

ART. III.—THE HUDSON'S BAY ROUTE.

1. *Geological and Natural History Survey of Canada.* By ALFRED R. C. SELWYN, LL.D., F.R.S., Director. For 1879 to 1885. Published by authority of the Parliament of Canada.
2. *Reports of Robert Bell, B.A.Sc., M.D., LL.D., F.R.S.C., on the Geology, Zoology, and Botany of Hudson's Straits and Bay.* For the same years. Published by authority of the Parliament of Canada.
3. *Report of the Select Committee of the House of Commons, Canada, to Enquire into the Question of the Navigation of Hudson's Bay.* April 8, 1884. Printed by order.
4. *Our Northern Waters.* A Report presented to the Winnipeg Board of Trade, regarding the Hudson's Bay and Strait. By CHARLES N. BELL, Vice-President, Manitoba Historical and Scientific Society. 1884.
5. *Report of the Select Committee of the Legislative Assembly of the Province of Manitoba, on the Hudson's Bay Route.* March, 1884.
6. *Navigation of Hudson's Bay and Straits.* A Paper read before the Manitoba Historical and Scientific Society, Winnipeg, by CHARLES N. BELL, Vice-President. May, 1885.
7. *The Arctic Regions and Hudson's Bay Route.* A Lecture delivered before the Manitoba Historical and Scientific Society, Winnipeg, 1882, by Dr. JOHN RAE.
8. *The Development of North-West Canada by the Hudson's Bay Trade Route.* By W. SHELDFORD.
9. *A New Trade Route between America and Europe.* A Paper read before the Birmingham Meeting (September, 1886) of the British Association, by HUGH SUTHERLAND, a Member of the House of Commons of Canada.
10. *Reports of Two of the Three Hudson's Bay Expeditions, 1884-1885, ordered by the Parliament of Canada, and carried out by Lieut. A. R. Gordon, R.A.* (Report of 1886 not yet presented to Parliament.)
11. *Report of Capt. Markham, to British Capitalists interested in the Hudson's Bay Route.* August, 1886.

TABLE OF DISTANCES.

Liverpool to Quebec,	-	2708 Miles, Geographical.	Liverpool to Kong-Kong (via Quebec),	-	11,691 Miles.
Quebec to Vancouver,	-	3047 " Statute.	" to Auckland	"	12,689 "
Liverpool to Halifax,	-	2463 " Geographical.	" to Sydney	"	19,189 "
Halifax to Vancouver (via Short Line),	-	3595 " Statute.	" to Hong-Kong (via Halifax),	-	11,994 "
Vancouver to Hong-Kong,	-	5936 " Geographical.	" to Auckland	"	12,992 "
" to Yokohama,	-	4374 " "	" to Sydney	"	13,492 "
" to Sandwich Islands,	2415	" "	" to Hong-Kong (via New-York and San Francisco),	-	12,879 "
" to Feejee,	-	5070 " "			
" to Auckland,	-	6934 " "			
" to Sydney,	-	7434 " "			

Difference in favour of Canadian Route, - 1188 Miles.

Liverpool to Cape Chudley,	1766 Miles, Geographical.	Liverpool to Halifax,	-	2463 Miles.
Cape Chudley to Port Nelson,	1200 "	Halifax to Vancouver,	-	3478 "
Port Nelson or Churchill to Regina,	- about 700 "	" to Regina,	-	2366 "
Regina to Vancouver,	- 1112 "	" to Winnipeg,	-	2010 "
Port Nelson to Winnipeg,	- 715 "	Liverpool to Montreal,	-	2787 "
Length of Hudson's Straits,	500 "	Montreal to Regina,	-	1781 "
Winnipeg to Regina,	- 356 " Statute.	" Winnipeg,	-	1425 "

THE extraordinary success of the Canadian Pacific Railway is the subject of comment in both hemispheres. Its far reaching effects are surprising even its originators. Projected and carried out as a Dominion work only, it has proved itself an undertaking of high Imperial consequence. Conceived simply as a tie binding together the Provinces of Canada composing the confederate Dominion, it has already taken rank as a powerful factor in the Imperial system, and has won its way to the position of being considered by the Imperial authorities the greatest Imperial work of the century. As I write, eighty-ton guns, to be despatched from the arsenals of England for the defence of our Pacific coast, will soon be passing along the Canadian Pacific Railway at a speed which no steamer can equal, and at a charge which no steamship can accept. But this great road does not begin at its Atlantic terminus, nor does it end at that of the Pacific. Its imperial character has so developed that its termini are now Liverpool, Hong-Kong, and Melbourne. As a natural and almost a necessary consequence it has given life to an Imperial system of telegraphy, and while the steam ships of the line are moving rapidly from Vancouver to China or Australasia, its lightning 'under the sea' will be outstripping them in the great ocean race.

But great as is the Canadian Pacific, its greatness will be enhanced by another road to which public attention has for a number of years been directed; and important as it is to the Imperial interests of the Empire, its value to these interests will be vastly increased by the establishment of another, and an alternative route between Britain and Canada—that of Hudson's Bay. This will be the necessary complement to the Canadian Pacific, as it will form its great feeder and assistant. To the average British reader, to whom the first road was a surprise when it was urged upon the attention of English capitalists, and to whom its success has been a wonder, the Hudson's Bay route will probably appear a chimera. The idea of a young country like Canada, with a population not greatly in excess of that of London, building a road 4000 miles in length, passing over and through several hundreds of miles of rock north of Lake Superior, and penetrating 630 miles of one of the loftiest mountain ranges of

the globe, seemed madness not only to all English engineers and capitalists but to thousands of patriotic Canadians as well. But the hereulean work is accomplished, and instead of consuming ten years in its performance as was stipulated, the Company completed the road in five. Avalanches of snow, impenetrable rock, glaciers of ice, Arctic frost, and the cloud-capped Rockies, were invoked as the 'giants in the way' which would forever forbid such an undertaking, but, like most difficulties, the nearer they were approached the smaller they grew, and the more vigorously they were attacked the weaker they became. And now the British traveller who passes in a luxurious Pullman along the stupendous works of the great road, while he wonderingly admires the triumphs of Canadian enterprise, engineering and pluck, is forced to admit that no undertaking should be denounced as chimerical until it has been so declared by the practical men of the business world, as distinguished from the scientific Solon, who bases his opinion on bookish theory. If he was staggered at the proposal to build the Canadian Pacific, what will be his ideas when a route through Hudson's Bay and Straits is propounded? Will not the formidable visions appear of pack ice twenty feet thick—a thermometer ranging among the thirties and forties below zero—icebergs 'cavorting' about and threatening instant destruction to the strongest ship—of vessels crushed like egg shells in the terrible fields of ice which, like the 'Iron Mask,' will gradually close in upon them with irresistible force—of blinding snow storms, and dreadful 'blizzards' in which the dazed and frozen mariner will grope helplessly to his destruction—of a frightful temperature which will render all tackling as stiff as iron rods, and leave the helpless ship to the horrors of the merciless storm—of iron-bound coasts—of treacherous currents—of bewildering fogs and ruthless tides? All these terrors were invoked when it was proposed to establish a steamship line between Liverpool and Montreal, and yet the Allan Line has become one of the largest in the world. It will doubtless be difficult for the British reader to believe that a navigation which is in his mind intimately connected with Arctic experience—with the names of Baffin, Davis, Frobisher, Fox, Franklin, Parry, and the numerous other brave men who have suffered or died in their

battles with these Northern regions, can possibly become a successful business matter. But I propose to show that it can, and in doing so I shall state only facts ascertained and verified by the highest authorities, official and scientific. Having shewn this, I propose to point out the great importance of the Hudson's Bay route to the imperial interests of Britain.

