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Mohday, May 6th, 1861.

MAJOR-GENERAL THE HONOURABLE J. LINDSAY, M.P. in the Chair.

SUBMARINE TELEGRAPHY WITHIN THE LIMITS OF THE NORTH ATLANTIC AND ARCTIC REGIONS.

By MAJOR G. RHODES.

It is not my intention here to enter into the scientific and intricate details of the theory of Submarine Telegraphy, but, in taking a general practical view of this interesting subject, I will endeavour to convey, for your earnest consideration, some historical, geographical, topographical, and other facts relating to the same, classifying them under the following heads:

1. The Route of the proposed North Atlantic Telegraphic Scheme, geographically, historically, and topographically considered.
2. A proposed New Route of Submarine Telegraphy between Europe and America (connecting therewith England and Gibraltar), geographically, historically, and topographically detailed.
3. The insulating materials of Gutta-percha and India-rubber compared and considered.
4. Concluding Remarks.

I must preface my remarks by stating, that the honour of originating the North Atlantic Submarine line of communication between England and America belongs wholly to Colonel Shaffner of the United States, who, in 1854, obtained a concession from the Danish Government of exclusive telegraphic rights in the Farøe Islands, Iceland, and Greenland! His proposed route is as follows:—

1. From Scotland to the Farøes	. . .	250 miles.
2. „ Farøes to Iceland	. . .	350 „
3. „ Iceland to Greenland	. . .	550 „
4. „ Greenland to the coast of Labrador	. . .	600 „
		1750 miles.

Total 1750 miles of submarine cable.

You will perceive that none of the four lengths of cable *exceed* 600 miles, which, electrically, commercially, and nautically considered, are, compared to the 2050 nautical miles of cable laid by the Atlantic Tele-

graph Company (viz., between Valentia and Trinity Bay), infinitely superior.*

The historical information we possess of these northern regions is very interesting; but, I assure you, nothing but a labour of love, combined with an earnest desire, on my part, of acquiring the fullest information, could ever have induced me to continue my research through such a labyrinth of dusty materials. However, I will endeavour to give you some brief details, commencing with the Farøe Islands.

These islands are a triangular group of lofty table-shaped rocks cropping out of the Atlantic, about a third of the distance between the Shetlands and Iceland, and composed entirely of volcanic formations which have been superimposed beneath the depths of the ocean, and, by subsequent igneous convulsion, driven up to, and far beyond, the surface of the sea.

The twenty-five islands of which this group consist are so intimately related in formation and appearance, that they evidently were once a compact mass, in which upheaval has caused the rents, or rather fiords, by which they are divided. In general, these fiords are very deep, and vary from one to two miles in width, and are parallel to each other. The cliffs, which are nearly all perpendicular, average 800 feet in height, and such, with little variation, save in altitude and extent, is the general aspect of Sandøe and Stromøe.

Thorshavn is the capital and seat of government, and situated on the eastern side of the latter island. It is built crow's-nest fashion, or perched on a slightly-elevated promontory, having one house huddled on the top of, and almost into, another, as if the town allotments were without price. They are all built of wood and coated with tar.

The shores, or rather cliffs, of the Sandøe and Diamond Islets are so steep that *no boat can be kept there*; their sparse inhabitants living in entire seclusion, saving an annual visit from the clergyman, who is hoisted up by ropes. On the contrary, the Islet of Suderøe, situated more to the south, has its deep bays and also basaltic rocks; its climate is more genial, and the produce of its soil nearly sufficing for the support of its inhabitants.

The shores of the bay in which Qualvig, their principal village, stands, are amongst the most picturesque and fertile of the Farøes, and contain some *conspicuous beds of coal*. To the west are the precipitous and weather-worn shores of Vaagoe and Myggeliæs, together with numerous rocks and islets.

Eastwards the southern point of Osterøe almost joins Naalsøe, and the fiord which intervenes is very dangerous, from its irregular and rapid currents.

