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PAPERS AND CORRESPONDENCE

RELATING TO THE

EQUIPMENT AND FITTING OUT OF THE ARCTIC EXPEDITION OF 1875,

INCLUDING

REPORT OF THE ADMIRALTY ARCTIC COMMITTEE.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1875.

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CONTENTS.

REPORT OF THE HYDROGRAPHER OF THE NAVY ON THE PROPOSED ARCTIC EXPEDITION, 1875.

Hydrographic Office, Admiralty.

THE subject of a Government Expedition to examine the unknown area round the North Pole, as detailed in the accompanying papers addressed to the Prime Minister, is brought under their Lordships' notice for consideration.

The details attendant on such an application will be found in a letter dated December 6th, 1873, from Sir Bartle Frere, then President of the Royal Geographical Society, to Mr. Gladstone, and its four enclosures. Letter not printed.

Enclosure marked 1 gives the names of the eminent members of Council of the Royal and the Royal Geographical Societies, together with the British Association for the Advancement of Science, elected to represent by deputation the views of those bodies.

Enclosures 2 and 3 are printed Memoranda, and 4 a M.S. Memorandum (emanating from those members) giving in general, and, on some heads, in minute detail, the grounds for undertaking such an expedition, and the advantages that will result therefrom to science.

A subsequent letter, dated October 12th, 1874, from Sir Henry Rawlinson, President of the Royal Geographical Society, to Mr. Disraeli, draws attention to the success of the Austrian Polar Expedition, which has just returned, and to its achievements; expresses the hope that the above papers are under consideration, and urges despatch if the views of Her Majesty's Government are favourable to such an expedition, on account of securing suitable vessels for next spring. Not printed.

For a clear apprehension of the many details surrounding the question of Arctic exploration, as now urged on Her Majesty's Government in the foregoing papers, it is, perhaps, convenient to examine them under the following heads:—

1. The grounds for renewing Arctic exploration.
2. Objects to be obtained therefrom.
3. Best route to be adopted for such an expedition, if sanctioned.
4. Best means to be employed for a successful issue, and the attendant risks.

1. Under the 1st head, it is shown in Memorandum 3, pages 12–13, that within the last century (1773–1845) Her Majesty's Government have despatched six scientific expeditions to explore the North Polar area;—that, consequent on the untimely fate of the Franklin Expedition in 1847, no less than 14 Government and private expeditions not exploratory or scientific, but devoted to search alone, proceeded to the Arctic area and returned between 1848 and 1861, making incidentally very large additions to its geography.

On the solution of the fate of Franklin's Expedition in 1859, Great Britain withdrew from the field of Arctic research. Not so other nations; emulous of the knowledge so honourably gained by British enterprise, America, Sweden, Germany, and Austria have from time to time since that period made efforts to reach the North Pole.

The area over which these several exploratory expeditions have been made, and the bearing of their collective results on the present application to Government, will be more clearly seen by reference to the annexed chart, where, by an arrangement of colour, the relative contributions of the several nations to our knowledge of Arctic geography are distinguished.

It will be seen by this chart that America has devoted all her labours to approach the North Pole by way of Smith Sound at the head of Baffin's Bay. These expeditions (two private and one Government), indifferently adapted for the service as events have proved, succeeded in exploring this Sound, and reaching so far as 82° 16′ N., tracing beyond that position a continuity of land, several leagues in advance, in the direction of the Pole, with "water sky" and "every sign of the sea being navigable "further north at some period of the open season."

Germany, influenced by the opinions of continental geographers, attacked the Pole by the way of the eastern shore of Greenland; their expedition (1869–70) attained a latitude (77° 0′), but little beyond that reached by the present Sir E. Sabine in 1823.

Swedish expeditions have been repelled in their exertions made between Spitzbergen and Nova Zembla by formidable ice about the 80th parallel; while within the last few weeks we have heard that the Austrian explorers who left Norway in 1872 reached the latitude of 82° by sledge journeys, and observed continuous land as far as 83°, but were obliged to abandon their vessel in the ice barrier near the 80th parallel.

Notwithstanding these continuous and earnest efforts, it is remarkable that our own Parry, in his boat and sledge journey, made in 1827 from the northern part of Spitzbergen, attained the highest latitude yet reached, and that the credit due to the geographical achievement of the position nearest the North Pole still remains with England. The failures, however, of Germany, Sweden, and Austria in the directions they have respectively made their explorations, notwithstanding the fine achievement of the latter nation, have a material bearing on the question of Great Britain again assuming Arctic exploration. The area for attacking the Pole has, in consequence of those failures, been narrowed, and is shifted to regions originally explored by Englishmen, held by a majority of their living representatives to be the clearest and fairest gateway to the Pole, and only lately abandoned by the Americans, by a combination of untoward circumstances, the failure of perfect success on their part being anticipated, it may be observed, by those experienced in Arctic voyaging and travelling, who well knew the necessity of skilled training, proved appliances for voyaging, and lastly (but having a most important bearing on the subject now under consideration) discipline, as elements of success.

The retrospect of the extended exertions of Great Britain in the field of Arctic research, the important results that have been obtained therefrom, their cessation in past years, and, in this interval, the persevering efforts of other nations to supplement, and, if possible, to eclipse the century of exertions made by this country, form, it must be allowed, reasonable grounds, so far as a worthy emulation is concerned, for all interested in geographical science, and especially for Arctic travellers, to urge another trial.

2. Under the second head, or the objects to be attained from an Arctic expedition:

The benefits that will accrue to science are very ably, and I believe, truly set forth in Memorandum 3, at page 8; they are thus generally stated: "It may be shown " that no such extent of known area (the immense unknown area round the North " Pole) in any part of the world ever failed to yield results of practical as well as of " purely scientific value. Further, it is necessary to bear in mind that the Polar area " is, in many most important respects, of an altogether special character, affording " exclusive opportunities for observing the condition of the earth's surface, and the " physical phenomena there to be seen, under certain extreme and singular circumstances, which are due to the relation of this area to the position of the axis of " revolution of the terrestrial spheroid, and which have to be considered not only with " reference to the present time, but to the earth's past history. It may therefore be " received as certain that discoveries will be made in all branches of science, the exact " nature of which cannot be anticipated."

The advantage to Hydrography and Meteorology deserve special notice; see page 8. In Magnetism and Physics (p. 9), it is well stated, "Investigations in all branches " of Physics in the proximity of the Pole, where so many of the forces of nature " operate in an extreme degree, either in excess or defect, will surely be followed by " the acquisition of knowledge which can only be obtained in those exceptional " localities." The succeeding observations on the study of the Aurora, the Solar Spectrum, the results that may be expected to advance Geology, Botany, Zoology, and Ethnology, are stated in a manner worthy of the eminent men of science under whose auspices the Memorandum was drawn up; and are convincing that, cheerless and barren as are the Arctic regions to the ordinary observer, there, nevertheless, to the skilled explorer, will be found a wide field for research, and the promise that his labours will worthily add to the sum of human knowledge.

3. On the best route to be adopted:

In Memorandum 3, at page 18, it is stated that, "The distinguished naval officers " who are members of the Geographical Council, and who have carefully considered " the evidence accumulated since 1865 in a Special Committee, are now unanimously " of opinion that the route by Smith Sound is one which should be adopted, with a " view to exploring the greatest extent of coast line, and of thus securing the most " valuable scientific results."

Bearing in mind the failures of the German, Swedish, and Austrian expeditions to penetrate with their vessels the ice barrier between East Greenland and Nova Zembla, as well as the experiences by Parry, in 1827, north of Spitzbergen, and the fact that the American vessel *Polaris* sailed from Baffin's Bay through Smith Strait to 82° 16′ N. without obstruction of any kind (see Memorandum 4), and moreover that it was then discovered a constant current set down the strait, and that drift wood was found on the shore, is a proof of, combined with other evidence adduced at p. 15, Memorandum 3, "that the opening called Smith Sound is a channel with a constant "current flowing southward from the unknown area."

The modern application of steam power to whaling ships, and the success attending it, removes much of the objection that formerly existed against the Smith Sound route, an objection based on the time consumed in reaching Smith Sound from European ports from ice obstruction in parts of Baffin's Bay. In Memorandum 4, as bearing on this point, it is stated, "The voyage of Captain Markham (made in 1870 in the Dundee "whaling ship *Arctic*) shows the great change that powerful screw steamers have "made in ice navigation. His vessel was only detained 60 hours by the ice of "Melville Bay, when former expeditions composed of sailing vessels had usually been "stopped for several weeks." After a careful examination of all the conditions of this question of route, I fully concur in their recommendation of Smith Sound.

4. On the means to be employed for a successful issue, and the attendant risks:

In Memorandum 2 the Arctic Committee forcibly state on this head, "It is quite "clear that the dangers of the Arctic regions are, in most instances, the direct con- "sequences of despatching ill-equipped and inadequately supplied vessels with "undisciplined crews. The really unavoidable dangers are thoroughly understood, "and most of them can be obviated by modern appliances and experience. Two "vessels stationed at suitable distances could keep up communications with each "other and with the whalers which annually frequent the 'North Water' of Baffin's "Bay, while under the most unforeseen and improbable contingency a safe retreat "would always be kept open." A very important feature in the late voyage of the American ship *Polaris* is also brought to notice; namely, that this ship safely drifted out into Baffin's Bay from a high northern position in Smith Sound or Strait, the inference to be drawn from which incident is thus stated (Memorandum 2), "This "proves that the ascertained current keeps the ice in motion, and carries it South, "thus preventing any long interruption of the navigation. The safety of a Government "expedition is thus assured."

Further considerations as to the health and risk attendant on Arctic exploration are given in the closing paragraphs of Memorandum 2, which appear to me, based as they are on experience, to be just and reasonable. The last paragraph but one of Memorandum 3 indicates in general terms the manner of carrying out such an expedition, relying for details on the past experience of the Admiralty. "It should consist of "two moderate-sized screw steamers, one to be stationed at some distance within the "entrance of Smith Sound, the other to advance as far as possible to the Northward "(preserving communication with the depôt vessel), from which point sledge parties "would start in the early spring and explore the unknown region in various directions."

* * * "The advanced parties would be in such a position as to be able to fall "back upon the consort, at her station near the entrance of Smith Sound. Thence in "the improbable event of accidents, the whole expedition could retreat to the Danish "Settlements in Greenland, as has been done before." The general views here expressed as to the basis of the means for carrying out an expedition appear to be sound.

In accordance with verbal instructions from the First Lord, I have drawn up the following estimates:—

	£
For purchase of two suitable steam vessels from one of the Northern Whaling ports	24,000
For fitting and equipping these vessels for sea	15,000
Stores, &c. for whole time of expedition; in this is included the cost of a transport for conveying stores to fill up in Baffin's Bay	5,000
Victualling of 130 men for 2½ years	10,000
Scientific stores and appliances	1,000
Coal supply for duration of expedition	1,000
Expenditure (probable) to start vessels from England	56,000

	£
Wages of officers and crew, 130 men (assuming they will be paid, as is customary, double wages), for one year	21,000
Salaries for small staff of scientific gentlemen, for one year	1,500
First year's expenditure	78,500
Second „ „	22,500
Final half year	11,250
Total cost	£ 112,250

The foregoing estimate must be received as only approximate, and so far as I can see will not be less. It is fair to assume that when the vessels return, they and the stores would be worth about 15,000*l.*, or in round numbers the cost of the expedition will be about 100,000*l.* for two-and-a-half years. Should the expedition return in one-and-a-half years it will be lessened by about 22,500*l.*

(Signed) Fredk. Jno. Evans,
Hydrographer.

October 22d, 1874.

Enclosure No. 1.

The deputation to represent to Mr. Gladstone the valuable results to be derived from an examination of the unknown area round the North Pole, and the importance of despatching a Naval Arctic Expedition in the spring of 1874, would be composed of—

The Council of the Royal Geographical Society, represented by Sir Bartle Frere, the President; Sir Henry Rawlinson, Admiral Collinson, Admiral Sherard Osborn, Sir George Back, &c. &c.

The Council of the Royal Society, represented by Dr. Hooker, the President; Professor Huxley, Professor Allman, Mr. Bush, Mr. Prestwich, Mr. Sclater, and General Strachey. The Council of the Royal Society resolved that, "In the event of a renewed "application being made to the Government by the Royal Geographical Society for the "purpose of inducing them to undertake a Polar expedition, a deputation be appointed "to represent to the Government the views of the Royal Society in reference to the "scientific results to be expected from the expedition." "That the deputation (named "above) be requested to make the necessary arrangements with the President of the "Royal Geographical Society."

The British Association, represented by a committee elected by the Council at Bradford, consisting of Admiral Ommaney, Dr. Hooker, General Strachey, and Mr. Markham.

The Dundee Chamber of Commerce, who at the same time will present a memorial, submitted by their member Sir John Ogilvy, representing the great practical value of Arctic exploration, both with reference to the interests of the seafaring population of the west of Scotland generally, and to those of the trade and manufactures of Dundee, especially that branch engaged in the manufacture of jute, for which animal oil is essential. This branch of industry not only gives employment to thousands in Scotland, but to millions in our Eastern Empire. The Chamber consider it most important that the whole unknown area should be explored, that a more exact knowledge may be acquired of the haunts, migration, and numbers of the various oil-yielding animals. The Chamber also look upon Arctic expeditions as an admirable school for training seamen, and as useful in giving employment to some of the most intelligent among the experienced mates, harpooners, and foremast men at the Scottish and Yorkshire ports, especially Peterhead, Aberdeen, Dundee, Whitby, and Hull.

Enclosure No. 2.

The importance of exploring the unknown area round the North Pole is now well understood, and the scientific results of such an examination, which have already been enumerated in the Memorandum of the Arctic Committee, can easily be set forth in complete detail. The point, therefore, which requires more immediate consideration is the best way of securing these results, without exposing the explorers to undue risk.

As the full scientific results of Arctic exploration can only be attained on and near the land, the route by Smith Sound is undoubtedly the one that should be adopted. There alone the land is known to extend, in a northerly direction, far into the unknown area; so that the geography, geology, meteorology, botany, zoology, and ethnology of an extensive new tract can be investigated; while the currents, deep-sea temperatures, and character of the fauna of the adjacent seas can also be ascertained.

Our knowledge respecting the navigability of the long strait leading north from Smith Sound has hitherto been very defective, as Captain Inglefield did not pass the entrance, and Drs. Kane and Hayes wintered only a few miles within it. But the report received from the boat's crew of the *Polaris* furnishes additional information of great importance. We now know that the American vessel commanded by Captain Hall passed up the strait in one working season, for a direct distance of 250 miles, without a check of any kind, reaching latitude 82° 16′ N.; and that at her furthest point the sea was still navigable, with a water sky to the northwards. The *Polaris* was a mere river steamer of small power, and ill adapted for ice navigation, with a crew, all told, of only about 25 men. If she could make such a voyage without difficulty, it may fairly be anticipated that a properly equipped English expedition, under equally favourable circumstances, would do more. Such an expedition would consist of two strongly fortified steamers of 70-horse power, adapted for charging the ice and forcing their way through it, with a crew of 60 officers and men each.