Canada is divided into the five basins of Hudson's Bay, the St. Lawrence, the Peace, the M'Kenzie, and the St. John rivers, and the two slopes of the Pacific and Atlantic Oceans. Of these basins, that of Hudson's Bay is the largest, covering the enormous area of 3,000,000 square miles; that of the St. Lawrence has an area of 530,000 square miles; that of the M'Kenzie covers 550,000 square miles; that of the St. John with the Atlantic slope has an area of 50,214 square miles, while the slope of the Pacific embraces 341,000 square miles. Some idea of the vastness of the country may be formed when we reflect that, excluding the areas of the great Lakes, Superior, Michigan, Huron, Erie, and Ontario, which comprise 59,000 square miles, British North America covers 3,470,392 square miles, or about 40 per cent. of the area of the whole British Empire. England, Scotland, and Wales have an area of 88,000 square miles. They

would be all submerged in the five lakes I have mentioned without disturbing their navigation, saying nothing of the great lakes of the Northwest—Winnipeg, Manitoba, Lake of the Woods, Athabasca, Slave, and many others. Canada would make forty Englands, forty Scotlands, and forty Waleses. New South Wales contains 309,000 square miles, and is larger than France, Italy, and Sicily combined. Canada would make eleven New South Waleses, or eleven Frances, eleven Italys, and eleven Sicilys. India is considered an enormous possession, but Canada would cut up into three British Indias, with enough over to make a Queensland and a Victoria. The German Empire is a great country, but Canada would make sixteen such empires.

Hudson's Bay lies between the parallels 51° and 63° north. It is a vast sheet of salt water, 1300 miles in length, with an average breadth of 600 miles. It has not yet been completely surveyed, and these measurements are only proximate. The fresh waters of a great number of rivers flow into it from the East, the

South, and the West. The Whale, the Koksook, and the Larch run North into Ungava Bay, a part of the Hudson Straits. The Great Whale, Big River, East Main River, and Rupert's River run West from the interior of Labrador and empty in Hudson's Bay. The Harneanaw, Abittibi, and Moose flow North into that portion of the Bay known as James Bay. The Albany flows East into the same sheet of water, as also do several smaller streams. The Weemisk, Fawn, Severn, Shamattawa, Hill, Hayes, Nelson, and Churchill rivers furnish their quota flowing North-easterly, and the Fish River and Baker Lake supply their waters flowing West. The Hudson's Bay Company have posts at Chimo, the bottom of Ungava Bay, Hannah Bay House at the mouth of the Harneanaw, Moose Factory at the mouth of Moose River, Fort Albany at the mouth of the Albany, York Factory at the mouth of the Hayes, at the point where the Hayes and Nelson enter the Bay, and Fort Churchill at the mouth of the Churchill.

Of the numerous rivers which supply the Bay, about thirty may be termed large. Those conveying the greatest quantities of water are the Nelson and the Churchill. Into the Nelson fall all the waters of the Red River of the North, which takes its rise in the State of Minnesota, but a few miles from the source of the great Mississippi, which, after flowing South four thousand miles, empties into the Gulf of Mexico at New Orleans. The Red River flows North about 200 miles, passing between the City of Winnipeg and St. Boniface in its course, and empties into Lake Winnipeg. The North and South branches of the Saskatchewan, rising in the Rocky Mountains 1200 miles West, unite at about 400 miles West of Lake Winnipeg, and form the Saskatchewan, which adds its waters to those of the Red River in Lake Winnipeg. The River Winnipeg, after receiving the great body of water brought by the Lake of the Woods and the system of rivers and lakes which empty into it, discharges itself into Lake Winnipeg, which after a course of 300 miles empties all these accumulations into Nelson River, and this stream, after a tumultuous course of about 400 miles, adds its vast floods to the waters of Hudson's Bay. This huge artery of the Winnipeg system of waters may be considered as one of the greatest rivers of the world.

From the North end of Lake Winnipeg, where its course begins, to its mouth, it has a descent of 710 feet; but it is broken by numerous rapids and falls to within 80 miles of the Bay, and up this distance large river steamers can ascend. The tides at its mouth rise to fifteen feet. It is here six miles wide, with a good channel about a mile broad, and from five to fifteen fathoms deep. In 1782 La Perouse, the French admiral, anchored with a seventy-four gun line of battle ship and two frigates of thirty-six guns each at the mouth of the Nelson. The ice disappears about the 15th of June, and it closes the harbour for steam vessels at about the end of November, thus affording between five and six months for navigation. The mouth freezes for about fifteen miles from the shore, and this is attributable to the shallowness of the bay. This ice, however, is being constantly broken up by the wind and tides, and floats backwards and forwards in the Bay. The harbour of Montreal usually opens about the 1st of May, and closes about the 25th of November, and yet no difficulty is found in keeping profitably employed the large fleets of vessels of all descriptions which frequent that port.

The Churchill is the next in size to the Nelson. It is a beautiful clear-water stream, somewhat larger than the Rhine. It is remarkable for having at its mouth a splendid harbour, with deep water and every natural advantage for commercial purposes. It runs for about 600 miles in a North-easterly direction, taking its rise in a small lake not many miles North of the rising town of Edmonton. It has a deep, rocky, and narrow mouth, which can be entered with ease and safety by the largest ships at all stages of the tide. On the West side of the entrance to the harbour are found the ruins of 'Fort Prince of Wales,' probably the largest ruin in North America. The massive stone walls, and the rusty guns lying dismantled amid the *debris* of the huge fortification, are all that can now be seen of the costly structure mounting forty heavy guns, which was surrendered without firing a shot to the French admiral, La Perouse, in 1772.

The harbour of Churchill would take rank among first-class ocean ports. Mr. Bayne, a civil engineer, tells us in his evidence before a Committee of the Canadian House of Commons that, having taken careful soundings, he found at a distance of 400

feet from high water-mark along the shore a depth of 38 feet, deepening suddenly to 50 feet. These soundings were taken at extreme low tides. At spring tides the river rises from 10 to 15 feet, so that the river affords from 48 to 65 feet of water. The entrance to the harbour is about half a mile in width. The ice in the harbour forms about the middle of November, and breaks up about the middle of June. The velocity of the tide-race is estimated by Lieut. Gordon at seven or eight knots per hour. Lieut. Gordon reports that the bay there never freezes over so far out from shore as to prevent one from seeing clear water with the naked eye; and as the temperature of the water must be above 29° 8' Fahr. (the freezing-point of salt water), when at the same time the temperature on shore is below zero, we have a set of conditions which will cause a regular area of low barometric pressure to remain over the bay during the winter, with prevailing West and North-west winds, and very cold weather on the West and North-west of the bay, as shewn by observations at York Factory; whilst on the opposite side of the bay winds from the South-west, South, and South-east would prevail. He points out that, so far as meteorological conditions are concerned, Hudson's Bay has been proved navigable early in June.

