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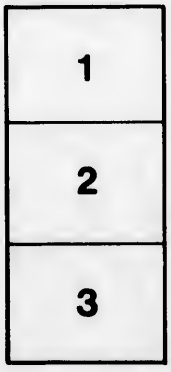

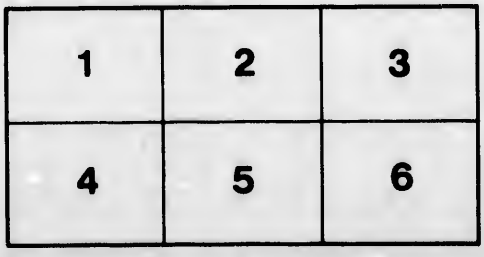

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CORRESPONDENCE

BETWEEN THE

ROYAL GEOGRAPHICAL SOCIETY

AND

THE GOVERNMENT.

LONDON:

PRINTED BY WILLIAM CLOWES AND SONS, STAMFORD STREET,

AND CHARING CROSS.

1875.

The New Arctic Expedition.

CORRESPONDENCE

BETWEEN THE

ROYAL GEOGRAPHICAL SOCIETY

AND

THE GOVERNMENT.

LONDON:

PRINTED BY WILLIAM CLOWES AND SONS, STAMFORD STREET,
AND CHARING CROSS.

1873.

CONTENTS.

I.

LETTER FROM THE PRESIDENT OF THE ROYAL GEOGRAPHICAL SOCIETY

TO THE

CHANCELLOR OF THE EXCHEQUER,

AND THE

FIRST LORD OF THE ADMIRALTY.

1, Savile Row, W.
December 16th, 1872.

On behalf of the Royal Geographical Society, I have the honour respectfully to request that you will bring to the notice of Her Majesty's Government the reasons which make it desirable to despatch, next year, a naval expedition with the object of exploring the unknown region around the North Pole.

I herewith submit the opinion of a Committee of Arctic officers appointed this year by our Council to consider the subject of an Arctic Expedition, as well as the views expressed by the Royal Society, the Geological Society, the Linnæan Society, the Scottish Meteorological Society, the Meteorological Department, and the Anthropological Institute; including the valuable remarks of Dr. J. D. Hooker, C.B., F.R.S., and of Dr. Carpenter, F.R.S., the President of the British Association.

The collective evidence of these seamen and men of science will, I trust, leave no doubt with regard to the value and importance of the results which a well-appointed expedition must yield, in exploring nearly two million square miles of unknown ground within the 80th parallel of north latitude. Such an expedition ought to lead to the solution of the numerous important scientific

questions in physical geography, geology, natural history, terrestrial magnetism, anthropology, and meteorology, which are referred to in the accompanying letters from the above-named scientific Societies. This Society, after a careful consideration of the subject, is convinced that its geographical results would be of great value.

In 1865 our late President, Sir Roderick Murchison, took steps to bring the subject of Arctic exploration before Her Majesty's Government; but his application was put on one side, and a decision was postponed until the question of the most advisable route could be decided by the expeditions then about to be despatched by the Swedish and German Governments by way of Spitzbergen. Seven years of unsuccessful labour in that direction have led to the collection of further proofs, by the leaders of both the Swedish and German expeditions, that the experience of all previous navigators was not at fault as to the impracticability of penetrating the ice in that direction. Arctic authorities are now, therefore, unanimous in the opinion that the route by Baffin's Bay and Smith Sound promises the largest amount of valuable scientific results combined with the best assurance of safety.

The American expedition, commanded by Captain Hall, has gone in an entirely different direction up Jones Sound, and must return in 1873. It consists only of one small vessel, and the results that can be obtained by it must necessarily be limited.

Apart from the purely scientific point of view, the various explorations of the Arctic Regions, by British navigators, have, since 1818, redounded to the national honour and repute, and have, in no small degree, contributed to keep alive, through a long period of peace, that spirit of courage, enterprise, and self-denial which is so essential to the character of the seamen of a great maritime nation.

Neither I nor those who are acting with me would submit this proposal if its adoption involved any undue risk of life, such as existed in former days. The experience acquired between 1850 and 1872, during which period expeditions commanded by British, American, Swedish, and German officers have safely, and at many points, gone to and fro within the Arctic Circle, has proved that, with the help of steam and other modern appliances, and of the knowledge gained concerning the proper organization of travelling

parties, Arctic exploration, under judicious leadership, is not unduly dangerous.

Universal interest continues to be felt in the examination of the unknown North Polar Region. Every first-class power of Europe and America, except England, has sent forth expeditions for Arctic discovery during the last twelve years. These attempts have been watched with the deepest interest, and not without some feeling of shame, by the press and the people of Great Britain; and there is now a very general feeling, in this country, that the time has come for us again to assert our old pre-eminence in the field of Arctic discovery.

I have the honour to be your obedient Servant,

H. C. Rawlinson,
President.

To the

Right Hon. Robert Lowe, M.P.,
Chancellor of the Exchequer,

and the

Right Hon. G. J. Goschen, M.P.,
First Lord of the Admiralty.

II.

REPLY

OF

THE CHANCELLOR OF THE EXCHEQUER.

11, Downing Street.*

Dear Sir Henry Rawlinson,

Mr. Goschen and I have carefully considered the documents which you have laid before us with regard to the proposed Arctic Expedition.

We do not find in them anything which shows that there is any pressing reason why the Expedition should be sent this year.

We give no opinion as to the expediency of such an Expedition at a future time; but we are clearly of opinion that it would not be right to send out a second Scientific Expedition precisely at the moment when the public revenue has to bear the main burden of the expenses of the operations entrusted to the *Challenger*.

I believe it has been erroneously stated that the *Challenger* Expedition involves very little expense. That is not so: the cost has already been considerable, and nothing has been spared to ensure success. There will further be an additional annual outlay for three years.

Under these circumstances, we regret that we cannot recommend the sending an Exploring party to the Arctic Ocean as a Government Enterprise this year.

Believe me,

Yours very truly,

(Signed) Robert Lowe.

Sir Henry C. Rawlinson, K.C.B.

* Received January 1st, 1873.

III.

LETTER OF ACKNOWLEDGMENT

FROM THE

PRESIDENT.

ROYAL GEOGRAPHICAL SOCIETY,
1, SAVILE ROW, BURLINGTON GARDENS,
January 13, 1873.

DEAR MR. LOWE,

I have this day, at the First Meeting of the Council of the Royal Geographical Society since the Christmas recess, laid before them your letter of the 31st ult., communicating the decision of Mr. Goschen and yourself that the documents submitted to you by our deputation of December 16th, do not show any pressing reason for sending out an Arctic Expedition this year.

The Council are glad to see that you do not express an opinion as to the expediency of sending such an Expedition at a future time. This does not, of course, involve any promise upon your part to reconsider our application; but it, nevertheless, emboldens us to hope that the additional arguments in favour of Arctic Exploration, with which we expect to be soon fortified, may prevail on Mr. Goschen and yourself to sanction, later in the year, the preparation of an Expedition which may leave England for Smith Sound in the Spring of 1874, and thus furnish a fitting and much needed complement to the Scientific voyage of the *Challenger*.

I remain,

Yours most faithfully,

(Signed) H. C. RAWLINSON,
President R.G.S.

Right Hon. Robert Lowe, M.P.,
Chancellor of the Exchequer.

ENCLOSURE No. 1.

REPORT OF THE ARCTIC COMMITTEE,*

Adopted by the President and Council of the Royal Geographical Society, April 29th, 1872.

1. SINCE 1865 several Swedish and German expeditions have attempted to explore the unknown Polar Region, by penetrating the ice between Greenland, Spitzbergen, and Novaya Zemlya.

2. The leaders of these expeditions, Captain Koldewey, and MM. Nordenskiöld and Von Otter, are convinced of the impracticability of the routes they attempted. Their work has been reviewed by Captain Sherard Osborn, in the accompanying Paper [Enclosure No. 2], which was read at a meeting of the Royal Geographical Society, on the 22nd of April, 1872.

3. This conclusion, strengthening the deductions from all previous experience, will enable those who advocate Arctic exploration to point out a definite course to be now pursued.

4. The unknown region covers an area of more than a million of square miles. It is obvious that a single expedition cannot undertake to explore the whole of this space. It is, therefore, necessary to select that portion of it for exploration which offers the three advantages that are considered essential. These are: 1st, the certainty of exploring a previously unknown area of considerable extent; 2nd, the prospect of the most valuable discoveries in various branches of science; 3rd, the best security for a safe return.

5. These advantages can only be secured in that portion where a coast line of great extent is known to exist, because the most valuable discoveries must be made on or near the land.

6. The unknown coast of Greenland intervenes between a point in about 82° N. lat., on the west side, and a point in 77° N. lat. on the east side; and at both points the land trends north. The following considerations lead to the inference that the land of Greenland extends far to the northward. The current flowing down the east side of Greenland has been observed by Dr. Forchhammer to be composed, not of Polar water, but of Atlantic water. A strong current flows through the channels between the Parry Islands down Baffin's Bay. If Greenland extended no further to the northward, this current would also sweep round it, and flow down its eastern shore. Observation has shown that this is not the case. The width of Greenland, at its most northern known points, is more than 600 miles. There is no other land, offering similar conditions, on the verge of the unknown area.

7. The object of an Arctic expedition of discovery should, therefore, be to explore the unknown shores to the north of Greenland.

8. In order to reach the point whence discovery would commence, an Arctic expedition must, therefore, proceed up the west coast of Greenland, in Baffin's Bay and Smith Sound. This route is preferable to one by the east coast of Greenland, because of the facilities for retreat to the Danish settlements.

9. Such an expedition 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 communica-

* Composed of the following gentlemen:—Sir George Back, Admiral C. Ibbison, Admiral Ommanney, Admiral Richards, Sir Leopold McClintock, Captain Sherard Osborn, Dr. Rae, Mr. Findlay, Mr. Clements Markham (Sec.).

tion with the depôt vessel), from which point sledge parties would start in the early spring, and explore the unknown region in various directions.

10. 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 event of accidents, the whole expedition could retreat to the Danish settlements in Greenland, as has before been done. Thus two advantages—namely, the discovery of a wide extent of coast-line, and the certainty of a safe return —are ensured by adopting this course. They could not be secured by adopting any other course.

11. The discovery of the northern side of Greenland also offers the third advantage—the prospect of securing the most valuable results in the various branches of scientific research.

I. *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 point, and discovering the conditions of land and sea in that portion of the unknown area.

II. *Hydrography.*—An Arctic expedition, as a supplement to the expedition now preparing to investigate the ocean-bottom in the middle and southern latitudes of the globe, is, in the opinions of Dr. Carpenter and Dr. Hooker, a scientific necessity; and Dr. Hooker considers that there is no better sphere for its labours than the northern Greenland seas.

III. *Botany.*—Recent botanical investigations, on both coasts of Greenland have tended to complicate, rather than to unravel, the problem involved in the remarkable differences between the existing floras on the two coasts. Its solution probably depends on the physical and biological conditions of much higher latitudes than have hitherto been explored. Other questions of surpassing interest have suggested themselves; foremost amongst which are the results of the investigations made within the last few years into the fossil flora of Greenland. These have indisputably proved that a vigorous forest-vegetation of many kinds of trees once flourished on what is now the Greenland coast, and extended far beyond the Arctic circle. There is a probability of this forest-vegetation having extended over the Pole itself; thus confounding all previous geological reasoning as to the climate and conditions of the globe during the Tertiary period. Recent expeditions have traced these fossiliferous beds to a much higher latitude than that of Disco, where they were first detected. To determine their extension to a point which would leave no doubt of this forest having clothed the Northern Pole would be a most important contribution to the history of palæontology, botany, and terrestrial physics.

IV. *Zoology.*—The Arctic Ocean teems with life, and the multitude of kinds of minute organised beings is prodigious. These play a most important part in the formation of sedimentary deposits, which, in future geological periods, will become incorporated with those rock-formations whose structure has only lately been explained. The kinds of these animals, the relation they bear to one another and to larger animals, the conditions under which they live, their distribution according to warm and cold currents and geographical areas, are all subjects on which very little is known. As regards larger organisms, the conditions of life in the unknown area may be such as to sustain rare and solitary species, such as the *Rhytina Stelleri*, and other animals unknown elsewhere. A more complete knowledge of the habits and habitats of the larger animals, fish, shells, corals, and sponges of the Arctic zone is much needed, as well as good specimens for museums; and more valuable still would be anatomical and physiological experiments and observations on these animals, under their natural conditions.

V. *Ethnology.*—The discovery of a sledge-runner north of the Humboldt glacier in Smith Sound, on the west side; and of people by Clavering and Sabine, on the east side, who had disappeared when the Germans visited the same spot last year; prove that human beings have wandered into the unknown area. The traditions of the Arctic Highlanders, the most northern known people, furnish evidence that they have no intercourse with the people further north. The dwellers in the unknown area have, therefore, probably been isolated for centuries. Under these circumstances their condition will offer a most important object of study for the præhistoric archæologist. Their customs and mode of life will, in themselves, be subjects of deep interest; and their language, traditions, and methods of making dwellings, clothes, arms, tools, and utensils, may throw light upon one of the most interesting problems in the history of the spread of mankind over the earth.

VI. *Geology.*—The microscopic vegetables, which swarm in the Polar seas, contribute to the sedimentary deposits by the siliceous coating of their cells. These siliceous coats are indestructible, and being of irregular geometric forms, and the different kinds having differently and exquisitely sculptured surfaces, they may be recognised wherever found, and at all future epochs of our globe. A knowledge of the species inhabiting the northern Greenland seas would throw great light on investigations into the age of the rocks of our own island, and on the later changes of the climate of the northern hemisphere. The examination of a long extent of coast-line will yield other geological results of great value, from the collection of rocks and fossils, and the observations on glacial action.

VII. *Geodesy.*—An expedition could do much useful preliminary work in geodesy, in making a series of pendulum observations, and in registering the dip and intensity of the needle.

VIII. *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. It may be added that, though all previous observations for temperature at great depths have proved to be valueless, in consequence of the imperfection of the instruments, this defect has now been provided against.

IX.—In the enumeration of some of the scientific results which must certainly be secured by the discovery of the northern coast of Greenland, it should be remembered that the exploration of an unknown region will necessarily bring to light a vast number of important facts in every branch of science which cannot possibly be foreseen.

12. In addition to the harvest of results with which Arctic discovery will enrich science, and thus extend the sum of human knowledge, there are other considerations to which great weight must be attached. Another generation of naval officers will be trained in ice-navigation, a much needed field will be opened for individual enterprise, opportunities will be offered for distinction, and a great benefit will thus be conferred on the Navy, and through the Navy on the country generally. All classes of the people, it is believed, will unite with men of science in the desire that the tradition of Arctic discovery should be preserved and handed down to posterity; and that Englishmen should not abandon that career of noble adventure which has done so much to form the national character, and to give our country the rank she still maintains. An interest once very keenly shown in such enterprises may, it is believed, be easily revived.

ENCLOSURE No. 2.

ON THE

EXPLORATION OF THE NORTH POLAR BASIN;

WITH A RÉSUMÉ OF RECENT SWEDISH, GERMAN, AND AUSTRIAN ATTEMPTS TO REACH THE POLAR CIRCLE FROM THE ATLANTIC OCEAN. BY CAPTAIN SHERARD OSBORN, R.N., C.B.

A Paper read before the Royal Geographical Society on the 22nd April, 1872.

TO WHICH IS APPENDED A

PAPER ON THE EXPLORATION OF THE NORTH POLAR REGION,

Read by the same Author, before the Royal Geographical Society, on the 23rd January, 1865.

AT the Tenth Evening Meeting of the Session 1871–2 of the Royal Geographical Society, held on the 22nd April, 1872, after the routine business had been transacted, the following Paper 'On the Exploration of the North Polar Basin,' was read by Capt. Sherard Osborn :—

Our able and indefatigable secretary, Mr. Clements Markham, has recently, in a valuable Memorandum, called the attention of the President and Council of the Royal Geographical Society to the necessity of public interest, in this country, being again directed to a scientific exploration of the 1,131,000 square miles of the globe's surface, which still lie unexplored around the northern pole of our earth. It will be in the recollection of the members of this Society that, in 1865, I read a paper on this subject, and therein to the best of my ability, urged the necessity, on many grounds, for an exploration of the Polar basin, and set forth the arguments in favour of reaching that unknown area by way of Baffin Bay and Smith Sound.

That route, it is maintained, is the one which two hundred and odd years of experience have given to British navigators and explorers the best assurance of reaching the 80th degree of north latitude, with the greatest certainty, and smallest amount of risk, to ship and life.

Backed by all the scientific bodies of this country, our late distinguished President and Council took immediate steps for a revival of English Arctic enterprise, and wrote to, as well as had an interview with, the then First Lord of the Admiralty, His Grace the Duke of Somerset, with a view to obtaining that assistance from the Navy, which we believed would give the best guarantee for a successful geographical exploration of the area under consideration. Unfortunately for the purpose we had in view, an eminent German geographer renewed a theory which he had first started at a still more inopportune time, during the search for Franklin,—and had English navigators then listened to it, that search would have been a failure, the North-west Passage would not have been discovered, and the geography of the lands between Baffin and Behring Straits would still have remained unknown; his theory being that the true way to reach this unknown area, was by following in a very different direction what he believed to be a current of warm water, flowing to the north-east from the tropical regions of the Atlantic towards the shores of Spitzbergen and Nova Zembla. He maintained, in the face of three centuries of experience, that a route could be found into the area round our pole in that direction, and that a navigable sea existed there.

His arguments and opinions caused a division amongst Arctic authorities in this country; and the First Lord of the Admiralty, though apparently sufficiently enlightened to entertain the general proposal, very naturally declined verbally to assume the responsibility of deciding which route was the right one, until geographers and Arctic authorities could themselves agree on so important a point.

