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*The Arctic Campaign of 1879 in the Barents Sea.*

By Captain A. H. MARKHAM, R.N.

(Read at the Evening Meeting, November 24th, 1879.)

Maps, p. 80.

THE year 1879 must always be regarded as a very remarkable one in the annals of Arctic exploration, for during the last few months two important geographical problems have been successfully solved.

We have, in the first place, the Swedish ship *Vega*, under the leadership of that persevering and energetic explorer Nordenskiöld, completing her voyage from the Atlantic to the Pacific, by rounding the northern termination of the old world—a voyage which, even if it should not prove important in a commercial sense, will always rank as one of the greatest geographical feats of the present century. And, secondly, we have a small sailing schooner reaching the hitherto inaccessible shores of Franz-Josef Land. I say inaccessible, because it must be remembered that the *Tegetthoff*, the only vessel that had ever approached this coast, had been carried thither by the ice in which she had been helplessly beset for two years, an imprisonment from which her officers were never able to extricate her. The vessel that has so successfully accomplished the second feat is the little Dutch exploring schooner *Willem Barents*, an account of whose cruise, undertaken during the preceding year, was communicated to our Society by Mr. Clements Markham in December 1878.

Three hundred years ago the Dutch flag was a formidable rival to our own in the van of Arctic discovery, and I am confident that English geographers will be delighted to hear that Holland has again entered the lists, and has already scored a great success.

The importance of this achievement cannot be too highly rated, for it tides over the only difficulty which, in the opinions of a great many

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Arctic authorities, presented itself with regard to the selection of a route for future exploration. At the same time it entirely corroborates the views that I have held since my return with Sir George Nares, and which I had the honour to announce publicly in this hall some months ago, during a discussion which took place on that interesting subject. The great obstacle to success that seemed then to present itself, was a strip of ice-covered sea, some 60 miles in breadth, that was supposed to exist immediately to the southward of Franz-Josef Land, the penetration of which would offer so many difficulties as almost to be regarded as insuperable. Now, we hear that this impediment is not a permanent one, and is, indeed, in some seasons, altogether removed, for the *Willem Barents* actually sailed from Cape Nassau in Novaya Zemlya, to within a few miles of M'Clintock Island, in Franz-Josef Land, without, as the saying is, "touching a piece of ice!"

By a brief reference to what has already been accomplished in the Novaya Zemlya waters, I hope to be able to prove satisfactorily this evening, that the past summer, during which the *Willem Barents* made her memorable trip, was not an exceptionally favourable one, and that the only other time that Franz-Josef Land has been approached, namely, in 1872-3, when the *Tegetthoff* was drifted thither, was a remarkably unfavourable ice year.

Since the return of Sir George Nares' Expedition in 1876, England has been content to look on whilst our foreign friends have been energetically and successfully prosecuting the work in which we cannot but feel that this country ought to continue to take a leading part. Although our geographical knowledge of the unknown region has not been greatly increased, yet the observations that have been made regarding the conditions and locality of the ice, and other important investigations connected with physical geography, will prove of the greatest value, more especially when regarded with a view to further Polar exploration.

My own cruise, this year, although undertaken in only a little sailing cutter of 43 tons burden, was, as far as it went, perfectly successful, and has tended very materially to strengthen my preconceived opinion that the route by Franz-Josef Land is the one that will lead to the discovery of the greatest amount of previously unknown country.

It is time for this Society again to take a leading part in arousing the British public from the apathy they appear to have fallen into, and to excite in them a friendly rivalry by pointing out the successes of other nations in that field in which England has already scored so many glorious successes.

I propose, before referring to the proceedings of the present year, to submit a rapid sketch of previous work in the direction of Novaya Zemlya. The two islands, generally known as constituting Novaya Zemlya, are situated between the 70th and 77th parallels of north

latitude, and between the 51st and 69th meridians of east longitude. They lie in a N.N.E. and S.S.W. direction, bending towards the east at either extreme. They are nearly 400 geographical miles in length, with an average breadth of about 50 miles. The northern island is the larger of the two, and is separated from the southern by a narrow channel, in some places not more than a mile broad, and about 60 miles in length, called the Matyushin (Matotschkin) Shar.

This remarkable strait is bounded on either side by high hills, and, in some places, steep precipitous cliffs. The former are noble *fjelds* towering, in majestic solemnity, to an altitude of from 3000 to 4000 feet above the level of the sea. The channel is excessively deep, as much as 80 and 90 fathoms being found in the centre, but there are good anchoring places for small vessels close to the shore.

So sharp are the windings in the Matyushin Shar that vessels have frequently been known to sail some 10 or 15 miles into the strait, when, seeing land close ahead, with, apparently, no outlet to the right or left, the captains have concluded that they were running into some land-locked bay, and consequently sailed out again, to look for the entrance of the channel they were actually in. A great deal has been said by former navigators of the difficulty experienced in finding the western entrance to the Matyushin Shar, but this difficulty can only have occurred to those who visited the channel for the first time, for the entrance is marked by such conspicuous and prominent hills and headlands that no man with any pretensions to being a sailor, who had once visited the strait, could be deceived regarding the identity of its entrance. A number of rocks, the majority above water, fringe either side of the channel at the western end, necessitating caution on the part of those desirous of entering, but once fairly inside the strait the shore may be approached on either side with impunity.

When, and by whom, Novaya Zemlya was first discovered, are questions difficult of a satisfactory solution. The name itself, signifying New-land, implies that the first discoverers were Russians.

Nearly all the old navigators of whose deeds we possess records, mention having met Russians along the coast who were employed hunting for furs and oil. Although English names are conspicuous by their absence from the charts of Novaya Zemlya, yet the first authenticated record of its discovery is, undoubtedly, that of Sir Hugh Willoughby, who sighted the western coast in latitude 72°; thence sailing to the northward for three days, presumably in sight of land, and finally to the south. This was in the year 1553. The extreme northern position reached by this navigator is unknown. The tragic fate of the expedition is a matter of history.

Sir Hugh, with his two vessels, the *Esperanza* and the *Confidentia*, put into a bay on the Lapland coast, merely for the purpose of awaiting a favourable change in the weather, but shortly after their arrival a

severe winter set in, and the ships were frozen up. Parties were at once despatched, who made journeys of three and four days' duration, in search of inhabitants, but they all returned unsuccessful. The ships were ill provided with the necessaries for guarding against the rigours of an Arctic winter, the hardships of which were, in those days, little understood by our countrymen, so that it is hardly surprising to hear of the appalling fact that Sir Hugh Willoughby with the entire crews of both vessels, numbering sixty-five souls, perished from the combined effects of cold and starvation. The following year the two ships, with their ghastly crews of stiffened corpses, were discovered by some fishermen. From a signature of Sir Hugh Willoughby it was ascertained that he, at any rate, was alive towards the end of January, 1554, but in all probability the majority of his companions perished at an earlier date.

There is little doubt regarding the exact locality where this tragical catastrophe occurred. The bay in which the vessels took shelter is situated on the coast of Lapland, to the westward of the island of Nor-kueiff, near the Arzina (Varsina) River. The authority for this is Mr. Anthony Jenkinson, captain of the ship *Primrose*, who visited the spot in the year 1557, four years after the melancholy event. In his journal he thus alludes to it:—"July 6th. We passed by the place where Sir Hugh Willoughby, with all his company, perished, which is called Arzina-reca, that is to say, the River Arzina." The place was pointed out to Jenkinson by one Robert Best, who, two years previously, had been at the mouth of the River Dwina, when Willoughby's two ships were brought round.

Sir Hugh Willoughby's expedition had originally consisted of three ships, but one of them, commanded by Richard Chancellor, had parted company from the others off the North Cape on their outward voyage, and thus escaped the like fate.

Sir Hugh Willoughby's chief qualifications (for he was no sailor) for being selected as commander of this expedition were, firstly, "by reason of his goodly personage, for he was of tall stature," and secondly, "for his singular skill in the service of war." These would, at the present time, be considered singular qualifications for the leader of an Arctic expedition!

The next to sight *Novaya Zemlya* was Stephen Burrough, who had served as pilot or master of Chancellor's ship in the afore-mentioned expedition. He sailed from England in the spring of 1556, in a little pinnace called the *Serchthrift*, for the purpose of finding a north-east passage to China. Sailing along the coast of Lapland, he discovered the strait leading into the Kara Sea, which separates *Novaya Zemlya* from *Waaigat Island*, but being prevented from proceeding further by "the great and terrible abundance of ice," and by persistent head winds, he sailed into the White Sea, and wintered at Archangel, returning to England the following year. This strait has subsequently borne the

name of its discoverer, although it is as often called the Kara Strait or Gate.