Towards the South Hudson's Bay narrows, and this portion is known as James Bay. This is about 360 miles in length, with an average breadth of about 150 miles. The constant supply of water furnished by the rivers I have mentioned, and flowing chiefly from the warm South, keeps the great Canadian sea always full. The overflow reaches the Atlantic Ocean through Hudson's Strait. There is a current setting from the Western and Southern shores both of Hudson's and James Bay Northerly to the western terminus of the Strait. The average depth of the Bay is about 70 fathoms, while that of the Strait is 340 fathoms. This remarkable opening extends for about 500 miles from Cape Wolstenholme, its westerly terminus, to Cape Chudleigh where it meets the Atlantic. Its average width is about 100 miles, at its narrowest point it is 45 miles wide. The current flows very rapidly, from 4 to 6 miles an hour, from West to East, and the tide running the contrary way rises from 30 to 40 feet. Both coasts are bold and high, the land on the North

rising from 1000 to 2000 feet. Hudson's Bay as well as the Strait is remarkably free from shoals, reefs, and sunken rocks. The numerous islands in the Strait have bold shores, permitting the largest ships to lie close to their rocky sides. In the absence of ice the navigation of the Strait would be exceptionally easy and safe. A line of islands stretches along the Northern shore and another along the Southern. These form three channels, the main one being in the centre. Fox Channel connects the Strait with the waters of the Arctic Ocean; and it is through this opening that the stream of icy water supplied by the Arctic system finds its way into the Northern end of Hudson's Bay, and joining its current on its way to the Atlantic at the Western extremity of the Strait seeks the ocean at the rapid rate just mentioned. It is also by this channel that the masses of ice which form the only real impediment to the safe and easy navigation of the Strait during the whole year find their way from the great arsenals of ice in the Gulf of Bothnia and the adjoining waters into the Strait. Nature has fortunately so placed Fox Channel that its waters and its streams of ice are diverted from a Southerly to a Westerly course, and are thus prevented from entering Hudson's Bay proper. Were Fox Channel moved to the westerly side of the bay, and its cold contents projected into it, its whole West coast would be tormented as is the Eastern coast of Labrador, and its navigation almost destroyed. But the Strait carries off these dangerous streams, and the great sea of Hudson's Bay, a body of water half as large as the Mediterranean, is left to the enjoyment of its own warm atmosphere. Supplied chiefly from the South and South-west, the temperature of its waters is much higher than that of the Strait, or of the Labrador coast. It is really higher by 14° than that of Lake Superior, which has already become a favourite resort of tourists, who seek its invigorating breezes, travelling on the magnificent steamers of the Canadian Pacific Railway Company. The bay is singularly free from storms, fogs, shoals, and rocks, and it has established this character after an experience of navigators during the last two hundred years. The captains of the Hudson's Bay ships are unanimous on this point. The two narrowest points in the Strait are the one at the Eastern entrance

between Resolution Island and the Button Islands, and the other opposite North Bluff, near the Savage Islands. Between Resolution Island and the mainland, North, there is Gabriel Strait, a passage ten miles wide. Button Islands are about ten miles from the mainland, South. There are, therefore, three separate entrances into the Strait from the East—the northern and southern ones being each about ten miles wide; the central is about 45 miles in width. The prevailing winds are from the North and the North-west. Much of the ice coming down Fox Channel is thus driven into the central and southern channels, rendering the North channel the best of the three during these winds. Sailing vessels very rarely attempt to enter by this channel from the East, because the current is very strong against them; and the North shore being very high, they are exposed to the danger of being becalmed and cast on the rock-bound coast.

The Circumpolar Charts, published by the Hydrographical Office of the United States Navy Department, show that an ocean current passes from the North along the Eastern shores of Greenland, then round its southern point to the East of Davis' Strait, running towards Baffin's Bay, and thence South towards Labrador, coming in contact with the rush of waters from Hudson's Strait. The Polar ice which comes down through Fox Channel into the Strait meets this current at the eastern opening of the Strait, as well as the icebergs which it bears, and this accumulation of ice renders it frequently difficult, especially during the prevalence of easterly winds, which force the ice into the very jaws of the Strait, for vessels to enter. Sailing vessels are particularly unfit for this work, as, besides the ice impediment, they are met by the stormy current of the Strait itself. Steamers can thread their way through this ice, which is always broken, and can take advantage of the openings which are constantly appearing. One effect of these currents is that the eastern coast of Labrador, the Straits of Belle Isle, and the easterly coasts of Newfoundland are 'fretted' by the ice and icebergs brought down from the Gulf of Bothnia, and perhaps further north, through Fox Channel and Hudson's Strait, as well as from the extreme North through Baffin's Bay and Davis' Strait. This great current is so strong at the easterly mouth of Hudson's

Strait, that in 48 hours of lying-to a ship will be set 40 miles South of her position by dead reckoning.

At Port Burwell, near Cape Chudleigh, the tide rises and falls at springs about 19 feet, while the current in Grey Strait, between the Button Islands and the Cape, flows at the rate of about four miles per hour. At Ashe's inlet, near North Bluff, the tide rises and falls 32 feet at springs. There is a tide-race off the Bluff; and within three miles of the shore the velocity of the tide currents is very great, sometimes reaching six knots. At Stupart's Bay, near Prince of Wales Foreland, the rise and fall of the tide is 28 feet. The tides of the southern coast do not show as high velocities as those of the north side of the Strait, probably because the water is not so deep. At the western end of the Strait also the tides run with great velocity. The rise and fall at Nottingham Island at spring tides is 14 feet, and at Cape Digges about 10 feet.

The ice which frets the Strait is composed of three classes, each class having a distinctly separate origin from that of the others. They are, first, the icebergs from the glaciers of Fox Channel; second, heavy Arctic field ice from the channel itself; and third, ordinary field ice, formed on the shores of the Bay and Strait. No icebergs are ever seen in the Bay. They are frequently seen in the Strait, and chiefly along the North shore, but they are often to be met with in mid-channel. They occasionally find their way from Davis' Strait, passing between Resolution Islands and East Bluff; but all those found in the westerly portion of the Straits come from Fox Channel. Observations made at North Bluff show that an iceberg coming in sight from the West will pass out of view to the eastwards in from three to four tides, shewing an easterly set of ten miles per day. It is important to observe that the bergs seen in the Strait in August and September would, in Lieutenant Gordon's opinion, form no greater barriers to navigation than do those met with off the Straits of Belle Isle, nor does it appear that they are more numerous in Hudson's Strait than they frequently are off Belle Isle. It is by the Straits of Belle Isle chiefly that the enormous traffic carried on between Europe and Montreal is conducted.