Disappointed though I and others naturally felt at this first result of our efforts, still we could not but acknowledge the justice of the course taken by the Admiralty; and, as a matter of policy and common sense, I advised Sir Roderick Murchison to be patient, and wait till time had proved the fallacy of theories based upon the existence of an imaginary open Polar ocean, and upon the possibility of ice-navigation late in the autumn.

Seven years have now elapsed, and though I am prepared to do justice to the zeal, enterprise, and courage, with which the German explorers have endeavoured to give effect to the theories of their speculative geographer, and to the noble fortitude with which they have faced severe hardships in trying to reach the Polar basin, between the east coast of Greenland and the meridian of Nova Zembla, yet I maintain that the result proves the learned but purely theoretical German geographer to be wrong, and the ex-

perienced Arctic voyagers, who thought with me, to be right. I do not propose, in a short paper adapted for our evening discussion, to attempt to give full details of the two German Expeditions of 1868 and 1869, which sailed from Bergen and Bremen respectively; and there is the less need to do so, as our distinguished Associate, Admiral Sir Leopold M'Clintock, in January, 1871, gave us a paper containing an excellent *résumé* of the last expedition.

The result of those two German efforts was, in my estimation, calculated only to confirm our opinion that between Spitzbergen and the coast of Greenland there was no navigable passage through the ice-drift from the Pole, either for steamer or sailing-ship, to the northward of points reached by Hudson two centuries, by Phipps one century, and by Scoresby, Buchan, Parry, Clavering, and Sabine, half a century ago. The Pendulum Islands and adjacent coast of Greenland were the furthest point northward of the German, as it had been fifty years before of the English navigators. Captain Karl Koldewey, who commanded both expeditions, happily relieves me from the pain of feeling that I differ, in this respect, from one who so gallantly endeavoured to test Dr. Petermann's theory. In May, 1871, after his experiences of Petermann's route to the Polar basin, he writes as follows :—

"One can hardly resist the conviction that the hope of attaining the North Pole by ship, or of finding an open sea around the Pole, are alike among the most improbable of things.

* * * * *

"I confess that I myself was misled by representations in Dr. Petermann's 'Geographische Mittheilungen,' and held it to be at least possible, by following a line of coast, to penetrate by ship far into the central Arctic Regions, and then certainly to make one's way to the Pole. A winter in East Greenland, the most careful observation of those mighty masses of ice, their movements and formation, and of the whole conditions of temperature, and finally the careful study of Arctic literature in its original form, and not by means of one-sided extracts, have radically cured me and all my companions of this idea.

* * * * *

"If its principal object is to be the nearest possible approach to the Pole, I am quite of Osborn's opinion that the best way appears to be through Smith Sound. Here one can penetrate by ship every year to the 78th parallel, and then one has a continuous line of coast running north, which has been sighted as far as the 82nd

parallel. Along this coast one would have to work one's way, in spring, with dog-sledges.

* * * * *

"*I consider it a wild undertaking to penetrate towards the Pole by ship, between Spitzbergen and Nova Zembla.*"

Comment on this honest seaman's opinion is unnecessary, and no amount of specious reasoning, spread over any amount of pages, by any mere theorist, be he German or English, can undo the effect of evidence so strong and conclusive.

Before touching on the voyage undertaken last year by Lieut. Payer, I must refer to the results of the Swedish expeditions to Spitzbergen; and it is the more incumbent upon me to do so, because the Duke of Somerset rested his decision (to delay further action with respect to the representation that was made to him) upon the importance of first being furnished with the conclusions arrived at by the Swedish explorers.

Nordenskiöld, Von Otter, and other intrepid Scandinavian men of science, have led no less than four expeditions to the verge of the unknown Polar Region, on the Spitzbergen meridian, between the years 1858 and 1868, with the object of making researches into natural history, and achieving such discoveries as might prove to be feasible.

The opinions of Nordenskiöld and Von Otter are most valuable, and they fully confirm the experience of centuries, that in the summer or actual sailing season in the Polar Seas, it is not possible to penetrate through the pack. They observe, however, that at the season when, in consequence of the heat of the summer and the influence of ocean waves and streams, the ice-masses have been reduced to their minimum—that is to say, in the autumn—theorists had thought it possible to advance further than in summer.

They therefore made the attempt, and are most emphatic in its condemnation. Their conclusion is, that during the autumn a vessel might possibly reach a latitude considerably higher than that which has been obtained by the early summer expeditions. But they further point out that progress would soon be rendered impossible by the cold and darkness, the winds accompanied by snow-storms, the heavy seas covered with drifting floes, and the young ice. They also record their opinion that an open Polar Sea is a mere hypothesis, destitute of all foundation in the experience which has been gained, and that the only way to approach the Pole, which can be attempted with any probability of succeeding, is that proposed by English authorities of exploring on sledges in the spring. Here, then, are

the reports for which the Duke of Somerset desired to wait, and by them we find that the Swedish and German Commanders of Arctic Expeditions, after gaining actual experience in ice-navigation, fully agree with their brother-explorers of England in the route that should be taken, and in the means by which success must be achieved.

Such were the results of the German and Swedish Arctic Expeditions up to the year 1871. I now proceed to give you a *précis* of a very interesting voyage, made under Austrian auspices last year, into the sea between Spitzbergen and Nova Zembla.

Lieutenants A. Weyprecht and Julius Payer, of the Austrian Navy—the latter of whom was associated with Captain Koldewey in his voyages to the North—appear to have very ingeniously thought of following the supposed Gulf Stream into the Polar Basin, by keeping more to the eastward of Spitzbergen, and towards Nova Zembla, than Koldewey had done, and especially directed their attention towards Gillies Land.* After many delays, Payer and his associate, Lieutenant Weyprecht, put forth from Tromsö, in Norway, on the 21st June, 1871, in a small hired native vessel of 70 tons, and a crew, all included, of eight souls. Finding they could not reach Gillies Land in a direct course, they endeavoured to work their way up the Stor Fiord. Here they were met by southerly currents and heavily drifting ice, against which they struggled fruitlessly until the 19th August, when, for good and sufficient reasons, they abandoned the Stor Fiord route towards Gillies Land, and attempted then to reach it by following the eastern coast of the outermost islands of the Spitzbergen group.

On the 19th August they reached Hope Island. It was free from ice, and they anchored there, and logged a current running past the ship W.S.W. three knots per hour. Leaving Hope Island on the 21st August, they had reached lat. 77·17° N., and between the 28th and 36th degree of long. E. found much lighter ice than had hitherto been met with. On the evening of the 22nd the Report says:—

"Of King Charles's Land we saw nothing, although only 40 to 50 miles distant. In the evening, for a short time, we had a clear sky towards the northward; otherwise we were enveloped in eternal fog.

"The vicinity of the land, however, was proclaimed by the decreasing depth of the sea, and numerous bear-tracks on the ice."

Between that date and the 29th they appear, on the parallel

* 'The Polar Expedition of A. Weyprecht and Julius Payer in the year 1871.' Geographical Society, Vienna, 1872.

of 77·30°, to have been beating about in perfectly navigable ice, but the fogs were so extensive they could not see far.

On the 29th August they had reached 42° E. long., and were much astonished to be able on the 30th, to pass 78th degree lat. and 41·30° E. long. without encountering ice; but that night they struck against the ice-edge. The ice, however, was moving to the north instead of to the east. On the 31st, at mid-day, the Report states they were in 78·25° N. lat., 42° E. long; at eight o'clock in the evening, in 78·41° N. lat., amongst ice, which seemed to be moving north-east. To the west the ice lay dense, with strong ice-glare and detached icebergs, but to the north it was loose or open. On the 1st September, midnight, they reached their highest latitude, 78·48° N., dead reckoning, and by indifferent observations at noon, on the 2nd, they were in 78·37° N., 42·32° E.

I now particularly call your attention to the two following paragraphs of the Report:—

"Very thick fog, with a stiff, contrary wind, prevented our getting forward in a northerly direction. The condition of the ice would have been no obstacle. The 79th parallel we could, without very great effort, have passed, only, with the stiff north wind, it would have taken at least a day's cruising, and the short time which still stood at our disposal was too precious for us to be willing to sacrifice a whole day for a few miles.

"Many signs led us here to infer the near neighbourhood of land. We saw much drift-wood, which, further south, we had hardly ever met with; and at one spot, where we were fishing, there was fresh mud, also sea-weeds, and much fresh-water ice, which is easily known by its transparency. An almost infallible sign was six southward-flying eider-ducks, which never go far away from the land. Unfortunately, however, the fog was always so thick that we never got a wide prospect. These thick fogs with a north wind are very remarkable in such high latitudes.

"A further energetic northerly advance was no longer to be thought of: the obstacles being our scanty provisions, the disinclination, already mentioned, of the crew, and, lastly, the condition of our prow.

"The quality of the ice in these high latitudes was by no means difficult. Except detached and small icebergs, and one solitary larger old slice, we saw nothing implying heavy pack-ice in the north.

All these signs, read by the light of Arctic experience, point, in my opinion, to the existence of land not very far north of the position reached on the 42nd Meridian by the Austrian Expedition, and by no means towards an opening into the Polar Sea.

To gratify their curiosity, and to allay the fears of the Norwegian seamen, the ship now stood towards the coast of Nova Zembla, to ascertain whether they had been merely steering up a bight in the ice. The result proved that, from their furthest, on the 1st September, to the coast of Nova Zembla, the sea was free from ice. They then appear, owing to the south-west winds, to have been forced back on the 6th September in a northerly direction to 78·5° N. lat., and 56° E. long., where, it is worthy of remark, they met ice, in an east and west direction, with a heavy sea beating against it. The expedition now struggled homeward through heavy continual storms from the south-west, and anchored in Tromsö on the 4th October; and the Austrian navigators do not fail to remark that the increasing length of the nights and heavy snow-storms would have rendered the navigation highly perilous, had they had the misfortune to have fallen amongst ice. A contingency which was avoided by the heavy south-west gales, and consequent warm-water drift pressing the pack-ice away to the northward and westward, and northward and eastward.

Lieutenants Weyprecht and Payer, having been unable to trace this open water on the north shore of Nova Zembla to its furthest limit, appear to jump at the conclusion that they have discovered a key, to use their own words, "to the mystic Polynia, the open sea to the north of Siberia."

This may be so: the word Polynia means spaces of open water in a frozen ocean; and there may be many such spaces, if not a continuous channel of open water, late in the autumn, say October, extending from Nova Zembla, along the shores of Asia, to Behring Straits; and I do not deny that an exploration of this open water may yield most valuable results in a geographical and generally scientific point of view. But, with all kindness and sympathy for them, I appeal to their own Report, and the results obtained, whether in observations of ice, water, depths, and temperatures, in proof of the fact that, at their furthest north, they were merely approaching those lands which previous visitors to Spitzbergen have frequently reported were seen to the east and north-east, and generally known under the term "Gillies Land," or, more recently, King Charles's Land; and I only regret to learn from Sir Leopold McClintock that the gallant Austrians, who are again about to put forth on a voyage of discovery, do not intend to return there, and explore a region so likely to yield such interesting results in a geographical point of view; though I feel confident that the Polar basin will not be explored by any expedition in that direction.

To sum up, another seven years' labour only goes to confirm old

Arctic experience, that the outpour of Polar ice is too heavy and continuous, from Gillies Land to Greenland for any ships to penetrate through it. I believe that outpour to be incessant, both summer and winter, and that sledging expeditions at any season of the year, northward from Spitzbergen, would encounter to-day the same difficulties Parry did in the summer of 1827.

With respect to the Nova Zembla Sea, there is evidently land to the northward, and the south-west gales of the Atlantic force up a body of warm water in the autumn, by which a route may be found round Nova Zembla into the open water on the Siberian coast. Indeed this is already proved to be possible by a Norwegian, Captain Mack. On these grounds, and on those already stated in my previous paper, I would again appeal to the President, Council, and Members of the Royal Geographical Society, to turn their earnest attention during this summer and autumn towards a resumption of the exploration of the Polar area, by way of Baffin Bay and Smith Sound, and by means of sledge travelling parties, such as explored so many hundreds of miles of coast-line in former years.

This route recommends itself on the three following grounds:—

First. That it is the most advanced known position towards the Polar area, with almost continuous land extending to the 82° lat. N.

Secondly. That from it, to the north-east and west, important geographical discoveries and scientific results await us.

Thirdly. That this route offers the best guarantee for the safety of the people employed in the exploration of a vast unknown area.

If the Arctic Committee now sitting under the able presidency of our distinguished and veteran Associate, Admiral Sir George Back, can show on these grounds, that Polar exploration can and ought to be carried out, I trust, for the sake of my country and profession, that our Admiralty may be induced to open to the Royal Navy, this field for glorious enterprise and national renown. The First Lord of the Admiralty, Mr. Goschen, in a recent speech to the House of Commons, speaking of our Navy Estimates, justly said: "It must not be supposed that all this money was spent on war, but that a great portion was spent on duties, which, notwithstanding the reputation this country had most unjustly got of pursuing a selfish policy, redounded to the benefit of the world at large as much as of our own country."

The cheers with which such a statesmanlike view of the duties of the Royal Navy was received, would, I am sure, be re-echoed throughout the length and breadth of our land; and knowing as I

do that there never was a time in the history of our Navy, when a finer body of seamen and gallant officers, highly trained in scientific acquirements, could be better made available, or more earnestly rejoice at such a field for individual enterprise being thrown open to them, I think it would be a crying disgrace if the accomplishment of Polar discovery, a labour undertaken by English seamen and explorers in the time of Queen Elizabeth and continued to that of Queen Victoria, should be achieved by the sailors or explorers of any other nation. Rather than see those laurels wrung from us, I would, much as I believe in the advantage and certainty of a Government Expedition, advocate an appeal, on the part of this Society, to send forth a private expedition, in the spring of the year 1873.

The PRESIDENT, before calling for any remarks on Captain Sherard Osborn's paper, wished to remind the Society that the Arctic Regions had been for a long period the proudest field of triumph, not only of the Royal Geographical Society, but of the British navy and the British nation. He was glad the subject of an expedition to the North Pole was again brought forward, by a gentleman so competent to discuss it as Captain Sherard Osborn. He was also pleased to see nearly all our great Arctic authorities present, men who had carried the flag of England into those seas, and who had been mainly instrumental in obtaining for this nation that Arctic glory we were so proud to possess. There were also present authorities in matters of science, who, he trusted, would give their opinions as to the scientific results to be looked for from an Arctic expedition.

Admiral Sir GEORGE BACK said, Captain Osborn had so completely exhausted the subject that he had little else to say, than to give his perfect approbation of every word he had uttered. The expeditions which had recently gone east and west of Spitzbergen, however encouraging, might be considered simply tentative to the great object of Polar research. The direct route to the North Pole remained very much as it had been left by his own dear friend, Sir Edward Parry. Without undervaluing the persistent and zealous efforts of our gallant contemporaries, but rather honouring them for what they had done, the Arctic Committee had considered the question seriously, and had come to the determination that the route which offered the greatest probability of success for Polar exploration, was by Smith Sound, or the route taken by the gallant American, Dr. Kane. The difficulties and contingencies of such an exploration cannot be calculated beforehand, though it is well known they partly vanish in making the attempt. It would be most mortifying to reflect, that the very prize for which our country had been contending more or less for over three centuries, should, through an unwonted and unnatural apathy on our part, glide away from us into the hands of a younger and more energetic nation. There had been Swedes, Danes, Germans, Norwegians, Russians, Americans, and, prior to their great calamity, even the French were fitting out an expedition to Behring Straits; while we, whose birthright it was, were left ingloriously in the eddy. Captain Osborn had given the most convincing reasons for our making another attempt; and he was certain that, when the time came for carrying it out, they would have the active co-operation of every member of the Royal Geographical Society.

Dr. HOOKER said, as a botanist he took great interest in Arctic exploration, for the vegetation of the Arctic Regions threw as much light upon the geographical distribution of plants on the surface of the globe as any that he

knew of. 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 his 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 Zurich, for investigation, who had brought forward the most convincing proofs that that latitude was once inhabited by extensive forests, presenting fifty or sixty different species of arborescent trees, most of them with deciduous leaves, some 3 or 4 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 seemed 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 extended even to the Pole; and he knew of nothing that would give greater assistance in solving this problem than the proposed expedition along Smith Sound. Turning to the existing flora of Greenland, he pointed out that, though one of the most poverty-stricken in the globe, it was possessed of unusual interest. It consisted of some 300 kinds of flowering plants (besides a very large number of mosses, algæ, lichens, &c.), and presented the following peculiarities:—1. The flowering plants were, almost without exception, natives of the Scandinavian peninsula; 2. There was in the Greenland flora scarcely any admixture of American types, which nevertheless were found on the opposite coast of Labrador and the Polar Islands; 3. A considerable proportion of the common Greenland plants were 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 long, contained 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 he (Dr. Hooker) had 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 re-peopled 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 naturalist to call for vaster changes than can be brought about by a re-disposition 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.

Admiral G. H. Richards said he had always looked upon Greenland as a country that had reason to complain of the way in which it had been treated. It was a body without head, tail, or limb. Although Greenland was no child of ours, he had felt that, geographically, we had adopted it. It was our duty, he thought, to complete the symmetry of Greenland, by exploring the northern end, and in doing so we should probably find the North Pole. He did not attach much importance to finding the North Pole; if it was found incidentally, well and good. He would call attention to the fact, that for the last twenty-five years this country had made small progress in the way of Arctic Exploration, except in the searching for Sir John Franklin; and although we had made many discoveries during that time, they had been incidental discoveries. Had we been purely exploring for only one-tenth part of that period, there would be nothing left to discover. Therefore, he hoped the Government would send out an expedition. He was not himself in favour of private enterprise. Private enterprise laboured under many disadvantages. He did not know of any private expedition that had succeeded except one, and that was the expedition under Sir Leopold McClintock. The chief was an experienced Arctic navigator, he was supported by officers of his own profession, and the crew was composed principally of British seamen who had just returned from a Government Arctic Expedition, many of them under his own command. Although they were bound by no ties or laws of hard discipline, it was a point of honour with them to conduct themselves in every way as if they were on board a ship of war. To that he attributed its success, and it was for that reason he was in favour of a Government expedition. He fully appreciated the efforts of the Swedes, Prussians, and others,—they had accomplished much to the advantage of science; but he maintained that they had been productive of little in the way of new discovery. He would as soon undertake an Arctic expedition in a penny river-boat. If any expedition succeeded, it would be one sent by this country. And he trusted it would be effectually carried out.

