

ART. XXIV.—*Account of the Swedish North-Polar Expedition of 1868, under the command of A. E. NORDENSKIÖLD and F. R. W. VON OTTER.**

THE study of the natural history of the polar regions has been of late years prosecuted in Sweden with so much interest that, exclusive of the present year's undertaking, no less than three† separate expeditions have been sent out from this country to the arctic seas. When Nordenskiöld last winter again brought forward a proposal for a new expedition, on a different plan, which was to set out in the autumn from the northern coast of Spitzbergen and penetrate farther northward, the means requisite to defray the expenses of the expedition were in a few days raised in the second city of Sweden, Göteborg [Gottenburg], at the instance of the resident governor, Count Ehrensvard. When, moreover, the Government, in order to assist the undertaking, fitted out and manned the steamship *Sofia*, well adapted for the purpose, strongly built of Swedish iron, and originally intended to carry the mails over the Baltic in winter, the new expedition was enabled to assume a more extensive character and embrace a wider compass than had originally been intended. Most expeditions of this kind have had for their object to attain as high a degree of north latitude as possible; but a glance

* Extracts from the full report, here reprinted from the Minutes of the Royal Geographical Society of the meeting March 22, 1869.

† These were the following:—

The Expedition of 1858, fitted out at the expense of Otto Torell. The following gentlemen took part in the undertaking: O. Torell, A. E. Nordenskiöld, A. Qvenerstedt. The Expedition visited the western coast of Spitzbergen, and brought home considerable zoological and geological collections.

The Expedition of 1861, fitted out at the public expense. The gentlemen who took part in the expedition, besides the proposer and chief, O. Torell, were A. Von Goës, A. T. Malmgren, F. A. Smitt, G. Von Yhlen, zoologists and botanists; B. Lilliehöök and W. Kuglenstjerna, commanders of the vessels; C. W. Blomstrand, C. Chydenius, N. Dunér and A. E. Nordenskiöld for geological and physical investigations. The expedition visited, in both vessels, the western and northern coasts of Spitzbergen, made extensive journeys in boats for the purpose of constructing a topographical and geological map of the group of islands, and of examining the northern part of the triangulation for degree-measuring, which the present President of the Royal Society, General E. Sabine, as early as 1826, proposed to get executed, in these high northern regions; and lastly brought home with them a collection of materials for studying the *fauna, flora*, and geology of the islands, probably not surpassed in completeness by any similar collections from districts situated at so great a distance from the centers of civilization.

The Expedition of 1864, fitted out at the public expense, chiefly for the purpose of continuing the survey for the measurement of the degree. The gentlemen who took part in the undertaking were A. E. Nordenskiöld, chief, N. Dunér and A. J. Malmgren. The expedition visited the southern part of Spitzbergen and Storfjord, completed the survey for the degree-measuring, and brought home rich geological, zoological and botanical collections.

at their history will convince us how difficult and uncertain the attainment of this object is, and how frequently an insignificant circumstance has obliged the, in other respects, best planned expeditions to return without any scientific result whatever,—a contingency which there would have been no reason to apprehend if proper care had been taken in the scientific furnishing and manning of the expedition. In order to remove all fear of the new Swedish expedition having a result of this kind, it was determined that in this, as in the preceding Swedish arctic expeditions, a continuation, as general as possible, should be made of the researches in natural history commenced by their predecessors. For this purpose the expedition was provided, by the Royal Academy of Science in Stockholm, with a carefully-selected and appropriate scientific apparatus,* and was accompanied by as numerous a body of professional scientific men as room and circumstances permitted.