Oliver Brunel, a Dutchman, appears to have been the next to visit the shores of Novaya Zemlya, for, during a journey he made through the Samoyede country to Siberia, he was conveyed by sea along the coast to the mouth of the Obi River, and thence was taken by a Russian pilot through the Kostin Shar, a channel on the south-west coast of Novaya Zemlya, separating that land from a large island called Mesdusharsky.

It is generally supposed that, during one of his numerous expeditions, Brunel was taken through the Matyushin Shar. Should this supposition be correct, he is, without doubt, the first *civilized* European who ever sighted the northern island of Novaya Zemlya, but no authentic proofs exist to substantiate such a supposition. The exact date of Brunel's expedition alluded to above is unknown, but it was prior to the year 1580, and in all probability about 1571 or 1572.

Pet and Jackman in 1580 followed in the footsteps of Burrough, but did little more than discover the strait separating Waaigat Island from the mainland, since called Pet, and sometimes Jugor Strait. They penetrated a short distance into the Kara Sea, but finding the ice heavy and tightly packed, and being withal severely handled by it, they were compelled to relinquish further idea of making the north-east passage, and steered in a homeward direction. The two ships parted company in a dense fog on the 22nd of August, the *George*, with Captain Pet, reached England in safety the same year, but Jackman's ship, the *William*, was never again heard of. Although it has been generally supposed that Jackman succeeded in reaching some Norwegian port in which he wintered, and sailed the next year bent on further discoveries in a north-westerly direction; it is, I think, more than likely that he passed the winter at Kolguiev Island, or else in some bay on the coast of Lapland, whence he sallied forth the following year to prosecute his researches to the north-east. This idea is formed in a measure from the following notes, published by Purchas, of one Antony Marsh, who was a chief factor of the newly formed Muscovy Company. He derived the information from Russian sources. He writes:—"Heretofore your people (that is the English) have been at the said river of Ob's mouth with a ship, and there was made shipwracke, and your people were slaine by the Samoeds, which thought that they came to rob and subdue them." This was written in 1584, and Jackman was lost in 1580. As no other English ships were trading, and lost, during those years in that particular locality, it seems reasonable to conclude that the vessel and people here alluded to could be no other than the *William* and her crew.

Following closely on the heels of Pet and Jackman, we again find Oliver Brunel navigating the Novaya Zemlya seas, and this time in command of the first real Dutch Arctic Expedition that had ever been despatched from the shores of Holland. The expense of this enterprise

was in all probability partially defrayed by the liberality of the well-known merchant, Balthazar de Moucheron. It resulted, however, in total failure. Brunel attempted, but in vain, to pass through Pet Strait; the ice was of such a nature as to effectually defy all efforts made to penetrate it, and Brunel was eventually shipwrecked on his return voyage.

Barents, the famous Dutch navigator, in 1594 was the next to visit Novaya Zemlya, and to him, I think, must be accorded the honour of being the discoverer of the north island, at the north-eastern extremity of which he subsequently (in 1596-7) passed a winter.

On some of the English charts this island bears the name of Admiral Lutke, the distinguished Russian naval officer who was employed sixty years ago in surveying the coasts of both islands. In my opinion, it would be an act of greater justice to call it Barents Land after its real discoverer, as also to distinguish it from the southern island, which would continue to bear the appellation of Novaya Zemlya. Marsh, writing in 1584, calls the north island "Mathew's Land," by which we may infer that it had been seen and named, before the time of Barents, by the same individual whose name was conferred on the strait separating the two islands; for there is little or no doubt that "Matotschkin Schar" is a corruption of Matyuska, which is the diminutive of the Russian name Matvei or Mathew. Marsh calls it the Mattuschan Yar, whilst, according to Dr. Hamel, Matotschkin Schar is a corruption of Matyushin Shar, the correct form.

Further allusion to the voyage of Willem Barents is, I think, unnecessary. It is sufficient to say that he sailed along the entire west coast of Novaya Zemlya, naming the different prominent headlands and bays as he sailed past, and fixing their positions so correctly as to prove his skill and accuracy as a surveyor and navigator. The Dutch names given by Barents remain in the chart to this day. The two voyages, one in 1594 and the other in 1596-7, undertaken by this intrepid and energetic Dutch seaman, are of the greatest importance when taken in connection with those of more recent times, for they enable us to form a very fairly correct estimate regarding the conditions of the ice in those seas three hundred years ago, by which we know that it has undergone little or no change during that long period—at least not more than is usually found from year to year, for it is well known how very erratic are the movements of ice.

It also shows how very little has been effected in those regions, in spite of modern improvements and the immense advantages derived from steam power, since the gallant Dutch sailed round the northern extreme of Novaya Zemlya, for it is only within the last eight years that Barents' winter quarters have been visited since that time. This significant fact, I fear, is a lamentable sign of the want of enterprise of the present day.

We now come to the voyage of Henry Hudson in 1608, that adventurous British seaman who, the previous year, had, in a small vessel with a crew consisting of ten men and a boy, undertaken to sail to China and Japan across the North Pole! Hudson reached the coast of Novaya Zemlya, in the vicinity of Cape Britwin on the 26th of June, having sailed to the eastward from lat.  $75^{\circ} 29'$  along the pack edge, which he found to be impenetrable in a northerly direction. This is not to be wondered at, considering the early time of the year that Hudson was there. Had he remained for another two months he would, in all probability, have found a clear and open sea, in which he would have sailed to a high latitude, instead of which he returned to England, arriving at Gravesend on August 26th.

During the seventeenth century many adventurous voyages were made by the Dutch whalers, among which may be mentioned that of Captain William de Vlamingh, who, according to his own account, reached the high latitude of  $82^{\circ} 10'$  in a north-westerly direction from Novaya Zemlya, meeting little or no obstruction from ice. This statement must be received with due caution, for, if he reached the position claimed, he must undoubtedly have seen Franz-Josef Land, the southern edge of which is in latitude  $79^{\circ} 50'$ . At any rate, whether his position is correct or not, there is little doubt but that he sailed to the northward of Novaya Zemlya without any hindrance from ice. Another Dutchman, Cornelis Roule, in about 1698, also claims to have sailed as far as  $85^{\circ}$  due north of Novaya Zemlya, where he discovered land! If any reliance is to be placed on the veracity of this statement, the honour of discovering Franz-Josef Land is due to Cornelis Roule.\*

In the year 1676, Charles II. of England was induced to send out an expedition for the purpose of attempting the north-east passage. The conduct of it was entrusted to a Captain Wood, and two small vessels were placed under his command. He did little else but sight the edge of the pack in latitude  $75^{\circ} 59'$ , on the 22nd June, but, like Hudson, he was much too early in the season. Standing over to Novaya Zemlya, one of his ships was lost on a reef of rocks, the crew being saved and brought to England by her consort without attempting further exploration. With the exception of three voyages made during the last ten or fifteen years by yachtsmen, this voyage of Wood's was the last undertaken by Englishmen towards Novaya Zemlya, and these yachting cruises of modern times were solely for the purpose of sport and *not* for exploration.

Up to the eighteenth century no attempts had been made to explore the east coast of Novaya Zemlya, with the exception of the north-east extreme where Barents wintered. Russian walrus hunters had however, at various times, visited the coast, whence they returned with reports that the mountains contained large quantities of silver ore. In conse-

\* See '*Noord en Oost Tartarye, door Nicolas Witsen*,' p. 920.



quence of these rumours an expedition was set on foot by a rich merchant of Archangel, but the death of the originator nipped it in its bud.

In the year 1760, another Russian, named Sawwa Loschkin, sailed with the object of exploring the east coast. Although little is known regarding this expedition, it is on record that he passed into the Kara Sea, through Burrough Strait, and successfully circumnavigated both islands, rounding Cape Mauritius, and sailing down along the west coast. He encountered great difficulties from the ice in the Kara Sea, and was occupied no less than three summers in performing the journey from the Kara Strait to Cape Mauritius. His two winters were therefore spent on the east coast.

In 1768–1769, Lieutenant Rosmysloff, who had been an officer in the Russian Navy, undertook to explore Novaya Zemlya, and, in the interest of an Archangel merchant, to seek for silver ore. He sailed from Archangel on July 10th, in a small vessel with a crew of thirteen men, and reached Goose Land on August 3rd. Thence he proceeded northwards, making a thorough examination of the coast as he sailed along, until he reached the Matyushin Shar, through which he sailed, finding the Kara Sea perfectly free from ice. Being provided with a wooden house, which had been put on board the ship in pieces, he determined upon wintering. The house was set up, but not being large enough to accommodate the whole party, he pulled down a hut that had been erected before by some hunters, and transporting the material to his winter quarters, built a second house, dividing his party between the two.