The President was sure the meeting had been much gratified at hearing

the observations of Admiral Richards, the more especially as he was the professional adviser of the Admiralty. He trusted Admiral Richards would imbue the Admiralty with the sentiments he had expressed to the meeting.

Captain Sir LEOPOLD MCCLINTOCK said, as a naval officer and an Arctic explorer, he was sorry to say that our experienced Arctic men were passing away. It was now twenty years since Government had sent an expedition to the Arctic Regions, and at the present moment we could find but few officers or men competent to undertake another expedition. A few years hence we should probably have to fit out an Antarctic Expedition, to observe the transit of Venus. We should have to entrust that costly and difficult expedition to unskilful persons, unless we kept up our practice in the mean time. Thirty-three years ago, the only Antarctic expedition ever sent out by the British Government, was placed under the command of that most experienced Arctic navigator, Sir James Ross, and nothing could have been more complete and triumphant than his success. Therefore, he was for Arctic exploration in any direction even; the attempt to reach the North Pole was the highest object remaining for the exercise of geographical and maritime enterprise. An expedition by Smith Sound would give us as much practical experience in ice-navigation as would suffice for the next ten or fifteen years. He believed that route afforded the best chance for reaching the North Pole, and also the safest retreat in the event of a reverse. Of all the suggested routes, it was the least dependent upon the accidents of season. We had heard lately of the N.E. route as a favourable one, because open water had been seen off Siberia by Wrangel and others. Yet it was remarkable that, in 1847, Wrangel himself proposed that an attempt should be made by Smith Sound, in dog-sledges, showing that, in his opinion, there was no open Polar sea. In connection with what Dr. Hooker had said, he might state that, in Banks Land and Prince Patrick's Land, there were hill-sides covered with semi-fossilized wood, much of it still fit to be used as firewood; from this he inferred that the time when those lands were covered with trees was not very remote. The proposed expedition did not contemplate any commercial advantages, such as were derived from the expedition to Baffin Bay in 1818, which opened up a whale-fishery; and from Beechey's voyage to Behring Straits, which opened up the whale-fishery now carried on there; nor were we to expect the discovery of vast deposits of fossil ivory, such as had been found in the Liakhov Islands off the coast of Siberia.

The PRESIDENT called upon Dr. Carpenter to explain the prospective advantages to physical geography, to be derived from this expedition to the North Pole.

Dr. CARPENTER looked upon the proposal as of peculiar interest, as it would be the complement of another expedition which Government had undertaken to send out for the prosecution of scientific inquiry into the physical and biological condition of the deep sea in various parts of the globe, ranging, he hoped, to the edge of the southern ice-field. But he apprehended it would not be able to reach the North Polar basin, and it was extremely important that a North Polar expedition should be carried out in connection with the other. Last year he explained his views on the general oceanic circulation, as dependent upon difference of temperature purely—difference of temperature giving a different specific gravity, therefore difference of pressure; which would necessarily produce a continued outflow of cold water along the floors of the ocean-basins from the Polar areas towards the equator; and, on the other hand, a continual movement of a more superficial stratum of warm water towards each Polar area. The inquiries that had been made during the last twelve months had only confirmed that view. When these researches were commenced, the general notion in this country, and among German physical geographers, was the prevalence of a temperature of 39° in the deep sea. That had been completely exploded, at least so far as the Atlantic was

concerned; and it was now well known that salt water at 28° (just on the point of freezing) was heavier than water at 39°, which was formerly supposed to be the temperature of the greatest density of salt water, as it is of fresh. The ignorance which still exists on this subject is shown by the fact that, in a recent paper, Dr. Mühry spoke of cold water overflowing warmer water. This can only be in exceptional cases; as when the surface-water, chilled by the melting of icebergs, is at the same time rendered lighter by the reduction of its salinity. Taking the temperatures obtained by Lieutenant Payer between Spitzbergen and Nova Zembla, he observed that they corresponded exactly with the temperatures he should have expected to find in that region; and, so far from becoming warmer as the thermometer went down to greater depths, the water became colder. The warm stratum at the surface was about 40°; at 300 or 400 feet down, the temperature was about 32°; and at 800 feet, the thermometer sank to 29°·7. Farther north, at 77½° N., they found that the warm stratum had cooled down on the surface to 36°, and became much thinner: for, at 40 or 50 feet down, they came at once to a temperature of 32°, and at 120 feet to 29°. Of course, if there should be land beyond the northernmost point of Payer, the inflow of warm water in that direction would cease; and if Smith Sound had a tolerably deep channel, extending continuously northward, while there would be an outflow of cold Polar water at the bottom, there would be a tendency to inflow of warm water along the surface of that channel, as far as it extended. He merely threw out that hint with reference to the particular route chosen. But, with regard to the general question, the Society would see how important this exploration of the Northern Polar area must be, in connection with the expedition to the Antarctic seas; because, while the southern circle of open Polar water was sending out in every direction its deep outflow of glacial water, the land-locked Polar basin of the north possessed but few, and comparatively narrow, communications with the great oceans of the northern hemisphere. These phenomena were of great interest geologically, since there could be no doubt that the temperature and biological conditions of distant oceanic areas were influenced by the outflow of glacial water from the Polar Regions.

Mr. R. H. Scott, Director of the Meteorological Office, said he had recently received letters from Swedes and Germans, who had actually been on these expeditions; and it would be a satisfaction to Captain Osborn to know, that Captain Koldewey had arrived at the conclusion that an open Polar Sea did not exist. With regard to the Swedish expedition, Professor Nordenskiöld intended starting in the course of a few months with three officers and scientific men, and a crew of twenty. He proposed to start from the Seven Islands, a little to the east of Spitzbergen; and before the winter he hoped to reach Gillies Land by the ice. But the main object of the expedition was to get to the Pole by means of rein-deer sledges.

Admiral Ommanney said all Arctic navigators were not in favour of Smith Sound. He adhered to his former view that the right direction to take was by way of Spitzbergen. It was sometimes difficult to reach Smith Sound, but they could always get to Spitzbergen.

The President said, the Council of the Society had appointed a Committee of the most experienced and practical members of their body, to report their opinions upon the subject; and they were unanimously in favour of Smith Sound. The Council, having discovered on a previous occasion that the whole matter broke down, through want of unanimity in the application to the Admiralty, thought they were now justified in proceeding, on the assumption that the Council were at any rate of one mind. When the time came, and the subject had been sufficiently ventilated, and public opinion pronounced in its favour, they purposed to go to the Admiralty with a direct proposal. Con-

sidering the enlightened views which had been expressed by the First Lord and the Chancellor of the Exchequer, with regard to the Deep-sea exploration, about to leave our shores in the course of the summer, he thought they had a right to anticipate a favourable consideration of their application, especially when it was supported by the professional approval of an officer so thoroughly competent to give an opinion as Admiral Richards. No one could have heard the stirring appeal of Captain Osborn, without seeing that in a national point of view, independently of all scientific considerations, it was an object of great importance to keep up the high spirit of the navy. In these piping times of peace, sailors and officers were apt to get rusty; and an expedition of this sort would have a good effect in rubbing them up, keeping the men up to their work, and stimulating the officers to that career of exertion, emulation, and competition, which was really the soul of the service. On that ground, and on the ground of the progress of geography and the acquisitions of science, he hoped the members of the Society would cordially support the Council in their application to the Government.

ON THE

EXPLORATION OF THE NORTH POLAR REGION.

A Paper read by CAPTAIN SHERARD OSBORN *on the 23rd of January*, 1865.

THE ordinary Evening Meeting (the fifth of the Session) of the Royal Geographical Society, held on the 23rd of January, 1865, was attended by a large concourse of members and their friends; the Paper of the evening being 'On the Exploration of the North Polar Region,' by Capt. Sherard Osborn, R.N.

Amongst the audience were M. le Comte de Paris, Count Strzelecki, the Earl of Donoughmore, the Earl of Sheffield, Lord Dufferin, Lord Colchester, Capt. Sir John Dalrymple Hay, Bart., R.N., M.P., Admiral C. R. Drinkwater Bethune, C.B., Sir Henry Rawlinson, K.C.B., Sir Charles Nicholson, Bart., Admiral Fanshawe, Capt. Sir F. W. Nicolson, Bart., R.N., Capt. the Hon. A. Cochrane, R.N., C.B., Capt. G. A. Bedford, R.N., Capt. E. A. Porcher, R.N., John Barrow, Esq., F.R.S., John Lubbock, Esq., F.R.S. (President of the Ethnological Society), John Crawfurd, Esq., F. Galton, Esq., F.R.S., W. Spottiswoode, Esq., F.R.S., &c., &c., and the following gentlemen who have served in the Arctic Regions :—General Sabine (President of the Royal Society), Admiral Sir Edward Belcher, C.B., Admiral R. Collinson, C.B., Capt. G. H. Richards, R.N. (Hydrographer to the Admiralty), Capt. Inglefield, R.N., Capt. R. V. Hamilton, R.N., Capt. W. W. May, R.N., Capt. Aldrich, R.N., Staff Commander J. E. Davis, R.N., Capt. Allen Young, R.N.R., Dr. Rae, Dr. Domville, R.N., Dr. Donnet, R.N., Clements R. Markham, Esq., Mr. Dean, R.N., &c.

The ordinary routine business having been gone through, Capt. SHERARD OSBORN read as follows :—

Arctic discovery, however imperfectly treated, must always, I feel sure, claim the attention of all true lovers of geography and physical science, especially that of a Society which, in its present prosperity, represents the deep interest recently exhibited by all grades of the public in the solution of the problem of a communication between the Pacific and Atlantic, and the world-wide sympathy in the noble devotion by which that mystery was solved.

I need not, therefore, offer an apology to the members of the Royal Geographical Society for any effort upon my part to show the perfect practicability of an exploration of the blank space around our Northern Pole, and to place before you opinions entertained by myself, and those of my brother Arctic explorers who do *not* belong to the new school of "rest and be thankful" men, either in science or naval achievement, and who are no more prepared to turn their backs upon the Arctic Regions because Franklin died off King William's Land, than you would wish them to do so to an enemy's fleet, because Nelson fell at Trafalgar.

In the year 1818, Baffin's discoveries upon the one hand, and those of Behring

upon the other, with dots for the mouths of the Mackenzie and Hearn Rivers, was all we knew of the strange labyrinth of lands and waters now accurately delineated upon our charts of the Arctic Zone. Sailors and travellers, in thirty-six years, have accomplished all this: not always, be it remembered, in well-stored ships, sailing rapidly from point to point, but for the most part by patiently toiling on foot, or coasting in open boats round every bay and fiord. Sir Leopold McClintock tells the Royal Dublin Society that he estimates the foot explorations accomplished in the search for Franklin alone at about 40,000 miles. Yet during those thirty-six years of glorious enterprise by ship, by boat, and by sledge, England only fairly lost one expedition, and 128 souls, out of forty-two successive expeditions, and has never lost a sledge-party out of about one hundred that have toiled within the Arctic Circle. Show me upon the globe's surface an equal amount of geographical discovery, or in history as arduous an achievement, with a smaller amount of human sacrifice, and then I will concede that Arctic exploration has entailed more than its due proportion of suffering.

They who assert that our labours and researches have merely added so many miles of unprofitable coast-line to our charts, had better compare our knowledge of Arctic phenomena to-day with the theories enunciated by men of learning and repute a century ago. They should confront our knowledge of 1864 with that of 1800 upon the natural history, meteorology, climate, and winds of the Arctic Regions. They must remember that it was there we obtained the clue, still unravelled, of the laws of those mysterious currents which flow through the wastes of the ocean like two mighty rivers—the Gulf Stream, and the Ice Stream; they must remember that it was there—in Boothia—that the two Rosses first reached the Magnetic Pole, that mysterious point round which revolves the mariner's compass over one-half the Northern hemisphere; and let the world say whether the mass of observations collected by our explorers on all sides of that Magnetic Pole have added nothing to the knowledge of the laws of magnetic declination and dip. They should remember how, a few years ago, it was gravely debated whether man could exist through the rigours and darkness of a Polar winter, and how we have only recently discovered that Providence has peopled that region to the extreme latitude yet reached, and that the animals upon which they subsist are there likewise, in winter as well as in summer. All this, and much more, should be borne in mind by those cynics who would have you believe we have toiled in vain; and I hold, with the late Admiral Beechey, "that every voyage to the North has tended to remove that veil of obscurity which previously hung over the geography and all the phenomena of the Arctic Regions. Before those voyages all was darkness and terror, all beyond the North Cape a blank; but, since then, each successive voyage has swept away some gloomy superstition, has brought to light some new phenomenon, and tended to the advancement of human knowledge."

I will not dwell upon the personal hardships or risks incurred—they can be easily discounted at any Insurance Company in the City of London, and the privations are best appreciated by those who have been sledging over the barren ground of 76° N., and are not scared by the recollection of cold fingers and banian days. Men do not volunteer for certain death or starvation, and

I can only say that so popular is Arctic service with our sailors, that I am frequently asked by old shipmates, "Are we going up that way again, sir? Please don't forget I am a volunteer!" The fact is, more sailors have been thrown to the sharks from the diseases incident to the service in China and the coast of Africa, within the last four years, than ever fell in thirty years of Arctic service, and our seamen and officers know it. And, after all, the dangers of exploration in the north are those common to like undertakings in all unknown regions—Speke and Grant seeking for the sources of the Nile, Burton at Harar, Fremont in the Sierra Nevada, Livingstone on the Zambesi, or Burke and Wills in the hungry wilds of Central Australia, have all moments of as great peril as Kane ever endured in Smith Sound, or McClure passed through in Banks's Land.

I will, therefore, without further preamble, deal with the points which are the most important for our consideration.

First. The direction from which a Polar exploration should be undertaken with the least risk and greatest probability of success.

Second. The mode in which such an exploration should be executed, and the scientific results likely to accrue.

We have before us a circumpolar chart. Mark the nearest known points to the Pole—the extremes of Spitzbergen and North Greenland. Let us first deal with Spitzbergen. Hakluyt Head is about 600 miles from the Pole: in the last century the whale fishery was situated off that Cape, and we have the concurrent testimony of all those ancient fishermen to prove that the sea was often found clear of ice for another hundred miles further north. I say, therefore, that sailing-ships have been in that direction within 500 miles of the Pole. For the information of those more sanguine than myself of the existence of open water at the Pole through the action of the Gulf Stream, I annex a table collated, by my kind friend Mr. Markham,* from the data furnished to the Royal Society by the Hon. Daines Barrington, Colonel Beaufoy, and others. You will there find that stout old Dutch and English skippers vowed they had been as far north as the 88°, some to 83° N., and many into the 82° parallel: indeed one old sailor declared to Master Moxon, hydrographer to Charles II. of glorious memory, that "he had sailed two degrees beyond the Pole!" but it is only fair to add that this was said in dreamy Amsterdam, over strong Dutch beer.

I am content, however, to point to the position reached by the late Sir Edward Parry, in his boat expedition from Spitzbergen in 1827. There, at any rate, he stood upon a floating sea of ice on the night of July 22, 1827, being then in lat. 82° 45′ N., exactly 435 geographical miles from the Pole. He was constrained to give up the attempt simply because the ice was being swept faster to the south than his men could drag their boats to the north. It was the height of the Arctic summer, and all the ice-fields were in motion. The experience of the last twenty years tells us that instead of starting on such a journey in June, Parry ought to have wintered in Spitzbergen, and started for the north in February; and such is the perfection to which Arctic sledge-equipment is now brought, that the weights would be infinitely less

* See p. 46.

for the men to drag, whilst the provisions would last months instead of weeks.

But there are great objections to any effort to reach the Polar area by sledges from Spitzbergen. You will observe as yet no known lands exist upon its meridian and to the north of the island; consequently no fixed points for depôts of provisions: whereas, in Smith Sound, we have a starting-point 120 miles nearer to the Pole, and there is good ground for believing (as I will show) in a further extension of continents or islands upon the meridian of the American and Greenland continents, which is not the case in Spitzbergen. For instance, the floes which drift down upon Spitzbergen from the north contain in their embrace no icebergs proper. This tells us that no extensive lands lie upon that meridian; for the iceberg is the creation of the land, born of a glacier, and not of the sea: whereas these icebergs abound in Smith Sound; and the glaciers, as Kane advanced northward, appeared to increase rather than diminish in extent, which would not be the case if the land ended abruptly near the Humboldt Glacier, in 80° N. latitude.

Those vast accumulations of snow and fresh-water ice, and their beautiful creations the iceberg, tell us of great lands with lofty mountains and deep valleys retaining the moisture and snow-drift of ages, and promise that continuity of coast-line, and that frozen seaboard, which is only needed to enable our explorers to reach the Pole in safety. Greenland, therefore, and not Spitzbergen, is the direction I advocate. At the same time, do not jump to the conclusion that there is nothing to reward the explorer in the direction of Spitzbergen or Nova Zembla, for there is much yet to be seen and done there in scientific research. The bugbear of Arctic navigation is being gradually dispelled. 'A Cruise in High Latitudes,' and 'A Season among the Walruses,' encourage us to hope, that where yachtsmen have not hesitated to go for pleasure, and where poor Norwegian fishermen yearly sail in almost open boats for hides, ivory, and the more precious livers of Arctic sharks, which produce, as you know, "pure *cod-liver* oil!" it is possible others will yet wend their way for love of science, and add to our knowledge of the laws of electricity, light, magnetism, temperature, and winds.