The heavy Arctic ice is altogether different from the ordinary field ice. It ranges from fifteen to forty feet in thickness, and is a solid blue structure, formed at once, and not at intervals as in the field ice. The origin of this ice is yet unknown, but it is evidently not produced in Fox Channel, since it is not considered possible that ice in that water can be formed in one year more than ten feet thick. In ice so heavy as this, any ship would be helpless, but it appears in a broken state and is being constantly opened up by the currents, tides, and winds. The depth to which water will freeze does not appear to have been yet authoritatively ascertained, but it is certain that ice being a poor conductor of heat, the rate of thickening will decrease after a certain thickness has been reached. This heavy ice does not appear every year, but thus far the experience of navigators has not been sufficient to warrant any statement as to the frequency or infrequency of its visits to the Strait. The report of Lieut. Ray, United States Signal Service, for 1884, on the conduct of the observations at Point Barrow in the Arctic, shews that the greatest thickness of ice formed in one season was six feet and two inches. It is to be observed that at Point Barrow the formation of ice on the shore is influenced by a current of warm water which passes through Behring Straits and setting north-east. Fox Channel has no such warmth, and it is therefore probable that a sheet of ice ten feet in thickness might there be formed during one season.

The third kind of ice to be encountered in the Strait is the ordinary field ice. This is formed along the shores of the Strait and of the islands. It does not extend across either of the three channels, and so far, therefore, as it is concerned, there are navigable channels all through the Strait during the whole year. It is quickly broken up by the tides, winds, and currents, and in June is found already detached from the land and floating in long strings to the ocean. It is not thick, and being churned backwards and forwards by the tides, it becomes a comparatively soft mass easily penetrated by a stout ship. As in its voyages to the ocean it takes the form of long strips, it passes in parallel lines, forming openings of water which a steamer would have but little difficulty in reaching, even were she caught and imbedded in a large field. This is the ice which forms the chief difficulty in the

navigation of the Strait, but when understood, it ceases to be formidable. It is collected in large quantities at the eastern entrances to the Strait by the force of the current from Baffin's Bay, to which allusion has already been made; but by the time it has reached that position it has become broken up into comparatively small pieces. These have become saturated with water, which gives them a deep flotation, and they have become 'brashy.' After getting through the accumulation at the mouth, all of the ice to be met going West is of this fragmentary and brashy character, and is easily and safely penetrated by an ordinary steamer at a speed of even twelve knots. Captain Markham alludes to a special peculiarity of this ice in the Strait, and adds that it is one with which he has not met in any other part of the Northern regions. He says the packs are composed of small pieces, and it is from this composition chiefly that they are unable seriously to injure a ship that may happen to become imbedded in them. because, when any pressure occurs, these small pieces, being of a soft and brashy nature, 'act as cushions or fenders, and thus secure the vessel from being violently squeezed or nipped.' He adds these significant words: 'This is, in my opinion, an important feature in the character of the ice in this locality, and it is one that should not be disregarded when the question of the feasibility of navigating the Strait is under consideration.' The Captain observes another peculiarity in the ice of the Strait, but this was in the heavier and larger floes—it was the irregularity and unevenness of their surfaces.

'A perfectly smooth and level floe of any extent was rarely seen. I can only account for this peculiarity by the supposition that each one of these floes is composed of a number of small pieces of ice, which have escaped dissolution during the summer, and have then been connected together by the frost and snow of the succeeding winter. Hence the irregularities resembling small hillocks that are observed on their surfaces. These "hillocky" floes were the heaviest pieces of ice we saw, and would average in thickness from six to twelve feet. They were invariably of a dirty brown colour, evidently due to dust and debris that had been blown off the shore and deposited on them; on some I noticed quite thick sand where the snow had melted. I imagine these floes to have been formed in Fox Channel and thence drifted into the Strait.'

With regard to fogs in Hudson's Bay and the Strait, complete

observations have been taken during the years 1884, 1885, and 1886 by the officers of the *Alert* and the men stationed at the various posts established by the Dominion Government, to which full reference will be made before this paper is concluded. Lieut. Gordon, in his report of 1885, compares a number of these with the observations recorded by the Meteorological Service at Belle Isle, in the regular trade route between Montreal, Quebec, and Europe. The dense and frequent fogs of Newfoundland, the Gulf of St. Lawrence, and the Maritime Provinces are apt to lead to the belief that Hudson's Bay and Strait are similarly afflicted, but these observations, which closely agree with the tenor of the universal testimony of navigation for the last two hundred years, clearly show there is no ground for such a belief. Lieut. Gordon says:—

‘For the first period, from 1st to 31st August, the *Neptune* was on 1st August, 1884, at Nachvak Bay, within 100 miles of the east end of the Strait, and on 30th August, had just left Nottingham Island at the west end, so that the month of August was spent in the Strait's region.’

‘The following table is compiled from the Meteorological Records:—

	Belle Isle Strait.	Hudson Strait.
No. of days on which fog is recorded,-	13	9
Approximate No. of hours of fog,	320	182
Days on which snow fell, - - - - -	—	4
„ „ rain fell, - - - - -	10	8
„ „ winds exceeded 25 miles per hour, but did not reach 40, - - -	6	5
„ „ wind exceeded 40 miles, - - -	2	1

‘The month of August, 1884, thus shows favourably for Hudson's Strait—the fog there being reported on six days only, as against thirteen days in Belle Isle; and the total number of hours of fog being respectively one hundred and two in the Strait, and two hundred and twenty in Belle Isle; and if the duration of the snow storms in Hudson's Straits be added to the number of hours of fog, it still shows favourably. The number of gales also is six at Belle Isle, for five in the Strait; and of heavy gales, two at Belle Isle, and only one in the Strait.’

‘The following comparison for September, 1884, is between Station No. 1 at Cape Chudleigh and Belle Isle:—

	Belle Isle Strait.	Hudson Strait.
No. of days on which fog is recorded, - - -	7	4
Approximate No. of hours of fog, - - -	82	34

Days on which snow fell, - - - - -	3	8
„ „ rain fell, - - - - -	15	6
„ „ velocity of wind was between 25 and 40 miles per hour, - -	4	5
„ „ velocity of wind was 40 miles or over per hour, - - - -	11	3

‘In the character of the weather, therefore, for these two months, so far as it affects navigation, the Strait compares favourably with Belle Isle.’

The mean temperature of the month of August at Cape Chudleigh was 39°, for Belle Isle 40° 67'; and for September, Cape Chudleigh 32° 76', Belle Isle 40° 1'. The temperature of the surface water off Belle Isle on 25th July 1884 was 41° 6', which gradually decreased as the ship proceeded northward to 31° 7' on 4th August off the entrance to Hudson's Strait.

This brief account of the geography of Hudson's Bay and Strait, of the ice, currents, tides, fogs, and winds, was necessary to the discussion of the question, ‘Can a paying trade route be established between Europe and the British and American Northwest *via* Hudson's Bay and Strait? It is clear that the only impediment to the successful operation of such a route is the ice to be met with in the harbours of Churchill and York Factory, and in the Strait. How long are these portions of the route so free from ice as to render navigation so easy as to be profitable in a mercantile sense? There are five distinct and independent descriptions of evidence to be offered on these questions; (1.) The evidence of navigators who have traversed these regions in search of a Northwest passage to India; (2.) The evidence of the captains of the ships of the Hudson's Bay Company trading into Hudson's Bay; (3.) The evidence of the American whalers who have prosecuted their fishing in the Bay; (4.) The evidence supplied by the reports of Lieut. Gordon for 1884 and 1885, who was commissioned by the Dominion Government to enquire and report upon these matters; (5) The special report of Capt. Markham, 1886.