Commander Charles S. Forbes, R.N., (to whom I am chiefly indebted for this information,) states that "the wind often arises at these islands apparently without cause or warning, and sweeps down the gullies and fiords with great violence."

To exemplify the rugged nature of this island, I may further mention that a little to the north-west of a large dome-shaped rock called

* On the submergence of the Atlantic Telegraph Cable, see *Journal of the Institution*, vol. II. p. 96.—E.N.

Hestöe, within Skaapen-fjord, lays Trothoved, a small detached islet or basaltic rock, which opposes on its western side an unbroken front to the Atlantic ocean of 1,500 feet in height, but on its eastern part slopes gradually down, and only affords shelter and grazing to a small flock of sheep.

With reference to the discovery of these islands, I may mention that an Irish monk, called Dicuil, of the ninth century, especially states in his geographical treatise, "*De Mensurâ Orbis Terræ*," that they had been discovered by his countrymen.

The remarks I have to make relative to the depths of the ocean, &c., between the various landing-places for the cable on this northern submarine route I will defer until I have completed the historical and geographical details. We will now proceed to Iceland, and, having safely landed, I must request your first attention to its historical, and secondly to its geographical, points.

For the earliest reliable information we possess concerning this island we are chiefly indebted to a very distinguished literary Icelander, called Sœmundr, surnamed Feódi, or, the Learned Parson, born at Oddi, in Iceland, A.D. 1056. He, the pioneer of history in the far north, commenced the celebrated Book of Chronicles called "*The Landnámabok*," or "*Book of Occupation*." This celebrated divine left several other monuments of his labours, which have unfortunately been lost.

Amongst the earliest chronicles, "*The Landnámabok*" is the most important, and, although commenced by Sœmundr, was compiled by several trustworthy writers of the twelfth century.

This book informs us that the first Northman who landed on the shores of Iceland was Maddod, a celebrated sea-rover, who, being driven by a violent storm on to the eastern coast about the year 860, entered one of the friths, and ascended a high mountain that commanded an extensive prospect, but, discovering no traces of the country being inhabited, set sail again, after giving it the name of Snœland (Snowland). But some years after another famous sea-rover, a Northman called Floki, went there with the view of forming a settlement, but was obliged to abandon his object, owing to all his cattle having perished during the winter. He bestowed the name of Is-land (Iceland) on the island, in commemoration of having sojourned there during so gloomy a season. It is worthy of remark that "*The Landnámabok*," and other ancient Icelandic documents, state "that before Iceland was settled by the Northmen there were men there called by the Northmen Papy. These men were Christians, and are thought to have come from the west, for there were found Irish books and bells, and various other things, whence it is thought that they were West-men. These things were found in the Isle of the Papy, situated on the eastern coast, and which still bears the same name, and also at Papyli, in the interior; and, further, that the Christians left the country when the Northmen settled there." Dicuil, the Irish monk whom I have previously mentioned, expressly states in his "*Geographical Treatise*" that Iceland was discovered by his countrymen.

Iceland (which now belongs to Denmark) is one-fifth larger than Ireland, having a superficial area of about 40,000 square miles. It is situated about 500 miles north-west of Scotland, on the confines of the Polar Circle, which bisects its northern extremities, and, unlike any other

portion of the world of a similar size, owes its creation entirely to submarine volcanic agency. At some early period of geological history, the nucleus of this island was thrown up by volcanic power, as Sabrina and Graham's islands were in the present century. The form of the island is that of a flat ascending arch, attaining the elevation of about 754 yards above the level of the sea, near its central point. Its interior, as a whole, is one vast tract of lava desert, and ice mountains—jökulls, as they are termed; these last mentioned occupy one-tenth part of the island, and never have been and never can be traversed. The habitable coasts consist for the most part of marshy districts, watered by numerous rivers, which descend from the jökulls and lakes, and then pour into the various fiords; the whole extent only affording a bare subsistence for the scanty population. Grain will not ripen in the transient and uncertain summers of these regions, and such like provisions are entirely imported from Europe—even the grass crop is often destroyed by the effects of the Polar ice, which in some years embelts the island (especially on its north and western coasts), causing incessant rain, and therefore an impossibility of drying the hay. Paradoxical as it may seem, there are plenty of forests, but no trees,—such tracts being erroneously so termed by the natives, whereas they only consist of stunted birch-bushes, averaging from about six feet in height, and never exceeding nine.