From Spitzbergen let us turn to Greenland. In the year 1853 my lamented friend Dr. Kane entered Smith Sound, at the head of Baffin Bay, with his little brig, the *Advance*. At that time I was serving with Capt. Richards, the present Hydrographer of the Navy, in an expedition in Wellington Channel, under Sir Edward Belcher; Kellett and McClintock were in Barrow's Straits, McClure had just reached the waters of the Atlantic from the Pacific Ocean. Collinson and Rae were in Victoria Land and Boothia, and Inglefield had just made one of his summer trips to Beechey Island. There could not have been less than four hundred British subjects within the Arctic seas. All our ships had been admirably found, and our crews lived in comparative comfort, for the resources of a nation and a great navy had been placed at our disposal. Dr. Kane's expedition was rather the result of private munificence, and a generous impulse of individuals; and it is only fair to Dr. Kane to say, that never in our times has a navigator entered the ice so indifferently prepared for a Polar winter. With only seventeen followers, two of

them mutineers, without a steam-power for his solitary vessel, without proper sledge-equipment, without any preserved fresh meat, and a great insufficiency of preserved vegetables, and with only coals enough for twelve months' fuel, the only marvel to me is, that he ever returned to relate his sufferings. They are only to be equalled by those of the navigator "James," in Hudson's Bay, two centuries earlier. God forbid that I should be thought to cast one reflection upon those warm-hearted Americans who came nobly forward, and said, "We too will aid in Arctic enterprise;" but the fact is, that enthusiasm and high courage without proper knowledge and equipment must, on such service, infallibly lead to the suffering which Dr. Kane's followers endured; and it is *that* which best explains how it was, that whilst our sailors, far beyond the present haunts of Esquimaux, waxed fat and fastidious, Kane's poor followers had to eat the raw flesh of animals to avert the ravages of scurvy brought on by a poisonous dietary of salt-meat. This much to meet the objections of those who point to Dr. Kane's thrilling narrative, with a view to frighten us from Arctic exploration; and I may add, that I know well that chivalrous man never penned those touching episodes to frighten men from high enterprise, but rather to caution us to avoid his mistakes, and to show us how nobly the worst evils may be borne when the cause is a good one.

The brig *Advance* entered Smith Sound, but departed from an Arctic canon by keeping upon the eastern or lee-shore instead of the western or weather-shore: she was quickly beset, and fell into a bay sixty miles further on, out of which she never again sailed.

In the spring of 1854 a further exploration was accomplished, of about 160 miles of the Greenland coast, and the western land was observed for a still greater distance. The extreme of Greenland visited was a point beyond a stupendous tongue of the great glacier, and named Cape Constitution by the only man (Mr. Morton) who reached it. This sailor could not get round the Cape because of water existing at the base of the cliffs; he could not scale the cliff, because it was too steep; what more there is, therefore, beyond Cape Constitution none of us know. Kane thought it the termination of Greenland. I entirely dissent from so hasty a conclusion, because I cannot believe that such a glacier as that of Humboldt, bearing the hundreds of icebergs, which Kane tells us of, into the waters of Smith Sound, was ever fed otherwise than by some extensive parent glacier spread over a very great area; and this proclaims, in my opinion, a continuity of the Greenland shore, as there was, undoubtedly, land on the opposite side as far as Morton could see.

Scrambling up the face of Cape Constitution, to the height of either 300 or 500 feet, Mr. Morton could see no ice to the westward: to which I attach small importance, never having myself seen floe-ice from any altitude at a greater distance than 12 miles; but he did see land rolling away to the northward, a bold but indented coast, he thinks, with a fine range of mountains looming in the interior. This land is appropriately named Grinnell Land.

English and American hydrographers are at variance as to the assigned latitudes of Cape Constitution and Cape Parry, the two extremes discovered by Kane. I sincerely trust the American computation will prove correct. Cape

Constitution will then be in 81° 22′ N., and the point seen on the west land would be in about 82° 30′ N., or just 450 miles from our Pole, a distance equal to that of the Land's End from Balmoral.

But in order that we may deal with the subject from its worst point of view, I am prepared to accept the more southern positions assigned to the extremes by Admiral Collinson, Captain George, and Mr. Arrowsmith. They, as you will observe, place Cape Constitution in lat. 80° 56′ N., and credit Morton's vision with a range of 60 miles; fixing Cape Parry in lat. 81° 56′ only, or a distance of 484 miles from the Pole. I accept this as the distance we have to deal with, and declare that Cape and Grinnell Land as my assurance of the perfect possibility of reaching the Pole.

Cape Parry is, as you see, a fixed point, more than a degree and a half nearer to the Pole than Hakluyt Head, in Spitzbergen, and therefore the best point of departure for the exploration of the great unknown space before us.

The distance of Cape Parry to the Pole and back is just 968 miles; a distance which has been repeatedly exceeded by our Arctic sledge and boat parties since the year 1850, and far short of what we subsequently accomplished, as I will presently show.

But, apart from mere proximity to the Pole, there are other conditions which recommend this route to our consideration. It will be remembered that at Cape Constitution a considerable extent of water was found to exist in the early summer. Recent Arctic explorations have taught us that this is no great novelty. Dr. Kane, however, believes it to be very extensive; but, as I have good reasons for being sceptical upon this point, and as the Pole is within our reach whether Kane's Polynia be great or small, I shall not urge the facilities which open water offers to a boat-navigation. The future explorer might hail open water if it were found to exist along the shores of Grinnell Land; but, if not, he would be well satisfied with plenty of ice, and merely pray that the mainland or off-lying islands should be found to exist as far as the 87th parallel. And there is, I hold, more chance—far more chance—of that being the case, than of any open sea round our Arctic Pole.

But Kane's Polynia evidently exists where there is a far greater abundance of animal and vegetable life than we have found to exist round the *water-holes* of Regent's Inlet, Wellington Channel, or Lancaster Sound. The possibility, therefore, of future explorers of Smith Sound being able to vary their dietary with the flesh of deer, bear, seal, or wild-fowl, is an important recommendation to the route in question.

In this meridian, too, we find human life extending to a higher latitude than in any other known direction. A fine tribe of Arctic savages was first discovered by Sir John Ross in lat. 75° 35′ N., long. 65° 32′ W., in his voyage of 1818. Ross christened this isolated section of the great Esquimaux race, "Arctic Highlanders." Through his interpreter, Sackense, he learnt that their tribe dwelt to the northward of the great glacier of Melville Bay, by it they were entirely cut off from all knowledge of anything in that direction, and when Ross told them that his ship had come from the south, they replied—"It was not true; there was nothing but ice there!" Subsequent Arctic expeditions, as well as whale-ships, have had intercourse with these people, and so far conciliated them, that instead of offering to kill Europeans, as

they threatened in 1818, we find them in 1854 positively saving Kane and his followers from starvation, and carefully sharing food and lodgement with the poor sailors. Of this isolated group of the human family Dr. Kane gives us a very interesting account. Having no boats, nor a knowledge of how to construct them out of bones and seal-skins, as other Esquimaux do, afraid to cross the two great ice-streams of Melville and of Humboldt, these poor creatures inhabit a region, between the prongs of the Greenland Glacier, which embraces about 600 miles of coast-line, and they cannot penetrate far into the interior, for there they said was the "Sernik Soak," or Great Ice Wall!

Without any drift-wood, except a fragment of wreck at rare intervals, the Arctic Highlander is compelled to use bones alone in the construction of his sledge and weapons. The latter consist simply of knife, harpoon, and lance, bones lashed together with an iron point or edge ingeniously fitted from fragments of meteoric iron found in the country, or from scraps of iron hoops which reach the coast upon the casks of wrecked whalers. Without a bow or arrow they are unable to kill reindeer or musk-oxen; the former range unmolested over the barren uplands at the base of the glaciers; and the art of fishing is likewise unknown, for Kane saw lakes full of salmon-trout which the Arctic Highlander could not catch. With his spear and harpoon, however, he slays the bear, seal, and powerful walrus; and in summer time nets vast quantities of the little auk, a delicious morsel, well appreciated by all of us who have visited those Crimson Cliffs of Beverley, as Ross poetically named their haunts. These people are thus dependent for subsistence upon the flesh of marine creatures, and consequently upon the existence of broken ice, or open water near the coast, throughout every season of the year. Without it they would all perish in a single winter. But a Beneficent Providence has so arranged it that from the action of oceanic currents, and the destruction of the ice-fields by the large icebergs thrown off from the glaciers constantly sailing through them, there is always, even in the depth of a Polar winter, some "North Water" to be found, and in it walrus and bear. The land, as I have said, yields these Arctic fishermen no animal food, neither can I discover an instance of their ever having been seen to partake of a single herb, grass, or berry grown upon the shore; of vegetables or cereals they have, of course, no conception, and I know of no other people on the earth's surface who are thus entirely carnivorous. Kane says that they must be an expiring race. I can find no proof of it, though no doubt, like all savage races, they are doomed to pass away or merge into those of a superior organisation. Where Ross found the Arctic Highlanders in 1818 they exist in 1864, and from occasional contact with Europeans have rather improved than deteriorated. All who have seen them, and I am one, describe the men as square-built, hearty fellows, deep chested, bass-voiced, and merry-hearted. Ready to fasten on with their harpoon to a fierce walrus, and, line in hand, struggle for life with it upon the weak ice; or, aided by their dogs, bring the Polar bear to bay, and close in upon it with lance and knife; yet these poor savages showed in their kindness to the starving and not always rational crew of the *Advance*, that they were not deficient in the nobler attributes of our common nature. Their women, good souls, were tender and sympathetic in their quaint way, for it is not every European mother who would lend a nice warm babe to

make a soft pillow for a weary traveller, as the ladies of Etah did; and the spinsters of Smith Sound were fair enough to win the hearts of some on board the *Advance*. Indeed more than one little scandal related leads me to believe that, in spite of the struggle for existence in 80° N., the unwashed, sealskin-clad beauties of Murchison Sound have their little flirtations, as well as their sisters of ampler robes in more southern climes. "One touch of nature makes the whole world kin;" and I know nothing more strange in all Arctic adventure than when Kane was escaping southward, to find his faithful hunter, Hans, voluntarily abandoning him, and turning Arctic Highlander all for the love of Shanghu's pretty daughter—she had gently tended him when injured in a walrus-hunt. The elopement of the fond pair upon a bone-sledge, drawn by wild dogs, is perfect as an Arctic love-scene; but, unfortunately, Hans was already a married-man. "Alas for Hans!" Dr. Kane pathetically observes. I say, "Alas for Miss Shanghu!"

It has not been without a purpose that I have thus touched upon the habits of the Arctic Highlanders. I have endeavoured to show you that, though carnivorous creatures, they are, after all, much as we are in other respects: it tells you that there, in Smith Sound, inhabitants exist who have helped the European and can do so again; and, above all, their existence is an incontestable proof of an amount of animal life being found in that latitude throughout the year and in all seasons.

Kane says that his Arctic friends would not carry him beyond the Humboldt Glacier, and seemed to have no knowledge of lands to the north. Yet Morton found a fragment of an Esquimaux sledge on shore between that glacier and Cape Constitution. May it not be that other Esquimaux exist there? and does not the question occur to you, How far does human life extend in Smith Sound? May it not reach much nearer to the Pole than even where Kane found it in 80° N.? So far as we know, the Arctic Highlanders are confined to the Greenland shore; and for our purposes of exploration it would be well it were so. They would then be near enough to aid as hunters and sledge-drivers, and not so close as to endanger good order and discipline amongst a crew in hours of trial or suffering.

There is one more reason for preferring this route to any other, viz., that the Danish settlements extend along the coast of Greenland as high as 72° N. Kane in open boats carried off his men in safety to Upernavik, when it became imperative to do so; other navigators could do likewise, if any accident occurred to their ships in Smith Sound. Trusting I have shown the right direction in which the proposed exploration should be attempted, I will now sketch out the mode in which it should be carried out; for the details would be too technical and voluminous to interest all geographers.

An exploration of the Polar area should always be sent under naval auspices and naval discipline. I have no faith in purely private expeditions on such a service as this I advocate. We need all the resources of a naval dockyard, all the especial knowledge collected in various departments—whether in the preparation of vessels, food, raiment, sledges, or equipment—to insure the work being well and safely done. Wooden ships-of-war are now rotting and sinking at their anchors in our arsenals; all the old ladies round our seaports are cooking their tea with heart-of-oak from poor chopped up gunboats. We don't

want three-deckers, but you might have them for the asking: you can be more modest, and ask for something much smaller than wooden line-of-battle ships. Of course you will not expect the Admiralty to take the initiative in such matters. Columbus would never have reached the new continent; the immortal Cook would never have made his voyages round the world; the illustrious names of Franklin, Ross, and Parry would not have been added to the rolls of fame; if you had waited for past Admiralties to originate scientific research and geographical exploration.

But I have no doubt men of science—men who think the Navy and its officers and sailors exist for nobler purposes than to slay or be slain—will find His Grace the Duke of Somerset just as amenable to reason and healthy pressure as former First Lords have been. The Board, like other Boards, will, as good servants of the public, do whatever the public calls upon them to do; and it is by the action of public opinion, directed by the men of science in this country, that I hope to see a Polar expedition sent forth in this generation under naval auspices. The Navy needs some action to wake it up from the sloth of routine, and save it from the canker of prolonged peace. Arctic exploration is more wholesome for it, in a moral as well as a sanitary point of view, than any more Ashantee or Japanese wars.

You are not going to educate us, work us up to the point of nautical perfection, awaken hopes and ambition, and then give us oakum to pick, or run us over the mast-head after-top-gallant yards, to keep down the spirit which intellectual progress has evoked. The navy of England cries not for mere war to gratify its desire for honourable employment or fame. There are other achievements, it knows well, as glorious as victorious battle; and a wise ruler and a wise people will, I hold, be careful to satisfy a craving which is the life-blood of a profession—indeed, I hold that it ought to be fostered and encouraged.

Upon these grounds, as well as those of scientific results, would it be too much to ask for a fraction of the vast sum yearly sunk in naval expenditure, for two small screw-vessels and 120 officers and men, out of the 50,000 men annually placed at the disposal of the Admiralty?

Let us suppose it granted, and two vessels like the *Pioneer* and *Intrepid* ready by the spring of 1866. They would sail for Baffin Bay, reach Cape York in August, and one vessel would be secured in or about Cape Isabella, leaving only twenty-five persons in charge of her; the other vessel, with ninety-five souls, would be pressed up the Western shore, either as far as Cape Parry or in that direction, taking care not to exceed a distance of 300 miles from her consort. That autumn the southern ship would connect herself by depôts with the northern vessel, and the northern vessel would place out depôts towards the Pole ready for spring operations.

In 1867 and 1868 sledge and boat operations should be directed towards the Pole and over the unknown area, and in 1869, either in ships or by boat to Upernavik, our expedition would retire from Smith Sound. They would thus only have two winters and three summers to encounter; a period which experience has taught us healthy men, with proper care, can well spend at a time in those regions.

With respect to the distance to be traversed by sledge, we have ample data to show that it has been exceeded by our sailors and marines in the most sterile land yet visited within the Frigid Zone. For instance, in 1853, Commander McClintock's party did 1220 geographical miles in 105 days; Lieutenant Mecham did 1203 miles; and Captain Richards and I did 1093 miles. Mark, that all these distances are in excess of the 968 miles between Cape Parry and the Pole. Lieutenant Hamilton did 1150 miles with a dog-sledge and one man. Yet, in subsequent expeditions to those of 1853, still longer marches have been accomplished, and the men suffered still less. In 1854 Mecham marched 1157 miles in only seventy days, a gain of a month in time, equal to a distance of 300 miles more had it been necessary; and in 1859 Captain McClintock actually accomplished 1330 miles and Young 1150, and that distinguished officer, Sir Leopold McClintock, agrees with me in thinking that it is quite possible with proper management to extend a journey over a distance of 1500 miles, or just 500 miles more than are required to take a sledge from Cape Parry to the Pole and back. Thanks to hard-earned experience, we have learnt in ten years to double the period a sledge-party may support itself away from the ship, and trebled the length of the journeys to be accomplished; yet at the same time reduced the labour of the seamen and the personal risk to its minimum.

I am not vain enough to suppose my unsupported opinion of the practicability and safety of a sledge-exploration of the Polar area would suffice to convince you all; but I can confidently appeal to an officer of far greater experience, Captain Sir Leopold McClintock. He, writing to me in December last, says: "I am glad you are poking up the embers of Arctic discovery. I wish I were now preparing for a trip to the North Pole. I regard it as being within the reach of this generation; for knowledge, as you know, is power in sledge-travelling." Can you doubt the practicability of such an exploration, I say after such a declaration from an officer who has spent seven winters and ten summers in these seas? I am sure you will not; and that you will say with me, that of all men he is the best fitted to head such an expedition.

3rd Point. We have now to consider the final portion of my argument:—The advantages to be derived from an exploration of the Polar area.

In the first place, you as a scientific body have before you an unknown area of 1,131,000 square miles of the globe's surface a sheer blank. Within that area you are profoundly ignorant whether there be lands or waters; whether, as some say, it is a silent frozen solitude, or an open sea teeming with animal life. So far as you as yet have explored in that direction, you have found the land capable of supporting not only animal, but human life.

