

**A REPORT ON THE  
RESOURCES OF ICELAND  
AND GREENLAND**

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A Report on the Resources of Iceland and Greenland by Benjamin Mills Peirce

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**BENJAMIN MILLS PEIRCE**

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U. S. STATE DEPARTMENT.

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COMPILED BY

BENJAMIN MILLS PEIRCE.

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## REPORT.

WASHINGTON CITY, April 24, 1868.

SIR: When you did me the honor last summer to call my attention to the treaty negotiated by you with Denmark, by which we acquired the important islands of St. Thomas and St. John, I ventured to suggest to you the propriety of obtaining from the same power Greenland, and probably Iceland also. You thought the suggestion worthy of serious consideration, and requested me to communicate to you in writing my views and the facts on the subject, that they might be on the files of the department and ready for use whenever the question might be considered hereafter by the government. In compliance with that request this report is made.

The books, maps, and authorities to be obtained here were so scanty that I applied for aid to Mr. Carile P. Patterson, a distinguished assistant of the United States Coast Survey, for assistance, stating to him, confidentially, the purpose for which the application was made. The result was the very able and exhaustive report (which I handed you a few days since) of Mr. Benjamin M. Peirce, indorsed and adopted by Professor Benjamin Peirce, the eminent head of our Coast Survey. Relying mainly on the authentic facts given in that report, I will now discuss the subject, beginning with Iceland.

This large island has an area of 40,000 square miles, being about equal to that of the State of Ohio. It is 130 miles east of Greenland, and 850 miles west from Norway. By location, then, it belongs to the western hemisphere, and is an insular dependency of the North American continent. Only about one-tenth part of its surface (entirely on the coast) is now inhabited. About one-third part of its area is agricultural, one-third heath, and one-third mountains and lava. It has "fields beautifully green, mountains clothed in purple heath, and the atmosphere is of astonishing purity." "The lava in time becomes soil and pasture-land." Much of the heath can be made pasture-land. About one-third part of the males are farmers, the remainder are mainly occupied in the mines and fisheries. The population of Iceland is about 70,000, but in view of its pasture and arable lands, its valuable mines, its splendid fisheries, and its unsurpassed hydraulic power, it could, when fully developed, sustain a population exceeding 1,000,000. It has been greatly neglected by Denmark. The Icelanders complain of this, and look forward with hope to association with the United States. It has numerous lakes, rivers, bays, estuaries, and fiords, with many good harbors. Four of its rivers equal or exceed 100 miles in length, and several of them, at a distance of 60 miles from the sea, are as large as the Hudson river at Poughkeepsie. It is misnamed Iceland, for, owing to the Gulf Stream, "its climate is fine and almost temperate." Its mean temperature by Fahrenheit is 40°; summer temperature of its capital, 56°; winter, 29° 30', or about that of St. John's, which is 16° of latitude south of Iceland. Its winter temperature is about that of Denmark. "The months of July and August are delightfully mild and pleasant;" "recommended to consumptives." There are over 100 warm springs in the geysir region; their temperature 251 to 260. There are many valuable sulphur springs; but the sulphur mountains, beds, and mines are very rich and extensive, easily worked, and of immense value. The sulphur is supplied at half the cost of that furnished by the Sicilian mines,

which it is believed will soon be exhausted. The possession of these mines as a part of our territory is a question of vital magnitude.

Besides these sulphur mines there is in Iceland "a remarkable mountain of obsidian." There are also vast beds of lignite of great value. "The grass lands of Iceland, with their superb fisheries, are their great wealth." The grass is rich and soft, feeding vast flocks of sheep, cattle, and horses, the price of the latter being but \$10 each. Wool, mutton, horses, fish, sulphur, oil, and eider-down, constitute the principal exports. Iceland moss is found in profusion, and is very valuable. Potatoes and some other vegetables are raised, but no wheat. The fisheries include the whale, shark, seal, salmon, trout, cod, herring, haddock, &c., &c. The fisheries are most extensive and among the best in the world. "The French had in 1860 269 vessels and 7,000 seamen engaged in the cod fishery of Iceland." Salt abounds also; the valuable Iceland spar, or double refracting crystal, magnificent zeolites, and splendid calcedonies.

Iceland, together with Greenland, if ours, would become most valuable to us for an independent American line of interoceanic telegraph. No ocean line by this route would exceed 660 miles.

The religion of Iceland is Lutheran. There is a college at Bessastadhir, and a more modern gymnasium at Reykjavik. Education is universal; all can read and write. Icelandic literature is highly advanced. The Icelanders are a very handsome race, with frank and manly countenances and superabounding hospitality. Morals are excellent, crimes almost unknown, and they have no soldiers or police.