During the eleventh century, we find that the island was a mere battle-field of internal wars for supremacy amongst the most powerful chiefs, and continued so till the thirteenth century, when, in A.D. 1254, it was surrendered by its own hardy people to King Hakon, and thus, after 340 years of independence, became an appendage of the Norwegian crown.

The history of the fourteenth century is chiefly remarkable for being one of volcanic activity, and an unusual accumulation of Greenland ice round the shores of the island, and many earthquakes.

In the middle of the eighteenth century, severe winters followed in rapid succession, inducing a famine, which swept away 10,000 of its inhabitants.

The south-western cape of Iceland (the neighbourhood of which I believe Colonel Shaffner intends as his starting point for Greenland) is called Reikianess, or Smoky Cape. From this point, to some sixty miles out to sea, the volcanic power has from time to time manifested itself, continuing in the same parallel which bisects Iceland in a south-west direction.

Islands and reefs have been created and destroyed in those waters, and some detached groups and rocks are still in existence, one of which is appropriately termed the Elld-eyar, or Fire Island.

In the year 1783, famous in Icelandic annals by the tremendous eruption of Skaptar jökull, a submarine volcano burst out of the sea, thirty miles to the south-west of this cape, and ejected so much pumice that the surrounding ocean was covered with it, fish were driven from the coast, and ships impeded in their course. Ultimately an island was formed, bearing three distinct volcanoes. It was claimed by the Danes, and called Nyöe, or the New Island; but before a year had elapsed it sunk, and nothing remained but a reef and rocks, which are from five to thirty fathoms under water. The almost simultaneous time of its eruption with that of the Skaptar jökull (a distance of nearly 200 miles apart), clearly illustrates

the extensive and intimate ramification of the volcanic power in those latitudes.

I may here mention that the valuable sulphur range called in Icelandic Gull-bringu Syssel (or gold-bringing country), forms the back ground of the main extending to the north, nearly up to Reikiavik, the capital of the island, and on the south to the small town, or rather village, of Krisuvik. This district (with the refusal to purchase the northern sulphur district), you will be glad to hear is the property of Mr. Bushby, an Englishman, who in 1857 explored it, and then purchased it from the peasant proprietors. For further particulars I must refer you to Commander Charles S. Forbes's valuable and very interesting work on Iceland; nevertheless, I will briefly describe the nature of the *terra firma* of this southern sulphur district. From a little to the south of Hafna fiord (a snug tidal harbour), and on the road, or rather track, to the village of Krisuvik, "the country assumes a picture of erratic ruin; it appears as if it had been baked, broiled, burnt, and boiled by some demon-hand, until its chemical soul had fled, leaving nought behind save a grimgrey shroud of darkness and despair." No bird or beast frequents this lifeless range, except near the mud caldrons situated in the Kleisavatu valley; there the grass grows most luxuriantly, affording good grazing for the cattle. The village of Krisuvik is situated at the bottom of this difficult and wild range, distant only about four to five miles from the sea. Returning to Reikiavik, the capital, and proceeding northwards, we find that the coast of Faxo-bay is exceedingly irregular, and beset with numerous rocks and shoals at the entrances of the fiords, especially at and to the north of Borgar fiord; from the latter to the neighbourhood of the crater called Ellborg (the Fortress of Fire), the coast is more regular.

From Nuklaholt (on the usual track for travellers proceeding west) to the town of Budir the distance is about seven hours' journey on pony back, ponies being the only animals of burden in the island. The land track from this point to Budir lies across a series of marshes (extending from the sea to the base of the mountain spur) of the very worst description, or, in other words, is nothing better than quivering quagmires.