The plan of the journey was, during the summer and early part of the autumn, to pay a visit in the *Sofia* to Beeren Island and Spitzbergen, and carefully examine both the marine and terrestrial fauna of these lands; their flora, both phanerogamous and cryptogamous, as also their geography and geology. It was also intended to make deep soundings, and to take meteorological and magnetical observations, &c. A supply of coal was to have been deposited by a ship, hired for that especial purpose, at some fitting spot on the northwest corner of Spitzbergen, which is accessible till late in the season; which tract the *Sofia* was accordingly to visit during the course of the autumn, and whence some of the scientific men were, in the beginning or middle of September, to return in one of the colliers to Norway. The rest were to endeavor, in the *Sofia*, to make their way farther north, and, if necessary, to pass the winter (circumstances permitting) in some appropriate harbor of the Seven Isles, which form the Old World's most northern archipelago.

The gentlemen who took part in the expedition were:—*Geologist*,—A. E. Nordenskiöld; † *Captain*,—Fr. W. v. Otter, R. sw. N.; *Lieutenant*,—A. L. Palander, R. sw. N.; *Physician*,—C. Nyström; *Natural Philosopher*,—S. Lemström; *Zoologists*,—A. E. Holmgren, A. J. Malmgren, F. A. Smitt; *Botanists*,—Sv. Berggren, Th. M. Fries; *Geologist*,—G. Nauckhoff.

* The London Royal Society and the University of Helsingfors contributed to the instrumental apparatus of the expedition.

† The geographical and hydrographical researches were to be performed by Nordenskiöld, von Otter and Palander. These last—of whom, in consequence of their office, one was almost always on board—also took upon themselves the meteorological observations. Nyström assisted the zoologists, and also directed his attention to the remarkably interesting hygienic features of these regions.

The vessel was manned by fourteen seamen, together with the zoological conservator Svensson, and six dredgers, hired in Norway. The ship placed at the disposal of the expedition having been under the inspection of Captain von Otter, duly fitted out in Carlsrona, and furnished with provisions for something more than a year—or, when account is duly made of the game that in these parts one may always reckon upon, for about a year and a half—and touched at Göteborg to take on board the scientific apparatus and the men of science who took part in the undertaking, anchor was weighed on the 7th of July. The 16th–20th Tromsø was visited for the purpose of taking in coal, &c.

On the 22nd the *Sofia* cast anchor in the southern harbor of Beeren Island, where some members of the expedition landed to study the natural phenomena of a place difficult of access on account of the want of a good harbor; while the remainder continued on board the vessel, which cruised in the neighborhood, and occupied themselves with soundings and with an examination of the local marine fauna.

The expedition left Beeren Island on the 27th of July. Our course was directed to the eastern coast of Spitzbergen, which had not been visited by any of the previous Swedish expeditions; but already at South Cape we met with ice, which, as we approached the Thousand Isles, became more and more abundant, and we were obliged to turn back. After some hesitation as to whether we should wait at South Cape till the water became more free from ice, in order to proceed farther eastward, or immediately begin the scientific operations on the west coast of Spitzbergen that entered into the plan of the voyage, we embraced the latter alternative; and it was very fortunate that we did so, for on our return home we learned that the east coast, during the whole summer of 1868, had been rendered completely inaccessible by the ice.

Our course was now directed to Ice-fjord, where the *Sofia* cast anchor on the morning of the 31st of July. We continued a fortnight in the different harbors of that extensive fjord, and penetrated, in our boat-excursions, to the innermost parts of the fjord's northern arm, which had not previously been visited by the Swedish expeditions. During this time all the members of the expedition were busily occupied in scientific researches, and in collecting objects of natural history. The change was, indeed, advantageous, as well for our zoological and botanical as especially for our geological investigations.