#### GREENLAND.

This is the largest island in the world. It extends, according to Petermann, (a very high authority,) from longitude 20 west of London to 175 east, thus passing nearly half round the globe. Its area, thus elongated, would be about 1,800,000 square miles, or largely more than half the size of all Europe, but with a far greater shore line. Not a hundredth part of this vast region has been explored, but the geologic structure indicates great mineral wealth. Greenland extends, according to Petermann, from north latitude  $59^{\circ} 57' 30''$  to within 50 miles of the North pole, with a length of several thousand miles. The open Polar sea of our American explorers is regarded by Petermann as only a large bay, north of which the land closes again. This may be, although it would still leave a smaller Polar sea; but in view of the discoveries of Wrangel, and still later of an American captain in the Arctic ocean, north of Behring's straits, is it not probable that a portion of the land elongated by Petermann, west of our supposed Polar sea, may not be continuous, but, as suggested by General T. L. Kane, a congeries of islands, (somewhat resembling the Aleutian group,) still constituting a part of Greenland, but leaving probable openings between these islands to the Polar sea and the North pole? In view, also, of the mild temperature at Behring's straits, and of the fact that Parry ascended to latitude  $82^{\circ} 47'$  unobstructed by land and with none in view, is not the proper route by these straits for our next expedition to the North pole, and should not balloons similar to those used in military reconnoissances be elevated when necessary to descry distant objects?

The shores of Greenland much more than those of any other country are indented with deep bays, inlets, estuaries, and fiords, some of them possibly extending from the western to the eastern coast, presenting an immense shore line, and furnishing most extensive and protected fishing grounds. "These inlets are bordered by meadow lands, beech and willow, whence the name of Greenland." The population, neglected by Denmark, lives mainly by hunting, including furs and the fisheries.

Greenland has in vast quantities whale, walrus, seal, and shark, cod, ivory-cod, salmon, salmon-trout, and herring; foxes, wolf, reindeer, bear, hare, myriads of

birds, including the king duck, eider duck, dorskin, petrel, gull, brent, burgo-master, goose, killiwoke, lolard, and sea swallow, &c., &c. Good coal is found on the western coast at various points, extending far north, most cheaply mined, and close to good harbors. From the best of these northern harbors of Greenland there is believed to be practicable summer ocean steam navigation 1,500 miles to Alaska, extending, also, through Behring's straits to China or Japan, or southward to Sitka, Puget sound, the Oregon river, San Francisco, &c., &c. This Greenland and Alaska coal may possibly render this transit practicable, and would be of immense value in connection with the fisheries.

The whale fisheries of Greenland, in 1864, were of the value of \$400,000. The climate of south Greenland is one of "unusual healthfulness, and clear atmosphere." The limits of summer are from May to September. All the shores and inlets of Greenland abound with animal life, such as fish, birds, &c. Kane states the all-important fact of a *vast increase of animal life as you approach the most northern arctic waters*. The rocks and geology of Greenland, as before stated, besides the valuable coal discovered, indicate vast mineral wealth. Kryolite, a most important mineral, and of very rapidly increasing use and value, is found *only* in Greenland. One of the mines is 80 feet thick. This mineral is mined in large quantities, its rapid development being due in great part to American enterprise. It is used in the manufacture of soap, soda, and soda salts, and yields a residue which has a great value as a flux in the treatment of difficult metallic ores. It also makes a fine glass, and has been employed in the manufacture of *aluminium*, and its alloys, a most valuable metal, being very brilliant, one-third the weight of zinc and one-fourth that of silver, good for coins, much used in France, one-third the price of silver, valuable for jewelry, tenacity equal to steel, valuable for watch cases, mirrors, spectacle cases, opera and field-glass cases, pendulum rods and small weights and balances, instruments of precision and where great lightness is required, spoons, forks, dinner service, cooking apparatus, being unaltered by water, vinegar, salt, and other organic matter. The mines appear to be inexhaustible, and are of great and rapidly increasing value. Geologists all look for *new and immense* mineral developments in Greenland. Kane's book is most valuable. He found "fabulous numbers of whales in Whale sound; swarming also with sea animals and myriads of birds." Hayes describes "the green meadows there as a paradise, with swarms of whales, walruses, &c., and in adjacent seas." On the extreme north coast the north winter winds bring *mild weather*, because they come, as believed, from what the Russians call Polynya, referring, in some way, to a Polar sea. Wrangel observed that the northwest winds, as well as some of the northeast, brought with them a thick, moist fog, so that the clothes and tents were wet through.