On the contrary, the sea-shore, at low-water, consists of hard and extensive sands, usually strewed with barks of timber, borne thither by the great Gulf stream from the American continent. So says Commander Forbes; but, as I shall hereafter refer to the very interesting subject of ocean currents, I will only here state, that that great stream does not approach the Icelandic coast nearer than between six or seven hundred miles. Besides an oceanic stream which brings drift timber from the south-west, there is a north or arctic current which conveys immense quantities of timber from the northern coast of Asia round the north shores of Iceland; and, being checked somewhat in its course by its junction or contact with a south-western current off Faxo Bay, causes this great accumulation of drift-wood to be thrown up on the sea-shore near and in the bay of Budir.

It is by the aid of this timber, drifted here by the will of the all-seeing and all-powerful hand of our Maker, that the inhabitants of these regions are provided with fuel. It is also probable that the extensive beds of *surturbrand*, a species of bituminous coal, found on the north and

western coasts, have been gradually formed by the accumulating deposits of drift timber.

Commander Forbes informs us that "the enterprising owners of the mail steamers are about to make a trial of this coal, and had ordered a supply to be procured from one of the extensive beds now laid bare in the cliffs near Seiders fiord, where it can be shot into a vessel lying beneath."

The small town of Budir is snugly esconced in an ocean of lava, at the foot of a very ugly red conical crater, one side of which has fallen in. Its port is a deep channel worn in the sand by the downward current of an ice-river. Budir is the chief town of that district, and the residence of Mr. A. Thorsteinson, the sysselman, or district magistrate. This port is entirely sheltered from the prevailing north winds, and I would, for various reasons (some of which I have alluded to), recommend it to the favourable consideration of the North Atlantic Company, as their starting point for their section of the submarine cable, with which they intend to connect Iceland with the south of Greenland.

I have already explained to you the nature of the bottom of the sea off Cape Reikianess, together with the volcanic and sulphureous composition of the main land of that south-western district, that it is underneath this cape and adjacent region that the active volcanic power exists; on the contrary, the promontory on which the town of Budir is situated "has not been subject to any volcanic eruption since the memory of man, a few warm waters alone attesting its slumbering powers." Surely this is another reason why this latter spot should be selected as the landing-place for the cable in preference to the district south of Reikiavik, which has, I believe, been considered by the North Atlantic Telegraph Company as best suited for that purpose.

I must now call your attention to the south-eastern portions of the island, immediately above which, and towards its north-eastern extremity, I believe it is the intention of Colonel Shaffner to land the cable, which is intended to connect Iceland with the Farøe Islands. These south-eastern districts are to a great extent occupied by very extensive conglomerations of ice, termed Vatna and Klofna jökulls, occupying a space of no less than 3,000 square miles, and at an elevation varying from 3,000 to 6,000 feet. One of these travelling glaciers (so termed on account of its now occupying what was, previous to the fourteenth century, a fertile and well-inhabited plain) has accumulated and consolidated to such an extent as to form a vast field of ice, about twenty miles in length, by fifteen in breadth, and 400 feet in height. I may also add, that these huge glaciers are yearly on the increase, and gently advancing towards the sea.

With respect to the land portion of the proposed telegraph, I must refer you to Dr. Rae's graphic and interesting description of his explorations undertaken last year, when he surveyed the usual north road, or track of communication, from the east to the west shores of the island.

But to facilitate the carrying out of my proposed western point of departure for Greenland, viz. the port of Budir, I will briefly describe that portion of territory to the west of Dr. Rae's most northern point, when, it may be remembered, that, at about 66° north latitude by 20°

west longitude, he suddenly took a south-western direction, with the view of reaching Reikiavik, the capital.

Proceeding westerly from the above point, the extensive lava desert of Arnarvatnsheidi is shortly reached. It appears that there are two regular roads, or rather tracks, traversing this vast desert, over which travellers can reach the western coast of the island.