The previous Swedish expeditions had pretty fully explored the principal features of the geology of Ice-fjord, and had found it, in consequence of the varying strata on its shores, full of different types both of animal and vegetable remains, and un-

usually rich in materials illustrative of the geological history of the extreme north. Innermost in the fjord are found immense beds of red clay-slate, and sandstone, probably Devonian, which, however, do not here contain fossils. On them lie strata of limestone, gypsum and flint, filled with large coarse-scaled mountain-limestone brachiopoda; then come *Trias* beds, with large nautilus-forms and remains of saurians; after these, *Jura* strata with *ammonites*; then *Tertiary* strata, in many places rich in plant-impressions, indicating a former temperate climate; and, lastly, scanty remains of *Post-tertiary* strata, with plant-fragments and sub-fossil marine shells, *some of which now first occur in living condition in the northern parts of Norway*. The preceding Swedish expeditions had brought home specimens from all these strata;* not, however, sufficiently numerous to give a geological representation of the place's former history so complete as the importance of the subjects requires. To supply this defect was one of the chief objects of the expedition of 1868; and we succeeded in bringing home unusually rich collections, especially of plant-impressions and *Trias* petrifications, which, when duly studied, will, no doubt, throw much light on the condition of the climate and arrangement of the land of the arctic regions at that remote period.

Spitzbergen, as is generally known, is at present frequently visited by Norwegian ships engaged in walrus and seal fishing, or in fishing for the "haakjoering" (*Scymnus microcephalus*) on the banks beside the island's coast. The walrus is, however, now but very rarely met with on the western side of Spitzbergen; and its fjords are therefore only occasionally visited for the purpose of taking in water or hunting the reindeer. On how large a scale the hunting of these animals may be carried, is evidenced by the circumstance that the vessels fitted out from Tromsø alone in 1868, according to official returns, killed 996 head. From Hammerfest the returns are still greater; whence we may conclude that, in spite of the war of extermination which, under the name of hunting, has for some time been carried on against these animals, two or three thousand head are annually slaughtered. If we compare that number with the scanty extent of ice-free meadow-land in Spitzbergen, we are tempted to suppose that an immigration must take place from *Novaja Zembla*, which, nevertheless, is

* The first mountain-limestone petrifications in Spitzbergen were found by Parry in 1827 at Cape Fanshawe, and the same year by Keilhau at South Cape. *Jura* fossils were first discovered by Lovén in 1838; the tertiary plant-remains by Nordenskiöld in the Swedish expedition of 1858; the *Trias* strata by Blomstrand in 1861; the post-tertiary beds, containing *Mytilus*, by Torell, Malmgren and Blomstrand in 1861; the Saurian strata by Nordenskiöld in 1864.

scarcely possible, unless some large island or group of islands facilitates the communication between these two countries, situated at a distance of between 400 and 500 nautical miles from one another. Of late years the Norwegians have resumed the method, formerly employed by the Russians, of using large nets, formed of rope, to catch the Beluga (*Delphinopterus leucas*); and in 1868 several vessels were fitted out exclusively for that species of fishing. Some of the fishermen whom we met had, on one or two occasions, taken from twelve to twenty head at a single drag of the net: right handsome sport, when one considers that the *Delphinopterus* is often larger than the walrus itself.

Ice-fjord, like most of the other gulfs of Spitzbergen, is surrounded by vast glaciers with their mouths turned toward the sea, which offer to the geologist an opportunity of studying that phenomenon so important in the history of the earth's development. But extensive valleys or declivities free from ice and snow are also met with, especially in the inner parts of the fjord, and the fertile soil here produces a vegetation more luxuriant than in other parts of this island group. One may here see whole fields yellow with poppies (*Papaver medicante*), or covered with a thick green and red carpet of the beautiful *Saxifraga oppositifolia*. The fjord, which lies beneath them, and in the summer months is often as still and clear as a looking-glass, abounds with marine animals of various kinds. Everything contributes to make this a most important spot for the study of both animal and vegetable life in the Arctic regions. The zoologists and botanists of this expedition here gathered a rich harvest; among the results of which we may mention the taking of several fine salmon, and fully-developed examples of the esculent mushroom, &c.