Another very important feature in the voyage of the *Polaris* is the fact that she was safely drifted out into Baffin's Bay from a high northern position in the strait. This proves that the ascertained current keeps the ice in motion, and carries it south, thus preventing any long interruption of the navigation. The safety of a Government expedition is thus assured. For it is quite clear that the dangers of the Arctic regions are, in most instances, the direct consequences of despatching ill-equipped and inadequately supplied vessels with undisciplined crews. The really unavoidable dangers are thoroughly understood, and most of them can be obviated by modern appliances and experience. Two vessels stationed at suitable distances could keep up communications with each other, and with the whalers which annually frequent the "North Water" of Baffin's Bay, while, under the most unforeseen and improbable contingency, a safe retreat would always be kept open.

There is a third feature in the voyage of the *Polaris* which strengthens the argument in favour of exploration by Smith Sound. At the winter quarters, in 81° 38′ N., the climate was milder than it is further south, and animal life abounded, including musk oxen. This account corroborates that of Dr. Hayes, who was able to supply his men with plenty of fresh provisions in the less hospitable region near the entrance of Smith Sound. A Government expedition, with properly organised hunting parties, will be able to obtain considerable supplies of fresh meat, and thus add to the prospect of maintaining the men in health and vigour. Under such circumstances there is no healthier climate than that of the Arctic regions.

These considerations are, it is believed, sufficient to show that the highly important scientific results of Arctic exploration can be secured without undue risk, and with a reasonable assurance that no disaster involving loss of life or health is to be apprehended. The system of Arctic sledge travelling, which is now thoroughly understood, will ensure the examination of a vast extent of new country in various directions, from the wintering positions of the two ships; and the navigable seasons will enable the expedition to obtain valuable information respecting the hydrography of the now unknown seas round the Pole.

Enclosure No. 3.

The Arctic Committee of the Royal Geographical Society have the honour to submit to the Committee appointed by the Council of the Royal Society to confer with them, the following Memorandum on the subject of a renewal of Arctic exploration.

General Scientific Results.—The results of scientific importance to be derived from an examination of the immense unknown area round the North Pole, are as numerous as the region to be explored is extensive. It may be shown that no such extent of unknown area, in any part of the world, ever failed to yield results of practical as well as of purely scientific value; and it may safely be urged that as it is mathematically certain that the area exists, it is impossible that its examination can fail to add largely to the sum of human knowledge. Further, it is necessary to bear in mind that the Polar area is, in many most important respects, of an altogether special character; affording exclusive opportunities for observing the condition of the earth's surface, and the physical phenomena there to be seen, under certain extreme and singular circumstances, which are due to the relation of this area to the position of the axis of revolution of the terrestrial spheroid, and which have to be considered not only with reference to the present time, but to the earth's past history. It may be, therefore, received as certain that discoveries will be made in all branches of science, the exact nature of which cannot be anticipated. But there are also numerous objects, that have been stated and enumerated by the Presidents and officers of the several Scientific Societies, the attainment of which make it desirable to despatch an Arctic expedition of discovery. These are as follows:

Geography.—A geographical problem of great importance and interest will be solved by completing the circuit of Greenland, ascertaining the extent and nature of its northern coast, exploring the land to the westward, and discovering the conditions of land and sea in that portion of the unknown area.

Hydrography.—An Arctic expedition is a necessary complement to the expedition now investigating the ocean bottom in the middle and southern latitudes of the globe. The hydrography of the unknown seas has a most important bearing on the general question of oceanic currents, a question which is of practical consequence to navigation. Our knowledge of the general system of currents will be incomplete without an investigation of the currents, deep-sea temperatures, and soundings in the unknown area. Observations, at great depths, with the improved instruments now in use, would be of much value in connexion with the like observations which are being carried on by the expedition now exploring the tropical seas.

Geodesy.—A series of pendulum observations at the highest latitude possible, following upon the series just completed in India, and made with the same instruments after verification at Kew, will be of essential service to the science of geodesy. Neither the data for forming a mathematical theory of the physical constitution of the earth, nor the means of testing such a theory, are complete without experimental determinations of the intensity as well as the direction of the force of gravity, and such observations would be especially valuable at the North Pole.

Meteorology.—Observations of the temperature of the sea at various depths; of temperature and pressure of the atmosphere; and of prevailing winds, with reference to currents, in very high latitudes, will form valuable contributions to meteorological science. The present state of meteorology requires a more thorough investigation of the motions of the earth's atmosphere than has yet been undertaken; and for this important object the less frequented parts of the earth's surface should be studied as well as the most frequented.

The climate of Europe in no small degree depends on the atmospheric conditions of the Polar area, in which the development of extremely low temperatures necessarily leads to corresponding extreme changes of pressure, and other atmospheric disturbances, the effect of which is felt far into the temperate zone. For the satisfactory appreciation of these phenomena, a precise knowledge of the distribution of land and water within the Polar area is quite necessary, and any addition to our geographical knowledge of the Arctic Region, accompanied by suitable observations of its meteorology, cannot fail to afford improved means of understanding the meteorology of our own country and of the earth generally.

Magnetism and Physics.—The extension of research into the phenomena of magnetism and atmospheric electricity, in the vicinity of the Poles, will necessarily be of much scientific importance; and generally, so far as the conditions of the climate and the means of an exploring expedition will permit, investigations in all branches of physics in the proximity of the Pole, where so many of the forces of nature operate in an extreme degree, either of excess or defect—will surely be followed by the acquisition of knowledge which can only be obtained in those exceptional localities.

The study of the Aurora, which is among the most striking phenomena visible on our planet, is almost impossible in low latitudes; while the advance of spectrum analysis has given the means of determining the chemical elements involved, so that all that seems required here is the means of applying this description of observation; and this can only be got near the Pole.

The separation of the terrestrial lines from the truly solar ones, in the solar spectrum, as seen from the earth's surface, is another important desideratum, inquiry into which can only be well pursued in high latitudes, where the path of the sun at low altitudes above the horizon gives opportunities for the necessary observations not to be secured elsewhere.

Geology.—A more complete investigation of the geology of the Arctic Regions is extremely desirable, both for its scientific importance and the value of its practical results. The existence of Carboniferous, Jurassic, and Miocene rocks is known, but much is needed to be done to obtain complete collections of their organic remains. The existence of a true palæozoic coal formation has been determined, but we require to know its extent and composition.

One of the most interesting facts of late years acquired to geological science has been that of a luxuriant and highly organised vegetation, of Miocene age, on the east coast of Greenland; a fact alluded to further on under the head of *Botany*. It is of great importance that some determinations based on fragments of leaves should be confirmed by the acquisition of more perfect foliage, as well as of seeds and fruits; such materials would be of great value in illustrating a flora which is in itself of much interest, but this interest is vastly increased when one realises the important inquiries on which such knowledge would throw light. These inquiries are:—

1. The geographical distribution of the Miocene flora, as indicated by the agreements and differences between the Miocene plants of Arctic Regions and of Central and Southern Europe.
2. The relation of the Miocene flora to previous and subsequent vegetations, and its bearings on the present geographical distribution of plants on the globe.
3. The evidence derived from these plants as to the physical conditions of the globe in past geological epochs.

It is certain that additional localities for fossil plants will be discovered, and of necessity additional species be brought to light, for, in the past, such remains have been found as far as explorers have penetrated.

From the important part extreme cold has of late years been found to have played in the last geological, or glacial period, it would be of much value to have exact observations of the effects produced on the rocks by the intense cold of the northern regions; to ascertain the extent, height, and range of the glaciers; and to note their effects on the surface of the country, and on the different classes of rocks. Again, it would be interesting to determine the extent of the river floods, and the depth of the channels they have excavated in the Arctic Regions.

Another desirable object of the proposed Arctic expedition would be the investigation of the Mollusca, not only of marine, but also of land and fresh-water kinds. In a geological as well as a zoological point of view, such an investigation would be especially valuable. The palæontological basis of the glacial epoch consists mainly in the identity of certain species which inhabit the Polar Seas, and are fossil in Great Britain and elsewhere. But such species may owe their present habitat and position to other than climatal causes, viz. to the action of marine currents. It is quite a mistake to assume that Arctic species are few in number; we know very little about them, because the exploration of the circumpolar seas by means of the dredge is so difficult. But the researches of the Scandinavian zoologists show that the Arctic marine invertebrate fauna is extremely varied and numerous. All fossils should be diligently collected and their positions accurately noted. The condition and climate of the Arctic Regions at the later geological periods may be thus ascertained, and a new chapter opened in the history of our globe.

The mineralogy of the Greenland continent is also important; and the discovery of new veins of cryolite and other valuable minerals is not improbable. Masses of meteoric iron have been recently discovered by the Swedish expedition, extending for a distance of not less than 200 miles; these require further study, and their position determined.

Botany.—The vegetation of the Arctic Regions, in the opinion of Dr. Hooker, throws great light upon the geographical distribution of plants on the surface of the globe. On the return of Sir Edward Belcher's expedition from those regions, a series of rocks collected in the neighbourhood of Disco, by his former fellow-voyager, Dr. Lyall, were placed in Dr. Hooker's hands, containing an accumulation of fossil leaves of plants totally different from any now growing in that latitude. These fossils he forwarded to Professor O. Heer, of Zürich, for investigation, who had brought forward the most convincing proofs that that latitude was once inhabited by extensive forests, presenting 50 or 60 different species of arborescent trees, most of them with deciduous leaves, some three or four inches in diameter—the elm, pine, oak, maple, plane, &c.; and, what was more remarkable still, evidences of apparently evergreen trees, showing that these regions must have had perennial light. It seems extremely probable that the vegetation, which belonged to the Miocene period, extended over a large portion of the Northern Arctic Regions. It would be of great interest to ascertain whether such vegetation extends towards the Pole; and there is nothing that would give greater assistance in solving this problem than the proposed expedition along Smith Sound. Turning to the existing flora of Greenland, Dr. Hooker has pointed out that, though one of the most poverty-stricken on the globe, it is possessed of unusual interest. It consists of some 300 kinds of flowering plants (besides a very large number of mosses, algæ, lichens, &c.), and presents the following peculiarities:—1. The flowering plants are almost without exception natives of the Scandinavian peninsula; 2. There is in the Greenland flora scarcely any admixture of American types, which nevertheless are found on the opposite coast of Labrador and the Polar Islands; 3. A considerable proportion of the common Greenland plants are nowhere found in Labrador and the Polar Islands, nor, indeed, elsewhere in the New World; 4. The parts of Greenland south of the Arctic Circle, though warmer than those north of it, and presenting a coast 400 miles in length, contain scarcely any plants not found to the north of that circle; 5. A considerable number of Scandinavian plants which are not natives of Greenland are nevertheless natives of Labrador and the Polar Islands; 6. Certain Greenland and Scandinavian plants which are nowhere found in the Polar plains, Labrador, or Canada, re-appear at considerable elevations on the White and the Alleghany and other mountains of the United States. No other flora known to naturalists presents such a remarkable combination of peculiar features as this, and the only solution hitherto offered is not yet fully accepted. It is that the Scandinavian flora (which Dr. Hooker has shown evidence of being one of the oldest on the globe) did, during the warm period preceding the glacial—a period warmer than the present—extend in force over the Polar Regions, including Greenland, the Polar American Islands, and probably much now submerged land in places connecting or lying between Greenland and Scandinavia, at which time Greenland, no doubt, presented a much richer Scandinavian flora than it now does. On the accession of the glacial period, this flora would be driven slowly southward, down to the extremity of the Greenland peninsula in its longitude, and down to the latitude of the Alleghanies and White Mountains in their longitudes. The effect in Greenland would be to leave there only the more Arctic forms of vegetation, unchanged in habits or features; the rest being, as it were, driven into the sea. But the effect on the American continent would be to bring the Scandinavian flora into competition with an American flora that pre-occupied the lands into which it was driven. On the decline of the glacial epoch, Greenland, being a peninsula, could be repeopled with plants only by the northward migration of the purely Scandinavian species that had been previously driven into its southern extremity; and the result would be a uniform Scandinavian flora throughout its length, and this an Arctic one, from north to south. But in America a very different state of things would supervene: the Scandinavian plants would not only migrate north but ascend the Alleghanies, White Mountains, &c.; and the result would be that, on the one hand, many Scandinavian plants which had been driven out of Greenland, but were preserved in the United States, would re-appear on the Polar Islands and Labrador, accompanied with sundry American mountain types, and, on the other, that a few Greenland-Scandinavian types, which had been lost in the struggle with the American types during their northward migration, and which hence do not re-appear

in Labrador and the Polar Islands, might well be preserved in the Alleghanies and White Mountains. And, lastly, that a number of Scandinavian plants, which had changed their form or habit during the migration in America in conflict with the American types, would appear in the Polar Islands as American varieties or representative species of Scandinavian plants.

Whether or no this be a true hypothesis, it embraces all the facts; and botanists look anxiously to further explorations in the northern parts of Greenland for more light on the subject, and especially for evidence of rising or sinking of the land in Smith Sound and the countries north and east of it, and for evidence of ancient connection between Greenland and Scandinavia; for observations on the temperature, direction, and depth of transporting currents in these seas, and on the habits of its ruminant migrating animals, that may have influenced the distribution of the vegetation by transporting the seeds. Such facts as those of the existence of ancient forests in what are now Arctic regions, and of the migration of existing floræ over lands now bound fast in perpetual ice, appear to some naturalists to call for vaster changes than can be brought about by a redisposition of the geographical limits of land and sea, and to afford evidence of changes in the direction of the earth's axis to the plane of its orbit, and perhaps of variations in the ellipticity of the orbit itself.

It has thus been shown that much interest attaches to the Greenland flora, which is far from being exhausted. And besides these general questions, there are others respecting specific subjects, of which our existing knowledge is very imperfect. A great interest attaches to the minute forms of vegetable life which swarm in Polar areas, affording food to the Ceteacæ and other marine animals, and which colour the surface of the ocean and its bottom likewise. Many of these forms are common to the Arctic and Antarctic seas, and have actually been far better studied in the latter than in the former sea. Of land plants the Lichens and Mosses require much further collection and study, and the Arctic marine flora is most imperfectly known. Ample collections of flowering plants should be made with a view of testing the variability of species and their distribution, and observations on the means of transport of land plants by winds, currents, ice, and migrating animals, are very much wanted.

Zoology.—With regard to the specific results in zoology which may be expected from the proposed expedition, they are numerous and important. It is now known that the Arctic Ocean teems with life, and that of the more minute organised beings the multitude of kinds is prodigious; these play a most important part, not only in the economy of organic nature, but in the formation of sedimentary deposits, which in future geological periods will become incorporated with these rock-formations, whose structure has only lately been explained by the joint labours of zoologists and geologists.