This desert waste is totally uninhabited, so that provisions and hay, and in some places even water, must be provided for the ponies, as no blade of grass exists in that exhausted solitude. At their south-western extremities these two routes converge into one, and shortly reach the upper part of the great West Hvita, or White River, and crossing by a ford to the left bank, again branch out in two separate routes, the south-western one proceeding to the north of the great Jhinvalla Lake, direct to the capital; the western one proceeding by the villages of Reykholt and Stafholt, situated in the well-watered, productive, and inhabited valley of Nupe Syssel. From the latter village the road winds in a north-western direction across the mountain range of West Skarsheide, which terminates at the Snœfells jökull, thus separating the Faxa and Breida fiords.

Having now left the great valley of volcanic activity that divides the island, we enter the extinct volcanic district of Western Skarsheide, which only affords a pasturing ground for sheep during the summer months. The next station is Stadarhraun, a small farm situated on the verge of a lava field, and, passing at the base of the extinct crater called Ellborg (the Fortress of Fire), the route verges on the north shores of the Faxa fiord, terminating at the town of Budir.

The object I have in view in recommending this direct western route is to keep clear of the dangerous volcanic south-western district off Cape Reikianess, which, both for land and submarine cables, is to be avoided. From the village of Stafholt (previously mentioned), a land telegraph should communicate with Reikiavik, the capital.

GREENLAND.

It appears from the earliest chronicles containing accounts of the discovery of Greenland, that, "after a period of 120 years from the first colonization of Iceland, Greenland was discovered by one *Grumrbiörn*, who had been driven off the Icelandic coast by successive gales: but he only discovered the mountains, and did not even approach the land.

No further practical notice of this was made until A.D. 986, when *Eric the Red*, a great chief, who was banished or driven out of Iceland on account of the numerous manslaughters he committed, first explored the country, and afterwards founded a settlement that flourished for more than 400 years, records of which were handed down uninterruptedly until the beginning of the fifteenth century.

Eric started from a small island situated at the entrance of Hyams fiord, and in the vicinity of the village of Breidabolstad (about 22½ west longitude and 66 north latitude), where subsequently he assembled the ill-

fated expedition for the colonization of Greenland, of which more than half the vessels, viz., twenty-five in number, were lost.

Eric, or Eirik, gave to his discoveries the name of Greenland, in order to create a favourable impression of its fertility amongst his countrymen and induce them to emigrate; ultimately, not fewer than twenty-five vessels left Iceland under his convoy, but of these only fourteen reached their destination, the rest being either driven back or lost.

The distance between the two countries being little more than 200 miles (so relate the Chronicles), a regular intercourse was established between them, and the number of settlers increased so rapidly, that soon after their adoption of Christianity (about A.D. 1000) a number of churches were built on the *East* coast, and a bishop appointed; he had his residence at *Gardi*, and was a suffragan of the archbishop of Tronhjelm, in Norway. A monastery, dedicated to St. Thomas, was also erected at another small town called *Albe*, and for the period of 350 years a regular trade was kept up with Denmark and Norway.

In the year 1406, the last bishop was sent over to Greenland. Since then the colony has not been heard of, and its loss, or rather destruction, is attributed to the wars then raging between the Danes and Swedes, which prevented the trading vessels, on whom they depended for their supply of grain, from putting to sea.

Previously, viz. in 1350, the colonists had been greatly reduced in *physique* and number by the *black death*, which did not spare these northern latitudes. Another cause was from the Esquimaux, who harassed them with repeated attacks.

With reference to the distance of 200 miles between Iceland and Greenland, in the account which the Icelandic Chronicle gives of the ancient sailing route, it is stated — “that half-way between Iceland and Greenland there was a cluster of little islands, or rocks, called ‘Gondebiurne-Skeer,’ which were inhabited by bears.” Hans Egédé, the celebrated missionary of Greenland, who resided there during a period of twenty-five years (from 1721 to 1746), states — “that the drifting ice has probably collected round these islands, and been so petrified by successive accumulations as to render them in appearance but huge masses of ice, and thus become wholly impenetrable to the melting action of the sun.” I gather from the various records and old chronicles which I have examined that the ice has increased, and has been forced much *further south* than it formerly was; and that islands that *then* existed may have disappeared by volcanic action, as is known to take place at the present age; also, from the long dormant state of the volcanic *northern* range in Iceland, we may fairly account for the present immense accumulation of ice and its encroachments towards the south, which volcanic action *alone* can dissipate and destroy.