On the 1st of October the strait was covered with ice, and five days later the Kara Sea was frozen over. On the 5th of November the sun disappeared, and the long winter night commenced, during which they suffered greatly from the want of space and air, in their wretchedly constructed huts. The sun reappeared on the 4th of February, and a week after a herd of reindeer was seen. One of the men was immediately despatched in pursuit; he succeeded in shooting several, but before he could return a heavy snowstorm overtook him, he lost his way, and was buried in a drift. Towards the end of June, Rosmysloff determined to complete his examination of the Matyushin Shar; this was successfully performed over the ice. In addition to his hydrographical work, he made extensive and valuable observations regarding the fauna, flora, and geology of the country, and appears to have been a most observant traveller. He was the first person to determine the length and breadth of the Matyushin Shar. The strait was free of ice in the first week of August, but the damaged condition of the vessel and the weak and sickly state of the crew prevented Rosmysloff from pushing further north. Whilst patching up his ship, he was fortunately fallen in with by a Russian fishing vessel, which conveyed the lieutenant and his men to Archangel, where they arrived on the 18th of September.

For nearly forty years after the return of Rosmysloff, the shores of Novaya Zemlya were unvisited, except by those engaged in the pursuit and capture of walruses and other oil-yielding animals. But in 1807 Count Rumanzoff equipped an expedition at his own expense for the purpose of examining the country, with a view to its mineral products. This examination was entrusted to one Ludlow, who held a high official position in the management of the Ural mines. An ex-lieutenant in the Imperial Navy, Pospeloff, was engaged as captain, and his crew consisted of a pilot and eight sailors. In addition, eight miners were embarked, to carry out the chief work of the expedition. They sailed on the 9th of July, 1807, in a little vessel of 35 tons burden, and on the 28th reached the neighbourhood of the Kostin Shar, where a thorough examination was made by Ludlow and his assistants for minerals, but without success. On the 8th of August they sailed northwards, reaching the Matyushin Shar three days later.

Anchoring in Silver Bay (so named by Ludlow, not on account of the presence of silver, but because the quantity of talc which he here saw mingled with the slate caused a metallic glittering similar to the white glimmer that would have been produced by the precious mineral), he made a diligent search for ore, but no traces was he able to discover. Pospeloff was unable, from the want of assistance, to do much towards the cartography of the island, but he projected a very serviceable sketch chart of the west coast of the south island.

In 1819 the Russian Government fitted out a brig named the *Novaya Zemlya*, for the purpose of making a complete survey of the east coast, but bad luck appears to have attended this expedition throughout. The command of it was entrusted to Lieutenant Lasareff, and his ship was prepared to winter. They sailed from Archangel on the 10th of June, and attempted to reach the Matyushin Shar, but falling in with some heavy streams of ice, they changed their course to the southward, hoping to enter the Kara Sea, through Burrough Strait. Here also their progress was arrested by ice. After striving in vain for some days to push through, Lasareff made another attempt to go north, but scurvy breaking out among his crew, he returned to Archangel, without having accomplished anything.

Undeterred by the want of success of this expedition, the Russian Government in 1821 sent another vessel of the same name, of 200 tons burden, built and strengthened expressly for ice navigation. The command of it was given to Lieutenant Lutke, with instructions to examine the coasts of Novaya Zemlya, to determine the positions of the loftiest and most conspicuous mountains, and above all to ascertain the true length and breadth of the Matyushin Shar. His crew consisted of two officers, a doctor, pilot, and thirty-nine men.

For four consecutive years, namely, 1821, '22, '23, '24, was Lutke employed in surveying the west coast, during which time, although the

seasons were apparently unfavourable, he did good work. The coast-line is very accurately delineated on his chart, and I was myself able, during my recent cruise, to verify a great many of the positions laid down by this excellent navigator more than fifty years ago. His observations extend no further north than the Pankratjeff Islands, the ice, on all occasions, offering a bar to his advancing beyond Cape Nassau. But Lutke, it must be observed, always relinquished his attempts to reach a high latitude, and to round the northern end of Novaya Zemlya, either in the months of June or July, or during the early part of August, believing, in the latter case, that the season was too far advanced to make further exploration prudent.

Had he waited until the beginning of September or even the end of August, the ice-fields that obstructed his passage would have vanished, and he would have had no difficulty in sailing round the north extreme of the island.

It is a significant and important fact that the edge of the pack between Spitzbergen and Novaya Zemlya, with only one or two exceptions, has been invariably found by different navigators during the last 300 years, in the same position, at the same time of the year. During the month of August the lapse of a few days will make a marvellous difference in the position of the ice.

The next contributions to our knowledge of the shores of Novaya Zemlya are due to expeditions sent out between the years 1832 and 1836, by private individuals belonging to Archangel. The principal object was the laudable one of attempting to re-establish the old trade through the White Sea to the Obi. Being interested in science, the originators were also desirous of combining with their mercantile transactions, the exploration of the east coast of Novaya Zemlya. Lieutenant Pachtusoff was entrusted with the chief command of the first that sailed.

From experience derived with the Russian walrus hunters he had become convinced that their flat undecked boats, called "karbasses," were the most suitable for ice navigation. A vessel was therefore built, according to his plans, in the form of a karbasse, which was 42 feet long, had 14 feet beam, and a depth of 6 feet. Cabins were built in the fore and after ends of the vessel, and the crew consisted of two officers besides the captain, and seven peasants! Pachtusoff's instructions were to sail into the Kara Sea, and work up along the east coast of Novaya Zemlya from the southward. In the meantime two other vessels were fitted out under the respective commands of Lieutenant Krotoff, and the pilot Gwodareff, who were to proceed along the west coast, and co-operate with Pachtusoff after joining company with him in the Matyushin Shar, hoping through their joint efforts to make a very complete survey of the entire coast of the south island. They sailed from Archangel in the early part of August 1832, and ten days after

Pachtussoff sighted the south-west coast, to the eastward of the Kostin Shar. After many unsuccessful attempts to push through Burrough Strait, they reached Kamenka Bay at the south-east extreme of Novaya Zemlya, and here Pachtussoff determined to pass the winter, a decision mainly formed on account of the immense quantities of driftwood that he observed along the shore. During the winter the commander did his best to ensure the health and spirits of his men, by keeping them constantly employed. The sun returned on the 19th of January, after an absence of sixty-five days, and on the 18th of April they were able to recommence their examination of the coast. Towards the end of June the sea was free of ice, and shortly after, Pachtussoff started with only two men, and a month's provisions, to make a boat journey along the east coast, and endeavour, if possible, to reach the Matyushin Shar. This was a bold and adventurous proceeding. On the 15th of July he reached the latitude of  $71^{\circ} 38' 19''$  N.; but his progress being here obstructed by ice, he relinquished further attempt to go north. Returning to winter quarters he found his ship ready for sea, and lost no time in pushing on. On the 31st of July he reached a large bay, to which he gave the name of Lutke. The cairns and crosses erected by Pachtussoff in this bay were standing when the place was visited by us three months ago.

Continuing his northward course, he reached, and named, on the 22nd of August, Shubert Bay, and subsequently two more bays further north, to which he gave the names of Brandt and Klokoff respectively. On the 23rd of August they entered the eastern end of the Matyushin Shar. The Kara Sea was then so free from ice, that no difficulty would have been experienced in going further north, but to do so would have necessitated another winter, and for that they had neither strength nor provisions remaining. On the 27th of August they sailed through the Matyushin Shar, but found no signs, as anticipated, of either Krotoff or Gwosdareff, who were expected to winter in that locality. On the 5th of September, Pachtussoff reached Kolguiev Island, and finding his little vessel, from her encounters with the ice, to be in a seriously damaged condition, he gave up the idea of taking her to Archangel, and ran into Petchora instead, where he left his crippled craft, travelling himself by reindeer sledges to Archangel, which he reached on the 10th of December. He found that Gwosdareff had already returned, having had fairly good sport with the walrus, but of Krotoff there were no tidings. Pachtussoff lost three men during his cruise, two of whom died in winter quarters.

In the following year another expedition was despatched, and this time under the auspices of the Russian Government. It consisted of two small vessels. The command of one was given to Pachtussoff, and the pilot Ziwolka was placed in charge of the other. The crews of both ships only numbered seventeen, but they were both prepared to

winter. The main object of the expedition was to discover the fate of Krotoff, and to explore the east and west coasts of the north island.

They sailed from Archangel on the 3rd of August, but the ships were separated in a fog on the 19th, joining company again, however, on the 6th of September at the western entrance of the Matyushin Shar, where, on the 25th of September, the ships went into winter quarters, in a small harbour on the north side of the channel. In April these indefatigable men commenced their observations—Pachtussoff confining his to the strait, whilst Ziwolka was entrusted with the exploration of the east coast, north of the Matyushin Shar. Pachtussoff made a very complete chart of the strait, his observations agreeing very nearly with those previously made by Rosmysloff.