The kinds of these animals, the relations they bear to one another, and to the larger animals (such as whales, seals, &c., towards whose food they so largely contribute), the conditions under which they live, the depths they inhabit, their changes of form, &c., at different seasons of the year, and at different stages of their lives; and, lastly, their distribution according to geographical areas, warm and cold currents, &c., are al subjects of which very little is known.

With regard to the fish, mollusca, echinodermata, corals, sponges, &c., of the Arctic zones, those of Greenland alone have been explored with anything approaching to satisfactory results. A knowledge of their habits and habitats is most desiderated, as are good specimens for our museums. More important still would be anatomical and physiological investigations, and observations on those animals under their natural conditions.

With regard to the migrations of birds, Professor Newton, of Cambridge, has drawn attention to the interesting questions which will be solved by an examination of the unknown area.

The shores of the British Islands, and of many other countries in the northern hemisphere, are annually, for a longer or shorter period, frequented by a countless multitude of birds, which, there is every reason to believe, resort in summer to very high northern latitudes, for purposes the most important, and, since they continue the practice year after year, they must find the migration conducive to their advantage. There must be some water which is not always frozen; secondly, there must be some land on which they may set their feet; and thirdly, there must be plenty of food,

supplied either by the water or by the land, or by both, for their nourishment, and that of their progeny.*

Ethnology.—The knowledge already acquired of the Arctic regions leads to the conclusion that the discovery of the unknown portion of the Greenland coasts will yield very important results in the science of anthropology.

Light may not improbably be thrown upon the mysterious wanderings of those northern tribes traces of which are found in every bay and on every cape in the cheerless Parry group, as well as up to the further point that has been reached beyond Smith Sound; and these wanderings may be found to be the most distant waves of storms raised in far-off centres, and among other races. Many circumstances connected with the still unknown northern tribes may tend to elucidate such inquiries.

There are other investigations which would undoubtedly yield valuable materials for the student of man. Such would be carefully prepared notes on the skulls, the features, the stature, the dimensions of limbs, the intellectual and moral state of individuals belonging to a hitherto isolated and unknown tribe; also on their religious ideas, on their superstitions, laws, language, songs, and traditions; on their weapons and methods of hunting; and on their skill in delineating the topography of the region within the range of their wanderings.

The condition of an isolated tribe, deprived of the use of wood or metals, and dependent entirely upon bone and stone for the construction of all implements and utensils, is also a subject of study with reference to the condition of mankind in the Stone age of the world; and a careful comparison of the former, as reported by explorers, with the latter, as deduced from the contents of tumuli and caves, will probably be of great importance in the advancement of the science of man.

Having thus epitomised the various scientific subjects which await investigation within the Polar area, it only remains to explain, from the knowledge and experience acquired up to the present time, why such researches can only be successfully accomplished by a naval expedition despatched under Government auspices, and secured as far as possible from failure or disaster by careful organisation and good discipline.

It is now exactly a century since—in the year 1773—the British Government, moved by the Royal Society,† despatched the first Polar expedition of modern times, under

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* Professor Newton has furnished a short account of the movements of one class of birds—the Knots—*Tringa Canutus* of ornithologists. The Knot is something halfway between a Snipe and Plover. Examples of it are commonly to be seen in the cage at the southern end of the Fish House in the Zoological Gardens, and may be seen there at the present time. Like many other kinds of birds belonging to the same group, the colour of its plumage varies most wonderfully according to the season of the year. In summer it is of a bright brick-red; in winter it is of a sober ashy-grey. Kept in confinement, it seldom assumes its most brilliant tints, but some approach to them is generally made. Now the Knot comes to this country in vast flocks in spring, and, after remaining on our coasts for about a fortnight, can be traced proceeding gradually northwards till it takes its departure. People who have been in Iceland and Greenland have duly noted its appearance in those countries; but in neither of them is it known to tarry longer than with us—the summer it would there have to endure is not to its liking; and as we know that it takes no other direction, it must move further north. We then lose sight of it for some weeks. The older naturalists used to imagine it had been found breeding in all manner of countries, but the naturalists of the present day agree in believing that we know nothing of its nidification. Towards the end of summer back it comes to us in still larger flocks than before, and both old birds and young haunt our coasts till November; if the season be a very open one, some may stay later; but our winter, as a rule, is too much for it, and away it goes southwards, and very far southwards too, till the following spring. What has been said of the Knot in the United Kingdom is equally true of it on the eastern shores of the United States. There it appears in the same abundance and at the same seasons as with us, and its movements seem to be regulated by the same causes.

Hence we may fairly infer that the lands visited by the Knot in the middle of summer are less sterile than Iceland or Greenland, or it would hardly pass over those countries, which are known to be the breeding-places of swarms of water-birds, to resort to regions worse off as regards supply of food. But the supply of food must depend chiefly on the climate. The inference necessarily is that, beyond the northern tracts already explored, there is a region which enjoys in summer a climate more genial than they possess. It would be easy to summon more instances from the same group of birds, tending to show that beyond a zone where a rigorous summer reigns there may be a region endued with a comparatively favourable climate. If so, surely the conditions which produce such a climate are worth investigating.

† The Royal Society took an active part in furtherance of Arctic exploration up to the year 1845, and it is to be hoped that that eminent body will still persevere in a policy which has almost become traditional, and which has invariably been successful; for it cannot be said that any Arctic expedition despatched under their auspices ever returned empty-handed, or without an extension of our knowledge of the Polar Seas, except that of 1845, when all the valuable results of three years' labour of Sir John Franklin's associates perished with that expedition.

In consequence of the representations contained in papers submitted by the Hon. Daines Barrington in 1773, the Royal Society resolved to apply to Lord Sandwich, then First Lord of the Admiralty, to obtain His

Captain Phipps, subsequently Lord Mulgrave, and in which expedition Lord Nelson served as a midshipman. But this, like all other expeditions sent *viâ* Spitzbergen, failed in its purpose of penetrating within the 80th parallel; and although Mackenzie and Hearn, on the American continent, just traced the two rivers which bear their names into the Arctic Sea, nothing in the last century was added to geographical knowledge within the Arctic zone to the rough outline of Baffin's Bay, as discovered by that great navigator in 1616; and, apart from that mere outline of Baffin's Bay and Spitzbergen, the entire area of the Arctic zone was a blank, so far as all human knowledge was concerned.

In the year 1818 the Royal Society, prompted by Sir Joseph Banks and Sir John Barrow, then Secretary to the Admiralty, took up actively the subject of Arctic exploration, and between that period and 1833 the successive expeditions of Franklin, Parry, Back, John and James Ross, Sabine, Buchan, Beechey, and Lyons added much to our geographical knowledge, and threw new light on the meteorology, botany, hydrography, terrestrial magnetism, zoology, and ethnology of a previously unknown portion of the earth's surface.

After the discovery of the exact position of the magnetic pole by Sir James Ross in 1831–33 Arctic exploration may be said to have paused; but it is worthy of remark that, during the fifteen years it had thus been actively pursued by seamen and travellers with the then imperfect means at command, no loss of life had occurred, although there had been occasionally more than two hundred men at a time employed upon these expeditions.

In 1845 the subject of Arctic research in various branches of natural science was again taken up by the Royal Society, and that year a fresh Arctic expedition was despatched by our Government, in which there were various persons eminent in science, under the command of Sir John Franklin.

It consisted of two sailing ships, with auxiliary steam-power of a very imperfect nature, and both in that respect, as well as in their general equipment, stores, and provisioning, they fell far short of what an Arctic expedition of the present day would have at command; but subsequent events reveal to us that this expedition succeeded in making one of the most remarkable Arctic voyages on record, and that they perished, after abandoning their ships, at a position near the entrance of the Great

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Majesty's sanction for an expedition to be fitted out to explore the North Polar area. In a letter, dated January 19th, 1773, the subject was recommended to Lord Sandwich, and it was urged that such discovery would be of service to the promotion of natural knowledge.

The wishes of the Council of the Royal Society were immediately complied with, and it was ordered that an expedition should be undertaken, "with every encouragement that could countenance such an enterprise, "and every assistance that could contribute to its success." The command was given to Captain Phipps, afterwards Lord Mulgrave. The instructions were drawn up by Mr. N. Maskelyne, the Rev. H. Horsley, Mr. Cavendish, and Dr. Maty.

The comparative failure of Captain Phipps did not damp the ardour of the Royal Society. Early in 1774 the Council Minutes show that another expedition was frequently the subject of debate; and in February 1774 a memorial was presented by the Royal Society to the Admiralty. This led to Captain Cook's attempt on the Pacific side; the expedition sailing in June 1776.

In 1817 the Council of the Royal Society resumed the consideration of the best means of prosecuting Arctic discovery, and a letter was addressed by Sir Joseph Banks to Lord Melville, dated November 20th, 1817. A favourable reply was received on the 10th of December, in which it was announced that His Majesty's Government had deemed it their duty, in conformity with the suggestion of the Royal Society, to give orders for the fitting out of four suitable vessels, with a view of the important objects of Arctic discovery; two to proceed up Davis's Strait, and the other two along the east coast of Greenland to the northward. In a scientific point of view these expeditions were fruitful of results, including Sabine's magnetic observations.

On the return of Ross, another expedition was despatched in May 1819, commanded by Parry; when Sabine again made valuable magnetic and pendulum observations.

In 1826 the Council of the Royal Society again turned its attention to Arctic discovery, and Captain Parry proposed a plan to attempt to reach the North Pole by means of travelling with sledge-boats over the ice. Sir Humphry Davy, the President, wrote to Lord Melville, expressing the conviction of the Council that Parry's expedition could not fail to afford several valuable scientific results, and to settle many important matters of scientific inquiry. Lord Melville replied, "that, the Council having no doubt balanced all the "difficulties against the probable advantages, and having declared in favour of the expedition, I do not feel "myself at liberty to withhold my assent to Captain Parry's earnest request." In a letter to the Council, Captain Parry says, "that the liberal and enlightened views of the Council mainly led to the adoption of the "enterprise by the Admiralty."

In 1839 the despatch of the Antarctic expedition commanded by Sir James Ross, though originally suggested by a Committee appointed by the British Association, was urgently advocated by the President and Council of the Royal Society, who threw themselves unreservedly and with their whole weight into the scale, with immediate and decisive effect. The Council of the Royal Society then drew up a Report containing a detailed account of every object of inquiry which should receive attention from the explorers.

In 1845 the Council of the Royal Society again urged the importance of Arctic research, and their representations led to the despatch of the Franklin Expedition; since which time no Government scientific expedition has been fitted out for the exploration of the unknown area round the North Pole.

Fish River, where, had proper foresight been exercised, they could easily have been rescued. Subsequent experience has shown that the fatal omission which led to this catastrophe was the want of proper depôts of provisions being arranged so as to cover the escape of the crews, in the event of disaster to the ships—a measure of precaution which, since that disaster, has always been carefully provided for in all subsequent expeditions with signal success. This expedition of Sir John Franklin in 1845 was the last *scientific expedition* sent by Great Britain into the Arctic regions. In 1848 the search for Franklin's expedition was pressed on the Government by the public, and from that date up to 1861—a period of thirteen years—was steadily persevered in, no less than fourteen public and private expeditions having gone and returned during that period. So far as the people in those expeditions were concerned, they all returned in safety, and the proportion of deaths from climate and disease was considerably less than the average death-rate of our naval seamen on any other service; and this in spite of the extraordinarily severe exposure and labour to which men and officers were subjected, by the novel introduction of sledge-travelling whilst the expeditions were frozen in winter quarters. Dr. Donnet, Inspector-General of Fleet and Hospitals, shows that at one period, out of 1,878 persons who wintered repeatedly in these expeditions, the death-rate was only 1·7 per cent., and states that the risk from climate and disease in a voyage to the Arctic seas "is not greater than that which a ship like the *Challenger* will incur in her voyage of discovery." These fourteen Searching Expeditions were equipped simply for the purpose of rescuing Franklin, and in nowise professed to be of an exploratory or scientific character; and it was only incidentally, and as a pure matter of individual zeal, that anyone turned his attention to scientific observation, although, as a matter of fact, the various observations made by officers during their explorations contributed considerably not only to geographical, but to other branches of natural knowledge.

The general result pointed distinctly to the two following conclusions: that with the introduction of steam power in Arctic ships, and the remarkable improvements in victualling them, navigation in Polar seas had been rendered comparatively safe, and those maladies warded off from which seamen had suffered in ancient times. Further, that with proper organization and good discipline double the work could be accomplished; whilst the men employed sought Arctic service as the most popular employment in the navy. The circumstance that for some years past the ordinary sailing whaler to Baffin's Bay has been entirely superseded by the fortified steam-ship, and that since this transition no fatal accident has occurred, but that these vessels annually reach a high northern latitude in pursuit of their calling, and return with ease and safety, is one the significance of which cannot be over-stated.

On the solution of the fate of Franklin's expedition in 1861 Great Britain again withdrew from the field of Arctic research; but it was not so with other European nations. They, fired by the accounts of these different Arctic explorers, and of the honours reaped by British seamen and travellers, sought immediately to enter a field which had so redounded to our national honour; and Sweden, Germany, Austria, Russia, and notably America, year after year, made efforts to extend the area of human knowledge towards the North Pole, which, creditable and honourable as they were to those concerned, were undertaken with totally inadequate means and resources.

Under Dr. Kane and Dr. Hayes and Captain Hall, the Americans have attempted, with private expeditions, to emulate the achievements of the public ones of this country. The sufferings, the hardships, insubordination, and small results, in comparison with the expenditure and expectations of these American private expeditions, fully confirm the opinions of all British Arctic authorities as to the necessity for the officers and seamen in such expeditions being always under naval control and discipline, and strengthen us in saying that no amount of private enterprise, enthusiasm, or funds will justify the risk to lives or the success of an expedition, such as the Royal Geographical Society contemplates, except under Government auspices and Government control. That conceded, the safety of an expedition is comparatively guaranteed, so far as life is concerned, and its success for the objects set forth rendered doubly sure. It is contrary to fact, as has been alleged, that in public Arctic expeditions life has been sacrificed; and it is easy to show that the greater portion of the suffering and danger to which Arctic explorers have been subjected is owing to the want of organisation and discipline incident to private expeditions, and to the expeditions being entrusted to unprofessional leaders. Moreover, it cannot be too strongly insisted upon, that, with modern improvements and appliances, navigation in those seas has been made far more certain than it was in former years. That some risk may be incurred by individuals in prosecuting

scientific research in an Arctic climate is not denied; but it may be confidently affirmed that no one who participates voluntarily in such an expedition would hesitate to incur such risks, and equally that life lost in the serious pursuit of knowledge is, to say the least, as worthily sacrificed as in other human occupations which involve similar dangers.

With these facts before us we now turn to the subject of a fresh Polar expedition, of a purely scientific character, to deal with the points set forth in the first paragraph of this memorandum.