In looking at the geographical position of Greenland with respect to that of Iceland, it appears strange that the eastern coast of the former, although so near, should be unavailable, or rather unapproachable, for ships, and thus render it absolutely necessary for sailing vessels or steamers navigating between those countries to proceed in a south-westerly direction, and even round Cape Farewell, the most southern point of the mainland of Greenland, before that ice-bound coast can be approached.

Such is a positive fact, and has remained so for ages; but, with a view of confirming the various statements and recent explorations undertaken by Colonel Shaffner and his party, in H. M.'s steamer "Bulldog" and the "Fox," in July and August, 1860, and also to afford some historical information of *earlier* explorations on that eastern coast, I will give you a few particulars.

I gather from the narrative of an expedition to the east coast of Greenland, sent by order of His Majesty the King of Denmark to search for the lost colonies, under the command of Captain W. A. Graah, Danish Royal Navy, that, in the spring of 1829, he proceeded on an exploration to that coast, starting with a small party of Europeans and Esquimaux from the most southernly inhabited missionary establishment, called Friederichsthal, about 44° or 45° west longitude. Arriving at Cape Farewell, which, according to Captain Graah's observations, is in latitude $59^{\circ} 49'$ north, and longitude $43^{\circ} 34'$ west of Greenwich, he proceeded up the eastern coast, employing several of the Greenlanders' boats, called umiaks, of which the outside covering is formed of dried seal-skins carefully sewn together.

Captain Graah states that the usual current from the north-west round Cape Farewell ceases from September to the end of January, and that the sea round that promontory is usually free from ice, or nearly so, from October to January.

Arriving on 23rd May, 1829, at Cape Valløe, latitude $60^{\circ} 28'$, he found the sea was quite free from ice from about one to two miles off shore, and continued so all the way to Kutek further north. He was informed by the inhabitants that the mainland northwards was always buried under snow and ice, and of European ruins (of which he was in search) they knew nothing, neither did their legends say anything about European inhabitants. Further, that their country had no meadow lands, but at a point called Ekallumiut (further north) were to be found some grass-grown fields; and they all invariably stated "that their coasts were unfit for navigation by ships, as they were constantly beset with ice."

Captain Graah proceeded in his boats northwards (overcoming many difficulties caused by the ice, which even in July still adhered to the coast), and arrived at Sneedorffs Island, latitude $64^{\circ} 57' 56''$, and longitude $39^{\circ} 20'$, and eventually reached Cape Gudbrand (or Thorlaksen), off which is the island called Vend-om (or turn back), situated at $65^{\circ} 10'$ north latitude. From this most northern point explored by Captain Graah, and at a distance of about 40 to 50 miles east and east-north-east of Vend-om further north, he obtained a sight of two or three large islands. Captain Graah considers from their situation that these islands are the actual "Gunbiorn Skerries" of the ancients (which I have previously alluded to as being situated half-way between Iceland and the ancient East colony in Greenland). According to the early Icelandic sailing directions, to enable you to safely reach the "East Bygd," or Eastern Colony, in Greenland, we find "that, starting from the Cape of Snæfjeldness close to the town of Budir, it was four days' sail west, and then lies 'Gunbiorn Skerries,' exactly half-way between Iceland and the Bygd."