We left Ice-fjord on the 13th of August. At the entrance a boat-party was sent out northward, to map and examine geologically Foreland Sound. Their work was now—as during the expedition of 1861, when Blomstrand and Dunér sailed through the sound—rendered difficult by almost perpetual fog. During this time the vessel made a somewhat longer excursion westward for the purpose of taking soundings; which, however, were on the occasion rendered almost impossible by the heavy swell. We had arranged to meet at King's Bay, whither both parties came on the 17th, in the afternoon. Several zoological, botanical, and geological excursions having been made from this point, and a large number of miocene fossil plants collected, the *Sofia*, on the 19th, proceeded on her course farther northward.

We had hoped here, in some degree at least, to reinforce our already considerably diminished stock of coal, but we soon found that that would necessarily cause too great a delay. In fact, whereas, more to the south, the tertiary formation occupies the greater part of the extensive peninsula between Icefjord and Bell Sound, and there in many places forms mountains above a thousand feet high, at King's Bay, on the contrary, its extent is very inconsiderable, so that at present it forms only a few small hills consisting of strongly-folded strata, and separated from each other by the furrows cut by the glacier-streams. By this the supplies of coal, notwithstanding the thickness of the beds by no means inconsiderable and their accessibility (they lie only a few hundred feet from the shore of one of the best harbors in Spitzbergen), become of but little value, especially as the frost, which begins at a very short distance under the surface, renders the breaking of them extremely difficult; in fact, in consequence of the extreme toughness of the ice-drenched coal, almost impossible without regular mining. It is even to be expected that the whole of what still remains of the miocene formation of this spot will, in a comparatively short period, be washed away.

Late at night, on the 20th August, the *Sofia* anchored at Amsterdam Island, and the following day we had the pleasure of hailing the first of the ships which had been hired in Norway for the expedition for the transport of coals. A coal depôt having been established on the low tongue of land that shoots out south-eastward from Amsterdam Island, and five of the scientific members of the expedition having been landed at Kobbe Bay, together with the necessary tents and boats, to prosecute their zoological, botanical, and physiological researches, the *Sofia* sailed off with the rest on a sounding-tour toward Greenland. Our intention was to penetrate thither along the 80th degree of N. latitude, but before we had reached the longitude of Greenwich we were met by impassable masses of drift-ice. It was evident that the coast of Greenland was accessible only at a latitude much lower than was compatible with the plan of our voyage. We therefore turned our course north and northeast, and gradually, after innumerable zigzags in the ice, arrived at 81° 16' N. latitude. The temperature had now sunk to 6° (centigr.), with thick ice, fogs, and snow-storms. The ocean was sometimes covered with a thin coating of new ice, and the old ice northward was quite impassable, so that we were obliged to seek a passage out in a southeasterly direction. After another vain attempt to reach Depôt Point, in Brandewijne Bay, the *Sofia* anchored, on the 29th, in Liebe Bay.

During the passage of the *Sofia* from Norway to Spitzbergen, its officers, Captain Baron von Otter and Lieutenant Palander, took a number of soundings in the deeper parts with a "Bulldog" apparatus of the same kind as that constructed at Tromsö, by Torell and Chydenius, for the voyage of 1861, and which was found to be particularly applicable. These soundings were zealously continued during our cruising amid the drift-ice between 80° and 82° , and gave very interesting results not only as regards the ocean's depth in the parts visited by us, but also concerning Arctic animal life at the greatest measurable depths. It showed us that Spitzbergen may in a manner be looked upon as a continuation of the Scandinavian peninsula, inasmuch as that island-group is not separated from Norway by any very deep channel (not above 300 fathoms), whereas a little to the north and west of Spitzbergen there is a depth of 2000 fathoms and more. From these great depths specimens of clay were brought up by the Bulldog-apparatus, which, on immediate and close examination, were found to contain not only several microscopic, but even larger and tolerably highly-organized animal forms (*e. g.*, several kinds of Crustacea and Annelata). The greatest depth from which any specimen was procured was 2,600 fathoms, and the mass there raised consisted for the greatest part of white and red Foraminifera, in general scarcely as large as a pin's head. It is, moreover, deserving of remark, that, during our cruising amidst the ice, we met with and collected, not only a number of pieces of drift wood, but also (as, for example, at $80^{\circ} 40' E.$) glass balls of the kind used by the Norsemen, at their Loffoden fisheries for floats; an additional proof of the already well-established fact,* that the Gulf Stream reaches, though in a greatly weakened state, even these tracts.

