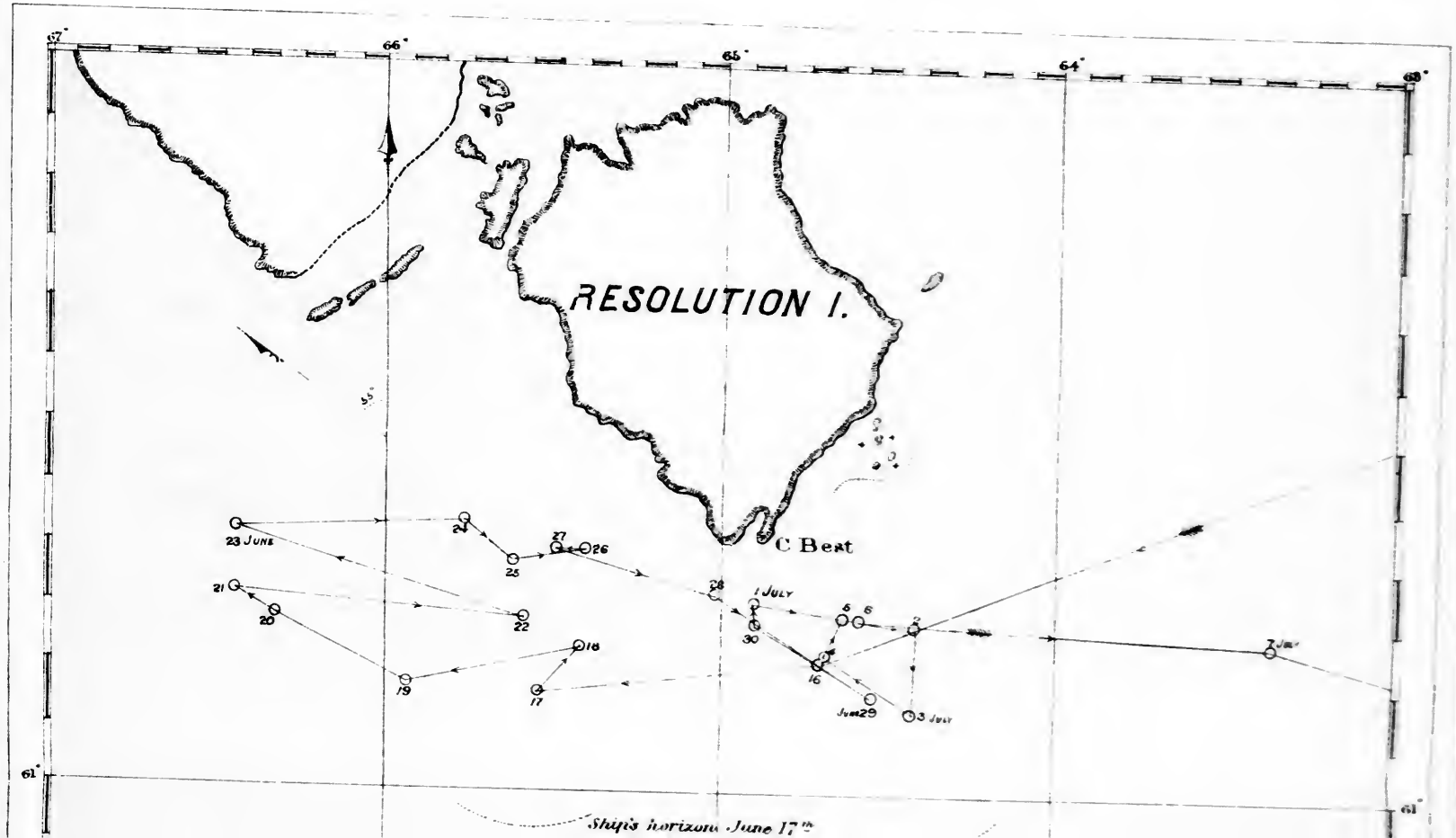
OTTAWA-CANADA

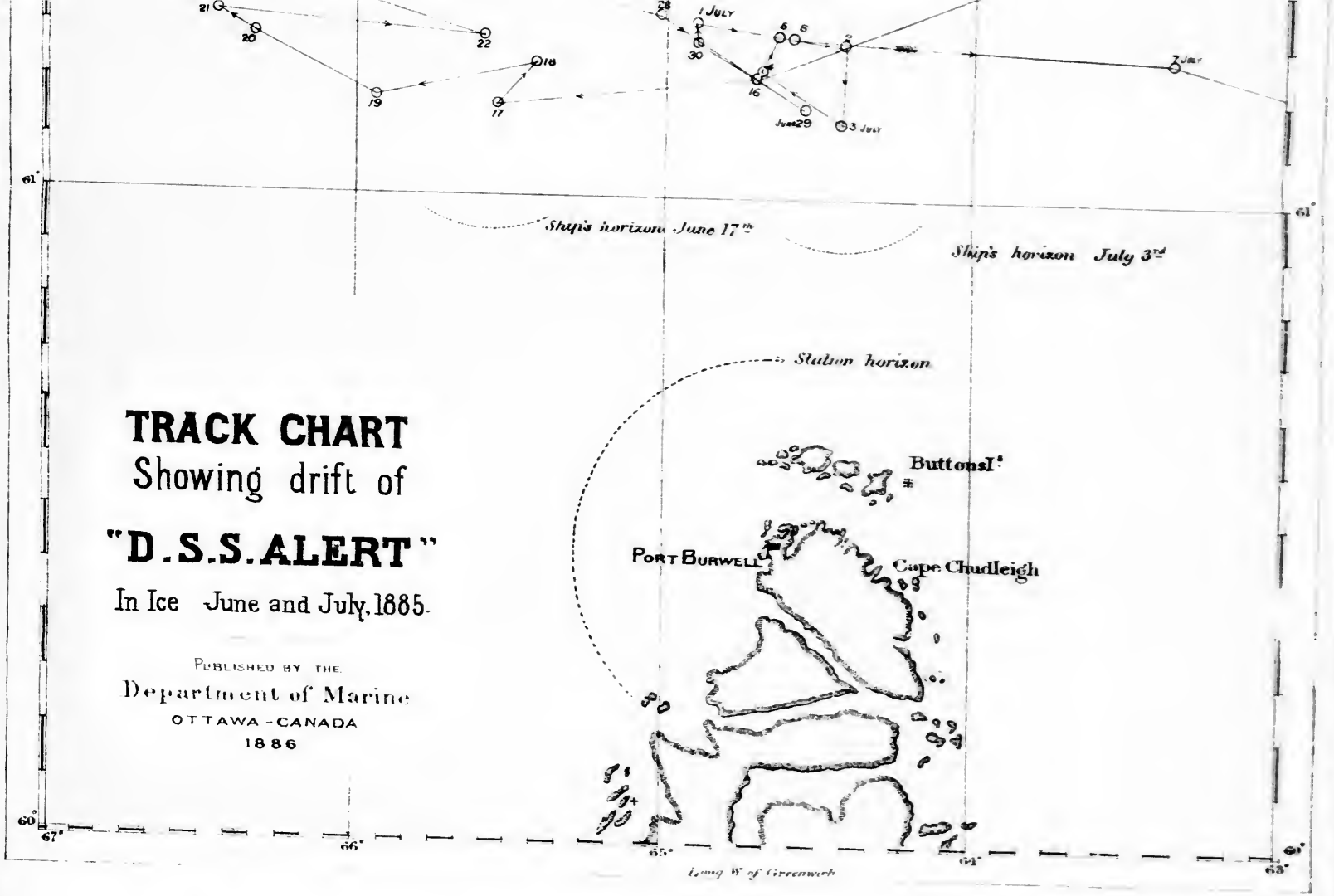
1886


DAVIS STRAIT
GREENLAND
HUDSON'S STRAIT
RESOLUTION I
FROBISHER BAY
Refer to large scale Chart for drift
PORT BURWELL
UNGAVA BAY
SKINNER'S COVE
Pt. Chimo
C. Mugford
NAIN
FORD Hr
LABRADOR
Hopedale I
RIGOLET
Hegrad Hill I
Belle Isle
Str. of Belle Isle
R. St. Lawrence
Anticosti
NEWFOUNDLAND
C. Race
St. JOHN'S
Quebec
Prince Edward I
Sable I.
Cape Canso
HALIFAX
Bay of Fundy
NORTH
ATLANTIC
OCEAN
70°
65°
60°
55°
50°
45°

Wa

June
do
do
do
July
do
do
Aug.
do
do
do
do
Sept.
do
do
do
Oct.
do
do


67°
66°
65°
64°
63°
61°
RESOLUTION I.
C Best
23 June
24
25
27
26
28
21
20
22
1 July
30
6
6
2
7 July
19
18
17
16
June 29
3 July
Ships horizons June 17th



TRACK CHART

Showing drift of

"D.S.S. ALERT"

In Ice June and July. 1885.

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