The ancient sailing directions of Ivar Bardsen fully agree with those directions. From these and other records Captain Graah is of opinion "that the East Bygd was identical with the present district of Julianshaab,

for the distance from Snøefjelds jökull (or Snow mountain) due west to Greenland is 400 miles, and thence to Cape Farewell about 340, together 740 miles, or eight days' sail at $92\frac{1}{2}$ miles." Captain Graah states "that the entire population of this eastern coast did not amount to 600 souls." In further confirmation of the paucity of inhabitants on that coast even at the present day, and the impossibility of the ancient East Bygd or colony ever having been situated elsewhere than in the district of Julianshaab, I may state that the Rev. M. La Trobe, the Moravian missionary residing in London, lately informed me that their missionary station of Friederichsthal was chiefly composed of emigrants from the eastern coast.

I fear that I have somewhat extended my descriptive remarks about the east coast further than was requisite, but I am very desirous of explaining the true cause why on such an extent of coast no safe harbour could be discovered for landing a cable, and also account for the necessity of laying it down passing round Cape Farewell.

Time will not permit of my entering into any details, although but brief, of the various ports, harbours, and missionary stations situated in the districts of Friederichshaab on the west, and Julianshaab on the south, but I will give you a few particulars descriptive of the best harbours or landing stations for a submarine cable situated along the coasts of the latter district, and will confine my remarks to the neighbourhood of Friederichsthal, the most southern establishment of the Moravian missionaries. This station (according to Captain Graah) was founded in 1824, and is considered the handsomest settlement in the whole of Greenland (latitude $60^{\circ} 0' 10''$, longitude $44^{\circ} 37'$ west of Greenwich). It is precisely on the same spot where the buildings of the present missionary establishment now stand, that anciently stood some of the early Icelandic edifices, and here it is that the missionary and historian Eggers places the most easterly of the Dygds, at Skage fiord.

The mountains about Friederichsthal have a wild and imposing aspect, are of great height, and perpetually covered with masses of ice. There are spacious fields in the neighbourhood, and the soil is favourable for the growth of all sorts of culinary vegetables. This station is subject to terrible storms from the south-east, threatening even the most solid edifices with destruction; but, on the contrary, we find directly opposite, viz., at Tldgeit, at the distance of only half a mile south of Friederichsthal, a small cove with a sandy bottom and sandy beach, suitable as a harbour for small craft.

Captain Graah considers this harbour to be the Sand-haven of the ancients. Should this harbour not be found suitable, there is a good one at the missionary station of Julianshaab, situated further to the north-west; but Captain Graah states that to the west of Kangek (the promontory) is situated the island of Nennortalik, on the east of which there is a good harbour, well protected against the ice by the small islands and skerries lying off its entrance.

I do not think that to the westward of this harbour any others could be safely approached, as between it and the large island of Nunarsoit, which forms the eastern and western boundaries of the large Juliana's Bay, the coast is beset with innumerable rocks, sunken rocks, islands, and no lack of shoals, thus rendering the navigation both intricate and dangerous.

LABRADOR.

With reference to the pre-Columbian, or first discovery, of America, and especially of that part called Labrador, to which I am about to call your attention, the Icelandic historians give the following particulars :

"In the year A.D. 1001 a Norseman of the name of Biorin Herinffson, on a voyage to Greenland to join his father, was driven by unfavourable winds towards the south-west, and discovered a flat, woody coast, which, from subsequent circumstances, together with the original narrative, we may infer to have been that of Labrador. Not being able to persuade his men to land, and being favoured with a south wind, he reached Greenland in six days. Attracted by these reports, Lief, the son of Eric the Red, who had first colonized Greenland, returned to Norway, fitted out a vessel suitable for the trip, and, with a crew of thirty-five men, sailed from Greenland, and reached the coast that Biorin Herinffson had discovered. He continued his course towards the south, and, reaching a strait which separates a large island [I suppose the Strait of Belle-isle] from the main, found a snug harbour, where, the country being fertile and pleasant, he hauled his vessel up, and huddled himself for the winter. He found the climate much milder and the days longer than in Greenland. On the shortest day the sun was above the horizon from *dagmal* to *eikt*—that is, from 7-30 a.m. to 4-30 p.m.—making the day equal to nine hours, and consequently placing his position a little to the northward of the present site of New York. A South countryman, called Tyrker, one of the crew, wandered into the interior, and found quantities of wild grapes, whence they gave it the name of Vinland. A few years after a colony was planted on these American shores by Thorfin, an Icelfander, and a regular trade with the natives in furs, skins, &c., was established. Records were carried down to the twelfth century, when a Bishop of Greenland visited the colony, and promulgated the faith; but since that period the fate of the colonists is lost in conjecture."