These are the main facts as to Greenland and Iceland, taken chiefly from Mr. Peirce's great report, which I consider as a most valuable contribution to science.

I have heretofore expressed the opinion that we should purchase Iceland and Greenland, but especially the latter. The reasons are political and commercial.

The proof has heretofore been submitted by me, that the government, recently partially established in British America, called the Dominion of Canada, was gotten up in England in a spirit of bitter hostility to the United States. It then was, and still is, intended to embrace all British America, extending from the Atlantic to the Pacific, with a railroad from Halifax to Puget sound, and an area exceeding that of the United States prior to the purchase of Alaska. By this great purchase, we have flanked British America on the Arctic and Pacific, cutting her off entirely from the latter ocean from north latitude 54° 40' to 72°, leaving the new dominion but 5° 40' on the Pacific, pressed between Alaska on the north and California, Oregon, and Washington Territory on the south, with even British Columbia now being rapidly Americanized. Now, the acquisition



of Greenland will flank British America for thousands of miles on the north and west, and greatly increase her inducements, peacefully and cheerfully, to become a part of the American Union.

The shore line of Iceland, measuring round its whole coast and islets, bays, rivers, and fiords, up to the head of tide-water, and back to the sea, is nearly half that of our whole coast when our Constitution was framed. Hence its immense and valuable fisheries.

And now as to Greenland. The same glacial action which has cut up Iceland into so many inlets and fiords has, so far as explanations have been made, produced similar results, on a much larger scale, in Greenland, thus probably rendering its shore-line nearly equal to that of all the United States before the purchase of Alaska. Hence, Greenland has immense fisheries, most of which are undeveloped. But all our explorers attest the important fact that, just as you proceed north in the Arctic towards the pole, the profusion of animal life, including birds and fishes, is *wonderfully increased*. Now, the nation with such vast fisheries must not only have the largest commercial marine, but the best and greatest number of seamen, and, as a consequence, enabled promptly, when required by any emergency, to put in operation the largest and most effective navy. Such vast fisheries and extensive coasts and numerous harbors, especially with abundant good coal there, must greatly antedate the period when the United States will command the commerce of the world.

But there are other most important considerations connected with extended coasts and great fisheries. The fisheries are capable of furnishing more and cheaper food than the land. The reasons are—

1. The ocean surface is nearly four times that of the land; the area being 145,000,000 square miles of ocean surface to 52,000,000 of land.

2. The ocean everywhere produces fish, from the equator to the pole, the profusion of submarine animals increasing as you go north, up to a point but 433 miles from the pole, and believed to extend there; whereas, in consequence of mountains, deserts, and the temperature of the surface of the earth in very high latitudes, less than half its surface can be cultivated so as to produce food in any appreciable quantities.

3. The temperature of the ocean, in high latitudes, being much warmer than that of the land surface, there is increased profusion of submarine animal life, especially in the Arctic and Atlantic seas, where, on account of extreme cold, the land surface produces no food. In warm latitudes the deep-sea temperature diminishes with the depth, until a certain point, below which it maintains an equable temperature of 40° Fahrenheit. The temperature of the ocean in latitude 70° (many degrees warmer than the land surface) is the same at all depths. There are wonderful provisions for the multiplication of animal life in the ocean, and it moderates both heat and cold. These are additional reasons in favor of the existence of a Polar sea, filled with a far greater profusion of submarine animal life than any other seas, and, as a consequence, possessing far the best fisheries. Indeed, as fish progress northward, on account of the better ocean temperature there, as also because the marine food there is much more abundant, there can be little doubt that the open Polar sea will furnish fisheries of *incredible value*.

4. The ocean produces food in all latitudes for the support of animal submarine life. These are squid, (the principal food of the whale,) also abundance of nutritious sea-grasses, &c., upon which the fish feed. Besides, as the earth is more and more cultivated, and farms, as well as towns and cities, drained by creeks and rivers to the seas, the submarine food is correspondingly augmented. Even in mid-ocean the phosphorescence observed there is produced by the presence in the water of myriads of living animals.

5. Whilst the earth produces food by ploughing its surface only a few inches deep, the ocean supplies myriads of fish, tier upon tier, thousands of fathoms

deep. Thus, the registered take of herrings in the Scotch fisheries, in 1861, was nine hundred millions, whilst that of Norway, in the latitude of Iceland and Greenland, was far greater.