His work completed, he returned to winter quarters, where he set to work to build a small vessel in which to sail round the north end of Novaya Zemlya, deeming it prudent to leave his own ship as a depôt, in case of any accident happening to the one in which he was about to explore. In the meantime Ziwolka had reached as far north as Cape Flotow on the east coast, when the diminished state of his small supply of provisions compelled him to return, after an absence of thirty-four days from the ship. At his extreme northern point he erected a couple of crosses, made from the driftwood with which the coast of Novaya Zemlya is so plentifully supplied, on which was inscribed the date of his visit. These spring operations were all carried out with sledges.

On the 9th of July the Matyushin Shar was free of ice, and the next day Pachtussoff, accompanied by Ziwolka, sailed up the west coast in the little boat he had just constructed! He took with him two smaller boats and provisions for three months and a half. At his winter quarters he left behind two invalids, with a couple of men to look after them. Near Silver Bay they found the remains of a shipwrecked vessel, which they concluded belonged to the unfortunate Krotoff, who, with his crew, must have perished the preceding year.

On the 19th of July they reached Willem and Berg Islands, round which they found much ice. In attempting to sail between these islands, the ice closed round their frail little bark and completely destroyed it. Such an eventuality had been foreseen by Pachtussoff; and arrangements had been made which resulted in the smaller boats, provisions, and other necessaries being saved. Whilst in this rather critical position a vessel suddenly, and most opportunely, made its appearance. She was a small "lodia," engaged in the capture of walruses. Pachtussoff and his crew were taken on board by their countrymen, who, however, remained in the neighbourhood until the 10th of August in pursuit of their avocations. On that day they weighed anchor, and going south, reached their ships in the Matyushin Shar on the 19th.

The indefatigable Pachtussoff, dissatisfied with the work that had

been accomplished, at once made arrangements for continuing the exploration of the east coast in a small "lodia." On the 20th of August he started with five seamen, sailed through the Matyushin Shar, and working his way through loose streams of ice, reached the island, that now bears his name, in latitude  $74^{\circ} 21'$ , about 20 miles beyond the position reached by his subordinate Ziwolka. From this position high land was seen about 40 miles to the northward, which he called Daljny-noss; but heavy ice made it impossible for him to proceed further north. The 8th of September saw this energetic and bold navigator back again in the Matyushin Shar, whence he sailed homeward on the 13th. The expedition was absent 440 days, during which time two of the crew died. The gallant Pachtussoff, who never spared himself, suffered so much from the hardships and privations endured during the cruise, that he died of nervous fever shortly after his arrival at Archangel.

In 1837, Baer sailed to make scientific observations in Novaya Zemlya, but, though this expedition was very important in its natural history results, it was not so interesting from a geographical point of view.

In the following year another Russian Government expedition was despatched to complete the observations along both coasts. It consisted of two schooners, which were built expressly for the purpose. One was named the *Novaya Zemlya* and the other the *Spitzbergen*. The first-named ship was commanded by Lieutenant Ziwolka, and the other by Lieutenant Moissejeff. The sum total of both crews amounted to twenty-four. They took out with them a house for wintering in, and they were ordered to sail, if possible, round the north end of Novaya Zemlya and down the east coast. They sailed on the 7th of July, 1838, accompanied by a "lodia," which was carrying their house together with a few other stores. On the 30th of August, leaving Moissejeff to put up the house and establish winter quarters in Cross Bay, in lat.  $74^{\circ} 10'$ , Ziwolka pushed on with the view of sailing round the north end of Novaya Zemlya, but being seized with illness he was forced to turn back. Both ships passed the winter in Cross Bay, and, from all accounts, their crews suffered terribly from cold and sickness. Ziwolka died on the 26th of March. On the 16th of April, Moissejeff attempted to explore the coast in the vicinity of their winter quarters with dogs and sledges, but the party suffered so terribly from the cold and snow-blindness that they were compelled to return after an absence of only forty-eight hours. On the 21st he made another attempt, but the exhaustion of his men obliged him to return again on the 29th.

On the 17th of May, the following entry appears in Moissejeff's journal:—"We have lost eight men, eleven men are ill, and only five in good health, and the latter are very weak." This was, it must be admitted, a truly deplorable state of affairs, but it was not sufficiently so to subdue the spirits of the gallant little band. On the 2nd of July

both ships were free, when Moissejeff, ordering one to the southward, on the 23rd, to take observations on the Kostin Shar, sailed with the other the following day to the north. Meeting some walrus hunters off Admiralty Peninsula, he was told that impenetrable icé would be found off the Pankratjeff Islands; so, giving up all hope of carrying out his instructions, he returned to Archangel.

Moissejeff attributed the great mortality and sickness of his men to their original delicacy, and not to the severity of the climate!

This was the last expedition despatched by Russia for the exploration of Novaya Zemlya, but hunters from that country annually visit its shores, bent on the capture of walruses, seals, white whales, and salmon. These add little or nothing to our geographical knowledge of the country. Important and interesting voyages, however, have been performed by Norwegians engaged in the same trade. In 1870 the circumnavigation of Novaya Zemlya was, for the second time,\* successfully executed by Captain Johannesen, who had also, the previous year, made a very remarkable voyage along the east coast.

In the following year, Captain Carlsen (who afterwards served on board the *Tegethoff* in the memorable Austro-Hungarian Expedition of 1872) made a most interesting voyage, for not only did he succeed in circumnavigating Novaya Zemlya, by sailing up the west side and rounding the northern point, and so down along the east coast, but he also visited the winter quarters of the old Dutch navigator Willem Barents, the solitude of which had been undisturbed for 274 years.

Both these last-mentioned voyages were performed late in the year.

The next to engross our attention is the pioneer voyage made by Weyprecht and Payer (at the same time that Carlsen was making the circuit of Novaya Zemlya), in the little cutter yacht *Isbjorn*, the same in which we have recently been prosecuting our researches. This expedition, on the 1st of September, reached the high latitude of 78° 38', in the 42nd meridian of east longitude. In this high position Payer writes: "The ice around us presented no serious impediment, as far as we could see," and had it not been for the opposition of their Norwegian crew, they would in all probability have reached a much higher latitude, and possibly anticipated those discoveries which were made by them two years later. The cruise of the *Isbjorn* in 1871, is a very important one, for, combined with others, it shows how easily a high latitude may be reached in those seas which have hitherto been regarded as almost unnavigable, provided such attempt is made at a comparatively late season of the year.

The next year, 1872, was a notoriously bad one, so far as ice is concerned, in the Barents Sea, and, taken in conjunction with other seasons, must be regarded as very exceptional. It was during the month of August in this year that the *Tegethoff* was beset in the comparatively

\* For the first time (see p. 8) in 1760 by the Russian Sawwa Loschkin.

low latitude of  $76^{\circ} 22'$ , never to be again released. It is unnecessary for me to enter into any details in connection with this expedition; they have been already described to this Society, and are well known to all geographers. The great mistake, if it can be so called, made by Lieutenant Weyprecht, was that of pushing his ship into the ice so early in the season. Had he patiently waited a few days, or even a few weeks, before attempting to penetrate the pack, he would assuredly have been saved the two anxious winters he was doomed to spend in his icy bondage; for he would then have ascertained that it was an unusually bad ice year, and would therefore have refrained from pushing on. The two most essential requisites for the leader of an Arctic expedition are patience, and the moral courage to turn back when all hopes of success are dissipated. From conversations that I have recently had with several Norwegian sailors, who were not far from the *Tegetthoff* at the time she was beset, I am fully persuaded that the year 1872 was an exceptionally unfavourable ice year, so far as northward progress is concerned.

It is remarkable that, in this same year 1872, the sea on the east coast of Spitzbergen was freer from ice than had been known for twenty years. On July 28th, 1872, the Norwegian captain Altmann reached the coast of Wiche's Land, later in the month Captain Nils Johnsen followed him, and during the first week of August Captain Nilsen sailed along the north coast of Wiche's Land, the sea being free from ice to the east and north.

Thus we find that when there is an exceptionally bad year for going north in the Barents Sea, the sea on the east coast of Spitzbergen is unusually free from ice, while in ordinary years the ice prevents the east coast of Spitzbergen from being approached. The deduction is that in ordinary years the ice is drifted against the Spitzbergen coast, leaving the sea navigable to the north in August and September; while in exceptional years, owing to failure of prevailing winds, the Barents Sea remains full of ice, and the Spitzbergen coast is comparatively clear.

I have been unable to obtain any statistics regarding the locality and conditions of the ice during the year 1873 in the neighbourhood of Novaya Zemlya, and as the *Tegetthoff* was frozen in to the northward of  $79^{\circ} 40'$  during the navigable season of that year, it would be unfair to call it a bad year from the mere fact of no open water being observed from that vessel, when close to the land, the fast, or land ice, always being the last to break up.