Moreover, as connected with physical geography, you have in 80° of North latitude reached the only known spot where Nature yields to man no plant, herb, or grass, which he uses for food or nutriment. Yet, imperfect as the botanical exploration of that spot has been, we learn from the report of the able American botanist, Mr. Durand, that, although Dr. Kane lost the major portion of his collection, the remainder "was yet the richest and most interesting ever brought by Arctic or Polar explorer;" and Kane added no less than *twenty-seven species* of plants to the list recently published by that

eminent Arctic naturalist, Sir John Richardson, as existing to the north of 73° of latitude. Proving that, at any rate, there was an error of 50 per cent. in the botanical geography of the region under consideration.

To botanists, therefore, as well as geographers, there is everything to be discovered within the Polar area; and not only the botany of the land, but that of the sea, and of the fresh-water lakes and rivers flowing from the glaciers of that ice-bound region. Immediately in connection, too, with the distribution of the animal and vegetable kingdoms of the Polar Basin, we have to solve more than one strange anomaly in the climate that has been noticed upon its margin.

The lowest known winter mean temperature has been recorded by Dr. Kane, in the very region which is so rich in Arctic flora, where the natives can support themselves alone upon the chase of marine creatures, and where the reindeer are so abundant that a traveller subsequent to Kane shot 600 head, and supported his party upon fresh food throughout a long winter.* There, in Renselaer Harbour, with open water not far to the south, with open water, as he believed, not far to the north, Kane records a winter mean temperature lower than we have found at Melville Island, where at that season we feel sure that there was no open sea nearer than the Mackenzie River, or the entrance of Lancaster Sound. Mr. Schott, the able American meteorologist, puzzled with the anomaly of so low a temperature near the reported open Polar Sea, says that "it points conclusively to either a considerable northern extension of Grinnell Land on the one side, and an eastern extent of Washington Land on the other, or to a considerable elevation of the interior on both sides of the channel above its level," and acknowledges that his conclusions are at variance with the supposed existence of an ocean around the Pole free for navigation.

The fact is, that meteorology is quite as much at fault there as elsewhere when it proceeds to theorise upon insufficient data. And, in a scientific point of view, I maintain that nothing could be more deeply interesting than a careful series of meteorological observations within the Polar area. Its climate is, as I have shown, a mystery; and Kane's rough observations require to be verified, as well as those of our searching-expeditions, by sending out a scientific expedition, with people well versed and earnest in that science alone.

In geology, and especially in the phenomena of those stupendous glaciers, as well as the great ice-streams of Humboldt and of Melville, there is much to repay the future explorer of Smith Sound. In the presence of men so eminently qualified to point out what is most deserving of scientific investigation under these heads, it would ill become me to do more than advert to the subject. Indeed, I feel I owe an apology to all men of science for even daring to touch upon subjects of which I, as a sailor, can have only the most fragmentary knowledge. But I am also addressing myself to those who know little of such subjects, and who may be carried away by the cuckoo cry of "Cui bono?" in discussing further geographical exploration. The learned Council of this Society are not likely to say so, I know well, or to ask me to demonstrate the necessity for further scientific research based upon an argu-

* Mr. Cornelius Grinnell informs me of this interesting fact connected with Dr. Hayes' second visit to Smith Sound.

ment touching whale-oil, whalebone, walrus-hides, seal-blubber, narwhal-ivory, deer-skins, peltry, or Upernavik graphite. I should as soon think of urging the exploration of New Guinea upon the speculation of profics arising from the tails of birds-of-paradise or edible birds'-nests.

No! I put the question before you upon purely scientific grounds; and I ask you—the Geographical Society—if you are not satisfied with the geographical harvest that awaits you there, to turn to the Royal Society and ask the learned Council whether there is anything likely to repay the explorer of the Pole for his labours? I can confidently appeal to its President, General Sabine. He is to-day the senior living officer of those who accompanied Ross and Parry in their early explorations of the Arctic Zone. In Spitzbergen, Melville Island, and East Greenland, he collected those valuable data in terrestrial magnetism which have subsequently led to the construction of those beautiful charts exhibiting the declination, inclination, and intensity of the magnetic force over the globe's surface—a wonderful reduction of scientific data to good, useful purposes, which every sailor can appreciate and be grateful for. And does he tell us that there is nothing more to be done in the Arctic Zone? On the contrary, in General Sabine's Address to the Royal Society, on Nov. 30th, 1863, he dwells especially on the pleasure with which he learns that the Swedish Government are about to carry out in Spitzbergen that measurement of an arc of the meridian, the value and importance of which the learned General had urged forty years ago upon the attention of the British public, and which, he says, "I had planned the means of executing, and which I ardently desired to be permitted to carry out personally."

General Sabine's original interesting paper upon the measurement of this arc was addressed to Mr. Gilbert, M.P., Vice-President of the Royal Society in 1826. In it he pointed out the facility offered by Spitzbergen for a measurement of an arc of the meridian extending over nearly 4½ degrees of latitude, stating that the value of this measurement, in the latitude of Spitzbergen, towards deducing the proportion of the polar and equatorial diameters by its combination with an arc near the equator, "was most important;" and adding that its value would be "equivalent to an arc in Lapland of six times the extent of the arc measured by the French Academicians."

Now the hope of the Royal Society of this measurement being at last obtained depends upon the scientific energy of the Swedish Government; but it so happens that in the expedition I urge upon your attention there might be every arrangement made for a measurement of four degrees of the meridian upon the shores of Smith Sound. I have told you that one of the ships should be left about Cape Isabella, and the other pushed on to Cape Parry, or that that point is to be considered our main station for a Polar expedition. The intervening space is rather more than four degrees; and during the summer season, whilst the Northern Expedition was absent, there could be no more profitable way of occupying those left in the charge of the ships than in doing such a work as measuring an arc; the ice of the strait, I would submit, affording considerable facilities for such an undertaking; and especial provision in the expedition might be made for such persons as were well qualified to execute it.

As late, too, as November, 1864, we find General Sabine, in his Address to

the Royal Society, calling the attention of that scientific body to some recent discoveries which attest the continuation of the tropical Gulf Stream to the shores of Nova Zembla, and to a communication from Professor Forchhammer, of Copenhagen, "a valuable contribution to a great subject—the History of the Sea"—in which, by careful analysis, it is shown that, in the Atlantic Ocean, the saline ingredients in the sea-water decrease with increasing depth. This is found to hold good even to extreme depths; and the existence of a Polar current in the depths of the Atlantic is hence inferred, since it is a well-established fact that the Equatorial seas are richer, and the Polar seas poorer in saline ingredients. Again, by analysis it has been proved that the current flowing down the east coast of Greenland has an Equatorial and not a Polar origin—a mere recurring of the Gulf Stream after rounding Spitzbergen; and the learned President fairly argued—"May it not be possible that the iceless sea teeming with animal life, described by Kane as viewed from the northern limit of his research, is, as he himself surmised, but an extension of the same Equatorial stream which produces corresponding abnormal effects at every point to which its course has been traced?" and adds, "when physical researches shall be resumed within the circle which surrounds the Pole, this, perhaps, will be one of the earliest problems to receive solution." In a recent letter to me he eloquently and justly adds, "to reach the Pole is the greatest geographical achievement which can be attempted, and I own I should grieve if it should be first accomplished by any other than an Englishman; it will be the crowning enterprise of those Arctic researches in which our country has hitherto had the pre-eminence."

I will not add one word to such testimony; but place this Paper in your hands, Sir Roderick Murchison, confident that you will give the cause I have feebly advocated the same enlightened support that geographical exploration has ever found at your hands. To you, Sir, since the death of Sir John Barrow, Arctic discovery owes everything, especially from the time that the search for your lamented friend, Sir John Franklin, was undertaken; but for your aid and counsel his resolute widow would never have brought to light the glorious achievement of her husband; but for you, Sir, and the judicious pressure brought to bear by men of influence in this country upon official inertness, Sir Robert McClure would have perished in Banks's Land, and the honour of a North-West Passage have been left to another generation; but for you, and the Royal Geographical Society, that Chart to-day would have been left the blank it was in 1826, and that page of naval glory would never have been written, of which Great Britain has such just reason to be proud. Let me, as a sailor, thank you for those services to my profession, and urge you to persevere to the end, in order that your long services to science may be crowned with the addition of Polar discovery to the domain of human knowledge.

After the conclusion of the paper, the PRESIDENT spoke as follows:—The subject brought under our consideration this evening, by our distinguished Associate, Captain Osborn, is one deeply interesting to all cultivators of science, and to geographers in particular; whilst it gratifies me to know that the sentiments of this gallant officer are warmly espoused by that enlightened class of our Society, to whose labours we owe so much—the Naval Surveyors of Britain. As one of them, Captain Osborn has satisfied us of the small amount of exploration, comparatively speaking, which remains to be accomplished to solve the desired

problem. He has shown us, not by guess or theory, but by an actual appeal to facts, that in the Arctic Circle his associates and himself have travelled, by sledges and on foot upon the ice, far longer distances than those which are required to reach the North Pole from stations which have been already reached. He has even pointed out the well-known Arctic officers, headed by M'Clintock, who are ready to serve in this proposed expedition. From his own experience, and by a reference to the statistics of former expeditions, he removes an erroneous opinion which many of our countrymen have laboured under, that there is much danger in such enterprises, whilst he convinces us, that there is in them just that amount of adventurous risk which is the heart and soul of a British sailor's life. He further assures us, that among our best seamen many volunteers will be found who much prefer an Arctic voyage to service in many other seas, and he cites the testimony of naval medical men as to the healthiness of the far northern climate. Now if (as I expect) the fate of my illustrious friend Franklin be thrown in our teeth when we advocate this project, let our opponents remember that that great navigator sailed for the express purpose of finding a North-West *passage* by unknown seas, and that, in forcing through his ships by water, he perished in gloriously realising his object. In the proposed expedition no such calamity can be dreaded, for it has no analogy to the case of Franklin. According to the plan of Captain Osborn, the two ships he asks for would be so stationed, at points beyond Baffin Bay whence other ships have returned, as to ensure their safety; and, as to the danger of sledge-surveys, not one life, he tells us, has been lost in them during the many years of active Arctic service. Captain Osborn has dwelt so effectively upon the importance of the various scientific results to be derived from this enterprise that I need not revert to all of them, though it is my duty, as your President, to express my own sense of the great desirableness of measuring, for the first time, an arc of the meridian in so high a latitude; and the President of the Royal Society, General Sabine, himself an Arctic explorer and the companion of Parry, is here to testify his approbation of the project, particularly in reference to those phenomena of terrestrial magnetism which he has done so much to illustrate. Rejoicing that other men of science, including the President of the Ethnological Society, are also favourable to the scheme, I say that it is on these broad grounds of scientific research that we have to thank Captain Osborn cordially for bringing forward the proposal in so hearty and perspicuous a manner. On our part, let us not weaken the dignity of our calling by any endeavour to show the *cui bono* of such a survey by the hope of obtaining profitable commercial results, since it is quite enough for us to be assured that the scientific objects to be attained are well worthy of the effort. I trust therefore, that, as British geographers, you will feel with me that it specially pertains to our nation, which, by the conduct of its bold and skilful voyagers, has delineated on the Map of the World the outlines of land and water over so large an area of the Arctic regions, to complete this grand survey, by an endeavour to hoist the Union Jack at the North Pole itself.

The President concluded his remarks by reading the following extract from the writings of Sir John Barrow, so many years Secretary of the Admiralty, and a mainspring of all Arctic enterprises:—

"The *physical* power of the navy of England has long been duly appreciated at home; also by most foreign nations, and is matter of public record; its *moral* influence, though less the object of publicity, requires only to be more extensively known to be equally felt and esteemed; and nothing can be more conducive to this end than the results to be derived from voyages of discovery, whose great aim has been the acquisition of knowledge, not for England alone, but for the general benefit of mankind.

"But it may be asked, '*Cui bono* are these northern voyages undertaken?' If they were merely to be prosecuted for the sake of making a passage from England to China, and for no other purpose, their utility might fairly be questioned. But when the acquisition of knowledge is the groundwork of all the instructions under which they are sent forth, when the commanding officer is directed to cause constant observations to be made for the advancement of every branch of science,—astronomy, navigation, hydrography, meteorology, including electricity and magnetism, and to make collections of subjects of natural history,—in short, to lose no opportunity of acquiring new and important information and discovery; and when it is considered that these voyages give employment to officers and men in time of peace, and produce officers and men not to be surpassed, perhaps not equalled in

any other branch of the service, the question '*Cui bono?*' is readily answered in the words of the Minister of Queen Elizabeth, '*Knowledge is power.*'"

General SABINE, President of the Royal Society, said it was almost unnecessary to say that he most heartily concurred in the project so ably proposed by Captain Sherard Osborn. He was particularly impressed by what that gallant officer had said with regard to affording to the officers of the navy an opportunity of enterprise and distinction in a time of peace, and he knew no better field for their exertions than explorations in the Arctic regions. Many of our most distinguished officers in the navy had been trained in that school, among them Captain Osborn himself, Sir Leopold McClintock, Captain Rochfort Maguire, and many gentlemen n that room whom he might name if they were not present. It was not to be supposed that in the present day, when the interest in geographical and in all the physical sciences has so much increased, that so large a portion of the globe, lying almost at our hands, should remain unexplored. And could this task be achieved at a more suitable time than this, when we have amongst us so many men trained in that school competent and willing to undertake it? He held it to be a great honour to Sir Leopold McClintock, and an honour to his profession, that he was willing to give up the command of one of the finest frigates in the service in order to conduct the expedition. On the part of the Royal Society, he might say that there were many subjects of the highest importance which they could suggest as requiring investigation by such an expedition; and they would be ready to co-operate in the recommendation by furnishing, at a suitable time, a statement of the objects in physical science which could be prosecuted without impeding the main or geographical purpose.

Admiral Sir EDWARD BELCHER was happy indeed to find this subject taken up by Captain Osborn, and should be glad to see it carried out. The only difficulty he apprehended was the probability that the floe to the north would be found in a movable condition, the same as Parry found it to the north of Spitzbergen, and by which he was compelled to return. Beyond this, he saw no risk in any part of Captain Osborn's plan. It was a curious fact that a different temperature prevailed on the two sides of Baffin Straits. On the Greenland side the land is warmer. When the expedition under his command arrived at Disco, wherever the sun bore upon the sides of the hills, which were of a coal or shaly formation, the snow melted instantly. This took place early in July; and from it he concluded that on the eastern side of the straits and the eastern side of Smith Sound, there would be more vegetation, owing to the greater warmth of the earth caused by the thaw mixing with the iron pyrites in the shale. On the western side, so far as he explored it to the north, he found, on the 20th of May the whole of the sea in that direction in motion, quite open to navigation by a boat. If it had been possible to get his boat over the obstacles which beset it—pinnacles of ice about twenty feet high, mixed up together like teeth—he should have preferred that mode of travelling. In latitude 78° 10″ he found on the islets quantities of deer-tracks, horns of deer, and during the summer geese found their way to the open water. The cliffs at the same date (the 20th of May) were washed by the sea. Therefore, he had no hesitation in saying that the northern part of Smith Sound, which was found washed by the sea, must agree with the line of current that passed to the northward of his expeditionary party of 1852. On that occasion, going up Wellington Inlet, the ice suddenly came in and drove them into Northampton Sound; but afterwards, on their sledge journey, he got on to the summit of Exmouth Island, and saw the whole of the floe beneath him crumble into small pieces and move off to the west, and he returned a distance of about eighteen miles in a boat, which he had previously traversed in a sledge over the floe. Therefore, he inferred that to the northward the ice is in motion much earlier than it is to the southward, for Barrow Strait is not open or navigable till late in August, and this was in May. Observations had been made with regard to the food that people at the North prefer. It happened that during the winter, when he was certainly in a delicate state of health, although ptarmigan and hares could be found, he strongly preferred bear and walrus, and he believed that the use of bear-flesh had conduced to his recovery. There was something curious with regard to the temperature of this region. He did not know what was Kane's mean temperature for the 176 days.

Captain OSBORN said it was not given. His lowest temperature was four degrees lower than any other on record.

Sir E. BELCHER thought it was a curious fact that in the Arctic regions, over the whole period examined by navigators, the mean cold for 176 days, from the southern point where Ross travelled up to the northern point where McClintock was, never varied more than a decimal point between 9° and 10° below zero. The currents that had been observed to the northward invariably seemed to take to the westward; and in the moving floe that he noticed from the summit of Mount Britannia he was unable to see a single iceberg. Consequently he believed all the ice to the north would be found to be floe-ice, perfectly free from icebergs; and that the icebergs shot off from Greenland all went south to the banks of Newfoundland. He might observe, that if the currents in the Arctic regions were different at the surface from what they were at greater depths, the icebergs, which are eleven parts under water, would be constantly moving up the floe instead of travelling with it. He thought this great problem of the Polar region should be solved by England; not agitated here, and the Americans allowed to take the lead as they did in Japan. Among the names of eminent Arctic explorers, he was sorry that Sir Francis Beaufort had not been mentioned, With regard to the health of the men, if the men were well examined before they started, he believed they would be in much finer condition at the end of the three years than when they set out.