It will be seen, on reference to a circumpolar chart, that the entire area within the 80th degree of north latitude, except at two points—Parry's furthest in 1827, and the American explorations at Smith Sound—is an entire blank. In addition to this, there is a great area north of Behring's Straits, between long. 150° E. and 130° W., which is likewise unknown. The aggregate of these two areas around our northern Pole is not less than 2,400,000 square miles.

Since 1865 the Council of the Royal Geographical Society have constantly had their attention turned to the desirability of extending their researches into this vast unknown region, and had they been justified in risking private expeditions upon such an enterprise, they might safely have appealed with success to their countrymen for funds and volunteers to undertake them, but they have, for reasons stated, preferred to urge such an undertaking on the Government, and in the same year a strong representation was made to the Duke of Somerset, then First Lord of the Admiralty, on the subject. At that time there was considerable divergence of opinion amongst English and other Arctic authorities as to the best route by which an expedition should be despatched, for successful exploration within the unknown area around the North Pole, and Swedish and German expeditions were then making the attempt by way of Spitzbergen. His Grace declined to entertain the proposition until the results of those said expeditions were known.

In consequence of this view, the Council of the Royal Geographical Society carefully watched the results of expeditions undertaken by foreign countries, in order to be in a position to recommend one route as undoubtedly the best, before again pressing the subject upon the attention of the Government. Eight years have now passed, and during that time additional experience has been accumulated by the Germans and Swedes, which has enabled the Council to form an opinion that justifies the renewal of their representation made in 1865. The distinguished Arctic officers* who are members of the Geographical Council, and who have carefully considered the evidence accumulated since 1865 in a Special Committee, are now unanimously of opinion that the route by Smith Sound is the one which should be adopted with a view to exploring the greatest extent of coast-line, and of thus securing the most valuable scientific results. They have recommended the Smith Sound route for the following reasons:—

1. That it gives a certainty of exploring a previously unknown area of considerable extent;
2. That it yields the best prospect of most valuable discoveries in various branches of science;
3. That, from the continuity of the land of Greenland and the Arctic archipelago southward from the 82nd parallel to the open sea in Baffin's Bay and Davis's Strait, it promises reasonable security for a safe retreat for the crews of an exploring expedition, should their ships be unable to be extricated from an advanced position, which, with steam-power, is a most remote possibility.

These opinions have been still further fortified by the recent report of the crew of the *Polaris*, which ship, it appears, safely navigated up Smith Sound 250 miles beyond the point reached by Dr. Hayes's schooner in 1861, and traced the land on either hand as far as 82° 16′ N. She subsequently returned, and although a portion of her crew were separated from her, and took to an ice-field in 77° N., they drifted under the influence of the Polar stream down to a point in Labrador (where they were picked up this spring), a distance of 1,400 miles. This is the fifth occasion on which the Polar current through Smith Sound and Baffin's Bay has drifted vessels into the Atlantic; proving that the opening called Smith Sound is a channel with a constant current flowing southward from the unknown area.

The boat's crew from the *Polaris* report open water at their furthest point to the north, in 82° 16′ N., a milder climate than has been found in more southern positions,

* Sir George Back, Admiral Collinson, Admiral Ommanney, Admiral Richards, Sir Leopold McClintock, Admiral Sherard Osborn, Mr. Findlay, Mr. Clements Markham.

and that terrestrial animal life abounded near their winter quarters, in 81° 38′ N., including musk oxen—a point the importance of which cannot be overrated.

The Admiralty have the means, by referring to past records and living authorities, of laying down clearly and economically all the requirements for such an expedition as is contemplated. It is therefore unnecessary in this Memorandum to enter into any lengthened detail on the subject. But we may say that in general terms we only seek that it should consist of two moderate-sized screw-steamers, one to be stationed at some distance within the entrance of Smith Sound, the other to advance, as far as possible, to the northward (preserving communication with the depôt vessel), from which point sledge parties would start in the early spring, and explore the unknown region in various directions, whilst the scientific staff on board the respective ships, being in near proximity to the land, would be able to prosecute researches both on shore and by means of the ice on the sea. The advanced parties would be in such a position as to be able to fall back upon the consort, at her station near the entrance of Smith Sound. Thence, in the improbable event of accidents, the whole expedition would retreat to the Danish settlements in Greenland, as has been before done.

In conclusion, we may be allowed to add that the Council of the Royal Geographical Society has never appealed to the Government to undertake enterprises which are of a nature to admit of being carried out by private enterprise. In almost every part of the unknown regions of the globe their emissaries have been and are abroad, and at the present time they have on hand *two* expensive and difficult explorations in the interior of Africa. But, for Arctic Exploration, the conditions under which the investigations must be made, for reasons already explained, are such that they can only be conducted through the instrumentality of a Government Expedition.

Enclosure No. 4.

Since the date of the last Arctic deputation appointed to bring the subject of Arctic exploration before Her Majesty's Government, the particulars of the voyage of the *Polaris* have been made known.

Successful voyage of the "Polaris."

It was then (December 16, 1872) thought by Arctic authorities, that the best route for discovery was by Smith Sound, but there was no certainty as to its being navigable. It is now known that the *Polaris* sailed from Baffin's Bay to 82° 16′ N., without obstruction of any kind, and that, at her extreme point, there was a "water sky," and every sign of the sea being navigable further north at some period of the open season.

Current down Smith Sound.

Driftwood.

Meeting of tides.

Moreover, it was discovered, that a constant current flows down the strait, and drift-wood was found on its shores. The meeting of the flood tides coming from different directions is another proof of an open sea, during part of the navigable season, in the far north. The constant southerly drift is also a proof that a ship or boats can always return by Smith Sound, and that there is no danger of permanent detention.

Assurance of safety.

Abundance of animal life.

The abundance of animal life, including musk oxen, at the extreme northern point, is a very important discovery; and many things, indicated by Dr. Bessels, tend to show that the results of a well-equipped expedition will be most valuable to science.

Scientific results.

This is fully anticipated by Dr. Hooker as regards botany; by Mr. Prestwich, as regards geology; by Dr. Allman and Mr. Gwyn Jeffreys, as regards zoology; by Mr. Norman Lockyer and Mr. Balfour Stewart as regards physics and meteorology; for reasons which those men of science have stated in detail. Dr. Carpenter is now also strongly in favour of the Smith Sound route.

Change caused by steam in ice navigation.

The voyage of Captain Markham shows the great change that powerful screw steamers have made in ice navigation. His vessel was only detained 60 hours by the ice of Melville Bay, where former expeditions composed of sailing vessels had usually been stopped for several weeks. It is also remarkable, that in his short summer cruise he passed the furthest points reached by Sir Edward Parry's expedition in 1844; by Sir James Ross' in 1848; by Mr. Saunders' in 1850; by Captain Forsyth's in 1850; by Mr. Kennedy's in 1851; and within a few miles of Sir L. McClintock's in 1858.

Favourable season.

Captain Markham reports that the two last seasons have been specially favourable, that 1874 will probably be the same, and that it is of great importance that the undertaking should not be delayed.

Mr. Gladstone.

These are all the noteworthy points which have become known during the present year, and which justify another appeal to the Government. Mr. Gladstone has since become Chancellor of the Exchequer. He was a member of the Government which in 1845 despatched the last scientific Arctic Expedition. He was also on the Select

Committee of the House of Commons on Sir John Ross' case in 1834; and his name is appended to the report in which he and his colleagues state that "they cannot overlook the public service which is rendered to a maritime country, especially in times "of peace, by deeds of daring, enterprise, and patient endurance of hardship, which "excite the public sympathy, and enlist the general feeling in favour of maritime "adventure."

He has never since intimated that he has seen reason to change or modify these views, which are worthy of the Prime Minister of England.

MR. DISRAELI TO SIR HENRY RAWLINSON.

Dear Sir Henry Rawlinson, 10, Downing Street, Whitehall, Nov. 17.

Her Majesty's Government have had under consideration the representations made by you on behalf of the Council of the Royal Geographical Society, the Council of the Royal Society, the British Association, and other eminent scientific bodies, in favour of a renewed expedition, under the conduct of Government, to explore the region of the North Pole; and I have the honour to inform you that, having carefully weighed the reasons set forth in support of such an expedition, the scientific advantages to be derived from it, its chances of success, as well as the importance of encouraging that spirit of maritime enterprise which has ever distinguished the English people, Her Majesty's Government have determined to lose no time in organizing a suitable expedition for the purposes in view.

I remain,

Major-General Sir Henry Rawlinson, K.C.B. Yours faithfully,

B. Disraeli.

APPOINTMENT OF THE ADMIRALTY ARCTIC COMMITTEE.

Sir, Admiralty, 24th November 1874.

My Lords Commissioners of the Admiralty consider it requisite to appoint a Committee of experienced officers who have served in the Polar Regions to aid them in the consideration of the following points in connexion with the proposed expedition to the North Pole:

I. The scope of the proposed expedition.
II. The orders which should be given for organizing and carrying it into effect.
III. The description of the ships to be employed.
IV. The most suitable place for winter quarters.
V. The various kind of stores, provisions, and clothing which will be required.
VI. The preparation of boats, sledges, fittings, &c.
VII. Whether dogs should be employed.
VIII. The selection of ice masters, quarter masters, &c.
IX. The sanitary arrangements best calculated to preserve the health of officers and men of the expedition.
X. A general consideration of all details in regard to the expedition itself.

My Lords being desirous of availing themselves of your Arctic experience, have directed me to request that you will serve on the proposed Committee in conjunction with the under-mentioned officers; viz., Rear-Admiral Sir L. McClintock and Rear-Admiral Sherard Osborn, C.B.

The Hydrographer of the Navy will be placed in communication with the Committee, and will be directed to afford all information in his power in regard to hydrographical questions, and the provision of necessary scientific instruments.

The Controller of the Navy, the Director-General of the Medical Department, and other heads of departments, will be also directed to afford the Committee all the infor-

mation and assistance in their power with reference to the subjects relating to their respective departments.

My Lords are desirous that the Committee should commence their consultations at once, and propose that they should assemble in this office on Tuesday next the 1st December at 11 a.m.

I am, &c.,

Rear-Admiral G. H. Richards, C.B. (Signed) ROBERT HALL.

Note.—Similar letters to the foregoing were also addressed to Rear-Admiral Sir F. L. McClintock, Kt., and Rear-Admiral Sherard Osborn, C.B.

REPORT OF THE ADMIRALTY ARCTIC COMMITTEE.

Admiralty, Whitehall, 4th February 1875.

IN pursuance of the instructions of the Lords Commissioners of the Admiralty, conveyed to us in their Secretary's letter, dated 24th November 1874, the Committee have held 19 meetings between the 1st December 1874, and the 4th of February 1875, and have the honour to report as follows on the several points submitted for their consideration:—

I. The scope of the proposed expedition.

II. The orders which should be given for organizing and carrying it into effect.

III. The description of the ships to be employed.

IV. The most suitable place for winter quarters.

The foregoing points, I., II., III., IV., are so intimately connected, that the Committee propose to deal with them collectively, and without adhering to the order in which they occur.

Description of Ships.

1. The ships to be employed for the main expedition should be two screw steam vessels, strengthened and fitted for Arctic service, and capable of carrying coal for fuel, provisions, stores, &c., for at least three years, for a complement of about 60 to each ship, and as much coal for steaming purposes as circumstances will admit of, without being too deeply immersed. The two vessels selected by the Admiralty on the recommendation of the Committee, viz., H.M. ship "Alert" and the sealing ship "Bloodhound,"* appear to be in all respects suitable for the service.

2. It appears desirable as a measure of precaution, that 50 or 60 tons of coal should be sent to Disco, for the use of the expedition, either in one of the whaling vessels which start earlier than the Polar ships, or in a hired transport.

3. Should the expedition not have returned to England by November 1876, a third ship should be prepared and strengthened, to leave England in the spring of 1877, to be placed as a depôt and relief ship at some position to be decided upon near the entrance of Smith Sound, probably inside Lyttelton Island; her special duties, and the instructions to be given her Commander, will be referred to hereafter.

Scope of the Expedition.

4. The scope and primary object of the expedition should be to attain the highest northern latitude, and, if possible, to reach the North Pole; and from winter quarters to explore the adjacent coasts within the reach of travelling parties. The limits of ship navigation should be confined within about the meridians of 20° and 90° of west longitude.

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* Since renamed the "Discovery."

The Route.

5. The route by Smith Sound appears by far the preferable one to adopt, for the following reasons:

a. Its southern entrance, in the latitude of 78°, has been found free from ice by the several vessels which have visited it since 1852; of late years, the sound has been penetrated for a considerable distance by American exploring expeditions, notably by Hall, who reached and wintered beyond the 81st parallel without much difficulty, and the vessels comprising these expeditions were far inferior in power and equipment to those which will compose the present.

b. Smith Sound is known to have a continuous coast line on either side up to the parallel of about 82°, the highest point yet reached, with comparatively well determined points, where records of the progress of the expedition could be deposited and depôts of provisions placed, if necessary. There are likewise the Danish settlements on the west side of Greenland to fall back upon by boats, should the expedition be hard pushed, and the steam whalers frequent a high latitude in Baffin's Bay every summer.

c. This route, moreover, offers the best—indeed the only—promise of a continuous coast line stretching far northwards, and upon this fact the prospect of reaching the Pole by travelling parties mainly depends. It is the only route, so far as our knowledge extends, where the operations of an expedition can be confined within such limits that succour would be reasonably certain of reaching it.

d. Finally, animal life has been found to exist to a considerable extent in the highest latitude yet reached up Smith Sound,—an advantage which cannot be over estimated as regards the health and comfort of the crews; and, as a matter of fact, Esquimaux are found up to the entrance of Smith Sound, who appear to have a knowledge of regions to the northward; and it is possible that some of their race may be found to exist in a higher latitude than has yet been attained.

Orders to be given.

6. It appears from experience hitherto gained, that the final departure of the expedition from England may be deferred until the middle of June, though an earlier date, if the equipment of the ships can be hastened, may be desirable in the interests of scientific research.

The ships should proceed to Disco, in Greenland, where they would touch, as well as at the settlements of Proven and Upernivik for dogs, Esquimaux drivers, &c., and then pass up to Smith Sound in the prosecution of the enterprise.

7. Both shores in the vicinity of Capes Isabella and Alexander should be examined, in order to select a suitable position for the depôt or relief ship to be despatched in 1877; but as such a position cannot be absolutely determined on before-hand, and it is necessary to decide where information will be found by any ship which may be subsequently sent out from England, Lyttelton Island, in our opinion, meets all the requirements of a fixed point for rendezvous. Here a conspicuous cairn should be erected; one record placed in the cairn, another laid beside it, and a third buried 20 feet due north of it. These records should contain proceedings of the voyage and such information as may be necessary for the commander of the ship to be despatched in 1877.