This early record of the discovery of America is very interesting, and I considered it worthy of notice, because it proves that the continent of America was known to Europeans nearly 500 years before the Genoese mariner set his foot on its shores in A.D. 1492. Even the great Humboldt, in his "Cosmos," believes that Columbus visited Iceland in the spring of 1447; that he started from Bristol, between which port and the north a considerable trade then existed; and that he then acquired the necessary information which induced him to cross the Atlantic ocean. Although we find that the coasts of Labrador had been discovered in the year A.D. 1001 by Biorin Herinffson, still the Portuguese lay claim to its more modern re-discovery, and called it by that name.

This country is one of the most barren in the known world; thus its sea-coast is remarkable for its great sterility. On its northern and eastern parts mountains rise suddenly out of the sea, producing but a few stunted spruce and other plants. Innumerable islands encumber its northern shores, and, as many of them are at a considerable distance off the main land, a ship of burden would sail a considerable way along the coast without forming any notion of its true situation. The navigation is consequently extremely hazardous, especially near the main, as the sea is

covered with large bodies of broken ice; and the further you proceed northward the greater is the quantity. The climate is extremely rigorous. The summer commences about the middle of July, and the winter about the end of September. All along the coast there are many rivers; but most of them are nothing better than broad brooks or rivulets, such being only drains or streams from the ponds.* In dry weather they are everywhere fordable, having a solid rocky bottom.

The Rev. Mr. La Trobe informed me that the Moravian missionaries have only four stations on the northern coast, viz., Nain (chief station), Okkak, Hebron, and Hopedale, all situated to the north of Hamilton Inlet. The coast inhabitants consist entirely of Esquimaux, who appear to have emigrated from Greenland about the middle of the last century. Lieutenant Roger Curtis, R.N. (to whose narrative I am indebted for the above information, dated 24th February, 1774), estimated their numbers from 1600 to 1700 souls. He says that a totally different race of savages inhabit the interior, which is still less populous. The latest reliable information I could obtain about that comparatively unknown coast, is to be obtained from a perusal of "the proceedings of Captain Hercules Robinson," and an inspection of the charts he sent to the Admiralty,—being results of a "surveying summer cruise" he was ordered to perform when in command of Her Majesty's ship "Favourite," between 4th May and 26th October, 1820.

I may here state that the coast was surveyed from the Strait of Belle-isle to and including Sandwich Bay. Full details of the depth and nature of the bottom of the various bays, harbours, &c. besides some account of the natural productions on the coast, with several other particulars, have been given.*

I shall defer entering into the interesting subject of the various currents and soundings of this north submarine route, until the reading of the concluding sections of my paper.

EXTRACTS FROM PROFESSOR WHEATSTONE'S REPORTS.

Indian-rubber and Gutta-percha considered as an insulating medium for coating wires for telegraphic purposes.

I can but very briefly refer to the above interesting subject, at this stage of my paper, as I intend to enter fully into the matter when I read the remaining sections.

I believe it is generally known that the above two substances have been for some considerable time antagonistically employed by competing manufacturers for the purpose in question.

With a view of setting at rest this vexed and long-disputed point (viz., as to which substance is best adapted for the coating of submarine cables), several of the most eminent electricians of the day (including Professor Wheatstone) have been examined before a Parliamentary Committee. I have been favoured with a perusal of that eminent Professor's printed report, and thus I am in a position to afford you some valuable information.

* Philosophical Transactions, 1774.

† See Nautical Magazine of 1851.