Mr. JOHN LUBBOCK, President of the Ethnological Society, said Captain Osborn had hit off in few words the main ethnological interest of the expedition. There was no doubt the manners and customs of savage life, the simple yet complicated contrivances by which they carry on the struggle for existence, always had great interest for those who live in more civilised countries. But of late years the remarkable discoveries that had taken place with reference to the antiquity of man, the various questions which had been opened up by the researches of M. Lartet, had certainly thrown upon these questions an entirely new interest. As had been truly observed, man, in the earlier times of which we have any relics, appears to have been not only a savage, but a savage living under Arctic conditions. Therefore, the native tribes who might be observed in the projected expedition, were precisely those who would have the greatest interest for us at the present moment. In the earliest voyages undertaken in the Arctic seas most interesting and valuable accounts had been given of the manners and customs of the Esquimaux, and even of the Arctic Highlanders who had been alluded to this evening. Still, there were many questions which we should like to have answered, and which, a few years ago, would not have occurred to anybody to ask. Most of those who had travelled among savages had brought back with them the more remarkable specimens of their skill and ingenuity; whereas, if we examined the remains which are found either in drift, or in the pile-villages of Switzerland, or in the shell-mounds of Denmark, it is not the best weapons, those which have been made with the greatest amount of labour and skill, but the worst, those which were most commonly in use, and which could be most easily made, which are the most often discovered. It is therefore precisely those with which the ethnologist and archæologist have principally to deal, which have met with the least amount of attention from travellers who have had the opportunity of studying the manners and customs of modern savages. He happened to have in his pocket a very simple little flint implement, which is extremely abundant in all the places in which the remains of ancient man have been discovered within the last few years. This instrument is flat on one side, convex on the other, rounded off at one end, and pointed at the extremity. It belongs to a type which is well known to archæologists, and was described by one of our most eminent men in this department of science, as having probably had the round end fixed into a handle, so that the sharp edges might be used as a knife. The general opinion had formerly been that the narrow end was put into a handle, and the broad end used as a scraper for the preparation of skins. This might have been a point for discussion for a long time had it not happened that an instrument like this had been found in use amongst the Esquimaux, and we now know how it was used by them. Thus one of the questions relating to the habits of the early history of man was satisfactorily solved. It might appear a very small point to know how a little bit of flint like this was used; but it is by these small points, by means of these little glimmers of light, that we can alone hope to obtain some information as to the mode of life of our ancestors in the earliest times of which we have any record. He trusted, therefore, if this expedition should be carried out, that the attention of the

explorers would be particularly directed to the simpler and ruder implements which they might find in use among the tribes they might visit. There was one little point in the paper upon which he should like to have further information. Captain Osborn said these people living so far north must evidently have had supplies of food all the year round. Now, he did not venture to question this, in a people living so far north; but he thought it probable that supplies of meat were stored for future consumption. In these northern regions it was very easy to preserve meat; it does not require to be hermetically sealed, or to undergo any difficult preparation. Sir Edward Belcher had already described, in the 'Transactions of the Ethnological Society,' some large stores of meat which he found under some Esquimaux habitations. This was an interesting point with reference to the remains of ancient man of which we have heard so much lately, because we must all be struck with the question, how it was that so large a number of bones should have been originally collected in these French caves; and here we get a glimpse of explanation in the analogous state of things described by Sir Edward Belcher as existing in the habitations of the Esquimaux. Thus we see that in one year these people could collect a sufficient quantity of food to last for a considerable time; and it might not be that game was plentiful in all seasons.

Captain HAMILTON stated that in 1853 he crossed over from Davy Island, where he had been wintering under Admiral Kellett, to Sabine Bay. He ascended the land to the northward, and after meeting Captain Richards and Captain Osborn, crossed by Morton Channel. The ice all the way was evidently the formation of that year. This was in May and June. There were no tides or currents, nothing to show any undue pressure of ice on that shore. Sir Leopold McClintock, who travelled to the westward, met with the same sort of ice; and to the northward there was nothing to indicate any undue pressure of ice on that shore. From that it was to be inferred that there must be land to the northward. To the west of Paget Land the ice was of the heaviest character—indeed the heaviest ever found by an Arctic navigator. On McClure Island the ice was found eight or ten feet high.

Mr. CLEMENTS R. MARKHAM was glad, as the humblest of those who had ever served in Arctic expeditions, to have this opportunity of expressing his intense satisfaction in listening to Captain Osborn's paper. An exploration of the North Polar Regions is now one of the greatest problems that remain for geographers to solve. What old Martin Frobisher said of the North-West Passage 300 years ago may now be as aptly said of the North Polar regions:—"It is the only thing in the world that is left undone, whereby a notable mind might be made famous and fortunate." Among the numerous points of scientific interest connected with the Polar regions, he would allude to the ethnological point—the migration of races—and to the question how far north man had fixed his permanent habitation. When the Normans first discovered Greenland in the eleventh century, they found it uninhabited—a silent land. They dwelt there a century and a half or two centuries; and then they appear to have been exterminated by a race of Skraelings or dwarfs, who were the Esquimaux. Observations had thrown some light upon the direction whence these people came. Along the whole length of the Parry Islands, east and west, we found the remains of Esquimaux. It happened that just at the period that the Skraelings appear to have exterminated the Normans, Zenghis Khan arose in Central Asia and poured forth his hordes west and north over Tartary and Siberia. It is possible that the invaders may have caused a pressure on the people of the north coast of Siberia, who wandered thence along the shores of Parry Islands, and, finding them uninhabitable, wandered on and on, unable to find a fixed habitation, until they arrived on the coast of Greenland. There they found a very different country, and one in which they could live; and meeting there only a small body of Norman colonists, they exterminated them, spreading afterwards to the south as far as Cape Farewell, and away to the north as far as Kane went. No importance was to be attached to an Esquimaux saying he believed there was no one further north or further south; because the Arctic Highlanders have no canoes, and therefore have no knowledge of inhabitants north or south of them. It is not at all impossible, therefore, that they may be found in small communities as far north as the Pole itself. This ethnological question is only one of the numerous interesting points which this paper raises, and which the proposed expedition will throw light upon.

Lord DUFFERIN said he had listened with the greatest pleasure, interest, and admiration, to everything that had been said, and, as far as his opinion was concerned, it seemed to him that the projected expedition was a proper object of national ambition. No difficulties of an insurmountable character appeared to present themselves, and if it were not that he had recently encumbered himself with trammels of a domestic character, he should humbly ask to be allowed to enrol himself a volunteer.

Dr. DONNET wished to add a few words with regard to the health of the expedition which he had the honour to belong to. He served under Admiral Austin in 1850 and 1851. They had a crew of 180 men, and the expedition was away altogether about twenty months. They lost but one man, and that poor fellow died frost-bitten. With respect to the salubrity of the Arctic regions, he thought there was not the slightest objection to the proposed exploration on this score. The expedition to which he belonged had for food chiefly the salt and preserved provisions which were supplied to the ships.

Mr. JOHN CRAWFURD had not one word to say except in the way of thorough approbation. Captain Osborn had given a most complete and satisfactory account of the projected expedition. He came into the room not perfectly satisfied with his project; but now he had heard the statements, he was thoroughly convinced and was prepared to advocate it wherever he went. With respect to the Esquimaux, they were certainly a remarkable people. He had lately been inquiring into the question of cannibalism, and he found that at one time or another all our forefathers of every race of man were cannibals, with the exception of one race, and that was the Esquimaux; he had not been able to discover a single instance of cannibalism among them. He appealed to Captain Osborn, if he had ever heard of a case.

Captain OSBORN said, as far as his information went, he had never heard of an instance.

Captain INGLEFIELD thought there could be but one opinion among geographers as to the paper of Captain Osborn. The subject divided itself under two heads: first, as to the objects of such an expedition; and secondly, as to the possibility of carrying out the enterprise. He thought we had been well assured that the object of the expedition was a very important one in a scientific point of view; and as to the possibility of carrying it out with comparative safety, he fully concurred in all that had been said. He had been into Smith Sound, and had seen open water there as far as the eye could reach, and he believed it was quite practicable to reach the Pole through that opening in the northern seas. He congratulated Captain Osborn upon the paper he had read, as being clear in its details, and proving satisfactorily to those who may style themselves Arctic navigators that the voyage is practicable, and that the adventure is one that quite recommends itself to Englishmen and geographers.

The PRESIDENT said Sir Edward Belcher had made allusion to that admirable man, who was beloved by all geographers, and who had done more for Arctic discovery than any other man he knew—Sir Francis Beaufort. It would ill become him not to mention the name of that eminent man to whom both he and the Society owed so much. As Hydrographer to the Admiralty, Sir Francis Beaufort had been succeeded by Admiral Washington, and he in his turn had been succeeded by Captain Richards, the present Hydrographer to the Admiralty, who had also distinguished himself in Arctic expeditions. He thought it would worthily conclude the discussion to call upon Captain Richards to express his opinion of the project.

Captain RICHARDS believed it was known to every one on the platform that he was in opposition. However it was only due to his friend Captain Osborn to give him credit for the powerful arguments he had used in support of his project. Captain Osborn had shown that it was an easy thing to reach the North Pole; and for his part he looked upon it as a piece of child's play in comparison with what had already been achieved. With regard to the scientific objects of the expedition, he could readily understand that General Sabine would be delighted to get an arc of the meridian measured in the Polar regions; that the field of meteorological inquiry which would be opened to Mr. Glashier would be highly appreciated by him; that Professor Huxley would add another laurel to those he had already gathered in his own particular branch of science; and that Sir Roderick Murchison himself even might find some new light thrown on the

science of geology from a visit to the Pole. And, after all, he did not know why the British nation should not have the honour of completing the discovery. With regard to the difficulties and risks, it had been his fortune to be associated with his friend Captain Osborn in one of these long Arctic expeditions, and during that time he could not recall that they went through any great amount of suffering; at all events, nothing that would deter them from offering to go again. Before he commenced his opposition, he might say that he was almost deterred from doing anything of the kind by a remark that fell from General Sabine, that with a great area like the Polar regions at our very threshold, we ought to find out all about it. That was the most convincing argument he had heard in the course of the evening. He saw plainly that at this late period of the proceedings he was not likely to make any impression on the minds of the audience, who would at any rate acknowledge that he stood up against great disadvantages, and he would therefore, with their permission, defer his opposition until a more convenient occasion.

Captain OSBORN, in reply, said if anything could add to the pleasure of the evening, it was to find that the official opposition was to be of so good-natured a character; and he hoped their Lordships would take their tone from their Hydrographer. The question which Mr. Lubbock put was one which had attracted his attention before he inserted it in the paper. Kane always found, as other explorers had found, that, in the height of the season when the Esquimaux were killing rapidly, the flesh they could not eat was collected in a heap on the shores, stones piled loosely over it, and they then went away to kill more. That formed a *câche*. Like all savages, they were singularly improvident. His brother found the Esquimaux of Lancaster Sound, who had killed a quantity of food during the time the ice was there, feeding on putrid walrus-flesh in the summer time; they had killed it in the early season, and had not the wit to bury it in an adjacent glacier to preserve the meat. Kane testified to the improvidence of these people: they were constantly starving when during neap-tides in midwinter the sea froze over. In the winter of 1854-5 they ate their dogs, but to their credit no case of cannibalism was recorded though several are supposed to have died of starvation. A calm winter was the worst difficulty they had to contend with. As long as the gales were blowing, and the icebergs were in motion, the walrus could break through the thin ice near the shore; but during the neap-tides the icebergs grounded, and the sea froze over, and the walrus was obliged to seek water in the offing. He wished some naturalist had spoken of the peculiarities of animal life in that region. Here was the walrus, as big as two oxen, feeding through the long cold nights of an Arctic winter in 80° N., yet it was doubtful whether it could be called a carnivorous animal. He had often found in its stomach a great many stones, as if they were required to assist in the digestion of some hard substance, which he thought must be the root of a seaweed. This creature was always there breaking its way through the ice. On one occasion he and Captain Richards found a walrus in the depth of the winter in 77° N., with its young lying beside it. Then again we have the seal, and it feeds on fish; and he must particularly call attention to the vast quantities of seal which existed all about these regions, thus indicating that there must be an immense quantity of fish existing there. And all this in regions where Kane tells us he found the thermometer ranging from 60° to 75° below zero during three months of the year. It was most astonishing, and it was necessary, in the interests of science, that the statement should be verified. He was really grateful to Sir Edward Belcher for having mentioned the name of one who was the first to take him by the hand, and pass him from the routine of Her Majesty's service, and show him that there was a better field for a naval officer in a time of peace than washing decks and cleaning brass-work. There never was one who held an official position who carried to his grave a greener heart. Had it remained with Sir Francis Beaufort to explore the globe in time of peace, there would be few naval officers idle. Often, when downhearted respecting the search after Franklin, Sir Francis Beaufort said to him, "Young man, don't despond. Go and induce others, men like Sir Roderick Murchison and General Sabine, who stood around that heroic woman, Lady Franklin, to move the public, and the Admiralty will follow suit." The name of Sir Francis Beaufort was too deeply engraven on his heart to lie ever ready at the tip of his tongue.

The meeting then separated.

TABLE OF VOYAGES TOWARDS THE NORTH POLE.

(*With Additions up to* 1873.)

Compiled by CLEMENTS R. MARKHAM, Esq., Sec. R.G.S.

Date.	Captain and Ship.	Latitude.	Nature of Observation.	Authority for the Statement.	REMARKS.
A.D. 1266	Normans from Gardar in Greenland.	75° 46′ N.	On July 25th, when on mer. in S., the sun was not higher than that when a man lay down across a six-oared boat, stretched out towards the gunwale, the shadow formed by the side of the boat nearest the sun, reached his face; but at midnight the sun was as high as when it was in the N.W. (highest) in Gardar.	Letter from a Norman named Haldor, to another named Arnold.—*Antiq. Amer.*, 'R.G.S. Journal,' viii. p. 127.	Angle formed by gunwale and man's face about 33°, lat. 75°. On July 25th in 13th century, ⊙ decl. + 17° 54′. Inclination of ecliptic + 13° 32′. Gardar is in 60° 55′ N. Height of ⊙ there when in N.W. at summer solstice 3° 40′: equivalent to midnight alt. of ⊙ on July 25th in 75° 46′ N., a little N. of Barrow's Strait.
1656	Two Dutchmen.	89° 0′ N.	Four journals kept in the two ships, agreeing within 4 minutes.	Captain Wood's 'Voyage,' p. 145. Wood said that a Captain Goulden told his Majesty so in 1676.	
1670	A Dutchman.	2° beyond the Pole.	Not stated.	Moxon, hydrographer to Charles II., was told so by a sailor in a drinking-shop at Amsterdam, where he went to get a glass of beer.—'Harris,' i. p. 616.	

1690	A Dutch ship.	88° 0′ N.	The captain would suffer no journal to be made.	The story was told in 1745 by Dr. Dallie, who said he was on board, to Dr. Campbell, the editor of Harris's 'Voyages.' Dallie was in Roggewein's voyage.	Weather warm, sea free from ice, and rolling like the Bay of Biscay.
1707	Captain Cornelis Giles, a Dutchman.	Far beyond 81° 0′ N.	Not stated.	Letter from John Walig to Messrs. Staphorst in 1775.	
1720	Captain Johnson or Monson.	88° 0′ N.	Not stated.	Buffon, 'Nat. Hist.' i. p. 25. M. de Buffon was told so by a Dr. Hickman in 1730.	Barrington thinks that Dr. Halley engaged Captain Johnson to take one of his thermometers to the north, and that he reached 88°.—'Barrington,' p. 47.
	Captain Alexander Cluny.	82° 0′ N.	Not stated.	'Barrington,' p. 48.	A map was engraved under Cluny's directions, with his position on it.
1744	The ship *Captain Guy*.	81° 30′ N.	Obs. of captain and mate.	James Hutton, "a hardy old tar," who was on board.—'Barrington,' p. 64.	
1746	Captain Andrew Fisher, Ship *Ann and Elizabeth*.	82° 34′ N.	.. ..	His own statement.	
1751	Captain MacCallam.	83° 30′ N.	Obs. both with Davis and Hadley quadrants.	Story of a Mr. Watts (who was aged 17 when on board) told 20 years afterwards, the captain being dead.	Sea open to the north, not a speck of ice for the last 3 degrees.
1752	Captain John Phillips, Ship *Loyal Club*.	81° 0′ N.	Obs.	His own statement.	He said that it was *very common* to fish in such latitudes.
1754	Captain James Wilson, Ship *Sea Nymph*.	82° 15′ N.	Obs. of Mr. Ware, the mate.	Mr. Ware's statement.	Sea perfectly clear.

TABLE OF VOYAGES TOWARDS THE NORTH POLE—*continued.*

Date.	Captain and Ship.	Latitude.	Nature of Observation.	Authority for the Statement.	REMARKS.
A.D. 1754	Captain Guy, Ship *Unicorn*.	83° N. (June 4). 82° 3′ N. (June 5).	Obs. of ⊙	Statement of a Mr. Adams, who was on board.	Captain Guy's 59th voyage to those seas.
1756	Captain James Montgomery, Ship *Providence*.	83° N.	Obs.	His own statement.	
1760	Captain Humphrey Ford, Ship *Dolphin*.	81° 0′ N.	Not stated.	His own statement.	
1766	Captain Robinson, Ship *Reading*.	82° 30′ N.	D. R.: computed by the run back to Hackluyt Head, in 24 hours.	His own account to Mr. Barrington.	Sea open. He thought he could have reached 83°.
1766	Captain Jonathan Wheatley, Ship *Grampus*.	81° 30′ N.	Not stated.	His own account.	Three Dutch captains told him they had been to 89° N.
1768	David Boyd, Brig *Betsy*.	82° 0′ N.	D. R.	His own statement. He was the mate.	Driven up by a gale of wind, beset.
1773	Captain Ralph Dale, Ship *Ann and Elizabeth*.	81° 0′ N.	Not stated.	His own account.	Found much ice.
	Captain John Greenshaw.	82° 0′ N.	Not stated.	.. .. ..	Nothing but a solid body of ice west of Spitzbergen. He said that "Captain John Cracroft, in the South Sea Company's time, was once so far as 83° N."
1765	Tschitschakoff.	80° 28′ N.	.. ..	.. .. ..	Russian Expedition to Spitzbergen.