8. The ships should then proceed up Smith Sound with all speed, so long as its navigation is not seriously obstructed by ice, carefully scrutinizing its shores for places of security for the ships, and stopping only to erect cairns on such conspicuous points as may be conveniently landed on. Similar information should be placed at these cairns, and after the same method as described for the cairn on Lyttelton Island. The commander will not fail to bear in mind, that these records of his progress and of any change of plans he may have found necessary to make, form an important feature in his instructions.

It is desirable that these cairns should not be more than sixty miles apart. By way of illustration, we would name Capes Frazer, Back, and Beechey on the western shore, and Capes Jackson and Bryan on the eastern shore; to these prominent headlands the attention of any searching party would naturally be directed. A small depôt of provisions and a boat might also be advantageously left at one or more of these points, to serve either for exploring parties or to aid in the event of an abandonment of the ships.

9. The general design of the voyage should be, that while both ships would share as far as possible in the objects of discovery and exploration, one must be so placed that she would not only serve for the crew of the other to fall back upon, but also, that the united crews could, without doubt, escape from her to the relief ship at the entrance of Smith Sound, by means of their sledges and boats over the ice.

Consequently, the second ship must not be carried northward of the 82nd parallel; such a position would secure this most important object, and also afford every prospect of exploration into very high latitudes.

10. The eastern or the western shore may be selected for her winter quarters according to circumstances; the advantages of the former are, that animal life has been found to exist there throughout the winter, and that the ship would be favourably placed for exploring the northern coast of Greenland, or adjacent land in the spring of 1876: on the other hand, if continuous land on the western shore is found, it may, in the judgment of the officer in command, afford a counterbalancing advantage, in the greater facility and security of communication between the ships, and their co-operation in subsequent operations; this point must, therefore, be left to him to decide; if he should select the western shore, then he would be careful to leave a record on the eastern side of the probable position of the second ship; and in the absence of any conspicuous cairn, a ship or party visiting the bay wintered in by the "Polaris," in about 81° 35′ north, would naturally seek the position of Hall's grave, where, and at 20 feet due north of it, records would be expected to be found.

11. The commander of the second ship, wherever placed, would follow such instructions as he received on parting company, or subsequently, from the officer commanding the expedition.

12. It should be a matter for consideration, whether, before parting, the leader would leave a depôt of some six months' provisions with the second ship, in the event of his own crew having to retreat, but time and circumstances must govern his decision on this point.

13. Having assured himself of the safety of his second ship, and increased his own crew by such portion of hers as he may deem necessary to enable him to accomplish a sledging attempt to reach the Pole, this being the main feature of his voyage, and also the exploration of his share of the coast line extending northwards, the leader of the expedition should then push on northward, and explore by ship as much of the unknown area as the season and the state of the ice would permit. But it is not contemplated that the two ships should winter at a greater distance apart than about 200 miles; and the officer in command, if he advance with his ship beyond that point in 1875, should use his best endeavours to return within the 200 miles distance, or the case may arise, in which it may be even wise to rejoin his consort and unite their forces for exploration in the spring and summer of 1876.

14. Should the advance ship, after leaving her consort, carry continuous, or nearly continuous land up to a high northern latitude, the officer in command should avail himself of opportunities to land small depôts of provisions at intervals, with cairns and records as already described; and also to deposit at the most northern station, a depôt of provisions and a boat, for his spring travelling parties.

15. In the absence of continuous land, it must not be lost sight of that sledge travelling has never yet been found practicable over any considerable extent of unenclosed frozen sea, although conditions may be found to exist which would enable parties to travel for limited distances by sledge and boat operations combined, and for this purpose the best boats and sledges that can be devised have been supplied. The leader having increased his own crew by such portions of the crew of the second ship as he may deem necessary, it is expected that he will have at least six strong sledge parties and four dog sledges.

In early spring his sledge exploration will commence, and all these parties should be employed in the first instance to push out the North Pole party (which should be provided with at least one boat) and upon return from this work, some weeks later, the parties for the exploration of the coast lines should be sent out.

16. It must be left to the officer in command to furnish ample instructions to his second, especially in regard to the explorations to be undertaken by him during the spring and summer of 1876, should the ships winter apart; and in this event, the first consideration should be, in the autumn of 1875 or early spring of 1876, to ascertain their respective positions; this, unless under very unfavourable conditions, would be

probably accomplished by dog parties, without interfering much with the objects of exploration.

In connexion with this subject the leader should bear in mind the necessity of giving such instructions as would govern his proceedings in the event of this proving to be a final separation.

17. It will be impossible to give any positive or detailed instructions for the guidance of the officer in command of the expedition after quitting his consort, further than that he should use his best endeavours to rejoin her in the navigable season of 1876, and in company with her return to England, provided his spring exploration has been reasonably successful. But in the event of another season being absolutely required to complete a reasonable amount of exploration, still it will be a matter for his careful consideration, whether it would not be advisable that the advanced ship should fall back towards her consort from any advanced position she may have wintered at; and, should it still remain doubtful whether a final retreat could be effected, the second ship might not be moved southward to such a position as would secure it.

18. In 1877 the leader should be at full liberty to abandon his ship as early as convenient, if, in his opinion, the explorations of the preceding year had been final, or, if from his experience of the navigable seasons of 1875–76 that her escape in 1877 would be doubtful; and he should so time this abandonment as to reach the relief ship at the entrance of Smith Sound not later than the first week in September 1877.

In the event of his remaining out in the hope of extricating his own, or it may be both ships, during the summer of 1877, he should consider the propriety of reducing his own or both crews to a minimum, sending away all that can be spared to the relief ship at Lyttelton Island.

In this case one or both ships would remain out for the winter of 1877, if unable to extricate themselves in the summer of that year, a contingency which is hardly possible.

It is not desirable, under any circumstances, that a single ship should be left to winter in the Arctic regions. If one ship remains up Smith Sound, a second ship should remain at the rendezvous at its entrance.

19. It does not appear that any more definite instructions, than are embraced in the foregoing remarks, can be furnished to an officer already familiar with Arctic service, although there are many important points and details to which it might be desirable hereafter to direct his attention. With the ample means at his command, he may vary the detail according to circumstances, but the main points laid down by the Admiralty for his guidance can always be kept in view, and all other objects should be subordinate to them.

20. He will be aware that in the summer of 1877, a relief or depôt ship will be dispatched to Smith's Sound, and that she will take up, if possible, a position to be agreed upon with him before his departure from England, subordinate to any suggestions which may be deposited in the cairn at Lyttelton Island. The instructions to this ship, so far as they need be decided on at present, should be to be found at the rendezvous agreed upon not later than the last week in August, 1877. She should be equipped and fitted for wintering in the Polar Seas, and, in the event of there being no tidings of the expedition nor instructions to the contrary, in the records to be found at the rendezvous, she should be ordered to winter at the position agreed upon.

21. If, under the circumstances alluded to in paragraph 18, the retreating parties should arrive at Lyttelton Island in 1878 and find no relief ship there, or no intelligence of her, it will be taken for granted that some unforeseen accident has prevented her reaching Lyttelton Island, and in that case the retreating parties must rely on their own resources for reaching Upernivik, looking out, of course, for the whalers on their fishing grounds between the months of May and August. The expedition will, in any case, on its return revisit the cairn on Lyttelton Island and leave records.

22. There is one other point which it may not be out of place briefly to refer to, notwithstanding that the officer in command is an experienced nautical surveyor, and it is this, that no minute surveys are necessary, nor, on an expedition of this character, are they possible. As a rule, the requirements of hydrography and geography will be

amply provided for, if the principal points discovered are determined with all the accuracy attainable, and the prominent features and general outline of the shores sketched in as faithfully as time and circumstances will admit, soundings being obtained when practicable.

23. The scientific memoranda furnished by the Societies at the request of the Admiralty should be supplied to the commanding officers, with instructions that the various suggestions therein contained should be carried out as far as circumstances will admit.

24. Should the season of 1875 be so unfavourable as to prevent the expedition from penetrating beyond the 79th parallel, it is for their Lordships to decide whether the ships would winter there or return to England and renew the attempt the following year.

V. The various kinds of stores, provisions, and clothing which will be required.

With the assistance of the two officers placed at their disposal by their Lordships, viz., Dr. David Lyall, Deputy Inspector-General of Hospitals and Fleets, and Mr. James Lewis, Paymaster, R.N., both of whom have had considerable experience in Arctic Service, the Committee have carefully considered all points connected with the provisions and clothing, and have decided on the species and quantities of each to be supplied to the expedition, together with scales of daily issue of the former, subject of course to any modification which the officer in command may, from time to time, feel it desirable or necessary to make. Lists also of the various kinds of stores requisite for the equipment of the "Alert" and "Bloodhound" for Arctic service have been drawn up.

For papers connected with the purchase of the "Discovery," see pages 35–39.

VI. The preparation of boats, sledges, fittings, &c.

The construction of the boats has been considered with a view to their employment on ordinary service, to their adaptability for navigating among ice and to their portability for carrying on sledges, and their numbers have been determined on the principle, that they should conveniently carry the whole of the crews, with ample provisions, under any contingencies which can be provided against. Their numbers, descriptions, and the names of their builders, will be found in the Appendix. In regard to sledges, the numbers have been determined on, viz., about 26 for both ships, and their construction is left to Sir Leopold McClintock, under whose superintendence the Expedition is being fitted at Portsmouth.

Not printed.

VII. Whether dogs should be employed.

The Committee are of opinion that dogs could be employed with advantage for auxiliary travelling and other purposes, and that with this view arrangements should be made with the Danish Government for providing a certain number of those animals, together with Esquimaux drivers, interpreters, &c., at the settlements on the Western Coast of Greenland, where the ships would call for them. For the correspondence on this subject, together with that respecting the engagement of Mr. Petersen, as principal interpreter, dog driver, &c., see Appendix.

See page 28.

VIII. The selection of ice-masters, quarter-masters, &c.

The Committee recommend that the practice adopted in former expeditions be adhered to, viz., that three ice quarter-masters be attached to each ship, and that they be selected from the crews of the whaling vessels at the northern ports of the United Kingdom. For the correspondence, respecting the terms on which these men shall be engaged, see Appendix.

See page 25.

IX. The sanitary arrangements best calculated to preserve the health of officers and men of the Expedition.

The Committee are of opinion that the precautions most conducive to health and comfort on an expedition of this character are, first, that the officers and crew should be selected with a due regard to their age and physical fitness; and, secondly, that they should be liberally supplied with the best provisions which can be procured, anti-scorbutics and medical comforts, as well as suitable clothing.

Upon these points, especially as regards the provisions, the Committee have been guided by their own experience with expeditions under the late Captain Austen and Sir Edward Belcher, in the years 1851–2–3–4, as well as the evidence of several of the seamen who served in these expeditions, and whom they have called before them.

The equipment of ships for Arctic service is now so well understood, that the Committee have not thought it necessary to offer any special sanitary suggestions on this point (the more especially as the ships of the present expedition are being fitted and equipped under the personal superintendence of their experienced Arctic colleague, Rear-Admiral Sir Leopold McClintock), further than that all possible measures should be taken to secure warmth, ventilation, and the absence of condensed vapour from between decks.

All details connected with the sanitary arrangements, together with drawings and plans of the ship's internal fittings, will be found in the Appendix. Not printed.

X. A general consideration of all details in regard to the expedition itself.

Many of the details connected with the expedition have necessarily been mixed up and considered with the main points submitted to the Committee by their Lordships, and will be found recorded in the daily minutes of proceedings, but the most important of the detailed arrangements will be connected with the travelling and sledge equipments, which must be carried out at the port where the ships are being fitted out, under the superintendence of Sir Leopold McClintock, aided by the officers of the expedition.

The Committee now believe that they have fully considered and reported on all the important points submitted to them, and as much of the detail as can be decided on at this early period of the outfit of the expedition; but they would desire to point out that their labours have been carried on, for the most part, during the absence of the leader of the expedition on foreign service; now that Captain Nares has returned to England, and during the progress of the equipment, some modifications of the Committee's views on minor, or even material points, may be found desirable as circumstances develop themselves; and in the event of any such modifications being found necessary, they would suggest that they should form a supplement to this report, in order that a concise and comprehensive record should be preserved of all matters connected with the equipment of the expedition, up to the date of its departure from England. Such a record, if further supplemented by a precis of the correspondence which may arise during the fitting out of the expedition, would be of great service should it become necessary to equip a relief ship in the winter of 1876–77.

Though the Committee believe that their own labours are ended, they would suggest that the services of the two officers who have been associated with them—Dr. Lyall and Mr. Lewis—should be retained for the present, and until the different articles of provisions, clothing, &c. which have been ordered to be prepared are delivered over into store, in order that they may examine and certify as to their fitness for the service.

Finally, the Committee would desire to acknowledge the ready assistance and courtesy they have received from the heads of departments and the officers with whom their Lordships have placed them in communication. With the heads of the Contract and Victualling Departments, the Committee have been in daily communication, and nothing could exceed the readiness with which these gentlemen and their staff have met their views and wishes in every respect.

GEO. HENRY RICHARDS,
Rear-Admiral.
F. L. McCLINTOCK,
Rear-Admiral.
SHERARD OSBORN,
Rear-Admiral.

Wm. Blakeney, Paymaster, R.N.,
Secretary to Arctic Committee.

DOGS REQUIRED FOR THE EXPEDITION.

SECRETARY of the ADMIRALTY to UNDER SECRETARY of STATE for FOREIGN AFFAIRS.

No. 1.

SIR, Admiralty, 5th December 1874.

I AM commanded by my Lords Commissioners of the Admiralty to acquaint you, for the information of the Earl of Derby, that their Lordships have decided that

dogs should be largely employed for auxiliary purposes in the proposed Arctic Expedition.

I am therefore directed by their Lordships to request that you will move the Secretary of State to cause a request to be made to the Danish Government to authorise their agents to collect at Disco, Prövén, and Upernivik about 20 dogs at each place, 60 in all, and four dog sledge drivers and hunters who can speak Esquimaux and who have some knowledge of English. These should all be ready by the 15th June 1875.

I am, &c.
(Signed) ROBERT HALL.

The Under Secretary of State,
&c. &c. &c.
Foreign Office.

UNDER SECRETARY of STATE for FOREIGN AFFAIRS to SECRETARY of ADMIRALTY.

No. 2.

SIR, Foreign Office, 30th January 1875.

I AM directed by the Earl of Derby to request that you will inform the Lords Commissioners of the Admiralty that the Danish Government have expressed their readiness to do all in their power to assist the Arctic Expedition, and are prepared to carry out, to the best of their ability, the wishes expressed in your letter of the 5th ultimo, respecting the collection of dogs, sledge drivers, and hunters.

The note from the Minister for Foreign Affairs, however, of which a copy is enclosed, shows that it is feared that dogs may be difficult to find, and that it is not clearly comprehended what is the number of men required. If under these circumstances the Lords Commissioners should desire any further intimation of their wishes to be sent to Copenhagen, it would be as well that this office should be informed at an early date, as the Danish Government proposes to send their instructions about the middle of next month.