The evidence afforded by the old navigators who entered Hudson's Bay through Hudson's Strait is so trifling and unimportant as compared with that obtainable from other sources that space for it cannot be given in this paper, and the second description of evidence is therefore adduced.

In 1668 the first English trading expedition entered the Bay, and this led to the formation of the Hudson's Bay Company, which obtained its charter from Charles II. in 1670, under the title of 'The Governor and Company of Adventurers of England trading into Hudson's Bay.' The record of their ships visiting the post of York Factory at the mouth of the Nelson and Hayes rivers, and that of Moose Factory at the mouth of Moose River since 1735 has been supplied by the Company, and it discloses the singular fact that this last post has been visited by a ship of the Company regularly every year since that date—or for one hundred and fifty-one years, with one exception, that of the year 1779. This of itself proves that the navigation is exceptionally safe and easy. The ships of those days were but jolly-boats compared with the huge steamers of the present, while their ability as sailing vessels to cope with the ice of the Strait bears no comparison with that of the powerful structures which are now seen in every quarter of the globe. Mr. Armit, Secretary of the Hudson's Bay Company, furnished Professor Bell with a list showing the dates of the arrivals of the Company's ships at Moose Factory, and of their departure from that point, and Mr. Chief Factor Fortescue supplied him with a similar one in reference to York Factory. These show that very few interruptions have occurred in making the regular annual voyages to these ports during the periods of 147 and 93 years respectively. The arrivals at York Factory and Moose Factory almost always occurred from the 15th to the 30th August, and the ships started on the return voyage usually between two and three weeks after their arrival. Reckoning five or six days as necessary to cover the distance between these points and the western end of the Straits, we may arrive at a tolerably correct idea of the dates at which they were passing through the Strait. This evidence is valuable chiefly as shewing that in July, August, and September at all events, the Strait and Bay must have been both easily and safely navigable; since during this long period but two ships were lost, and their destruction was the result of sheer carelessness. But the movements of the Hudson's Bay traders are no guide in determining the periods of the opening or closing either of the Bay or Strait. The duty of these vessels was very simple. It

was to convey the British supplies to the posts on Hudson's Bay, and return with the furs which had during the year been collected from the inland posts. Many of these furs would have travelled over a thousand miles before they reached the Bay, and the ships had no object in arriving earlier than they did, because the furs were not ready for them until August or September. Their object was accomplished if they secured their return cargo in time to get through the Strait before the ice formed. And as they could reach the Bay ports in ample time by appearing off the easterly opening of the Strait late in July, and even early in August, they never attempted to reach that point in June, and never willingly attempted to pass westward through the Strait on their return voyage later than September. These movements will not suit the modern demand for early communication and fast travelling. There is no doubt that during the period occupied by these ships in traversing the waters of the Bay and Strait, the atmosphere is pleasant—ice forms no impediment—storms are not frequent—fogs are hardly known, and both sailor and passenger enjoy the voyage.

The whalers, however, supply a more extended and valuable experience. These American ships have for many years carried on the whale and seal fishing in the northern waters of Hudson's Bay, and in the Gulf of Boothia. They usually leave New Bedford, Massachusetts, about the latter part of May, reaching the mouth of the Strait at the time when the pack ice breaks away in July. They pass through the Strait, and lay up for the winter at Marble Island. In the spring they proceed to Rae's Welcome and other places in search of whales. They are thus occupied until November or earlier, according to their catch, when they pass back through Hudson's Strait, and go home with the oil they have secured. These men report that the real difficulty in getting into Hudson's Bay is found, not in the Strait, but at its easterly entrance. The ice-pack formed directly across the mouth renders it impossible to count upon a free opening until this moves off, and these whalers look upon the early part of July as the time when they might depend on the removal, and time their arrivals accordingly. But they believe that a safe and easy passage for steamers may be found to the North of Resolution

Island, by which an entrance into the Bay could be obtained in the latter part of May—and this would enable steamers to reach Churchill and York Factory as soon as those ports are open—in the early part of June. It appears to be established that there is less ice in the Strait in May than in June, and less in June than in July. If this opinion of the American whalers be correct there is no doubt that steamers would have all of June, July, August, September, October, and a portion of November, during which they would be able with probably some, but not with serious obstruction, to carry on communication between Europe and the Hudson's Bay ports. It is conceded by all classes of navigators that the incessant movements caused by the high tides and the rapid currents, prevent the Strait from being ever frozen over; and that the chief, almost only difficulty in its navigation is the movement of the ice going from Fox Channel and the inlets on the North of the Bay to the Atlantic. This is over by May or June; and no shore ice to any considerable extent, floats out until the following spring. Much will depend on the truth or falsity of the supposition of the American whalers that the pack which bars the main entrance to the Strait from the East can be 'flanked' by steamers, who by going North of it may secure a comparatively clear entrance between Resolution Island and the North shore of the Strait. These whaling ships have always been sailing vessels, and the necessities of their trade have never induced the owners to spend either time or money in attempting to solve this question. All the evidence on the point leads to the conclusion that there is no difficulty from floating ice except in the spring and early summer, and if this idea of the American captains be correct, even this difficulty can be easily overcome. The whalers agree that even if this route be impracticable the Strait and Bay can easily and safely be entered and navigated by sailing vessels for three and a half to four months of the year—but that steamers would certainly extend this period to four or four and a half months, or perhaps even five—but that if this new route be as favourable as they suppose it to be, six full months would be obtained. Of course nothing would be gained in extending the period of entering or leaving the Strait unless the harbours of the Bay were open during the same periods.

We come now to the fourth class of evidence, the reports of Lieut. Gordon. On 11th January 1884, the Dominion House of Commons, at the earnest solicitations of a large class of influential persons, appointed a committee of the House, composed of fifteen members, of which Mr. Royal of St. Bonifaces, Manitoba, was elected chairman, 'to take into consideration the question of the navigation of Hudson's Bay, with power to send for persons, papers, and records.' This committee, after the labour of about two months, made their report, dated 8th April 1884. Fourteen witnesses were examined, all possessing peculiar knowledge of the Bay and Strait.

The evidence was so encouraging that the Government, supported by Parliament, determined to send an expedition to these waters for three consecutive years, charged with the duty of making such observations as would solve the navigation problem. A Newfoundland steam sealer was accordingly chartered and placed under the command of Andrew R. Gordon, Lieut., R.N. The staff of this first expedition was composed of Professor Bell, M.D., F.G.S. of Ottawa, geologist and medical officer; Mr. Fox, photographer; seven observers, and twelve station men. On 22nd July, 1884, the ship left Halifax *en route* for Hudson's Bay.