1765	Tschitschakoff.	86° 28′ N.	.. ..	.. .. ..	Russian Expedition to sp...
1773	Captain Robinson, Ship *St. George*.	81° 16′ N.	Obs. by Hadley's quadrant "very accurate."	.. .. ..	He afterwards pursued a whale for five hours north, so that he thinks he reached 81° 31′ N., long. 8° E. Sea open to E.N.E.
1773	Captain John Clarke, Ship *Sea Horse*.	81° 30′ N.	D. R.	.. .. ..	Open sea to the N., with a heavy swell from N.E.
1773	Captain Bateson, Ship *Whale*.	82° 15′ N.	D. R.	'Bateson's Journal.'	"A very able sea-officer is satisfied with the accuracy of his account." —'Barrington,' p. 74.
1773	Captain Phipps, Captain Lutwidge; H.M.S. *Racehorse*, H.M.S. *Carcass*.	80° 37′ N.	Obs.	'Phipp's Voyage towards the North Pole.'	The expedition was sent out on the suggestion of the Royal Society and Mr. Barrington. It was found impossible to penetrate the ice north of 81°. The ice was a continued, smooth, unbroken plain to the horizon.
1774	Captain John Reed, Ship *Rockingham*.	81° 42′ N.	Not stated.	His own account.	A Dutch captain, named Hans Derrick, told him that he, with five ships in company, had been to 86° N.
1780	W. Souter, Ship *Rising Sun*.	Some minutes N. of 82°.	Not stated.	The surgeon, Dr. Kaestrom ('Pinkerton,' i. p. 614.)	The mountains of the Foreland were said to be in sight, which makes the latitude impossible.
1806	Captain Scoresby, Ship *Resolution*.	81° 12′ N. Obs. May 23rd. 81° 30′ N. D. R. May 24th.	.. ..	'My Father,' p. 161.	Navigation quite open to E.N.E. for many leagues.
1818	Captain Buchan, Lieutenant Franklin; H.M.S. *Dorothea*, H.M.S. *Trent*.	80° 34′ N.	Obs. ⊙	'Barrow,' p. 56-73.	Stopped by the ice.

TABLE OF VOYAGES TOWARDS THE NORTH POLE—*continued.*

Date.	Captain and Ship.	Latitude.	Nature of Observation.	Authority for the Statement.	Remarks.
A.D. 1823	Captain Clavering, H.M.S. *Griper*; and Captain Sabine.	80° 20′ N.	Obs. ⊙	'Barrow,' p. 130.	On the east coast of Greenland, in 75° 12′ N., they saw high land due north as far as 76° N. Coast 3000 feet high, with higher mountains inland.
1827	Captain Parry, H.M.S. *Hecla*; Boats *Enterprise* and *Endeavour*.	81° 6′ N. in ships. 82° 45′ N. in boats.	Obs. ⊙	'Barrow,' p. 303.	The Commissioners of Longitude, in their memorial to the King, were of opinion that *there was no well authenticated account of any ship having gone further north than* 81°, except Scoresby.
1856	Captain Willis, Schooner *Swan*.	82° abont.	No observation.	Captain Willis.	
1861	Torell (Swedish Expedition)	80° 30′ N.	Obs. (·)	'R.G.S. Journal,' xxxix.	In the *Æolus*, and *Magdalena* schooner.
1868	Nordenskiöld (ditto).	81° 42′ N. 17° 20′ E.	.. ..	.. .. ..	Swedish Expedition. In an iron steamer, the *Sophia*.
1871	Leigh Smith.	81° 24′ N. 18° 35′ E.	.. ..	Mr. B. Leigh Smith.	

The usual fishing-ground in the last century appears to have been between 78° and 80° N. The Dutch skippers replied to Mr. Barrington (in 1774), "We can seldom proceed much higher than 80½° N., but almost always to that latitude."

1853 to 1855	Dr. Kane (Smith Sound).	80° 40′ N.	? Mer. Alt. of ⊙, according to Morton.	Statement of Morton, the steward, who said he saw land as far as 82° 30′ N., June 21st to 24th. —'R.G.S. Journal,' xxviii. p. 283, *note*.	See Dr. Rink's arguments against Kane's Polar Sea, in the 'R. G. S. Journal,' xxviii. p. 272 *et seq.* Morton, and the Esquimaux Hans, formed the party.
1860	Hayes (Smith Sound).	81° 35′ N.	Not given.	West coast of Kennedy Channel.	Dog sledge. Himself and one companion.

1860	Hayes (Smith Sound).	81° 35′ N.	Not given.	West coast of Kennedy Channel.	Dog sledge.	Himself and one companion.

ENCLOSURE No. 3.

OPINION OF DR. HOOKER, C.B.,

ON THE

IMPORTANCE OF ARCTIC EXPLORATION,

Speech delivered at a Meeting of the Royal Geographical Society on April 22nd, 1872.

DR. HOOKER said, as a botanist he took great interest in Arctic exploration, for the vegetation of the Arctic Regions threw as much light upon the geographical distribution of plants on the surface of the globe as any that he knew of. 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 his 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 Zurich, for investigation, who had brought forward the most convincing proofs that that latitude was once inhabited by extensive forests, presenting fifty or sixty different species of arborescent trees, most of them with deciduous leaves, some 3 or 4 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 seemed 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 extended even to the Pole; and he knew of nothing that would give greater assistance in solving this problem than the proposed expedition along Smith Sound. Turning to the existing flora of Greenland, he pointed out that, though one of the most poverty-stricken on the globe, it was possessed of unusual interest. It consisted of some 300 kinds of flowering plants (besides a very large number of mosses, algæ, lichens, &c.), and presented the following peculiarities:—1. The flowering plants were almost without exception natives of the Scandinavian peninsula; 2. There was in the Greenland flora scarcely any admixture of American types, which

nevertheless were found on the opposite coast of Labrador and the Polar Islands; 3. A considerable proportion of the common Greenland plants were 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 long, contained 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 I have 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 re-peopled 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 re-disposition 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.

ENCLOSURE No. 4.

OPINION OF DR. CARPENTER, F.R.S.,

ON THE

IMPORTANCE OF ARCTIC EXPLORATION.

Speech delivered at a Meeting of the Royal Geographical Society on April 22nd, 1872.

DR. CARPENTER looked upon the proposal as of peculiar interest, as it would be the complement of another expedition which Government had undertaken to send out, for the prosecution of scientific inquiry into the physical and biological condition of the deep sea in various parts of the globe, ranging, he hoped, to the edge of the southern ice-field. But he apprehended it would not be able to reach the North Polar basin, and it was extremely important that a North Polar expedition should be carried out in connection with the other. Last year he explained his views on the general oceanic circulation, as dependent upon difference of temperature purely—difference of temperature giving a different specific gravity, therefore difference of pressure; which would necessarily produce a continued outflow of cold water along the floors of the ocean-basins from the Polar areas towards the equator; and, on the other hand, a continual movement of a more superficial stratum of warm water towards each Polar area. The inquiries that had been made during the last twelve months had only confirmed that view. When these researches were commenced, the general notion of this country, and among German physical geographers, was the prevalence of a temperature of 39° in the deep sea. That had been completely exploded, at least so far as the Atlantic was concerned; and it was now well known that salt water at 28° (just on the point of freezing) was heavier than water at 39°, which was formerly supposed to be the temperature of the greatest density of salt water, as it is of fresh. The ignorance which still exists on this subject is shown by the fact that, in a recent paper, Dr. Mühry spoke of cold water overflowing warmer water. This can only be in exceptional cases; as when the surface-water, chilled by the melting of ice-bergs, is at the same time rendered lighter by

the reduction of its salinity. Taking the temperatures obtained by Lieutenant Payer between Spitzbergen and Nova Zembla, he observed that they corresponded exactly with the temperatures he should have expected to find in that region; and, so far from becoming warmer as the thermometer went down to greater depths, the water became colder. The warm stratum at the surface was about 40°; at 300 or 400 feet down, the temperature was about 32°; and at 800 feet, the thermometer sank to 29°·7. Farther north, at 77½° N., they found that the warm stratum had cooled down on the surface to 36°, and became much thinner: for, at 40 or 50 feet down, they came at once to a temperature of 32°, and at 120 feet to 29°. Of course, if there should be land beyond the northernmost point of Payer, the inflow of warm water in that direction would cease; and if Smith Sound had a tolerably deep channel, extending continuously northward, while there would be an outflow of cold Polar water at the bottom, there would be a tendency to inflow of warm water along the surface of that channel, as far as it extended. He merely threw out that hint with reference to the particular route chosen. But, with regard to the general question, the Society would see how important this exploration of the Northern Polar area must be, in connection with the expedition to the Antarctic seas; because, while the southern circle of open Polar water was sending out in every direction its deep outflow of glacial water, the land-locked Polar basin of the north possessed but few, and comparatively narrow, communications with the great oceans of the northern hemisphere. These phenomena were of great interest geologically, since there could be no doubt that the temperature and biological conditions of distant oceanic areas were influenced by the outflow of glacial water from the Polar Regions.

ENCLOSURE No. 5.

LETTER TO THE PRESIDENT OF THE ROYAL SOCIETY—WITH REPLY.

ROYAL GEOGRAPHICAL SOCIETY,
1, SAVILE ROW, W.,
May 31*st*, 1872.

SIR,

I have been authorized, by the Council of the Royal Geographical Society, with reference to a letter received by my predecessor from Dr. Sharpey, dated the 16th of February, 1865, to request the attention of yourself and of the Council of the Royal Society to the result of the attempt which was made in that year to induce the Government to undertake the exploration of the North Polar Region, and to the considerations which have led the Council of the Royal Geographical Society to entertain the opinion that the present year is a fitting time for the renewal of that attempt.

In 1865, the President and Council of the Royal Society, in a Resolution, which was communicated to my predecessor, stated "their full persuasion that the expedition then contemplated by the Royal Geographical Society might, by proper arrangements, be rendered highly advantageous in the advancement of several branches of physical science." Strengthened by this expression of opinion on the part of the Council of the Royal Society, and by the expression of similar views stated in more detail by other scientific Societies, my predecessor brought the subject of North Polar exploration to the notice of the Duke of Somerset, then First Lord of the Admiralty, in a letter dated the 19th of May, 1865; and the subject was discussed between his Grace and a deputation from the Council of the Royal Geographical Society, in an interview which took place on the 20th of June in the same year.

But, at that time, there was some difference of opinion among Arctic authorities on the subject of the best route to be adopted, and the Duke said that he would wish to be in possession of the results of the Swedish expedition then engaged in exploring Spitzbergen, and of other information, before he could recommend an Arctic exploring expedition to the consideration of the Government.

In consequence of the view taken by his Grace, the Council of the Royal Geographical Society have 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. Seven 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 coastline, and of thus securing the most valuable scientific results. The conclusion thus arrived at by authorities of such eminence has placed the Royal

Geographical Society in a position which will enable its Council to represent to the Government that the conditions are now fulfilled which the First Lord of the Admiralty deemed essential in 1865, before he could entertain the project of North Polar exploration.

I gather, from the tenor of the Resolution passed in 1865, that the President and Council of the Royal Society "will be fully prepared, in the event of the intention of her Majesty's Government to send out an expedition being notified to them, to submit a detailed statement of the scientific objects which might be prosecuted with advantage, without interfering with the main or geographical purposes of the expedition." At the same time the Council which I represent are anxious that I should fully inform the President and Council of the Royal Society of their proceedings in this matter; and that I should point out the very great importance of temperately, but forcibly, stating the scientific results to be derived from the exploration of the vast unknown Polar region, even in a first preliminary communication to the Government.

I, therefore, enclose a Memorandum which has been prepared upon this subject, together with copies of the papers which were read by Captain Sherard Osborn in 1865 and 1872, advocating a renewal of Arctic exploration: and I trust that the Council of the Royal Society will give such assistance as will enable me to make the detailed statement of the scientific results of the proposed expedition as complete as possible.

In conclusion, I take this opportunity of again urging upon your attention, as President of the Royal Society, a consideration which my predecessor brought to your notice in a letter dated February 14th, 1865. The exploration of the North Polar Region will be of great collateral advantage to the objects in which you take a deep interest, connected with the transit of Venus in 1882. It is of the first importance that an Antarctic expedition should be conducted by officers experienced in ice-navigation; but unless opportunities are afforded by a North Polar Expedition, there will be no such officers available for service in 1882. A comparison of the work of the Arctic officer Sir James Ross in the Antarctic Regions with that of other expeditions, will illustrate the vast importance of Arctic experience in conducting an expedition to the Southern Continent. The eminent Arctic authorities by whom I am advised, attach very great importance to this consideration, and are of opinion that the training of another generation of officers experienced in ice-navigation will be one among many valuable results to be obtained from an expedition to explore the unknown Polar Region.

I shall do myself the honour of communicating any further steps to you that may be taken by the Council which I represent in this matter, for the information of the Council of the Royal Society.

I have the honour to be, Sir,

Your obedient Servant,

H. C. RAWLINSON, *President.**

G. B. Airy, Esq., C.B.,
President of the Royal Society, &c.

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* A letter of similar purport was addressed to the various other Societies and Institutions, whose replies are here appended.

THE ROYAL SOCIETY, BURLINGTON HOUSE,
21*st June*, 1872.

SIR,

With reference to your letter of the 31st ult., addressed to G. B. Airy, Esq., C.B., President of the Royal Society, I have the honour to inform you that the proposal therein made to the President and Council of the Royal Society was considered at their meeting, held yesterday, and I am directed by them to return the following reply:—

"Understanding that the Expedition towards the North Pole, contemplated by the Royal Geographical Society, would be undertaken mainly with a view to Geographical objects, the President and Council of the Royal Society desire to express their opinion that there are various objects of physical and biological interest which could also be accomplished thereby; and should Her Majesty's Government decide on sending out such an expedition, the President and Council will be ready to offer their advice as to the scientific observations which it would be desirable to make, and the appliances which would be required for making them."

I have the honour to be, Sir,

Your obedient Servant,

G. G. STOKES, *Secretary R. S.*

Major-Gen. Sir H. C. Rawlinson,
President of the Royal Geographical Society.

ENCLOSURE No. 6.

LETTER FROM THE PRESIDENT OF THE GEOLOGICAL SOCIETY.

GEOLOGICAL SOCIETY OF LONDON,
SOMERSET HOUSE,
17*th July*, 1872.

To the PRESIDENT *and* COUNCIL *of the* ROYAL GEOGRAPHICAL SOCIETY.

GENTLEMEN,

Your communication of the 24th May, referring to a proposed Arctic Expedition, and requesting information as to the various ways in which the science of Geology would be benefited by such an expedition, was laid before the Council of the Geological Society; a committee, consisting of Mr. Warington Smyth, Mr. Gwyn Jeffreys, Mr. Carruthers, Mr. Evans, Mr. D. Forbes, and myself, was appointed to consider the subject, and in accordance with their request, I have embodied in the following statement the various suggestions made by them:—

The Committee consider that a new Arctic Expedition would be of great value to geological science on the following grounds:—

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 a true palæozoic coal formation has been determined, but we require to know its extent and composition. A long list of minerals, many of them extremely rare and valuable, have been found in extreme northern latitudes; and much attention should be paid to their further distribution. Masses of meteoric iron have been recently discovered by the Swedish expedition, extending for a distance of not less than 200 miles along the shores of Western Greenland; these require further study, and their position determined.

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. 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; no less than 200 species having been established: Equally important additions have been successively made by the supply of materials for the more certain determination of the large number of species that before could be only provisionally recognised. It is of great importance that 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 period, it would be of much value to have exact determination of the effect produced on the rocks by the intense cold of the northern regions, and to determine the extent, height, and range of the glaciers, and 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 important and interesting result of the proposed Arctic Expedition would be the investigation of the Mollusca, not only of marine, but also of land and fresh-water kinds. Of late years that enterprising and scientific nation, Sweden, has done something to increase our scanty knowledge of the Arctic marine shells, but their resources were limited, and not to be compared with those of our own nation. In a geological as well as a zoological point of view, a proper investigation of the Arctic Mollusca 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. The researches of Professor Torell, and other Scandinavian zoologists, induce us to believe that the Arctic marine invertebrate fauna is extremely varied and numerous.

All fossils should be diligently collected, and their position accurately noted. The former conditions and climate of the Arctic regions may be thus ascertained and a new chapter opened in the history of our globe.

I am, Gentlemen,

Your most obedient Servant,

Josh. Prestwich, *President.*

ENCLOSURE No. 7.

LETTERS FROM THE SECRETARIES OF THE LINNÆAN SOCIETY,

WITH

MEMORANDUM BY MR. J. GWYN JEFFREYS.

LINNÆAN SOCIETY, BURLINGTON HOUSE,
April 6th, 1865.

SIR,

In reply to your letter of the 2nd of March, I am directed by the Council of the Linnæan Society to communicate to you the following Minute, agreed to at their Meeting held this day:—

"The Council of the Linnæan Society hear, with the greatest satisfaction, of the proposal for an expedition to explore the North Polar Region. Concurring with the Council of the Royal Geographical Society in the opinion that important scientific results would be thereby obtained, that maritime adventure and voyages of discovery in the pursuit of science have an excellent effect upon the naval service, and that this expedition in particular would be in every respect worthy of the enterprize and prestige of the British Navy, they have no hesitation in complying with the request to state their views on the various topics suggested by the Council of the Royal Geographical Society, in so far as they are connected with the pursuits of the Linnæan Society, and for the purpose of being embodied in a joint representation of the principal scientific bodies, to be submitted for the consideration of Government.

"1. As to the popular objection to North Polar expeditions on account of the supposed danger, the Council cannot attach any weight to it, being convinced that it rests on a fallacy. The Linnæan Society has, during the last half century, enrolled among its members almost all the scientific officers of the surveying and exploring expeditions of our naval and other public services, and has occupied itself largely with the publication of the results obtained in natural history. It has thus been deeply concerned in watching the progress of such expeditions, and in judging of the comparative amount of loss and hardship incurred, the results showing a remarkable immunity from danger, exemplified in the Polar voyages, North and South, as compared with many others. With the exception of Sir John Franklin's party, it is believed that not one Fellow of the Society has met with his death through Polar discovery, whilst in those African surveys and explorations, which are so warmly supported, there are very few of the numerous contributors to our publications who have not perished in the prosecution of their researches; and the numbers lost in, or in consequence of scientific expeditions in India and other tropical countries, and in the interior of Australia, have been most deplorable. These losses, however, have retained no hold on the public mind, for

they have been unaccompanied by any great disappointment, such as that experienced in the ultimate failure of the persevering search for the phantom passage to the North-west, from which such grand results had been anticipated. The sad end of Sir John Franklin and his crew, and the long uncertainty as to their fate, may be considered, like those of La Perouse, Mungo Park, Edward Vogel, Leichhardt, and many others, items of past experience, to serve rather as guides to future expeditions than as warnings against undertaking them.