I am, &c.
(Signed) TENTERDEN.

The Secretary to the Admiralty.

(Enclosure to Foreign Office Letter.)

(Translation.)

SIR, Copenhagen, 23rd January 1875.

I HAVE the honour to send you information conveyed to me by the Minister of the Interior upon the subject of your letter of the 14th of last December, relating to the measures to be adopted to second the Arctic Expedition now fitting out in England.

The Minister of the Interior is quite disposed to do all that lies in his power to conduce to the assistance asked for, in the matter of dogs and sleigh drivers, being given to the expedition at due time; but having, in view of the sickness which, for several years, has raged among the Greenland dogs and the consequent dearth of good sleigh dogs, especially in Upernivik and Prövén, he is not prepared to promise distinctly that the desired number shall be placed at the disposal of the chief of the expedition.

As regards sleigh drivers and hunters, the Minister of the Interior, who has understood your note in this sense, that only four of these men were necessary in all, and not four at each of the three named stations, doubts the possibility of finding this number of individuals possessing the indicated qualifications and inclined to charge themselves with the service in question.

Persuaded, however, that a certain number of dogs can be procured, and considering as probable that some Greenlanders or Danes can be found who, at least to a certain extent, possess the desired qualities, the Minister of the Interior will take immediate steps to send the requisite instructions to competent employés in Greenland as soon as he shall have been informed that, within the limits above indicated, the Government of Her Majesty desires the measures in question to be taken.

Begging you therefore, M. le Chevalier, to be good enough to cause me to be informed of the view taken by your Government in the matter, I desire to add that, as the instructions to the Greenland employés cannot be sent before the middle of next month, it is little probable that the preparations in question can be completed before the 15th of June at Prövén and Upernivik, which stations letters can hardly reach before that time, unless indeed their transmission is by means of the English Expedition itself.

I have, &c.
(Signed) ROSENÖRN LEHN.

Sir C. Wyke, K.C.B.,
&c. &c. &c.

No. 3.

SECRETARY of ADMIRALTY to UNDER SECRETARY of STATE for FOREIGN AFFAIRS.

Admiralty, 5th February 1875.

SIR,

WITH reference to your letter of the 30th ultimo, in regard to the desire expressed by the Danish Government to assist as far as possible in procuring dogs, sledge drivers, and hunters for the intended Polar Expedition, I am commanded by my Lords Commissioners of the Admiralty to request you will inform the Earl of Derby that it is desirable the Danish authorities should be acquainted that three or four hunters and dog drivers *in all* (not four for each of the stations named) will be required, and that if orders are given to that effect, and as many dogs as can be procured (not exceeding 60 in all) are got ready by the middle of June, the requirements of the expedition will be met in these respects.

I am, &c.

The Under Secretary of State for Foreign Affairs.

(Signed) VERNON LUSHINGTON.

SELECTION OF ICE QUARTERMASTERS.

SECRETARY of ADMIRALTY to COMMANDER MARKHAM.

No. 4.

Admiralty, 17th December 1874.

SIR,

I AM commanded by my Lords Commissioners of the Admiralty to signify their directions to you to proceed to Dundee or Aberdeen to engage the services of six ice quartermasters for the intended Polar Expedition, and having made terms with them subject to their Lordships' approval, to inform them that they will be borne on the books of one of Her Majesty's ships till their services are required.

The highest rate of pay received by a chief quartermaster in the service, viz., 50*l.* 3*s.* 9*d.* a year, is to be offered to the ice quartermasters, to be doubled on leaving England; and the men should undergo a preliminary medical examination prior to their being engaged, which is to be undertaken by the medical officer of the drill ship of the Naval Reserve at the port where their engagement may be made; their ages should not exceed 35 years.

I am, &c.

Commander Markham, R.N.

(Signed) ROBERT HALL.

No. 5.

COMMANDER MARKHAM to SECRETARY of ADMIRALTY.

21, Eccleston Square, S.W., 16th January 1875.

SIR,

IN obedience to the directions of the Lords Commissioners of the Admiralty conveyed to me in your letter of the 17th ultimo, I have the honour to report that I have engaged, subject to the approval of their Lordships, six men to act as ice quartermasters in the forthcoming Arctic Exploring Expedition.

I have deemed it expedient, in consequence of the difficulty I have experienced in obtaining suitable men, to depart from the instructions I received relative to their age; but I have only engaged such men as, in the opinion of Staff-Surgeon Colan, of the drill ship "Unicorn," and myself, are physically fit for the duties they will be called upon to perform.

I enclose an agreement that I caused the men to sign as a record of their having engaged themselves for the expedition, and also a brief statement of the past service of each individual.

I have explained to these men, as far as I was authorised, what their pay and position will be; but they are naturally desirous of learning whether an advance on their wages will be paid them for the purpose of procuring their outfit, and also whether those men who have not completed their period of drill in the Royal Naval Reserve (for they all belong to that body) will be required to undergo the full term. I beg to state that the medical examination under the supervision of Staff-Surgeon Colan has been of such a searching nature as to render further examination unnecessary, and I would submit that these men should be entered forthwith.

I have, &c.

The Secretary, Admiralty.

(Signed) A. H. MARKHAM, Commander.

LIST of MEN selected to act as ICE QUARTERMASTERS to the ARCTIC EXPEDITION.

Name.	Age.	Rating in last Ship.	Last Ship.	No. of Years at Sea.	No. of Whaling Voyages made.	Where born.	Whether married.	Number of Children.	Religion.	Whether can read or write.	Whale Ships served in.	Address.	Remarks.
David Deuchars -	29	Harpooner	"Arctic"	14	10	Dundee -	Yes	2	Presbyterian	Yes	"Victor," "Arctic."	8, Park Hill Place, Blackness Road, Dundee.	—
John Thores -	36	Harpooner	"Mezanthium."	23	20	Peterhead	Yes	9	Presbyterian	Yes	"Mezanthium," "Intrepid," "Xanthyus," and other Peterhead Whalers.	37.11, Anne Street, Maxwell Town, Dundee.	—
William Dougal -	40	Harpooner	"Polar Star"	25	24	Peterhead	Yes	1	Presbyterian	Yes	"Polar Star," "Polynia," "Eric," and others.	32, Hill Town, Dundee.	Passed one winter in Exeter Sound. Acquainted with dog driving.
James Berrie -	32	Boat Steerer.	"Eric"	15	6	Dundee -	Yes	2	Presbyterian	Yes	"Victor," "Eric."	8, Down Street, Dundee.	—
David Taws -	43	Harpooner	"Diana"	26	14	Dundee -	Yes	0	Presbyterian	Yes	"Diana," "Arctic," "Polynia," "Namhal," "Columbia."	68, Anne Street, Dundee.	Passed one winter at Luively.
Alexander Gray -	37	Harpooner	"Victor"	15	12	Peterhead	Yes	4	Episcopalian	Yes	"Lord Saltoun," "Queen," "Arctic," "Dublin," "Perseverance," "Victor."	26.3, Longate Street, Peterhead.	Passed five winters in the Arctic regions. Well acquainted with dog driving.

Dundee, 15th January 1875.

WE, the undersigned, do hereby agree to serve on board such ships of the forthcoming Arctic Exploring Expedition that we may be appointed to by the Lords Commissioners of the Admiralty, during which service we are to conform to the rules and regulations of the Navy, and to be amenable to the Naval Discipline Act.

DAVID DEUCHARS.
WILLIAM DOUGAL.
JOHN THORS.
DAVID TAWS.
JAS. BERRIE.
ALEX. GRAY.

Signed in my presence,
A. H. MARKHAM,
Commander.
15th January 1875.

NATURALISTS.

No. 6.

ADMIRAL HALL to SECRETARY of ROYAL SOCIETY.

SIR, Admiralty, 11th January 1875.

I AM commanded by my Lords Commissioners of the Admiralty to request you will inform the President and Council of the Royal Society that their Lordships are prepared to appoint two gentlemen, one to each ship, to fill the position of naturalists to the intended Polar Expedition, and that it is desirable that two candidates should be recommended by the Society, who, as only two can be accommodated, should be selected for their acquaintance with as many branches of natural history as possible.

These gentlemen will be expected to conform to naval regulations whilst thus employed, and to undergo a medical examination in common with all others engaged in the expedition, to ascertain their physical fitness before receiving their appointments.

On being furnished with the names of the two gentlemen the Society would recommend, their Lordships will name a day when it would be desirable for them to place themselves in personal communication with the Arctic Committee, or the officer who is to command the expedition.

I am, &c.

The Secretary of the Royal Society,
Burlington House.

(Signed) ROBERT HALL.

No. 7.

SECRETARY of ROYAL SOCIETY to SECRETARY of ADMIRALTY.

The Royal Society, Burlington House,
SIR, 22nd January 1875.

I AM desired by the President and Council of the Royal Society to inform you that they recommend Mr. Chichester Hart and Captain Feilden for appointment as the two naturalists to the Polar Expedition, referred to in their Lordships' letter of 11th January 1875.

I have, &c.,

The Secretary, Admiralty.

(Signed) THOMAS H. HUXLEY,
Secretary R.S.

No. 8.

SECRETARY of the ADMIRALTY to MR. HART.

SIR, Admiralty, 5th February 1875.

I AM commanded by my Lords Commissioners of the Admiralty to acquaint you that having decided to appoint gentlemen to serve as naturalists in the forthcoming

Polar Expedition, and understanding from the President and Council of the Royal Society that you are willing to afford your services in such a capacity, they have been pleased to appoint you as naturalist to the expedition, subject to your undergoing a medical examination as to your physical fitness for such service.

The conditions of your appointment as regards pay, provisions, and clothing are to be the same as those of the lieutenants of the expedition, the single pay of a lieutenant, viz., 10*s.* a day, being paid to you from the date of your appointment, viz., 1st February 1875, and double that amount from the date of the expedition leaving England.

You will while so employed be expected to conform to the customs and usages of Her Majesty's Navy; and I am to request you will be good enough to signify by letter to me your willingness to accept this appointment on the terms herein proposed.

I am, &c.

Chichester Hart, Esq. (Signed) VERNON LUSHINGTON.

Similar letter addressed to Captain Feilden, R.A., the concurrence of the War Office having been obtained.

ENGAGEMENT OF MR. PETERSEN AS EXQUIMAUX INTERPRETER.

SECRETARY of ADMIRALTY to MR. PETERSEN.

No. 9.

MR. C. N. PETERSEN, Admiralty, 22nd December 1874.

MY Lords Commissioners of the Admiralty have had under their consideration your request to be allowed to volunteer for service in the Arctic Expedition of 1875, and their Lordships are pleased to accept your offer (provided you are considered to be physically fit), under the following conditions, viz.:—

1. That you shall be entered on the books of one of Her Majesty's ships with the rating of Esquimaux interpreter for dog sledge duties.

2. That your pay shall be three pounds (3*l.*) a calendar month up to the time of the expedition leaving England, and six pounds (6*l.*) a calendar month from that date to the date of your being paid off.

3. That you shall be granted leave from this date till 1st of April 1875, and that, as your residence is at Copenhagen, your passage from thence to London shall be paid by Her Majesty's Government.

I am, &c.

(Signed) ROBERT HALL.

P.S.—Unless you should hear to the contrary, you are to report yourself on board Her Majesty's ship "Duke of Wellington," at Portsmouth, on the 1st of April next.

STORES SENT BY THE UNITED STATES GOVERNMENT FOR THE RELIEF OF THE "POLARIS" EXPEDITION.

SECRETARY of ADMIRALTY to UNDER SECRETARY of STATE for FOREIGN AFFAIRS.

No. 10.

SIR, Admiralty, 4th December 1874.

I AM commanded by my Lords Commissioners of the Admiralty to request that you will move the Earl of Derby to cause inquiries to be made of the Government of the United States, whether any of the stores or provisions sent out for the relief of the "Polaris" Expedition are still in the depôt on the west coast of Greenland, and if so, whether the Polar Expedition of 1875 may consider them available for use on giving proper receipts.

In the event of the stores at the depôt being placed at the disposal of the expedition, my Lords request that they may be furnished with a list of all such stores, provisions, &c.

I am, &c.

The Under Secretary of State, (Signed) ROBERT HALL.
&c. &c. &c.
Foreign Office.

No. 11.

MR. LISTER to SECRETARY of the ADMIRALTY.

SIR, Foreign Office, 9th February 1875.

WITH reference to your letter of the 4th of December, I am directed by the Earl of Derby to transmit to you, to be laid before the Lords Commissioners of the Admiralty, a copy of a despatch from Sir Edward Thornton, forwarding the reply of the United States Government to the application which he was instructed to make to them in regard to the stores of the "Polaris" Expedition, and I am to request you to move their Lordships to inform Lord Derby whether they would wish Sir Edward Thornton to be instructed to convey the thanks of Her Majesty's Government to the United States Government for the liberal way in which they have placed the stores in question at the disposal of the Arctic Expedition about to be despatched from this country.

I am, &c.

The Secretary, Admiralty. (Signed) T. V. LISTER.

No. 12.

MY LORD, Washington, 25th January 1875.

IN compliance with the instruction contained in your Lordship's despatch, No. 364, of 12th ultimo, I addressed a note to Mr. Fish, inquiring whether the stores sent to Greenland by the United States Government for the relief of the "Polaris" Expedition could be made available for the use of the Arctic Expedition about to be despatched by Her Majesty's Government.

I have now the honour to transmit copies of Mr. Fish's reply, and of its enclosures, from which your Lordship will perceive that the United States Government is willing to place at the disposal of that expedition all or any of the above-mentioned stores which can be found.

I have requested Mr. Fish to offer my thanks to the United States Secretary of the Navy for the readiness with which he has complied with the request of Her Majesty's Government, and for the good wishes for the success of the British Expedition, which he conveys on behalf of the Navy Department.

I have, &c.

The Earl of Derby, &c. &c. (Signed) EDWARD THORNTON.

No. 13.

Department of State, Washington,

SIR, 23rd January 1875.

I HAD the honour to inform you in my note of the 29th ultimo that I had referred to the Secretary of the Navy a copy of your note of the 26th ultimo, in which, under instructions from the Earl of Derby, you made inquiries concerning the condition and location of stores or provisions sent to Greenland by this Government for the relief of the "Polaris" Expedition, and whether the Polar Expedition to be despatched by Her Majesty's Government in 1875 may consider them available for use, and requesting, in that event, to be furnished with a list of all such stores and provisions.

I have the honour to enclose, in reply to your inquiries, and in compliance with your request, a copy of a letter of the 19th instant, and of its accompaniments, from the Secretary of the Navy on the subject.

Accept, &c.

The Right Honourable Sir E. Thornton, K.C.B., &c. &c. (Signed) HAMILTON FISH.

No. 14.

The Hon. Hamilton Fish, Secretary of State. Navy Department, Washington,
SIR, 19th January 1875.