It is impossible in this paper to give in detail the progress of the 'Neptune.' She was a very slow vessel, and did not reach Cape Chudleigh until 5th August. It must be observed at the outset that the expedition was late. This was perhaps of no great consequence, as the first voyage was intended rather to inaugurate the investigation and establish posts for the observers, than to enter into the active work of observation. Steaming through Grey Strait between the Cape and Button Islands, the ship anchored in a fine harbour on the North-western shore of the Cape at the entrance to Ungava Bay. On the shore of this harbour, Lieut. Gordon placed Observing Station No. I., and named the place Port Burwell. The work of landing lumber and supplies and erecting the building was completed by the 8th of August. H. M. Burwell was placed in charge with two station men, and the ship left on the evening of that day. Ashe's Inlet was reached on the 11th, and here another building was put up;

it was placed in charge of W. A. Ashe, and was No. II. The ship left on the 16th, and the next day, 17th August, landed on the north-west shore of Prince of Wales Sound, at a point where Station No. III. was built, which was named Stupart's Bay. The 'Neptune' left on the evening of the 22nd, and reached Nottingham Island on 24th, where Station No. IV. was erected, and the spot was named Port De Boucherville. The ship left on the 29th, heading for Mansfield Island. A station was to have been placed here, but not finding anchorage Lieut. Gordon pushed on across Hudson's Bay, intending on his return to place a station on Cape Digges. He altered his course and stood for Marble Island, where he arrived on 2nd September. From this island he went direct to Churchill, which was reached on 6th September. Here the ship remained until the 9th, when she moved on to York Factory, which was reached on the 11th. Next day the anchor was weighed, and the ship's course was shaped for Cape Digges. Here the anchor was dropped on the 16th, Station No. V. was built, and on the 20th the ship started on her homeward voyage, and St. John's, Newfoundland, was reached on 11th October.

The report gives minute details of the observations made by Lieutenant Gordon as he proceeded on his voyage which cannot be reproduced here, but much of the matter of this paper has been taken from it. He observes that 'the ice had been supposed hitherto to be the most formidable barrier to the navigation of the Strait, but its terror disappears to a great extent under investigation.' He suggested that the Expedition for 1885 should leave Halifax not later than 15th May, arriving off the Strait about 1st June, and endeavouring to reach Churchill at about 15th June.

The Expedition of 1885 was also conducted by Lieutenant Gordon. He was supplied with a ship of the British Navy, the *Alert*, a screw steamship, barque rigged, of about 700 gross tons, specially rebuilt for the Arctic expedition of 1876 under the command of Sir George Nares. Her power was small, only fifty horse power, nominal, with a small screw. In smooth water and calm weather, at full speed she could make only about eight-and-a-half knots. The officers and crew numbered thirty-two.

The members of the Expedition consisted of Professor Bell, Mr. McNaughtan, Assistant Geologist, five observers, twelve station hands, and Mr. D. G. Beaton, Editor of the *Winnipeg Times*, who accompanied the Expedition as the representative of the Company interested in the construction of the railway from Winnipeg to Hudson's Bay. The *Alert* left Halifax on the 27th May. The reader will remember that Lieutenant Gordon, in his report for 1884, expressed his opinion that the Expedition for 1885 should leave Halifax about 15th May, 'not later than this date.' But for some unexplained reason it left twelve days later, a serious loss of time. On the route along the Labrador Coast the ice from Baffin's Bay and the Strait was found extended from thirty to fifty miles seaward. On 15th June the ship reached the edge of the ice about thirty-five miles East of Cape Resolution, and on the 16th Cape Best was reached. Here the iron stem plate was broken off at some distance below the water, and it became unsafe to drive the vessel at all hard through the ice; she therefore drifted in the pack until 6th July, nearly three weeks. At last she worked out of her bondage, and having reached clear water on the 8th, Lieutenant Gordon turned her head homewards, and reached St. John's, Newfoundland, on the 15th July. She was there put into dock and repaired, and on the 27th of July the Expedition again started for Hudson's Straits. But precious time had been lost. It was at least nine weeks behind time. The ship reached Port Burwell, Station No. I., on 4th August. The ice was heavy all the way through the pack, but it was the loose brashy ice which has been described, and such as a proper vessel would easily have penetrated. On the 5th the ship was headed for Ashe Inlet, Station No. II., which was reached on the 21st. The *Alert* was at the mercy of tides and currents, as when she got into a pack she was unable to force her way out. She broke one of the blades of her screw in attempting to reach Ashe Inlet, and was of course delayed while it was being replaced by a new one. The error of sending a vessel of her tonnage, 700 tons, provided with engines of only fifty horse power, was strikingly exhibited by her wretched performances on this voyage. The remarks of Captain Markham on this point, which will be given further

on, though severe are just. Leaving Ashe Inlet, she arrived at Stupart's Bay, Station No. III., on the 22nd. Thence the Expedition proceeded to Nottingham Island, Station No. IV., which was reached on the 24th. No ice having been encountered, the ship left the same evening for Cape Digges, Station No. V., which was reached the next day, 25th August. Here she remained until the evening of the 28th, when she headed for Churchill, where she came to anchor on the 31st. There was found the 'Cam Owen,' a Hudson's Bay Company Ship, which the *Alert* had passed in the ice on the 7th, she having reached Churchill two days ahead of her. Here the Expedition remained until 7th September, when the ship started on her home voyage. The 'Sleeper's' were reached on the 10th. The stations were then revisited, and the ship emerged from the Strait on the 8th October, and reached Halifax on the 18th of that month.

The Report gives a full account of the observations made at the Stations for August, September, October, November, December, 1884, and for January, February, March, April, May, June, July, and August, 1885. These observations include the formation of ice, its arrival, departure and character, the currents, tides, fogs, snow-storms, winds and temperature. The details of this valuable and highly interesting information cannot of course be given here; but Lieutenant Gordon sums up the result of his own experience in these words:—

'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. John's. Except on one occasion no large amount of open water was seen from our mast-head, 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. John's 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 endeavouring 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.'

The whole results in Lieutenant Gordon's opinion of the two Expeditions are thus stated by him in the concluding words of his report:—

'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.'

For the movement of the *Alert* in the third Expedition, 1886, we must for the present depend upon the report of Captain Markham,* who at the request of a number of British capitalists,

* In order to estimate the value of this officer's opinion it may be stated that 'After being promoted to a commander in the navy in 1872, he shipped as second mate of a whaler which sailed to Baffin's Bay, Lancaster Sound and the Gulf of Boothia. On that occasion the survivors of the American Arctic Expedition, *Polaris*, were picked up and brought to England by the *Arctic*, the steam whaler, in which Capt. Markham was serving. In 1875 he was selected as commander of the *Alert* in the Nares Expedition, when

accompanied Lieutenant Gordon on this occasion. These gentlemen wished to obtain the opinion of this distinguished Arctic Explorer on the feasibility of establishing a remunerative route via Hudson Bay and Strait, and he was deputed by them to go with the *Alert* and report the result of his observations. A copy of this report dated 'S.S. Alert, off York Factory, 6th August, 1886' is before me. The report of Lieutenant Gordon will not be made public until it is laid before Parliament, next April probably.*

The *Alert* left Halifax, 23rd June, 1886—again late; and reached the entrance to Hudson's Strait, 5th July. Here the pack which forms the greatest hindrance to the navigation of the Strait was found, just as has already been explained. The ship was enveloped in a fog, and she drifted sixty miles South in the three days of her imprisonment. Capt. Markham observes:—

'Had it not been for the fog, we should have experienced but little difficulty in threading our way through those loose streams of ice, and have made fairly good progress. No large floes were during this time seen, but the streams of ice encountered were composed of small pieces, all, more or less, what is called "honey-combed" and rotten, and in an advanced stage of disintegration. The larger pieces occasionally seen were also of a brashy nature, and so saturated with water as to give them a deep flotation. These are very apt by inexperienced people to be regarded as heavy pieces of ice in consequence of their increased immersion, but they easily break up on being struck by the stem of a steamer.'