On the retreat of the crew of the *Tegetthoff*, after the abandonment of their ship in the following year, we are told that they reached the open water in latitude  $77^{\circ} 49'$  on the 15th of August, 80 miles further north than the latitude in which they were beset two years before, and five days earlier in the season! This fact, in my opinion, taken in con-



junction with the experience of all navigators who have sailed in the Barents Sea, does not prove that the year 1874 was an unusually good one, but that the year 1872 was exceptionally bad. The expedition of the Dutch in 1878 tends materially to confirm this opinion, whilst the great success they have achieved this year, only strengthens and corroborates my views on the subject. I will not take up your time by describing the cruise of the Dutch in the summer of 1878; it has been already related in detail to this Society, and will be found in the 'Proceedings' for 1879.

Another remarkable voyage was also undertaken in 1878, by which geography has been enriched by the discovery of a hitherto unknown island, situated to the north-east of Novaya Zemlya.

In command of the Norwegian schooner *Nordland*, Captain Johannesen left Tromsø on the 22nd of May, and directed his course towards Novaya Zemlya, which he reached on the 6th of June. Sailing up the west coast, the Pankratjeff Islands were reached on the 21st of June, and a month later Cape Mauritius. On the 30th, having passed through some streams of loose ice, Barents' winter quarters were reached on the 30th. Sailing the next day, he remained off the north coast of the island hunting for walruses, until the 10th of August, when he shaped a course to the eastward, meeting with but little ice, but being greatly pestered by fog and rain. On the 16th, during a brief interval of clear weather, land was sighted towards the S.S.E. This was the coast in the vicinity of Cape Taimyr. Thence he sailed west and then north, occasionally meeting ice, but never in sufficient quantity to cause alarm or anxiety. On the 28th of August he saw an island, bearing north-west. On the 1st of September he sailed along its southern coast, then up the west side to the north, and so made the complete circuit of the island. The west side is reported to be steep and precipitous, rising to a height of about 100 feet, but the east side is low and shelving, and on it lay large quantities of driftwood. On this side landing would be practicable when the coast is unencumbered with ice. Along the south side were a number of grounded masses of ice, but whether of fresh or salt water formation is not stated. In the centre of the island there appeared to be a lake, but no vegetation was visible. Bears, walruses, and seals, and many kinds of birds were seen. The island was set down as being in  $77^{\circ} 40'$  N. lat. and  $86^{\circ}$  E. long. It was named "Einsamkeit," which means "lonely," or "solitude." Sailing on the 3rd of September, Johannesen shaped a course to the north-west, reaching the 78th parallel *without meeting ice*. On the 6th, he was off the east coast of Novaya Zemlya, which was entirely free from ice. From the 10th to the 11th he was off Cape Mauritius, eventually reaching Tromsø, after a most adventurous and successful cruise, on the 27th of September.

I will now proceed to give an account of the trip in which I have recently taken part, and which, though successful in a geographical

point of view, would have been more so had it not been for the unwillingness evinced by our Norwegian crew to face the ice.

The conception of the cruise was entirely due to our newly elected Associate, Sir Henry Gore-Booth, who to his qualities of a keen and successful sportsman adds those of a practical geographer and an ardent admirer of nature. Early in the year I gladly accepted his invitation to accompany him on a sporting trip to Novaya Zemlya, with the understanding that we should afterwards examine the ice in the Barents Sea and other localities, during what I considered to be the navigable season, namely, during the month of September. For our cruise he had hired the little Norwegian cutter *Isbjorn*, already rendered historical by her exploits under Payer and Count Wilczek. Since the cruise of the latter gentleman the little vessel had been employed fishing in Spitzbergen waters and off the coast of Norway.

The *Isbjorn* is a vessel of 43 tons burden. She is 55 feet long, with a beam of 17 feet. She was built in 1870, and made her first voyage in the following year with Weyprecht and Payer. She was cutter rigged, but was fitted, in addition, with a square topsail.

As the *Isbjorn* was essentially a cargo-carrying vessel, our accommodation was, as may be imagined, on a limited scale. The cabin, common to both of us, in which we slept, had our meals, and did all our work, was 5½ feet in length, by 5 feet 9 inches in breadth. Our crew consisted of a skipper, a mate, two harpooners, and five seamen. The latter all lived in a small place in the fore part of the vessel. The harpooners were the only men in the ship who had ever navigated the icy seas, and were therefore regarded by the skipper and remainder of the crew, as the great authorities on all subjects connected either with the ice or with sport. The captain was only captain in name, and because he was owner of the cutter; he was a good fisherman, but made no pretensions to being a navigator, indeed, it is very doubtful whether he had ever seen a sextant or chronometer before we went on board. The *Isbjorn* had been expressly built for ice navigation, and was therefore extra strengthened, having considerable beam power inside, whilst she had a 3¼-inch oak doubling outside. The stem was armed and protected with bands of iron, similar to those used by the Dundee and other whalers, whilst the inside was strongly fortified. Considering her size she was, for a sailing vessel, well adapted for such work as was anticipated, being, in smooth water, a very handy little craft.

But here I cannot help strongly expressing my opinion regarding the employment of vessels unprovided with steam power in exploring the icy seas. At the very moment when the ice is more open than at any other time, namely in a calm, a sailing vessel is perfectly helpless, and at other times, when there is a fair wind through the pack it would be imprudent for a commander to run on, because to extricate himself from the ice, he would have to work to windward in an ice-

blocked channel. Although most successful work has been accomplished in the Arctic seas by sailing ships, there is no doubt that had those vessels been steamers, much more would have been achieved. Yet this year we have an example of a small sailing vessel not only reaching, but also returning from, a country which a steamer approached, in 1873, by being helplessly drifted in the ice, only to leave her timbers bleaching on the shore. There is little doubt that had the *Willem Barents* possessed steam power, she would, this year, have made one of the most brilliant and successful summer cruises in the Arctic seas ever recorded.

Our crew shipped, chronometer rated, and stores and provisions to last us until the beginning of October on board, we sailed from Tromsø on the 18th of May, but finding our vessel rather *crank*, we put in to Hammerfest on the 25th, in order to take in ballast, sailing again the following day.

Passing through the fjords to the southward of North Cape, we shaped a course to the eastward, and experiencing fine weather, made the first ice on the 4th of June, about 40 miles due west of Goose Land. It consisted of loose streams of light brashy ice, sufficiently packed in some places to form an obstacle to navigation. It was what is called light floe ice, of only one season's formation, and was well "rotted" by rain and the motion of the sea. In places where excessive pressure had been exerted, the hummocks were piled up to some height.

I inferred that this ice had been formed to the southward of Novaya Zemlya, between Kolgueiev and Waigat Islands, and had been drifted to where we found it by the recent south-east winds.

This inference was, I think, a correct one, for after remaining in this ice for three days hunting walruses and seals, we had no difficulty in sailing through it, and reaching an unencumbered sea in the 72nd parallel of latitude. The temperature, whilst in the ice, was some three or four degrees below the freezing point, and the cold biting wind made it keenly felt. This wind brought us our first visitor from Novaya Zemlya, in the shape of a beautiful little "sylvia," about the size of a wren, having the most brilliant blue neck and breast. The poor little bird fluttered around us for a few minutes, and then alighted upon the bulwarks, innocently imagining it would be allowed to rest, but instead of kind treatment and a warm welcome, it was ruthlessly attacked and killed by a blow from a broom that would have felled an ox. It was a rare specimen to be found so far north, and was therefore sacrificed in the interests of science.

Our first encounter with the ice gave us convincing proof of the aversion of our Norwegian crew to making a closer acquaintance with it. In justice to some of the men, I must say that this timidity on their part or, I will say, their dislike to push the ship into the ice, was entirely due to the harpooners, who, being supposed to be experienced icemen, were

naturally the oracles of the crew. Whatever they said was bound to be accepted as the truth, and I rather think we were regarded as mad hair-brained Englishmen, ignorant of everything connected with ice navigation, sport, or anything else.

On the 9th of June we obtained our first glimpse of Novaya Zemlya, the low snow-covered coast of Goose Land. These low, flat, jutting out points and peninsulas, such as Goose Land, Suchoi-Noss, Admiralty Peninsula, and others, form a very peculiar feature of the otherwise bold mountainous scenery of the west coast. In the vicinity of these low lands, the water is very shoal, and it is unsafe for a vessel, even for a small one like the *Isbjorn*, only drawing six feet of water, to approach within a mile of the shore. Even at a distance of four miles we obtained soundings in 10 and 12 fathoms. The whole country lay buried in one impervious mantle of snow.