I HAVE the honour to acknowledge the receipt of your communication of the 29th December last, and the copy of the note of the 26th of December from the British Minister, making certain inquiries concerning the stores or provisions which were sent out by the United States Government for the relief of the "Polaris" Expedition. I beg leave to state that it is not practicable to furnish an exact inventory of stores, &c. left by the "Polaris" Expedition on the west coast of Greenland, but I enclose such information as is in the possession of this Department, with an approximate list of articles cached or otherwise secured or deposited, and a description of the localities in which they were left.

All or any of these stores are at the service of the Polar Expedition to be despatched in 1875 by Her Majesty's Government, and in the event of their use, the Department will accept such inventory and appraisement as may be made by the order of the commander of the expedition. If the *pendulum* should be recovered at Life Boat Cove, the Department hopes that it may be practicable to use it in connection with such observations as may be made by the British Expedition with its own instrument. On the return of the expedition the Department will be gratified to receive the pendulum, and also any other instruments, and such arms, implements, and books as may have been recovered. The Department takes this occasion to express its most cordial wishes for the success of the British Expedition of 1875 towards the North Pole by way of Smith's Sound.

I am, &c.
(Signed) GEO. M. ROBESON,
Secretary of the Navy.

No. 15.

United States Naval Observatory, Washington, D.C.,
SIR, 9th January 1875.

IN answer to your inquiries concerning the stores and provisions deposited on the west coast of Greenland by the "Polaris" Expedition, I have the honour to submit the following report:—

There were three different deposits made: one on Cape Sumner, another at Thank God Harbour, and the third near Life Boat Cove.

Two crews left their boats, one a whaleboat twenty-four feet long, and the other the "Heggleman," canvas boat, on Cape Sumner, at the southern entrance of Newman's Bay, in latitude 81° 51′ N., and travelled on foot over the land to the ship. No list was made of the articles secured with the boats.* The following is a complete list of what each boat took from the ships:—

Provisions, &c. for Whaleboat.

135	lbs. pemmican.	12	cans of milk.
192	,, preserved meats.	100	boxes of sardines.
23	,, tripe.	400	cartridges (Sharp's rifle).
76	,, Polar cake.	100	,, centre fire (Navy pistol).
24	,, ham.	1	grapnel.
31	,, molasses.	2	whale irons.
200	,, bread.	2	lances.
30	,, chocolate.	25	fathoms spare lance warp.
22	,, coffee.	1	spare set of rudder pindles (?).
50	,, oatmeal.	6	sleeping bags.
36	,, sugar.	1	tent.
20	,, cheese.	1	boat cover.

* A few cases of preserved meat and a little bread, about 500 cartridges, one shot gun, two rifles, one box chronometer, two sextants.

1 saw.
3 files.
6 sheath knives.
Lead, canvas, and tacks for boat mending.
1 dozen spare goggles.
1 spare oar.
6 pans, spoons, and pots.
1 small copper stove.
2 stove kettles.
2 spare roullaum (?).
5 Sharp's rifles.
1 shot gun.
2,500 fathoms of sounding line.
1 patent log.
1 bag of shot.
3 lbs. of powder.
2 rubber blankets.
1 box chronometer.
2 artificial horizons.
1 thermometer case.
1 sextant stand.
1 boat sled.
1 fog horn.
1 ball spun yarn.
6 briar pipes.
4 jack knives.
6 copper cylinders (for deposits).
2 telescopes.
1 pair of field glasses.
1 apparatus for sounding.
Alcohol for specimens.
Blotting paper for plants.

Provisions, &c. for "Heggleman" Boat.

134 lbs. bread.
90 „ pemmican.
18 „ coffee.
20 „ oatmeal.
2 cases preserved meats.
2 gallons molasses.
6 pans, spoons, and pots.
8 briar pipes.
6 sheath knives.
5 rubber blankets.
5 spare goggles.

The above list for the canvas boat is, perhaps, not complete, though its supply was much less than that of the whaleboat.

The provisions taken by each boat was nearly, if not quite, all consumed, but as the men could not carry much weight away, we may conclude that a great part of the stores still remain.

The following is a complete list of the provisions and stores deposited in Thank God Harbour in latitude 80° 37′ N., longitude 68° 37′ W. :—

3 barrels clear pork.
25 „ Graham bread.
1 barrel molasses.
1 „ vinegar.
½ „ brown sugar.
1 „ lime juice.
1 „ pea beans.
1 „ Southern wheat.
1 „ rice.
2 tierces hams.
4 1/6 cases pemmican (1,500 lbs.)
12 cases preserved meat.
1 chest black tea.
1 bag coffee (100 lbs.)
2 cases wheaten grits.
1 case alcohol (10 galls.)
1 „ brandy (1 doz.)
4 cases whiskey.
2 „ oil clothing.
1 case men's stoga boots.
½ „ men's kip shoes.
½ „ leather gaiters.
1 „ pea coats.
2 dozen blue flannel over-shirts.
2 „ drawers.
1 „ grey heavy under-shirts.
1 „ „ drawers.
2 „ black silk handkerchiefs.
1 „ blue Navy trowsers.
2 „ long woollen stockings.
2 dozen short socks.
2 „ blue flannel under-shirts.
2 „ woollen mittens.
1 „ woollen comforters.
1 „ Russian caps.
½ „ tarpaulin hats.
2 „ white linen frocks.
3 half boxes Navy chewing tobacco.
1 box Danish tobacco.
2 boxes salt water soap.
½ box Navy shaving soap.
3 lbs. black linen thread.
3 „ white „
1½ „ black sewing silk.
1½ „ papers needles.
5 lbs. woollen yarn.
1 case clay pipes.
3 dozen briar pipes.
3 „ assorted knives.
1 „ tin pots.
1 „ assorted tin pans.
2 bolts No. 1 cotton canvas.
1 bolt Ravens duck.
1 section main deck awning.
4 sewing and roping palms.
3 lbs. flax sewing twine.
3 „ cotton.
2 „ beeswax.
50 assorted sail needles.

Ordnance Stores.

4 short guns, with appurtenances complete.
4 Sharp's rifles.
4 Remington rifles.
6 Navy pistols.
1 dozen leather belts.
½ „ frogs.
½ „ cartridge boxes.
½ „ caps.
10 bags shot (250 lbs.)
20 lbs. musket powder.
50 „ bar lead.
½ dozen powder flasks.
½ „ shot belts.
10,000 gun caps.
10,000 cartridges (Sharp's rifle).
1,000 „ (Remington rifle).
1,000 „ (ball and buck shot).
100 „ (Navy pistols).
6 shovels.
2 pickaxes and hoe combined.
1 dozen assorted files.
3 clay hammers.
1 broad axe.
2 wood axes.
feet lumber.
1 barrel jar.
¼ gross assorted fishing hooks.
6 cod lines (60 fathoms each).
3 coils hallibut line.

The observatory at Thank God Harbour was left standing, filled with such articles as would be affected by the weather, and covered with a sail.

About 100 feet to the north of the observatory the remainder of the stores were deposited in a pile on the ground.

Near Life Boat Cove the following articles were placed in a cache:—

The pendulum.
The transit instrument without its glasses.
Three box chronometers.
Two or three trunks containing the Arctic library of the late Captain C. F. Hall.

The house where the second winter was passed by a portion of the "Polaris" crew is in latitude 78° 23½′ N., longitude 73° 21′ W.

The deposit is about E.S.E. from the house, and distant about one quarter of a mile.

The Esquimaux know where it is, and if they have not disturbed it would readily lead one to it.

Aided by the records of the expedition and my own recollection, I have endeavoured to answer your inquiries.

I have, &c.
(Signed) R. W. D. Bryan,
Astronomer to the late United States North Polar Expedition.

Rear-Admiral Wm. Reynolds,
Chief Bureau of Equipment and Recruiting Navy Department,
Washington, D.C.

No. 16.

Admiral William Reynolds.

Smithsonian Institution, Washington, D.C.,
13th January 1875.

Sir,

I have the honour to submit herewith a report, in accordance with instructions received, upon the stores deposited near Smith Sound during the late United States North Polar Expedition.

I understand that the Department is in possession of an invoice enumerating these stores, and therefore I beg leave merely to offer a few remarks with regard thereto.

The depôt left on the south shore of Newman's Bay cannot be relied upon, as it only consists of a very limited number of cans containing preserved meat, some hard bread, G.G., stowed in a whaleboat.

The latter might be found useful in case of emergency, though her bows are stove in, but as there are a package of tacks and some sheet-lead contained in her lockers the damage can be easily repaired.

As far as I can remember, the following instruments are contained in the boat:—

1 spirit boat compass.
1 patent log.
1 box chronometer.
2 sextants.

Near the whaleboat our canvas boat will be found, under a pile of stores, but most likely it will not be of any value, as it was already useless some three years ago. A

small sledge leaning against the stone-pile can be used to mount the whaleboat. Most likely the stores left at Thank God Harbour will be found in good condition, as it is not probable that they have been disturbed by bears, for we never saw any of these animals in the immediate vicinity of our first winter quarters. Some of the stores could not be cached properly, as the beach consists of shingle only, which could not be penetrated to a greater depth of about two feet owing to the frozen condition of the subsoil. The observatory, however, contains such stores as would have been injured by exposure to atmospheric influence. These will probably be found serviceable, as this building was carefully closed and fastened to the soil by means of the diverging arms of the transit stand ⊤, whereby the danger of its being blown over would be to a great extent obviated.

No provisions were left at Life Boat Cove, but a cache will be found at that locality (highest point of Lyttleton Island, N. 343° E. and N. 120° 5′ E., tangent to Cape Maryaling) containing several boxes of books and instruments; amongst the latter a pendulum, which served to make our determinations of force of gravity.

I would respectfully suggest that in case the English Expedition should land at Life Boat Cove, they take with them, if possible, this pendulum for the following reasons:—

1. A simultaneous comparsion of this instrument with that which will be employed by them would greatly enhance the value of their own as well as of our observations.

2. They would then be able to compare, probably at one point, two pendulums that have both been used extensively in different latitudes.

I am, &c.,

(Signed) EMIL BESSELS,
Chief of the Scientific Department
of late Arctic Expedition.

MEMORANDUM showing at what Localities Articles were desposited by the "POLARIS" EXPEDITION.

At Cape Sumner.

At the southern entrance of Newman's Bay, in latitude 81° 51′ N., one whaleboat, 24 feet long, one "heggleman," canvas boat, some stores, arms, ammunition, instruments, and implements were left in the boats, as the men could not carry much weight in returning to the ship; but an exact list of these articles cannot be furnished.

In Thank God Harbour.

Latitude 81° 37′ N., longitude 61° 37′ W. The observatory was left standing covered with a sail. In it were deposited those articles in the following list which would be affected by the weather, and the remainder were deposited in a pile on the ground about one hundred (100) feet to the northward.

3 barrels clear pork.	½ case of men's kip shoes.
25 ,, Graham bread.	½ ,, leather gaiters.
1 barrel molasses.	1 ,, pea coats.
1 ,, vinegar.	2 doz. blue flannel over-shirts.
½ ,, brown sugar.	2 ,, ,, drawers.
1 ,, lime juice.	1 ,, grey heavy under-shirts.
1 ,, pea beans.	1 ,, drawers.
1 ,, Southern wheat.	2 ,, black silk handkerchiefs.
1 ,, rice.	1 ,, blue Navy trowsers.
2 tierces hams.	2 ,, long woollen stockings.
4 or 5 cases pemmican (1,500 lbs.)	2 ,, short socks.
12 cases preserved meats.	2 ,, blue flannel under-shirts.
1 chest of black tea.	2 ,, wollen mittens.
1 bag of coffee (100 lbs.)	1 ,, ,, comforters.
2 cases of wheaten grits.	1 ,, Russian caps.
1 case of alcohol (10 galls.)	½ ,, tarpaulin hats.
1 ,, brandy (1 doz.)	2 doz. white linen frocks.
4 cases of whiskey.	3 half boxes Navy chewing tobacco.
2 ,, oil clothing.	1 box Danish tobacco.
1 case of men's stoga boots.	2 boxes salt-water soap.

½ box Navy shaving soap.
3 lbs. black linen thread.
3 „ white „
1½ „ black sewing silk.
papers needles.
5 lbs. woollen yarn.
1 case clay pipes.
3 doz. briar pipes.
3 „ assorted knives.
1 „ tin pots.
1 doz. assorted tin pans.
2 bolts No. 1 cotton canvas.
1 bolt ravens duck.
1 section main deck awning.
4 sewing and roping palms.
3 lbs. flax sewing twine.
3 „ cotton.
2 „ beeswax.
50 assorted sail needles.

Ordnance Stores.

4 shot guns, with appurtenances complete.
4 Sharp's rifles.
4 Remington rifles.
6 Navy pistols.
1 doz. leather belts.
½ „ frogs.
½ „ cartridge boxes.
½ „ caps.
10 bags shot (250 lbs.).
20 lbs. musket powder.
50 „ bar lead.
½ doz. powder flasks.
½ „ shot belts.
10,000 gun caps.
10,000 cartridges (Sharp's rifle).
1,000 „ (Remington rifle).
1,000 „ (ball and buck shot).
100 „ (Navy pistol).
6 shovels.
2 pickaxes and hoe combined.
1 doz. assorted files.
3 clay hammers.
1 broad axe.
2 wood axes.
feet lumber.
1 barrel tar.
¼ gross assorted fishing hooks.
6 cod lines (60 fathoms each).
3 coils hallibut lines.

Near Life Boat Cove.

No provisions were left at Life Boat Cove, but in a cache about one quarter of a mile E.S.E. from the house, in latitude 78° 23′ 30″ N., longitude 73° 21′ W., were placed—
The pendulum.
The transit instrument (without its glasses).
Three box chronometers.
Two or three trunks containing the Arctic library of the late Captain C. F. Hall.
The Esquimaux at Life Boat Cove were aware of this deposit and its locality.

No. 17.

SECRETARY of ADMIRALTY to UNDER SECRETARY of STATE, FOREIGN OFFICE.

SIR, Admiralty, 18th February 1875.

WITH reference to your letter of the 9th instant, forwarding the reply of the United States Government to the application made to them in regard to the stores of the "Polaris Expedition," deposited on the west coast of Greenland, I am commanded by my Lords Commissioners of the Admiralty to request that you will move the Secretary of State for Foreign Affairs to instruct Her Majesty's Minister at Washington to convey the thanks of Her Majesty's Government to that of the United States, for the liberal manner in which they have placed the stores in question at the disposal of the Arctic Expedition, and for their good wishes for the success of the undertaking.

I am, &c.
(Signed) ROBERT HALL.

The Under Secretary of State,
&c., &c.,
Foreign Office.

PAPERS RELATING TO THE PURCHASE OF THE "BLOODHOUND," NOW THE "DISCOVERY."

No. 18.

SECRETARY of ADMIRALTY to SIR L. McCLINTOCK.

SIR,

Admiralty, 17th November 1874.