The entrance to the Strait was again reached on 9th July, and no ice was visible. Slow as was the *Alert*, she made 130 miles West after she got fairly into the Strait, and though ice was met, it was of so soft a character that the captain declares he would

he reached the highest latitude ever attained (by a vessel) 83° 20' 24", within 400 miles of the North Pole. In 1879 he fitted out, with a friend, a small yacht in which he navigated the Basintz and Kara seas and took the English flag for the first time north of Nova Zembla. He was afterwards for three years flag-captain of the *Triumph*, an iron-clad, in the Pacific, and then for three years and a half in charge of the naval torpedo establishment at Portsmouth.'

* This report, I have reason to believe, was a few days ago laid before Parliament, but it has not yet been printed, and I am therefore unable to give Lieut. Gordon's final opinion on the route.

have had no hesitation in driving an ordinary steamer through it at the rate of ten or twelve knots per hour. The Upper Savage Islands were reached 11th July, and the station near North Bluff was visited. Here they heard the surprising news that the Dundee steam whaler *Arctic* had actually reached the Savage Islands on her way to Hudson's Bay on the 5th June, and her captain reported that after getting through the pack at the entrance of the Strait, which would be about the 1st June, he had met with no impediment from the ice, and had traversed two hundred miles of the Strait—nearly half of its whole length. Capt. Markham makes this remark on the performance of the steam whaler :—

‘This is a very important fact, shewing very clearly and conclusively what is now generally well known and acknowledged—how completely steam and modern appliances have robbed ice navigation of its assumed dangers, and many of its difficulties and imaginary terrors.’

The ice did not appear at that station until the middle of December, and it may therefore be assumed that the Strait was navigable by steamers up to the last of November. The ice in the Strait had broken up on 5th March, from which time until July the pack drifted off and on to the shore, according to the direction of the wind. It turned out that the fog which had detained the ship on her reaching the Strait on 5th July, was entirely local. The ship left North Bluff on the 11th July, and then was met the ice which to a sailing vessel would be a serious hindrance. It was evidently broken pack ice, composed chiefly of innumerable small pieces of soft brashy ice; and it is in consequence of this character that it is, in a great measure, deprived of its powers to injure seriously a ship that may happen to get beset in it. Captain Markham considers this a matter of the highest consequence in solving the question of navigation in the Strait. On arriving at the station on Digges Island he found the report on the ice movements ‘of a favourable and gratifying character.’ As early as the 16th of February clear water was visible within three or four miles of the Strait, ‘showing that at this early period a partial disruption of the ice had commenced.’ On 10th March much open water was seen. On 3rd April open water was seen in the

Strait 'as far as the eye could reach;' and on 6th May open water was seen off the island. On 1st July the ice was reported as loose, not heavy, and lanes of water were seen extending half-way to Nottingham Island. The Expedition did not visit Nottingham Island at this time. It left Digges Island on the 25th July, and after steaming about seven miles west of its western extremity, no ice causing obstruction was met. Churchill was reached on the 29th July, and York Factory on 6th August. Captain Markham makes the following observations on the *Alert* :

'I infer from the correspondence that was placed in my hands before leaving England, and also from other sources, that the special object of the cruise of the *Alert* during the current year, was not solely for the purpose of demonstrating the practicability of a route for steamers through Hudson's Strait, but principally to ascertain by actual experiment the earliest date that the Strait would be open to navigation, and the time that would necessarily be occupied in accomplishing the passage of the Strait. If my inference is a correct one, then I have no hesitation in saying that although the *Alert* is a strong stoutly built ship, and excellently well adapted for exploratory work in the icy seas of the north, she is not suitable for the special service that was this year required of her. I would state that there were many occasions during our passage through the Strait this summer (1886) when the *Alert* was beset, and her progress entirely arrested by loose brashy ice, through which a more powerful steamer would easily have penetrated. In fact, I shall not be at all surprised to hear that the steam whaler *Arctic* succeeded in reaching the open water in Hudson's Bay in a less number of days than we were occupied in doing so, in spite of her being more than a month earlier in the season. I cannot call to mind a single instance during our passage through the Strait, when a more powerful steamer, commanded by an able and experienced seaman, and one well acquainted with ice navigation would have suffered detention from the ice, except perhaps for about two or three hours at the outside—and there were many occasions when the *Alert* was pushing and boring her way in a futile and impotent manner in loose ice, without making headway at all, when a steamer better adapted for the purpose would, without doubt, have been accomplishing at least from four to five knots an hour. By carefully watching the movements of the ice, and taking advantage of all favourable opportunities to push on, it is quite certain that even a less powerful steamer than the *Alert* would have had no difficulty in effecting the passage of the Strait this year; but in proportion to her power, she would in a corresponding increase of time be longer accomplishing her voyage. But this was not, I understand, what was required—the objective view was to ascertain how *quickly* the passage of the Strait could be made, and a satisfactory decision on this point could not be obtained by the result

of a voyage made in a vessel of so little power as the *Alert*. From my own observations regarding the state and condition of the ice in the Strait, I am fully convinced that a more powerful steamer would have accomplished the passage in a considerably less period of time than that which was occupied by the *Alert* in steaming the distance.

‘From the remarks that I have made, and from the general tenor of my report, it will, I think, not unreasonably be assumed that I am of opinion that the practicability of the navigation of the Strait has been satisfactorily established, at any rate for a certain period during the year, and such undoubtedly is my opinion.’

Captain Markham then points out that the ordinary steamship of the day, a little strengthened to meet exceptional occurrences, and protected at the bows, would be fitting for the route, and as to the portion of the year during which navigation could be safely and easily accomplished through the Strait, he says further experience will be required to establish that, but so far, he thinks it is proved that ‘the Strait will be found navigable at least four months every year, and probably often for five or more. There will, I have no doubt, be many years when navigation can be carried on safely and surely from the first of June until the end of November.’ He then discusses the question of fogs, and after quoting the words of many navigators during the last century, he adds:—

‘It is therefore my opinion, and I think I am quite justified in forming it, that but little delay and detention will be caused to steamers navigating the Strait during the navigable season by fogs, and that the weather that may generally be expected will be fine, with many calm, clear days.’

This is the latest authoritative evidence on the question. Encouraged by this report the British capitalists, by whom Captain Markham was sent out, took immediate steps for the establishment of a great route from Britain to the centre of the rich lands of the British North-West *via* Hudson's Bay and Strait. On 9th October last the first sod was turned of a railway from Winnipeg to York Factory, 715 miles, and by 1st January last forty-one miles were completed. Two powerful steamers of 6000 tons each are being built expressly for the route, and two others have been chartered. It is intended that these vessels shall begin running between Britain and Hudson's Bay early in June.

They will finally solve the two questions yet unsolved,* and they will furnish the supplies required for the prosecution of the road from York Factory southwards, meeting it in its progress from Winnipeg northwards. The full development of the route will involve connection with the Canadian Pacific Railway at Regina, and with the American roads of Minnesota, Dakota, Montana, and the whole of the American North-West.