Perhaps, however, the main reason why the ocean produces so much more food for man than the land is, that whilst land animals only give birth to one or two of their young at a time, some fish produce millions of ova, to be matured into life. Thus, a female cod has been found to contain 3,400,000 ova; and other fish ova varying from several millions to 36,000. Hence the vast success attending the increased production of fish by transfer, by sowing the spawn, and other methods known to ichthyology.

This is a science of great importance, just in its infancy, and gives augmented value to the possession, by any nation, of extensive coasts and great fisheries. Indeed, should a largely increased density of the population of the earth augment greatly the difficulty of supplying sufficient food for man, we must look mainly to the fisheries and improve ichthyological science to prevent starvation.

Besides vegetable food for fish, the ocean produces salt, magnesia, lime, potash, iodine, bromide, &c., &c. Indeed, it is quite certain that the ocean, with equal capital and labor, can produce much greater riches than the land, and that the ratio is constantly increasing in favor of the ocean. The ocean is emphatically the poor man's home, with no monopoly or individual ownership.

The same philosophic reasons, growing out of the far warmer temperature of the Arctic ocean, as compared with the land, which indicate a Polar sea at the north, would lead to the conclusion that a similar Polar sea exists at the South pole, and that in the Northern and Polar seas will be found far the greatest fisheries of the globe, and exhaustless reservoirs of food for man.

The account of the Coast Survey for the invaluable information procured by them, is, I think, just and reasonable.

I have the honor to be your obedient servant,

R. J. WALKER.

HON. WILLIAM H. SEWARD,  
*Secretary of State.*

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COAST SURVEY OFFICE,  
*Washington, December 16, 1867.*

SIR: After a very careful examination of this report of Mr. Benjamin M. Peirce, I find it so exhaustive and so well and concisely elaborated, that it does not appear to me that I can improve it. I therefore adopt it as my own, and respectfully address it to you.

Very respectfully, your obedient servant,

BENJAMIN PEIRCE,  
*Superintendent United States Coast Survey.*

HON. WILLIAM H. SEWARD,  
*Secretary of State.*

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CAMBRIDGE, *December 14, 1867.*

SIR: I have the honor to submit to you the result of the labors which you instructed me to undertake, during the latter part of August of this year. I understood you to desire as full a description as was possible of the condition and resources of Greenland and Iceland. This I have done by the kindness of Mr. Sibley, librarian of Harvard University, and Mr. Winsor, of the Boston

Public Library, who afforded me the use of all the valuable works bearing upon the subject which were under their care. Where these libraries have failed me, I have been enabled to consult the maps of Iceland in the hydrographic office of the Naval Department. I am also indebted to Mr. Schroder, of the Astor Library, for access to some important statistical publications of the Danish government; and I have relied in some cases upon the generosity of private individuals.

The methods adopted for the drawing up of my article were these: First, to collect together all the more valuable authorities upon the subject. Secondly, to make a careful abstract of these works. Thirdly, to arrange and compare these notes, classify them and put them into an intelligible shape. Fourthly, to consult all the less important authorities, such as dictionary and review articles, and compare them with my own. Fifthly, to develop as far as possible the special consideration of the more important subjects, by means of the best authorities on these subjects. Sixthly, to make a careful revision of my work. Seventhly, to put the results into a written form.

I have endeavored, as far as possible, to state the authorities, with the precise citations, wherever a fact is given. In some rare cases this rule has not been followed, either because the fact was one which needed no authority to vouch for it, or else because it came from an authority which could not be cited. It is needless to say that in many of these rare cases the statements are a part of the general result of a long reading of the matter.

I have avoided all expression of opinion except where the opinion seemed a necessary consequence of the facts.

I have borne in mind the object of the article, that it should treat of the "condition and resources" of the countries, and have thus avoided the narration of their histories, except where the two were evidently connected.

I have been as brief as possible, and rather aimed to give a string of bare facts than to make an interesting article.

In many cases quotation marks would strictly be regular, but as this article has no pretension to originality, and no other object than information, they have generally been omitted.

I would say that I have been enabled by my professional education to discuss with some confidence the sulphur mines of Iceland and the uses of kryolite in Greenland.

I would suggest to you, sir, as being the most important parts of the article, those concerning the sulphur, fisheries, agriculture, and future of Iceland, and those concerning the explorations of Greenland. The article translated from Petermann is very valuable.

Hoping, sir, that this will meet with your approval, I remain, very respectfully, yours,

BEN. M. PEIRCE, A. B.,  
*Mining Engineer.*

Professor BENJAMIN PEIRCE, LL. D.,  
*Superintendent United States Coast Survey.*

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N. B.—For a formal list of authorities and of abbreviations, see Appendix.