I AM commanded by my Lords Commissioners of the Admiralty to signify their directions to you to proceed to Peterhead, Dundee, and, if necessary, to Aberdeen also, to select two whale steam ships for the intended Arctic voyage.

You are to request Mr. Froyne, assistant master shipwright, and Mr. Newman, engineer officer, to assist you, in order that any ships which may be selected as suitable may be examined, in hull and machinery, as to their fitness for the service.

You are also to make inquiry into the prices of the vessels which you may examine; but this will be finally arranged by my Lords.

You are to report the names and particulars of the vessels which you may consider best suited for the service intended, and the names of the owners, and to add an estimate of their value.

I am, &c.
(Signed) ROBERT HALL.

Sir L. McClintock, F.R.S.,
&c., &c.,
Her Majesty's Dockyard,
Portsmouth.

No. 19.

SIR,

Admiralty, 21st November 1874.

I AM commanded by my Lords Commissioners of the Admiralty to forward, for your information, the accompanying copy of a letter which has been received from Mr. Grieve relative to the proposed purchase by the Admiralty of the steam ships "Bloodhound" and "Micmac," together with a copy of the description of the latter vessel, as given in Lloyd's register. I am to request that you will consider whether the "Micmac" would be a suitable vessel for the Arctic Expedition.

I am, &c.
(Signed) ROBERT HALL.

Rear-Admiral Sir L. McClintock, F.R.S.,
&c., &c., &c.,
Portsmouth Yard.

P.S.—Messrs. Baine and Johnston have been asked to furnish the particulars as to the "Bloodhound," which will be forwarded to you as soon as received.

SIR,

Portsmouth Dockyard, 23rd November 1874.

WITH reference to your letter of the 21st instant, S. $\frac{10,606}{11,548}$, received this day and to telegram on the same subject, I beg to report that in as far as it is possible to judge from the particulars forwarded to me of the S.S. "Micmac," she is not suited for the Arctic service, being too large and too long (204 feet), and not originally intended for the whale fishery. The "Bloodhound" is of more suitable dimensions, and was built for a whaler; date not stated.

It appears desirable that professional officers from the "Aurora" reserve ship at Greenock should look at and briefly report upon her hull and machinery.

I am, &c.
(Signed) F. L. McCLINTOCK,
Admiral Superintendent.

The Secretary of the Admiralty.

SURVEY ON STEAM BARQUE "BLOODHOUND," NOW THE "DISCOVERY."

No. 20.

H.M.S. "Aurora," Greenock,
25th November 1874.

SIR,

WE have the honour to report that in obedience to your order we have been on board the steam vessel "Bloodhound," and to the best of our ability have held a strict and careful survey, and we beg to report that, in our opinion, the barque is well built and strong.

As we are not acquainted with the requirements necessary for a vessel for service in the Arctic regions, we append a general description of the barque, together with what we have seen as regards her power to withstand the coming into contact with and being pressed with ice.

We have, &c.

(Signed) JAMES HURRY,
Navigating Lieutenant.
" JOHN P. ALLEN,
Chief Engineer.
" W. J. SMITH,
Carpenter, 2d Class.

H.M.S. "Aurora," Greenock,
25th November 1874.

Approved.

Submitted for the information of the Lords Commissioners of the Admiralty, together with the report of the surveying officers.

(Signed) J. P. COODE,
District Captain.

SURVEY ON STEAM BARQUE "BLOODHOUND."

Vessel built in 1873 by Stephen and Son, of Dundee.
Length over all, 166 feet.
Main breadth outside, 29 feet $\frac{1}{100}$.
Depth of hold, 18 feet $\frac{35}{100}$.
Length of engine room, 13 feet $\frac{55}{100}$.
Two decks.
Build, carvel.
Frame work, wood; oak, English.
Height 'tween decks, 6 feet.
Tonnage—

Under tonnage deck - - -	528·41
" top-gallant forecastle - -	27·86
Deduct engine room space - - -	178·01
Register tonnage - - -	578·26

Vessel iron-kneed and fastened, sheathed with 3-inch Australian bark wood, from 3 feet below covering board to the keel.

The bows are plated with iron plates, ½-inch thick, extending from the forepart of the stem to about 4 feet aft, and from the knight heads to the fore foot.

Top sides—oak, English.
Forepart of vessel, trussed with oak, 12 in. × 13 in., and 14 ins. apart.
Afterpart of vessel built and fastened in the ordinary way.
Main deck beams—oak, 12 in. × 12 in. 4 feet apart.
Upper deck beams—oak, 10 in. × 9¾ in. 4 feet apart.
Deck planking, pine, 3-in. thick.
Covering board, pine, 1 ft. 6 in. × 11 in.
Stantions, oak, 7 in. × 7 in. 4 feet apart.
Outside planking, oak.
Size of main hatchway, 8 ft. × 6 ft. 3 ins.
" fore " 5 " × 3 " 5 "
Deep-load line, 17 feet.
Rigging, wire.

Windlass, fitted with patent whelps—old style.

Vessel has 7 pairs of iron davits already fitted, and 3 boats, clinker built, viz., 2 gigs, 18 ft. and 20 ft., and one long boat, 21 ft.

There is a spare rudder and a spare propeller on board.

Engine room is in the afterpart of the vessel, between main and mizen masts.

The engines are compound, with surface condensers, without superheaters.

The cylinders are inserted; they appear to be substantially made, and in good order.

Diameter of cylinders, 23 in. and 46 in.

Length of stroke, 36 in.

The engines and boilers were manufactured by the Greenock Foundry Company in January 1873, and are 96 horse-power nominal.

The boilers are cylindrical, and 2 in number, with return tubes, and are now receiving a new set of iron.

The plates of the shell are $\frac{5}{8}$-in. in thickness, and the boilers are pressed to 60 lbs. on the square inch. There are two furnaces in each boiler, 6 feet in length by 3 feet in breadth; the tubes are $3\frac{1}{2}$-in. in diameter.

The consumption of fuel is about 10 tons per diem, and the bunkers, which run athwartships, can stow about 65 tons of coal.

The propeller is of cast iron, with two blades, and is fitted for raising.

There is an auxiliary boiler in the afterpart of the funnel casing, on a level with the upper deck, for the purpose of working the steam winch, which is fitted before the mainmast.

The ship's pumps can also be worked by the auxiliary boiler.

The maximum speed of the vessel in smooth water is 8 knots.

The present internal fittings would have to be removed in order to make the accommodation suitable for the expedition.

Surveying Officers,
JAMES HURRY,
Navigating Lieutenant.
JOHN P. ALLEN,
Chief Engineer.
W. J. SMITH,
Carpenter, 2d Class.
H.M.S. "Aurora."

No. 21.

Messrs. BAINE and JOHNSTON to SECRETARY of ADMIRALTY.

SIR, Greenock, 27th November 1874.

WE have to acknowledge the receipt of your favour of 26th. When we made the proposal to submit the S.S. "Micmac" to a valuation to Sir Leopold McClintock and Messrs. Robert Steele & Co., it was because the vessel was in Newfoundland, and could not be seen and inspected by the Admiralty.

The circumstances are not applicable to the "Bloodhound," which is in port and can be thoroughly examined; and we would have been prepared to name a fair price for that ship, but taking into account the important service for which the ship is intended, and believing the parties will do substantial justice to us and the country, we consent to Sir Leopold McClintock and Messrs. Steele & Co., fixing the value at which the Admiralty shall acquire the "Bloodhound" and all her materials as she now lays in this port.

We are, &c.

The Secretary of the Admiralty. (Signed) BAINE AND JOHNSTON.

N.B.—The "Bloodhound" is really 100 horse-power nominal, and not 96; and works up over five times that. 668 tons builder's measurement. 556 tons gross register. 378 tons nett register.

No. 22.

SECRETARY of ADMIRALTY to Sir L. McCLINTOCK.

SIR, Admiralty, 28th November 1874.

I AM commanded by my Lords Commissioners of the Admiralty to acquaint you that the reports respecting the "Bloodhound" are such that my Lords are desirous that you should inspect her as to her fitness for the Arctic Expedition, and I am to signify their directions to you to proceed to Greenock for the purpose, taking with you the officers who previously accompanied you to the north.

Before, however, you proceed to Greenock, my Lords request that you and the officers will call at the Admiralty on Monday next, the 30th instant, when further instructions will be given you, and it will then be settled whether it will be necessary for an officer from the Controller's Department to assist you in valuing the vessel, as the owners are willing to sell her to the Admiralty at a price to be fixed by you and Messrs. Steele & Co.

I am, &c.
(Signed) ROBERT HALL.

Rear-Admiral Sir F. L. McClintock, F.R.S.,
&c., &c.,
H.M. Dockyard, Portsmouth.

No. 23.

SECRETARY of ADMIRALTY to Sir L. McCLINTOCK.

SIR, Admiralty, 1st December 1874.

I AM commanded by my Lords Commissioners of the Admiralty to inform you, in reply to your telegram of this day respecting the "Bloodhound," that they are prepared to purchase the ship at the valuation to be made by you and Messrs. Steele and Company, in accordance with the letter of Messrs. Baine and Johnston.

My Lords are desirous that you will avail yourself of the assistance of Mr. Dodd and Messrs. Froyne and Newman in coming to a conclusion with regard to the value of the vessel, and that you will then put yourself in communication with Messrs. Steele, and agree with them upon the price to be paid.

I am, &c.
(Signed) ROBERT HALL.

Rear-Admiral Sir Leopold McClintock, F.R.S.,
&c. &c. &c.

No. 24.

Sir L. McCLINTOCK to SECRETARY of ADMIRALTY.

Arctic Committee Room, Admiralty,
SIR, 3rd December 1874.

IN obedience to the directions contained in their Lordships' letters of 28th ultimo and 1st instant, I have the honour to report, for their information, that I have inspected the screw steamer "Bloodhound" at Greenock, and have fully availed myself of the professional assistance of Messrs. Dodd, Froyne, and Newman in arriving at a conclusion as to her value.

This we estimate at 15,620*l.*

I then had a meeting with Mr. Steele, of the firm of Steele and Company, who acted as valuator on the part of the owners (Baine and Johnston) of the "Bloodhound."

This gentleman valued her at 20,000*l.* But on describing the points of difference between the two estimates, and on a further reference to the owners, I was informed by Mr. Steele that Messrs. Baine and Johnston were willing to part with her for 18,000*l.* This sum is to cover the expense of sending back the crews to their homes in Newfoundland, and in remunerating them for the loss of their season's seal fishing.

If it is decided by the Controller's Department that her engines are not too extravagant in their consumption of fuel for the service required of her, and if her boilers are put into perfect repair by Messrs. Baine and Johnston, I recommend the purchase of this vessel at the sum asked for her, as her hull is perfectly sound, and she appears in other respects to be well suited for an Arctic expedition.

The repairs of her boilers are in progress and will be completed in five or six days, when she will be ready to proceed to a Government dockyard.

Messrs. Baine and Johnston agree to make good any defects not now apparent which may be discovered when she is docked. They also agree to deliver her at Portsmouth for the sum of 100*l.*, in addition to the coals consumed on the voyage from Greenock.

I beg to enclose the ship's inventory, also a letter from the owners received this morning, in which they propose to send her round with a cargo of coals.

To render the "Bloodhound," or any other whaler or sealer, efficient for a Government Arctic Expedition will probably require an outlay of from 6,000*l.* to 10,000*l.*

I have, &c.

(Signed) F. L. McClintock,
Rear-Admiral.

The Secretary of the Admiralty.

No. 25.

Secretary of Admiralty to Messrs. Baine and Johnston.

Gentlemen, Admiralty, 5th December 1874.

I am commanded by my Lords Commissioners of the Admiralty, in confirmation of their telegram of this day's date, to acquaint you that they will purchase the S.S. "Bloodhound" on the following terms, viz.:—

1st. Eighteen thousand one hundred pounds to be paid for the vessel delivered at Portsmouth, including all fittings, fixtures, &c., as set forth in the inventory which accompanied your letter of the 2nd instant to Sir Leopold McClintock, and on the further conditions that her boilers shall be thoroughly repaired by you, and that you make good any defects not now apparent which may be discovered when she is docked.

2nd. You will also be paid for the coals which shall be expended on the voyage to Portsmouth, but my Lords do not wish that any more coals should be put on board than will be necessary for the voyage.

My Lords desire that you will be so good as to insure the vessel against fire and sea risk on the passage to Portsmouth, and my Lords will repay you the amount of the premiums.

I am, &c.

Messrs. Baine & Johnston,
Greenock.

(Signed) Robert Hall.

COMPLEMENT OF H.M.S. "ALERT" *SENIOR* SHIP OF ARCTIC EXPEDITION.

No. 26.

Ranks and Ratings.	Ranks and Ratings.
1 captain.	1 cooper (captain of hold).
1 commander.	1 shipwright (or caulker).
4 lieutenants.	1 carpenter's crew.
1 sub-lieutenant.	14 able seamen.
2 fleet surgeons or surgeons.	1 captain's steward.
1 assistant paymaster in charge.	1 ward room steward.
1 naturalist.	1 ward room cook.
1 chief boatswain's mate.	2 engineers.
1 chief carpenter's mate.	1 leading stoker (a blacksmith).
1 ship's steward.	3 stokers and coal trimmers.
1 ship's cook.	
2 captains of forecastle.	Royal Marines.
3 ice quartermasters.	1 sergeant (charge of Lr. Deck).
1 captain of maintop.	6 Privates, including 3 gunners R.M.A., and privates as ward room officers' servants.
1 captain of foretop.	2 Esquimaux or Danes as dog drivers.
1 sailmaker, 1 ropemaker (seamen).	
1 armourer in charge of gunner's stores.	62 Total.
1 second captain maintop.	
1 second captain foretop.	

COMPLEMENT OF H.M.S. "DISCOVERY," *SECOND* SHIP OF ARCTIC EXPEDITION.

No. 27.

Ranks and Ratings.	
1	captain.
4	lieutenants.
1	sub-lieutenant.
2	fleet surgeons or surgeons.
1	assistant paymaster in charge.
1	naturalist.
1	chief boatswain's mate.
1	chief carpenter's mate.
1	ship's steward.
1	ship's cook.
2	captains of forecastle.
3	ice quartermasters.
1	captain of maintop.
1	captain of foretop.
1	sailmaker (seamen).
1	ropemaker (seamen).
1	armourer in charge of gunner's stores.
1	second captain maintop.
1	second captain foretop.
1	cooper (captain of hold).
1	shipwright (or caulker).
1	carpenter's crew.
12	able seamen.
1	captain's steward.
1	ward room steward.
1	ward room cook.
2	engineers.
1	leading stoker (a blacksmith).
3	stokers and coal trimmers.
	Royal Marines.
1	sergeant (charge of Lr. Deck).
6	Privates, including 3 gunners R.M.A., and privates as ward room officers' servants.
2	Esquimaux or Danes as dog drivers, &c.
59	Total.

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