This route will be the logical complement to the Canada Pacific Railway, and will be second only to it in its value as well to Canada as to Britain. Already the Canadian Pacific Railway is recognised in all well informed circles as the most important Imperial work of the age; for it has given to the Mother Country an alternative route to India, Australasia, China, and Japan—the land portion of 4000 miles being entirely in her own possessions. But the Hudson's Bay route will give her another and a much better one, since, while the water portion between England and Churchill will be shorter than that between England and Montreal by sixty-four miles, the land portion between Churchill and Vancouver, the Pacific terminus, will be shorter than that between Montreal and Vancouver by about 1080 miles. The distances involved in the Canadian Pacific and the Hudson Bay routes from Liverpool to the ports of Asia are given in the accompanying table. In case of war the value to Britain of such a route will be immediately seen. But it will be perhaps of greater value in furnishing the British Isles at all times, whether of war or peace, with an unlimited supply of grain and animal food at a rate considerably below that of a route either through New York by American roads, or through Montreal by the Canadian Pacific. The food supply must always be

* One of these is, 'At how early a period will a powerful steamer of such a class as may profitably be employed in the navigation of the route be able to penetrate the pack moving in front of the eastern entrance to the Strait?' and the other, 'Is the opinion of the American whalers correct that the pack opposite the eastern entrance of the small Strait between Resolution Island and the north shore of the main Strait can easily be penetrated at an early day; a ship taking that route thus "flanking" the great accumulation of ice in front of the main entrance, caused by the junction of the Fox Channel ice with that moving south from Baffin's Bay?'

a serious question to Britain. Notwithstanding her improvements in agriculture and cattle raising, she must ever draw her food largely from foreign countries. During peace her European neighbours, as well as Egypt, India, and the United States supply her amply at competitive prices; but were she engaged in war with a leading State these supplies would be reduced in volume and enhanced in cost. But with the greatest granary in the world, her American North-West and the immense ranches of Alberta, Assiniboia and Saskatchewan to draw on, she would be able to look with comparative indifference on the closed foreign ports. British North America can furnish ample and cheap supplies of cereals, and animal food for the British Isles; and if to its productions be added those of the immense American North-West, the aggregate would be practically illimitable. The North-Western States are as anxious for the establishment of this great route to Europe as we in the British North-West; for all of their produce intended for the European market would find its way there by it. The saving to the American and Canadian producer, as well as to the British consumer, will be readily seen by a study of the following quotation from the Report of the Committee of the House of Commons, to which reference has already been made:—

'Let us suppose, says one witness, the possibility of establishing a line of steamships between Liverpool and the Hudson's Bay ports, which would carry freight at the same rates as the steamships between Montreal and Liverpool;—now the distance between Winnipeg and Montreal is about 1,400 miles, while it is not more than 700 to York Factory. It costs $1\frac{1}{2}$ cents per ton per mile, to forward grain from St. Paul to New York, which applied to the distance to be traversed between Winnipeg and Montreal, would give a charge of \$21 per ton, or of \$10.50 from Winnipeg to York Factory, say the half. If, now, the ton is reckoned as equal to 33 bushels of grain, the difference in freight in favour of the Hudson's Bay route, would be a saving of 32 cents per bushel, or in other words, an additional profit of \$6.40 per acre, yielding an average of 20 bushels. Other calculations make the saving one third the present cost of transport realized by the farmer of the West, upon the opening of a channel of exportation by the Hudson's Bay. A large proportion of importation from Europe would take this road; the immigrants proceeding westward would see that they could shorten the annoyances, the delays and the costs of a journey across the continent by some 800 to 900 miles; the export of butchers' meats would alone furnish a considerable portion of the lading of Hudson's

Bay steamers; and many persons are of opinion that this route would command a considerable portion of the import and export trade of the north-western States of the Union. We speak merely incidentally of the Hudson's Bay fisheries, and of the working of the minerals, almost inexhaustible in their richness, which are to be found there. To sum up the whole, Hudson's Bay appears to us to be destined to perform the same service for the vast territories of the North-West that the Gulf of the St. Lawrence does for the vast and fertile valley bearing the same name. Churchill is 2,926 miles from Liverpool; Montreal is, 2,990 *via* Cape Race, and New York, 3,040; there is, therefore, a difference of 64 miles over the route by Montreal, and of 114 miles over that by New York, in favour of Churchill.'

In the event of war, the food *en route* to Britain would need protection only from the eastern opening of Hudson's Strait, for the Strait could easily be made impenetrable by an enemy. Troops or munitions of war *en route* from Britain to Asia or Australasia would require a convoy only to the same entrance, and for the same reason. Whether, therefore, the Hudson's Bay route be considered in war time or during peace—whether as a military power, or as a machine for supplying the people of the British Isles with the best of food at a rate beyond foreign competition, it may with perfect correctness be styled an imperial work second in value to the Empire only to the Canadian Pacific. The old navigators, in their search of a North-West passage to the fabulous wealth of the Indies, did not dream that when they stood on the western shores of Hudson's Bay they were really at the portal of a country infinitely more valuable than the crowded and parched plains of the regions they were striving to reach. This magnificent inheritance has been sealed up until the present days, but its amazing wealth is now displayed to the British people, who are invited to enter and enjoy. This thought naturally leads up to the great question of emigration. To us Canadians, living in this country of 'illimitable possibilities,' it appears simply amazing that no Imperial scheme of lessening the horrors of the poverty which crushes hundreds of thousands of valuable men, women, and children of Britain in an embrace more terrible than that of the devil-fish, has never even been attempted. If British statesmen could only be truly Imperial in their ideas—if they could but grasp in its full and

deep meaning the idea of Imperial Federation, and bring about the inauguration of a system which would make each Colony as much a part of England as the county of Kent, the chief objections to migration raised by these poor people would disappear. It would almost seem as if Providence had placed the great sea of Hudson's Bay in the very centre of Britain's possessions on this continent; and after constructing an approach impossible to unfriendly access, had spread out by its side half a continent as fertile as Egypt for the especial purpose of supplying homes of ease and comfort to her overcrowded and suffering people. And yet the wondrous gift is not understood, nor is its value appreciated. But the day must come, and that soon, when the scales will fall from the eyes of the British people, and when their great possessions, in this Western hemisphere, will be devoted to the purposes for which Providence has surely designed them. The Hudson Bay route is the latest, and must be the last development of modes of access to these richly-endowed and highly-favoured regions. Nature has ordained that no shorter road is possible. She has made it so short that steam has reduced it to a question, not of months, or weeks, or even of days, but one merely of hours—and hours of pleasant voyaging over placid waters and under sunny skies. As surely as the sun shines, so surely will the British people, when the power of the suffering population of Britain is able to make itself felt at Westminster, insist on a national system of assisted colonization.

WM. LEGGO.

~~ART. IV. THE REDEMPTION OF ASTROLOGY.~~

THE redemption of Astrology, as a potent means of influence over many minds, from the grasp of the ignorant impostor and the mischievous quack, can only be effected by the application to astronomical phenomena, considered as parallel to recorded events, by competent students, of the methods of inductive science. It might, indeed, be desired that such students should be persons