Liebde Bay had never before been visited by any scientific expedition, and its topography and geology were accordingly entirely unknown. A boat-party, consisting of Malmgren, Nordenskiöld, and Nyström, with three men, were therefore left here, while the ship went to fetch their comrades who had been left at Kobbe Bay. The boat's journey was favored with calm and mild weather and a clear sky; although a high wind, accompanied by snow-storms, prevailed out at sea—a circumstance very common at Spitzbergen, and which is said especially to characterize that beautiful, and, according to the unanimous testimony of the fishermen, appropriately named, fjord. We

* Among the proofs of this already given may be mentioned, that Torell, in 1861, at Shoal Point, met with a bean that had come from the Gulf of Mexico, the *Entada gigantilobium*.

were thus enabled, during the few days that our boat-voyage lasted, to map it, and ascertain the character of its somewhat uniform geology. Its shores were occupied exclusively by the same red, green, and dark grey kinds of slate, which in Icefjord are covered by mountain-limestone strata with *Producti*, and in Mount Hecla form the uppermost stratum of the vast series of schists to which the name of that mountain has been applied. But, as yet, no petrifications had been discovered in these strata. Their age was accordingly somewhat doubtful, and the probably Devonian fish-remains which we now found here are therefore a discovery of great value in the explanation of Spitzbergen geology. The lower slatebeds contained some vegetable remains, though probably of too indistinct a character to admit of identification.

On the 2nd of September, the boat's company and the ship, returning with our comrades from Kobbe Bay, met at a little distance off the promontory that separates Wijde Bay and Liebde Bay. After remaining in that bay a couple of days longer, the *Sofia* weighed anchor and touched at the now ice-free Cape Dépôt, in Brandewijne Bay, in order to fetch away the supply of pemmican that (in 1861) had been left there, an iron boat, &c. We thence steered northward, with the intention of passing round Nordostland to Giles' Land. The greater part of the arm of the sea, that lies between the Seven Islands, Cape Platen and North Cape, which, in 1861, was already, in the middle of August, perfectly free from ice, we now, in the beginning of September, found covered with a firm crust of ice. It was therefore impossible to reach Giles' Land by this route, and we were therefore obliged, after having for the purpose of botanical and zoological researches, remained a short time at Castiën's Islands and Parry's Island, which last, being still encompassed by a girdle of land-ice, was approachable only walking over the ice, to seek another passage, namely, that through Hinloopen Strait. Our course was directed to its southern part.

Already, before the end of September, some signs of the approach of autumn had been visible, and the hill-tops had frequently in the morning been for some time covered with a white mantle of new-fallen snow, which, however, had melted away again without causing any hindrance to our scientific pursuits. But now, during our passage to South Waijgats Islands, a copious fall of snow rendered all further researches in natural history on land impossible, and gave us pretty clearly to understand that the season for our purely scientific pursuits was to be considered as at an end. We accordingly turned back at Mount Lovén, in the southern part of Hin-