To the southward of Cape Britwin, on the following day, to our intense surprise, we observed a little craft bearing down towards us. It proved to be a small undecked boat about 18 feet long, containing five Samoyedes, two men, a woman, and a couple of children, and four wretched-looking dogs. The Samoyedes were clad in reindeer-skin coats with hoods, and sealskin trousers and boots. They were of short stature, bearing a strong resemblance to the Eskimos, and possessing the same Mongolian type of features, namely, high cheek bones and oblique-shaped eyes. They appeared merry and good-tempered, and boarded us in a very unceremonious manner, the lady being handed up the side in true cavalier style by our gallant skipper, who, however, treated the children in a ruder fashion, by seizing them summarily by the nape of the neck, or rather by the nape of their reindeer-skin habiliments, and thus lifting them, *volens volens*, on board! They spoke a little Russian, so through the medium of our mate, who understood that language, we ascertained that they had passed the winter in a hut, not far from where they met us, and that they were then on their way down to the Kostin Shar to visit their friends—a settlement of Samoyedes being established in that neighbourhood. A Russian had passed the winter with them, and had been left in charge of the hut. They informed us that the *Isbjorn* was the first vessel they had seen this year, and that the ice along the coast had broken up eight weeks before. Our visitors remained on board for upwards of an hour, when, after we had supplied them with a little biscuit, they took their departure. In their boat they had the runners and framework of a sledge, and their dogs were all accoutred in their sledging harness.

On the 12th we anchored in a harbour called on the Russian charts, Nameless Bay. This bay had the reputation of being a famous place for "looms," as Brunnich's guillemots are invariably called; and as the last of our fresh meat had been consumed, we determined to replenish our larder from the loomerics. High hills of from 800 to 1500 feet bounded the

harbour on three sides, leaving the entrance open to the westward. These hills sloped down towards the water, terminating in abrupt and precipitous cliffs of limestone formation, of about 100 feet in height. The cliffs, on the face of which the action of the weather and frost had formed narrow ledges in regular stratifications, rising tier over tier from the base to the summit, were the loomerics! On these ledges could be seen the birds congregated together in regular lines, not in thousands but in myriads, the face of the cliffs assuming a "pepper and salt" hue, from the combination of their black and white plumage. Some idea may be formed of the countless number of these birds, when I say that in two hours my companion and myself, with our two guns, bagged 600! On the first discharge of our guns, a perfect cloud rose in front of us, completely obscuring the face of the cliff; and I can only compare the noise made by the whirring and flapping of wings, to that produced by the fall of water from a large cataract. As they flew seawards they actually struck us in the boats, whilst the killed and wounded fell upon us like hail! The incessant flight of these birds in different directions reminded me more of the swarming of hundreds of hives of bees than anything else. The "loomerics" were entirely confined to the southern shore of the bay, along which they extended for three miles.

Under some of the cliffs were large caverns worn away by the action of the sea, whose entrances, in some instances, were almost blocked by heavy masses of pure white snow, whilst clusters of large transparent icicles hung pendent like stalactites from the top, forming a beautiful fringe or fret-work, which reflected the most lovely prismatic colours as they caught the rays of the midnight sun. The land above the cliffs rises in regular raised terraces to the base of the more lofty ranges of hills that form such a conspicuous feature of the west coast of Novaya Zemlya, showing clear indications of its upheaval. Another sign of the recent upheaval of the land was the discovery of a piece of seaweed in a small fresh-water pond 300 yards from the beach and 75 feet above the level of the sea. From the summit of the cliffs to the first raised terrace is a broad and level plateau which, after the snow has disappeared, is covered with a rich and luxuriant vegetation, on which the numerous herds of reindeer, indigenous to the island, subsist. This plateau is peculiar to the west coast, where it is fringed by steep cliffs. We found during the month of June, and even during the greater part of July, the snow very deep, rendering walking excessively laborious. I don't know that matters were much improved by the thaw, for then the soil was made so soft and tenacious that it was quite as bad as walking through deep snow.

The snow lies on the ground in Novaya Zemlya to a much later date than it did at the *Alert's* winter quarters, and the fall of snow is more excessive, judging from my experience at both places.

Numerous traces of former inhabitants are everywhere to be found

in Novaya Zemlya, sometimes in the shape of ruined huts, and sometimes only in that of circlets of stones or old fireplaces and fox-traps.

The former owe their existence to Russian walrus-hunters and others engaged in the same pursuit, whilst the latter are the remains of old Samoyede encampments. These migratory tribes have frequently passed many years of their lives in the southern part of Novaya Zemlya in the neighbourhood of the Kostin Shar, but I have never heard of any wandering so far as to cross the Matyushin Shar. Cairns abound along the coast, one of these essentially Arctic landmarks adorning the summit of every prominent cape, headland, or mountain. I should be excessively sorry to command an expedition in search of men lost in Novaya Zemlya, if I had to examine every cairn I saw for tidings of the missing ones. These cairns are erected by the Russian and Norwegian fishermen in their idle moments.

We remained in Nameless Bay some days, during which time we succeeded in shooting a great many reindeer, and thus, with our birds, obtained a good supply of fresh meat.

Whilst working to the northward along the coast, we struck heavily on a rock, which cost us the loss of the lower part of our stem and several feet of the false keel. We succeeded in getting the ship off without much difficulty, and even before the watch below could make their appearance, who rushed on deck imagining the direst of evils had befallen us.

The coast of Novaya Zemlya, on either side, is one that requires caution on the part of those navigating along it, but with a careful and constant use of the lead little danger need be apprehended. Most of the rocks are awash, and may therefore be avoided by a good look-out being kept, even in foggy weather. The water shoals gradually towards the land, which, in thick weather, should not be approached too near.

On the 20th we sailed into the Matyushin Shar. We had no difficulty in making the entrance, the Russian charts being fairly accurate. Our English charts are on so small a scale as to be almost useless for the coast navigation.

In beating in, the northern shore should be avoided as much as possible as, off it, are a great many rocks and foul ground. In making the entrance from the southward, several conspicuous rocks may be seen jutting out from the south-west point of land. These may be approached without fear, as deep water surrounds them. Fresh water is easily obtainable on both sides of the channel from some of the numerous rivulets and watercourses that pour down from the mountains. Leaving a cairn, with a record for the Dutch expedition, as agreed between Captain de Bruyne and myself, on a prominent headland, we sailed up the strait on the 20th of June; but, alas! had only proceeded about 12 miles, when we were stopped by a barrier of fixed ice extending right across the channel. This was convincing proof that we were

too early in the season, but it was only what we expected, for the Matyushin Shar is rarely navigable before the end of July or beginning of August. The scenery in this wonderfully formed channel is very grand, more especially on a fine sunny night, when the rays of the sun at a low altitude just "bathe in deep joy" the summits of the surrounding hills. These lofty ranges raise their crests to the height of from 3000 to 4000 feet above the level of the sea. Between them undulating valleys recede into the interior, covered with such deep snow as to conceal all rocky projections, and make them resemble glaciers in their milk-white opacity, rather than stretches of country which very shortly would be covered with a rich and luxuriant Arctic flora. Occasionally deep ravines, black and sombre-looking chasms, would separate the hills, their dark black cliffs forming a striking contrast to the universal whiteness that everywhere else predominated.

Our progress being checked in the Matyushin Shar, we resolved upon proceeding northwards along the west coast, deferring our observations in the Kara Sea until a later period in the season. During the few days we remained in this strait, I observed, what I considered a very remarkable incident connected with the congelation of sea water. This was that "pancake ice," that is young ice, was actually making on the surface of the water when the temperature of the air was as high as 39°! The temperature of the surface water at the time was 31°. This was taking place at the mouth of a large valley, through which a great quantity of fresh water, running down the sides of the adjacent hills, was being discharged into the sea. This fresh water suddenly being precipitated on to the sea water at a lower temperature, may account for the phenomenon. A great many seals, the *Phoca barbata* and the *Pagomys foetidus*, lay basking on the ice in the channel, and afforded good sport to my companion.

The Norwegian sailors declare that the seals as they lie sleeping on the ice are carefully guarded and watched over by the Glaucus gulls, or burgomasters, as they are more frequently called; and that these birds act the parts of faithful sentinels, warning them on the approach of danger. On one occasion I was placed in a position to corroborate this assertion. My companion had left the ship, in one of our walrus boats, to shoot a seal which had been observed asleep on the ice. When he had approached to within about a hundred yards of his would-be prey, I saw a couple of these "burgomasters" soaring over the animal, occasionally swooping down close to its head, as if imparting some confidential communication. The Norwegian sailors on board at once drew my attention to the circumstance, at the same time saying that the birds were warning the seal of danger! The latter, however, took no notice except to lift its head and look for a moment in every direction but the right one. As the boat approached nearer, the birds alighted on the ice, and walking up to the seal, deliberately pecked it, as much as to

say, "It's quite time to be off," on which the seal again raised his head, sighted the danger, and suddenly diving into his blow-hole, disappeared, sadly to the discomfiture of my companion. I relate the fact as it occurred, though it was the only instance of the kind that came under my notice.