"2. With regard to the excellent effect of these expeditions on the naval service generally, the Council consider that they cannot speak too warmly in their favour. As a school for cultivating the powers of observation in the officers, and thus affording them a means of rising to distinction, they are unrivalled. And as a proof of the estimation in which this branch of the service is held on the Continent, the Council need only to point to the number of officers of our exploring service whom the Imperial Institute of France has elected to honorary seats in their department of navigation; the highest foreign scientific distinction which a British officer can attain.

"3. With regard to the particular route, or routes, to be selected amongst those which have been proposed, or to the officers to be employed on the service, the Council feel that they could not with propriety pronounce an opinion, as questions foreign to the functions of the Society they represent. They believe, however, that either of the two routes advocated might essentially contribute to fill up the present vacuum in our knowledge of the Natural History of these high latitudes; and that by Smith Sound, as coasting a greater extent of land, might in respect of Ethnology and some other branches of Natural History, produce results of special importance.

"4. With regard to the specific results in Natural History which may be expected from the proposed expedition, they are numerous and important; and a detailed report on them would involve considerable labour in its preparation. Such a report, however, the Council will gladly undertake to have prepared, whenever the project is in a fair enough state of progress to make it desirable to do so. In the present stage of the matter, it may be sufficient to allude generally to the following heads:—

"The most important results in Natural History to be obtained from a voyage to the Arctic Ocean, are undoubtedly those that would extend our knowledge of the conditions of animal and vegetable life in those regions. It is now known that the Arctic Ocean teems with life, and that of the more minute organized 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 all subjects of which very little is known.

"In connexion with this subject, and indeed inseparable from it, is a similar

inquiry into the conditions of life of the microscopic vegetables with which the Polar Seas equally swarm, and which both form the food of the microscopic animals, and contribute to the sedimentary deposits above-mentioned the siliceous coating of their cells. These siliceous coats are indestructible, and being of irregular geometric forms, and the different kinds having differently and exquisitely sculptured surfaces, may be recognized wherever found, and at all future epochs of our globe; and a knowledge of the species inhabiting the Arctic Ocean, would throw great light on investigations into the age of the rocks of our own islands, and on the later changes of the climate of the northern hemisphere.

"With regard to the larger animals, the fish, shells, corals, sponges, &c., of the Arctic zones, those of Greenland alone have been well explored. 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 experiments, and observations on those animals under their natural conditions.

"In Botany very much remains to be done; not, perhaps, in the discovery of new kinds, but in tracing the distribution of those already known, in connexion with existing currents, and with the effects of the cold and warm epochs of the world's late history. It is well made out that the Arctic flora comprises three floras, namely, the Scandinavian, American, and Asiatic; but it has only recently been shown that these floras do not bear that relation to the geographical areas they respectively inhabit which the existing relations of land and sea would lead us to suppose. Thus, the West Greenland flora is European, and not American; the Spitzbergen flora contains American plants found neither in Greenland nor in Scandinavia; and other anomalies have been traced which indicate great recent changes in the physical geography of the Polar land. To correlate and explain these anomalies requires a Natural History Survey of the Polar area, and can only be accomplished by the joint labours of energetic officers who could devote a considerable time to the subject."

I have the honour to be, Sir,
Your most obedient Servant,

To the Secretary of the Royal Geographical Society.

GEO. BUSK, *Secretary.*

BURLINGTON HOUSE,
22nd June, 1872.

SIR,

In reply to your letter, requesting, on behalf of the Royal Geographical Society, to be furnished with a note supplementary to the Minute on Arctic Exploration which was supplied by the Linnæan Society in 1865, I have to state that the subject was brought before the Council of the Society on the 6th of June last, and referred to a Committee, with directions that the Committee should communicate the result of their deliberations to the Royal Geographical Society.

The Committee have since considered the subject, and I am requested, on their behalf, to report to you as follows:—

At the Meeting of the Royal Geographical Society on the 22nd of April last, Dr. Hooker (as you are aware) discussed at some length the advantages

which might be expected to accrue to botanical science by a renewal of North Polar Exploration. Upon that occasion, Dr. Hooker considered that he was expressing the views entertained upon the subject by the Fellows of the Linnæan Society generally; and his intention was, that the remarks which he then made should be looked upon as supplementary to the Minute of 1865. That Minute, together with Dr. Hooker's remarks (which are correctly reported in the printed slip of the Meeting of the Geographical Society of the 22nd of April last), embody all the points to which the Committee think it necessary that attention should be directed, so far as regards botanical science.

With regard to Zoology, the Committee would refer to the Minute of 1865, and to a supplementary note furnished by Mr. Gwyn Jeffreys, with whose remarks the Committee entirely concur, except upon the question of having a Naturalist to accompany the Expedition.

The Committee are of opinion that a skilled Naturalist would not only be desirable, but necessary, in order that the operations of dredging, and the selection and preservation of specimens, may be efficiently carried out.

I enclose a copy of Mr. Gwyn Jeffrey's supplementary note, and,

I have the honour to be, Sir,

Your obedient Servant,

FREDERICK CURREY, *Sec. L.S.*

Clements R. Markham, Esq.

MEMORANDUM FOR THE ROYAL GEOGRAPHICAL SOCIETY.

An important and interesting result of the proposed Arctic expedition would be the investigation of the Mollusca, not only of marine, but also of land and fresh-water kinds. Of late years that enterprising and scientific nation, Sweden, has done something to increase our scanty knowledge of the Arctic marine shells; but their resources were limited, and not to be compared with those of our own nation. In a geological as well as zoological point of view a proper investigation of the Arctic Mollusca 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 current. In the last Swedish expedition a remarkable shell (*Pecchiolia acutecostata*) was dredged at a considerable depth in Baffin Bay or Davis Straits. The same species was dredged by me in the Bay of Biscay; and it has been found living also in the Japanese Seas and Gulf of Mexico, and fossil in the Coralline Crag of Suffolk, and the so-called pliocene formation of Sicily. Several Spitzbergen species inhabit the depths of the North Atlantic in both hemispheres; and they will probably be found in every part of the ocean which is traversed by the great northern or Arctic current. A question, therefore, arises, What is the home of these species, or where did they originate? And it cannot yet be answered for want of sufficient information. 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. The researches of Professor Torell and other Scandinavian zoologists induce us to believe that the Arctic marine invertebrate fauna is extremely varied and numerous.

I would venture to suggest that if such an expedition be undertaken by the Royal Geographical Society, the ship should be fitted out with a double-

cylinder donkey-engine, as well as with ropes, dredges, sieves, and other apparatus for collecting and preserving specimens of Natural History. It is not essential that a good naturalist should accompany the expedition, although it would, of course, be desirable. Any sailor can work a dredge; living Mollusca, Crustacea, and Annelida, may be put into spirits of wine, and the rest of the contents of the dredge kept in bags. Land and fresh-water shells and insects may be also preserved in spirits of wine. The deepest part of Smith Sound should be dredged, and the depths there and elsewhere should be carefully recorded. If the expedition takes place I shall be glad to assist with any further suggestions that may occur to me, and to furnish some dredges and sieves.

I may add that all fossils should be diligently collected, and their position accurately noted. The former conditions and climate of the Arctic regions may be thus ascertained, and a new chapter opened in the history of our globe.

J. Gwyn Jeffreys.

Ware Priory, Herts,
10th June, 1872.

ENCLOSURE No. 8.

LETTER FROM THE SECRETARY OF THE SCOTTISH METEOROLOGICAL SOCIETY.

SCOTTISH METEOROLOGICAL SOCIETY,
GENERAL POST OFFICE BUILDINGS, EDINBURGH.

SIR, *June 20th*, 1872.

Your letter of the 24th ultimo addressed to Mr. Buchan, the Meteorological Secretary, inviting the co-operation of this Society with the Royal Geographical Society in an application about to be made to Her Majesty's Government with a view to fitting out an Expedition for scientific research in the North Polar Regions, having been laid before the President and Council of this Society, I am directed to state that it will give them very great pleasure to co-operate with the Geographical Society in this matter, and otherwise to give the undertaking whatever support may be in their power.

The Council are gratified to learn that it is contemplated to make observations of the temperature of the sea at various depths—of the temperature and pressure of the atmosphere, and of winds with reference to currents. The results of such observations will form a most valuable contribution to science, particularly on account of the intimate relations subsisting between the meteorology of the region from Smith Sound northwards, and that of the northern portion of the Atlantic, which last exercises so powerful an influence on the atmospheric conditions of Europe and North America.

The daily observations taken in connection with those made at this Society's stations in Scotland, Faro, and Iceland, and at the stations which have been, and are about to be established in Norway and Greenland, will be of the greatest use in discussing the weather and such storms as may occur during the expedition. These observations will give important data in connection with the more strictly Arctic storms about the origin of which so little is as yet known, and which, from their destructive character, it is so desirable to investigate.

I have the honour to be, Sir,
Your obedient Servant,
THOMAS STEVENSON, *Honorary Secretary.*

C. R. Markham, Esq.,
Secretary, Royal Geographical Society,
London.

ENCLOSURE No. 9.

LETTER FROM THE DIRECTOR OF THE METEOROLOGICAL OFFICE.

METEOROLOGICAL OFFICE,
116, VICTORIA STREET, LONDON, S.W.

SIR, *18th June*, 1872.

Your letter of the 31st ult., addressed to Sir E. Sabine, in which you do him and the Meteorological Committee the honour of requesting them to supply to the President and Council of the Royal Geographical Society a "statement of the questions in Meteorology which require further solution, observations made by well qualified observers in an expedition such as they are about to propose" (viz., to the North Polar Regions), has been laid before the Committee.

I am instructed to inform you in reply that, in their opinion, accurate Meteorological observations taken in the Arctic Regions would be of very high value indeed to the cause of Meteorology.

The information which is at present obtainable from latitudes north of 60° or 65° is very scanty, with the sole exception of that furnished by the stations situated in the north of Europe, and in Ireland.

Of late years a few whaling ships have contributed observations of considerable value, and the Committee are in hopes that the proposed Danish stations in Greenland, and the Swedish expedition to Spitzbergen, will help to throw light on Arctic Meteorology.

As regards the precise questions which require further solution, observations made under the conditions you describe, they may almost be stated to be co-extensive with the science itself, as there is no subject in Meteorology, in Physical Geography, and in Terrestrial Physics, the thorough elucidation of which does not call for a more extended area of observation than that at present available.

It need hardly be stated that the Meteorological Office would, as a matter of course, supply instruments and registers for such an expedition; and they think that the Instructions and Circular Letter which they issue to intending observers, and of which they enclose a specimen, will be sufficient to indicate to the Council the special lines of investigation which can be carried out to best effect on board ship.

The important subject of deep-sea soundings, and of temperatures below the sea surface, have not been touched upon in drawing up these Instructions, as the operations necessary for determining these points cannot, under ordinary circumstances, be carried out on board merchant ships.

The Committee, however, do not doubt that these questions will have already received from the Council the consideration they deserve.

In all matters concerning the circulation of the currents of the air and sea, and the relations existing between the conditions of barometrical pressure and of temperature in the Arctic Regions, and those prevailing in the Temperate zone, observations from high northern latitudes cannot fail to possess very high interest and value.

I have the honour to be, Sir,
Your obedient Servant,
ROBERT H. SCOTT, *Director*.

To the Secretary of the Royal Geographical Society.

ENCLOSURE No. 10.

REPORT OF THE ARCTIC COMMITTEE* OF THE ANTHROPOLOGICAL INSTITUTE.

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. Although barely one-half of the Arctic Regions has been explored, yet abundant traces of former inhabitants are found throughout their most desert wastes, where now there is absolute solitude. These wilds have not been inhabited for centuries, yet they are covered with traces of wanderers, or of sojourners, of a bygone age. Here and there, in Greenland, in Boothia, on the shores of America, where existence is possible, the descendants of former wanderers are still to be found. The migrations of these people, the scanty notices of their origin and movements that are scattered through history, and the requirements of their existence, are all so many clues which, when carefully gathered together, throw light upon a most interesting subject. The migrations of man within the Arctic zone give rise to questions which are closely connected with the geography of the undiscovered portions of the Arctic Regions.

The extreme points which exploration has yet reached on the shore of Greenland are in about 80° on the west, and in 76° on the eastern side; and these two points are about 600 miles apart. As there are inhabitants at both these points, and they are separated by an uninhabitable interval from the settlements further south, it may be inferred that the unknown interval further north is or has been inhabited. On the western side of Greenland it was discovered, in 1818, that a small tribe inhabited the rugged coast, between 76° and 79° N.; their range being bounded on the south by the glaciers of Melville Bay, which bar all progress in that direction, and on the north by the Humboldt Glacier, while the *Sermik-sook*, or great glacier of the interior, confines them to the sea-coast. These "Arctic Highlanders" number about 140 souls, and their existence depends on open pools and lanes of water throughout the winter, which attract animal life. Hence, it is certain that where such conditions exist man may be found. The question whether the unexplored coast of Greenland is inhabited, therefore, depends upon the existence of currents and other conditions such as prevail in the northern part of Baffin's Bay. But this question is not even now left entirely to conjecture. It is true that the "Arctic Highlanders" told Dr. Kane that they knew of no inhabitants beyond the Humboldt glacier, and this is the furthest point which was indicated by Kalahierua (the native lad who was on board the *Assistance*) on his wonderfully accurate chart. But neither did the Esquimaux of Upernavik know anything of natives north of Melville Bay until the first voyage of Sir John Ross. Yet now we know that there either are or have been inhabitants north of the Humboldt glacier, on the extreme verge of the

* This committee consisted of Sir John Lubbock (President), Professor Busk, Captain Sherard Osborn, Captain Bedford Pim, Col. Lane Fox, Mr. Clements Markham, Mr. Flower and Mr. Brabrook.

unknown region; for Morton (Dr. Kane's steward) found the runner of a sledge made of bone lying on the beach on the northern side of it. There is a tradition, too, among the "Arctic Highlanders," that there are herds of musk oxen far to the north, on an island in an iceless sea. On the eastern side of Greenland there are similar indications. In 1823, Captain Clavering found twelve natives at Cape Borlase Warren, in 76° N.; but when Captain Koldewey wintered in the same neighbourhood in 1869, none were to be found, though there were abundant traces of them, and ample means of subsistence. As the Melville Bay glaciers form an impassable barrier, preventing the "Arctic Highlanders" from wandering southwards on the west side; so the ice-bound coast on the east side, between Scoresby's discoveries and the Danebrog Isles, would prevent the people seen by Clavering from taking a southern course. The alternative is that, at the time of Koldewey's visit, they must have gone north.

These considerations lead to the conclusion that there are, or have been, inhabitants in the unexplored region to the north of the known parts of Greenland. If this be the case, the study of all the characteristics of a people who have lived for generations in a state of complete isolation, would be an investigation of the highest scientific interest.

Light may not improbably be thrown upon the mysterious wanderings of these northern tribes, traces of which are found in every bay and on every cape in the cheerless Parry group; 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. Thus, if they use the *igloo*, they may be supposed to be kindred of the Greenlanders; snow huts will point to some devious wanderings from Boothian or American shores; while some stone *yourts* would indicate a march from the coast of Siberia, across a wholly unknown region. The method of constructing sledges would be another indication of origin, as would also be the weapons, clothes, and utensils. The study of the language of a long isolated tribe will also tend to elucidate questions of considerable interest; and its points of coincidence and divergence, when compared with Greenland, Labrador, Boothian, and Siberian dialects, will lead to discoveries which, probably, could not otherwise be made. Dr. Hooker has pointed out that the problem connected with the Arctic flora can probably be solved only by a study of the physical conditions of much higher latitudes than have hitherto been explored. In like manner, the unsolved puzzles connected with the wanderings of man within the Arctic zone may depend for their explanation upon the clues to be found in the conditions of a tribe or tribes in the far north.

These are speculations which the results gained by Polar discovery would probably, but not certainly, show to be well founded. But 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. There are also several questions which need investigation, having reference to marks and notches upon arrows and other weapons, and to their signification. A series of questions has been prepared by Dr. Barnard Davis, Mr. Tylor, Colonel Lane Fox, and others, on these and other points,* attention to which

* 1. Instructions of Dr. Barnard Davis.
2. Enquiries as to Religion, Mythology, and Sociology of Esquimaux Tribes, by E. B. Tylor, Esq., F.R.S.

would undoubtedly result in the collection of much exceedingly valuable information.

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.

For the above reasons there cannot be a doubt that the despatch of an expedition to discover the northern shores of Greenland would lead to the collection of many important facts, and to the elucidation of deeply interesting questions connected with anthropology.

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3. Enquiries relating to Mammalia, Vegetation, &c., by W. Boyd Dawkins, Esq, F.R.S.

4. Enquiries into Customs relating to War, by Col. A. Lane Fox.

4*a*. Enquiries relating to certain Arrow-marks and other Signs in use among the Esquimaux.

4*b*. Enquiries relating to Drawing, Carving, &c., by Col. A. Lane Fox.

5. Enquiries as to Ethnology, by A. W. Franks, Esq.

6. Enquiries relating to the Physical Characteristics of the Esquimaux, by Dr J. Beddoe.

7. Further Ethnological Enquiries, by Professor W. Turner.

8. Instructions suggested by Captain Bedford Pim, R.N.

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