loopen Strait, having first on that spot collected, from under snow of a foot deep, an additional number of mountain-limestone petrifications. On the 12th of September we again anchored at our coal depôt on Amsterdam Island, and there met our second coal-ship, by which some of the members of the expedition (Fries, Holmgren, Malmgren, Nauckhoff, and Smitt) returned to Norway, carrying with them the valuable collections of objects of natural history which the expedition had up to that time succeeded in acquiring. These collections have now safely arrived in Stockholm, and will, after having been duly studied, be divided between the National Museum in that city, where already the extraordinarily rich Arctic collections formed by the preceding Swedish expeditions are preserved, and the Museum of Göteborg, the city whose liberal initiative first gave occasion to the new expedition. To give an idea of the extent of these collections, I need only refer to the notices above given of our geological operations, and remark that the zoological sciences were represented by no less than three members of the expedition, who, besides, had with them a taxidermist. Messrs. Malmgren and Smitt had also at their disposal a boat manned with four men for dredging every day, holidays excepted, when the ship lay still. They were thus enabled not only to make a searching examination of the Arctic marine fauna, which, in individual copiousness at least, is comparable with that of many more southern countries, but also to pay due attention to the terrestrial fauna of the locality, more especially the entomological branch, which is poor both with respect to individuals and species, and accordingly presented especial difficulties to its investigator, Mr. Holmgren. The dredgings also yielded rich contributions to the ocean's algæ-flora. Every opportunity that offered itself for land-excursions was used by the two botanists of the expedition, both for investigating the flora and for forming a collection of specimens for normal herbaria of Spitzbergen's phanerogamia, mosses, lichens, and algæ.

On the 16th of September we took leave of our homeward-bound companions, and immediately proceeded northward. Our intention was to touch at the Seven Isles, but these were now found to be still more thickly surrounded by ice than when we had visited that tract about a fortnight before. We accordingly determined to avail ourselves of a channel tolerably free from ice, stretching northward from those islands.

After a number of zigzags amidst the drift-ice, our vessel, in longitude $17\frac{1}{2}^{\circ}$ east from Greenwich, succeeded in arriving at $81^{\circ} 42'$ north latitude, probably the highest northern latitude a ship has ever yet attained. Northward lay vast ice-

masses, it is true as yet broken, but still so closely packed that not even a boat could pass forward, and we were therefore obliged to turn to the southwest and seek for another opening in the ice ; but we found, on the contrary, that the limit of the ice stretched itself more and more to the south the more we went to the west, so that, on the 23rd September, in the longitude of Greenwich, we were south of the parallel of 79° N. latitude. On the way we had in several places met with ice black with stones, gravel, and earth, which would seem to indicate the existence of land still farther north.

The ice itself had, moreover, a very different appearance from that which we had met in these tracts at the end of August. It consisted now, not only of larger ice-fields, but also of huge ice-blocks, so that it seems as if the former ice had drifted to the south, and given place to new ice-masses coming from the north. The temperature had now sunk to 8° or 9° (centigr.) below the freezing point, and the ice, which in these parts had before been of tolerably loose texture, had now become so compact that any more violent collision with it was combined with no little danger. Furthermore, the nights were now so dark, that it was necessary at that time to lay the ship to by the side of some large sheet of ice, at the hazard of finding ourselves blocked up there in the morning. Already, in the beginning of September, the surface of the ocean, after a somewhat heavy fall of snow, had shown itself, between the ice-masses, covered with a coating of ice, which, however, was then thin, and scarcely hindered the vessel's progress. Now it was so thick that it was not without difficulty that a way could be forced through it. All things clearly indicated that the season of the year, during which it is possible to sail in these tracts, was nearly at an end, and as we intended to make yet another attempt to find a northern passage from the Seven Isles, or seek a harbor for the winter, we determined to return to our coal-depôt.

On the 25th of September the *Sofia* once more cast anchor at the north-west corner of Spitzbergen, after having slightly struck upon a rock situated under the surface of the water in the middle of South-gat, and which has been forgotten in Buchan and Franklin's admirable chart of the harbor, although it appears, from Beechy's description, that they themselves happened to strike on the same shallow.