Bad weather and adverse winds detained us at the entrance of the Matyushin Shar until the 27th, when we again got under weigh, and sailed northwards along the west coast. This coast-line forms a succession of large indentations in the land, any one of which affords good and safe anchorage, protected from nearly all winds.

North of the 74th parallel of latitude, large glaciers may be seen at the head of nearly every bay, winding their long sinuous forms between the mountain ranges, and in many cases meeting round the base of a hill, where, after elbowing each other for a short distance, they would join and flow down towards the sea as one gigantic mass. The snow, as we proceeded northwards, instead of diminishing with the advancing season, appeared to increase, the entire country being completely covered with it.

On the 2nd of July we sighted the edge of the pack ice extending to the westward from the Pankratjeff Islands. From this date until the 18th we made various attempts to penetrate the pack and push northwards, but always without success. The land ice was still adhering, and therefore formed an effectual barrier between the mainland and the numerous islands that fringe this part of the coast. From the summits of several hills that were ascended, the pack could be seen stretching away in a northerly and westerly direction. Here, then, as in the Matyushin Shar, we were too early in the year!

Here also, for the first time, did we see icebergs, but they were wretchedly small and insignificant in comparison with the grand glacial productions that are found in Davis Strait and Baffin Bay. Those that we saw were not more than between 10 and 20 feet in height, and were hardly noteworthy except for their brilliant blue colour. From not having seen any of these bergs further south, we may naturally presume that either the land ice had not broken up sufficiently to allow the fragments to float away as they broke off from the glaciers, or else that a northerly current had at once carried them in that direction.

The pack itself, which retarded our progress, consisted of loose streams of light ice, in no place sufficiently packed to offer a real obstruction to any vessel provided with moderate steam power. Yet it must not be forgotten that it was exactly in this neighbourhood that the *Tegetthoff* was beset, never to be released. But I have already attempted to prove, and I hope not entirely without success, that the year in which that vessel was caught was an exceptionally bad one. We saw no flocs whatever, nor did the loose broken pieces of ice that we met, appear to be more than from three to five feet in thickness.



Under these circumstances, as sport was the main object of our cruise, it was deemed advisable, for the time, to relinquish the idea of pushing northwards, and to return again to the Matyushin Shar, which we hoped to find clear of ice, and then seek for walrus in the Kara Sea. The highest latitude reached by us on this occasion was  $76^{\circ} 18'$ . During our stay in the north we had several opportunities of visiting the different islands that lay off the coast, and amongst them Cross Island, so named by Willem Barents in 1594, from the fact of his having found two large crosses, made from driftwood, erected on the shore. The presence of those symbols of Christianity shows conclusively that the islands had been visited by white men, previous to their supposed discovery by the gallant Dutch navigator.

Cross Island possesses a melancholy interest as being the place where, seven years ago, Captain Tobiesen, an intrepid Norwegian walrus-hunter, and a most experienced and energetic ice navigator, ended his days. His vessel being beset in the ice, in the neighbourhood of Cross Island, in 1872 (the same year that proved so disastrous to the *Tegetthoff*), and there being no probability of her being released before the ensuing year, Tobiesen determined to stay by her in the hope of saving, if not his vessel, at any rate some of the stores and cargo. Accompanied only by his little son, and two seamen who volunteered to remain with him, he passed the winter in a small frame house, constructed from materials taken from his luckless vessel, and covered over with canvas. The remainder of his crew were received on board a Russian fishing vessel, and taken to the southward.

When the island was visited the following summer, only the two seamen were found alive, Tobiesen and his son having succumbed to that greatest enemy of Arctic travellers, scurvy! The former died on the 29th of April, the latter lingered till the 5th of July.

Captain Tobiesen, it will be remembered, made a most successful and adventurous voyage in 1864 round North-East Land (Spitzbergen). When we visited the scene of his winter quarters we found the little house standing in much the same condition as when its late occupants left it, whilst remains of the ill-fated ship and her cargo were strewn along the beach. The largest intact piece of the wreck was the bows, which was lying with the nose downwards, the stump of the bowsprit being buried in the snow. About 100 yards from the house were the graves of the father and son, marked by two little mounds of stones and a few small pieces of driftwood. Some eider ducks had built their nests under shelter of the stones, and on the boy's grave a little snow bunting had also constructed its nest; but alas, the nest it had built with so much care and trouble, in which to rear its young offspring, proved its own shroud, for the poor little thing was lying dead at the bottom, having in all probability been drowned by a sudden thaw! Captain Lyon noticed an exactly similar incident during his voyage of

1824. He, like us, remarked that the snow bunting has all the domestic virtues of our English redbreast, and Arctic voyagers consider it as the robin of those dreary wilds. A lady, on hearing the incident related, thus gave poetical expression to the feelings excited by it:—

“ Sweet bird! the breast of innocence  
Hath fadeless charms for thee!  
Although the spirit long has fled,  
And lifeless clay it be!

“ Thou darest not to dwell with death,  
Secure from harm or ill,  
For on an infant’s heart thy nest  
Is wrought with fearless skill.

“ And like our own familiar bird  
That seeks the human friend,  
Thou cheer’st the wandering seaman’s thoughts  
With home, his aim and end.”

It was a melancholy and dismal scene that we gazed upon. The two graves in the foreground, and the dreary, almost weird-looking house, with its ghostly white pall of bleached canvas, resembling a large tomb or sepulchre, immediately behind, whilst around, in all directions, lay the débris of the ill-fated schooner. Beyond, stretched the mainland of Novaya Zemlya fading away in the far distance in a succession of snow-capped ranges, separated from each other by large glaciers, only to be distinguished by their smooth and regular surfaces. It was indeed an Arctic scene in its dreariest and saddest sense.

These islands on the north-west coast of Novaya Zemlya are composed of a dark limestone or slate, interspersed with large masses of whity-greyish quartz or felspar. The limestone is highly fossiliferous, abounding with mussels, brachiopods, crinoids, and even trilobites and coral.

The positions of these islands are very incorrectly laid down on all the charts; not only are they out with regard to their geographical positions, but also with regard to their bearings one from another. Some of the islands are altogether ignored on the charts.

On the 21st of July we again entered the Matyushin Shar. A marvellous alteration had taken place in the appearance of the surrounding country since we sailed away four weeks before. Then the land was wrapped in an impervious mantle of snow, but this, during the month of July, had disappeared, revealing in its place long stretches of luxuriant green sward in which the *druba*, the *papaver*, the *potentilla*, saxifrage, and the pretty little forget-me-not, with many other members of the Arctic flora, clustered in rich profusion. The summers in Novaya Zemlya are brief, but the flowers make the most of their short term of existence!

During one of our excursions on the north side of the channel we picked up a bottle, well corked, containing a strip of paper on which a

few unimportant lines had been written by two men belonging to the steamer *Germania*, on August 9th, 1871. The *Germania* had been hired by the German naturalist Von Heuglin, who was engaged in scientific researches during the autumn of 1871, along the coast of *Novaya Zemlya*.

We were not destined to pass through the *Matyushin Shar* as easily as we anticipated. Sailing up with a fair wind, we passed the spot where a month previously our progress had been checked, and sailing onward with confidence, congratulated ourselves on the prospect of getting through; but a few miles further on we again came to an ice barrier, and one, apparently, of such a nature as to afford little hope of being cleared away until a much later period of the season. Anchoring the vessel, we walked along the shore in order to ascertain how far this ice barrier extended, when to our great delight we reached its eastern limit at eight miles distance. Knowing that a gale of wind would very soon disperse the ice, we resolved upon waiting, and in a week's time we were rewarded for our patience by seeing the ice clear away, and on the last day of July we had the satisfaction of sailing into the *Kara Sea*. The date quite agrees with what former navigators have said regarding the time that this channel is generally free of ice.

During our several detentions in the *Matyushin Shar*, extending over a period of about three weeks, we were able to determine, within a short distance, the point of junction of the two tides, namely, that of the *Barents Sea* and that of the *Kara Sea*. These two tides met at a point near *Cape Walrus*. East of that cape we found the tide flow to the westward, whilst the ebb ran to the east. West of *Cape Walrus* the reverse was the case, the flood tide being an easterly going one, and the ebb a westerly one. These observations were subsequently confirmed by those of Captain de Bruyne of the *Willem Barents*. Where the channel was very narrow, the tide flowed with great rapidity, on some occasions as much as  $1\frac{1}{2}$  and 2 knots an hour.

On the summits of some of the hills, on either side of the strait, and more especially on those at the heads of deep gullies or ravines, regular ice-caps or miniature glaciers are occasionally to be found. These ice-caps appear to me to be formed by the excessive snowfall during the year, which, never wholly melting, is in process of time converted by pressure and partial thaw into ice. One of these ice-caps bore a very decided resemblance to a glacier, and it was only after very careful and attentive observation that the land underneath it could be detected.