After a few days' rest, spent in inspecting the engine and taking in coal (the last remains of our store of coals had to be seached for under a thick covering of snow), and after having placed in the letter-box on the island in Kobbe Bay notices of our journey and our plans for the future, we steamed away

again, on the 1st of October, northward, notwithstanding a strong wind and a snow-fog that prevailed in the harbor we left. Our suspicion that this was only local seemed to be confirmed when we got out a little farther north, as the weather became clearer and calmer, but at the same time we met already, in lat. $80^{\circ} 40'$, sporadic blocks of drift-ice, which, as we proceeded farther north, increased in number and size. We continued our northward course during the following day, but it was soon evident that no open water would be arrived at that way, and in the afternoon we were again steering in a southerly direction. During the night we lay to under cover of a large sheet of ice. The temperature had now sunk to $14^{\circ} 5'$ (centigr.) so that in calm weather the surface of the water between the ice-masses was covered with ice of two or three inches' thickness, which considerably impeded the progress of the ship. But the following day we stood southward till we got into something like open water, and then followed the edge of the ice in a northerly and northwesterly direction. By this means we again arrived at 81° N. lat., but here the *Sofia* met with a misfortune which put an end to all further efforts to proceed northward. In the morning of the 4th October, during a storm from the southeast, and with a high sea, the ship was thrown violently upon a huge ice-block, or rather a small iceberg, whereby she sprang an extensive leak. We were therefore forced to turn back immediately and seek our harbor, where we arrived late in the evening, after eleven hours of incessant labor to keep the vessel free from water. Nevertheless, though all took part in this work, the water continually rose, so that, when the anchor was cast at Amsterdam Island, it stood about two feet over the cabin floor. Fortunately the provisions, being kept between water-tight bulkheads, were uninjured, and we succeeded, though with great difficulty, in keeping the engine-room so free from water that the fires were not extinguished. Had this not been the case, our ship must unquestionably, in a short time, have been the prey of the storm and the extremely heavy sea, which now, contrary to our former experience, raged among the thinly-scattered fields of drift-ice. Immediately on our arrival at Amsterdam Island the ship was careened and the leak provisionally stopped, so that already the next day we were in a condition to seek a more secure harbor in King's Bay. Here the ship was hauled so close to land at flood, that we, at ebb, were enabled to come at the leak and stop it effectually.

King's Bay, which in summer time is almost free from ice, was now filled with innumerable ice-blocks fallen from the mighty glaciers of the fjord, which, when carried by the flood-

tide in toward land, totally barricaded the harbor in which the *Sofia* had taken refuge ; and, notwithstanding that the temperature here was considerably higher than in the neighborhood of 81° N. lat., these blocks froze during the calm weather so fast together, that when we on the 12th of October, were again in a condition to sail, it was only with the utmost difficulty that our vessel could get out.

Our stay in King's Bay, like all the preceding occasions on which the ship remained any length of time still, was taken advantage of by our natural philosopher Dr. Lemstrom, for the purpose of making observation for the determination of the magnetic constants and variations. The ground was, however, too deeply covered with snow to allow of any geological or botanical operations. Even the brooks, so copiously supplied with water in the summer time, which intersect the lowlands adjoining the coal harbor, were now so entirely dried up by the effect of the cold that we endeavored in vain to reinforce our now considerably reduced supply of water.

Our ship, which had two ribs broken by the blow that caused the leak, was now too weak to be exposed, with the slightest prospect of success, in any new attempt to force a way through fields of drift-ice, as would in all probability be necessary, should we endeavor to visit the Seven Islands, which place we had intended to make our winter harbor ; and the wintering in any other part of Spitzbergen not having entered into our plan, nor promising results commensurable with the costs, dangers, and hardships, we determined to return to Norway. But yet we wished to make an attempt to reach Giles' Land round the southern point of Spitzbergen, which was probably still free from ice. Already during our passage along the west coast of Spitzbergen, which in summer is entirely free from ice, we passed large, though scattered, fields of ice, which farther to the east, near the Thousand Isles, completely obstructed the way. We were, therefore, constrained to relinquish that plan also, and to direct our course toward Norway. After having been once more, on the shallow banks off Beeren Island, during a severe storm and in a high sea rendered to the last degree boisterous by the shallowness of the water, in great danger of being ice-beset, the *Sofia* anchored again on the 20th of October in Tronsö Harbor, where we had the pleasure of learning that our comrades had happily arrived and reached home in safety.

From the above it appears that the expedition, as regards its second object—namely, hydrographical investigations in the Polar Basin—did not succeed in reaching any remarkably high

degree of latitude ; so that the portion of our globe that is known to us has not been to any material amount increased by it. I hope, however, that it has afforded a by no means unimportant contribution to the solution of the so-called Polar question.

A lively controversy has, as is generally known, been of late years carried on between the principal geographical authorities concerning the real character of the Polar Basin, some geographers maintaining that it is covered by an unbroken surface of ice, presenting an impassable barrier to the progress of a ship ; while others look upon this as only an obsolete prejudice, arising in a great measure from exaggerated descriptions of the difficulties which the sailor encountered at the point where he turned back. That this latter view, at least as regards that portion of the Polar Basin that borders on Europe during the actual sailing-season in the Northern Seas, *i. e.* the summer, is not in conformity with the real fact, has been proved, not only by the adventurous journeys of the older Arctic travelers, but by a number of expeditions sent out during the last century for the exclusive purpose of such investigations, among which may be mentioned :—

	Tschitschagaff's 1st expedition, 1765, which with their ship could reach only	80° 21' N. lat.
	“ 2nd “ 1766, which reached	80 28 “
Phipps	“ 1773, “	80 37 “
Buchan and Franklin's	“ 1818, “	80 34 “
Scoresby's	“ 1806, “	81 30 “
Sabine and Clavering's	“ 1823, “	80 20 “
Parry's	“ 1827, “	81 6* “
Torell's	“ 1861, “ about	80 30† “

It might then have been considered as already absolutely decided that it was not possible at that season of the year to penetrate very far into the Polar Basin, and any repetition *at the above-named season of the year* of these attempts could therefore only be looked upon as continually treading in old footsteps, which demonstrably do not lead to the intended object. But one doubt remained. At the season of the year when, in consequence of the heat of the summer and the influence of the ocean-waves and ocean-streams, the ice-masses have been reduced to their minimum—that is to say, in the autumn, before the formation of the new ice, no ship had ever before visited the Polar Basin. We could with certainty foresee that it might then be possible to go farther than in summer. There was a possibility that we might at that season be able to penetrate very far, perhaps to some land lying north of Spitz-

* By ship, but on the ice the party penetrated to 82° 45'.

† By ship, but in boats and by land journeys as far as 80° 45'.

bergen, which might hereafter serve as base from whence to push still farther onward. These considerations constituted the ground for the plan of operations for the latter portion of the Swedish expedition, and it may now be considered as proved, that a ship may, during autumn, reach a latitude considerably higher than that which has been attained by most of the summer expeditions. Unless this year is to be considered as unusually unfavorable with regard to the condition of the ice, we might in all probability have proceeded a considerable distance farther, perhaps beyond 83° N. lat. But we have at the same time convinced ourselves that, even in autumn, farther progress is soon rendered impossible by impenetrable masses of broken ice. The voyage itself, moreover, at that season of the year, in consequence of the cold, the darkness, and the boisterous winds, accompanied by snow-storms that are then prevalent in the polar basin, and the heavy sea amidst the masses of drift-ice caused by these latter, is rendered so dangerous that the risk to which the traveler exposes himself is far from being compensated by the meager prospect of success. The idea itself of an open polar sea is evidently a mere hypothesis, destitute of all foundation in the experience which has already by very considerable sacrifices been gained ; and the only way to approach the pole, which can be attempted with any probability of success, is that proposed by the most celebrated arctic authorities of England, viz., that of—after having passed the winter at the Seven Islands, or at Smith Sound—continuing the journey toward the North on sledges in the spring.