On one occasion I was able to observe a perfect section of one of these snow accumulations, which had the exact appearance of the rugged terminal edge of a discharging glacier. The face of this section appeared to be about 25 feet in height, but it was on the summit of a hill whose altitude was quite 1500 feet.

On reaching the *Kara Sea*, to our great disappointment we found it

to be full of heavy ice, impinging on the points to the north and to the south, and extending to the eastward as one heavy solid pack. Between the pack and the coast, a narrow channel of what might be termed land-water existed, and in this we worked our way to the southward with the intention, if possible, of reaching Yalmal Peninsula, which had the reputation of being a good place for walruses. The difficulties we had to contend with may be imagined when it is stated that we were occupied sixteen days in going a distance of 60 miles!

In addition to the natural difficulties, we also had to overcome the objections of our crew to pushing onwards, and I think the latter was by far the hardest, and certainly the most disagreeable work of the two. The ice obstructions were of such a nature that, after reaching Cape Hessen, we decided to return to the Matyushin Shar. It would have involved too great a loss of time if we had persevered in our intentions of reaching Yalmal Land.

The existence of this ice-pressure on the east coast of Novaya Zemlya is exactly what is to be expected when the Barents Sea is tolerably open to the northward, for the same reason that the east coast of Spitzbergen is usually encumbered with ice. This year nearly all the straits leading into the Kara Sea were closed, so as to prevent steamers from reaching the mouth of the Yenisei. Captain Arendsen, in the schooner *Nordland*, did succeed in passing through the Pet (Jugor) Strait in the middle of August with great difficulty, yet when he got into the Kara Sea he found open water, in which he sailed up to the latitude of Ice Haven, but some 30 miles from the land. The ice was blown against the eastern coasts, and pressed up as we found it, and the open seas were navigable away from land, and along western coasts. This is an ordinary year.

The ice in the Kara Sea was excessively heavy, infinitely more so than the ice usually met with in Baffin Bay. It has been asserted that it is impossible for ice to be of the thickness we found it to be in what we called the Palæocrystic Sea, although we met with sections of floes exhibiting perfect striations, thereby indicating their regular growth. Such ice could not possibly have been formed by one floe pressing over another, and so on, until it reached the thickness reported by us. This theory of formation may account for a chaotic mass of broken-up ice, but it cannot be applicable to floes of any dimensions. In the Kara Sea I was able to measure a perfect section of a floe above the surface of the water, by which I obtained, according to the regular calculation of the flotation of ice, the result that the floe was 31 feet in thickness, and this floe, I may mention, was over four miles in diameter! Near the *Alert's* winter quarters there was a floe extending in an easterly direction for seven miles, on which Commander Beaumont, and other officers, travelled when they crossed over to Greenland. This floe must have been at the very least 40 feet in thickness, and was considered as

very thin ice indeed when compared to the heavy ice met with by the northern sledge party.

During the time we spent in the Kara Sea, I was able to verify the positions of the different bays along the coast as determined by the Russian lieutenant Pachtussoff, and I was very much surprised at the extreme accuracy of his observations and the correct delineation of his coast-line, considering the circumstances under which his survey was undertaken.

The conformation of the land on the east coast of Novaya Zemlya is vastly different to what it is on the opposite side. On the east side, low undulating plains take the place of the noble hills, and deep valleys and ravines, for which the west coast is so conspicuous. Both coasts possess innumerable bays and harbours in which vessels may obtain refuge either from bad weather or the closing in of the pack. A very peculiar and noticeable feature of the east coast is, that where the land terminates in a cape or promontory it is invariably steep and precipitous, although perhaps not more than 50 or 100 feet high; and where this is the case, there is always a large rock or islet some little distance off the point. These rocks, in consequence of their isolation, are very favourite breeding places for the gulls and guillemots, as they are perfectly inaccessible to foxes.

Some of the cliffs just referred to present a most distorted appearance, the stratifications being at all angles from the vertical to the horizontal. The action of the frost and weather, and more particularly the snow with its annual thaw, causes large portions of these cliffs of disintegrated limestone to wear away, and the fragments, being disconnected from the parent body, form the rocks and islets just alluded to.

During the time we were in the Kara Sea we enjoyed the most delightful weather, which enabled us to take long walks into the interior and along the coast, when the ice prevented any movement on the part of the ship.

On the 18th of August we re-entered the Matyushin Shar, where, to our surprise, we met the Dutch exploring schooner *Willem Barents*, and renewed our acquaintance with the officers. As she had left Europe more than a month after our own departure from England, we had the great pleasure of receiving home news. She had from the early part of July been employed in sounding, dredging and taking serial temperatures on different meridians in the Barents Sea, and had made most valuable and important observations regarding the physical geography of the part explored.

On the 6th of July she met the pack, consisting of extremely heavy ice, in lat.  $75^{\circ} 36'$  on the 26th meridian; and on the 20th of the same month, on the 41st meridian, drift ice was fallen in with in lat.  $76^{\circ} 30'$ .

Captain de Bruyne's intention was to proceed north in order to place two memorial stones, one on Cape Nassau, the other in Ice Haven, com-

memorating the discovery of those places by the intrepid navigator after whom their ship was named. With this view he had hoped to have been able to sail along the east coast of Novaya Zemlya, but on observing the state of the Kara Sea he had very wisely abandoned this idea, resolving to pursue his course northwards along the west coast.

Having agreed, if possible, to meet at Cape Nassau or at Ice Haven, and having arranged about depositing records, and building cairns in various localities to the north, the two vessels separated on the 22nd, each pursuing her own individual course to the northward.

And here I cannot refrain from mentioning the great kindness and consideration we received at the hands of Captain de Bruyne and the officers of the *Willem Barents*. Their programme was even slightly altered in order to suit our convenience; and our wants, and I fear they were many, were at once administered to. It is not too much to say that the stores of the vessel were almost placed at our disposal to take anything that we needed. I shall always look back with great pleasure to the time when the Dutch and English flags flew side by side for the first time in the Matyushin Shar, and to the kind reception we experienced from the gallant Dutch off the sterile shores of Novaya Zemlya.

On the 25th of August we ran in and anchored in South Solmenjeff Bay in order to await a favourable change in the weather. Near our anchorage was a large glacier entirely surrounding a range of hills. In fact, the glacier itself appeared to be split in two by the hills which seemed to grow out from the very centre. The range extended for about five miles, and was completely surrounded by the ice. During our stay I was able to visit and make a closer inspection of this glacier. Accompanied by one of the crew, I first walked along the beach until within a few hundred yards of its terminal face, the rugged edge of which rose perpendicularly out of the sea to a height of about 35 feet. At its base, and therefore in the water, lay scattered about a few fragments of ice that had been recently broken off, and which had not had time to be carried away by wind or tide. Crossing the lateral moraine, consisting of large heaps of mud and stones pressed and squeezed into all sorts of grotesque shapes, we ascended the side of the glacier, and reaching the top walked some two or three miles on it towards the interior.

For about a mile from the face of the glacier the surface was an irregular and chaotic mass of ice, apparently thrown together and tumbled about in the strangest confusion. I can compare it to nothing better than a boisterous turbulent sea instantaneously converted into ice. Deep crevasses, treacherously bridged over with snow, necessitated great caution on our parts as we walked along. As we advanced, the surface of the glacier assumed a smoother and more undulating character, and the walking was proportionately improved. In some places the ice was so smooth and slippery that we found great difficulty in keeping a

perpendicular position, and much easier to make progress, however undignified it might have appeared, on "all fours"! There is nothing so deceptive to the eye as the appearance of the surface of a glacier. At a short distance it looks so smooth, and in some places so level that travelling over it appears easy enough. But on a closer approach the level plains are found to be intersected by broad rivulets running down towards the sea, which by constant friction have so worn away the ice that their beds are in reality chasms of many feet in depth—the smooth ice is too slippery to walk over, and progress is altogether very difficult. Some of the cracks or fissures were not many feet wide, and these we easily jumped over, the broader ones necessitating in some instances a long detour. The murmuring of the running water, and the low moaning of the wind, which had found its way to the bottom of these crevasses, some 80 or 100 feet immediately underneath us, had a very weird effect, enhanced, on gazing down into the fissures, by seeing the beautiful icicles of all sizes that fringed the sides. Having walked about three miles, we reached an estimated height of 800 feet above the level of the sea, and this was, I think, nearly the extreme altitude of the glacier. From this position we could see it extending into the interior, winding in long opaque sinuosities between the hills until lost to sight in the distance.

I observed here the same peculiarity which we noticed on the floes, on a sunny day, whilst sledging in 1876, namely, the bright iridescent colours caused by the sun's rays reflected on the surface crystals, although the colouring on the glacier was not near so brilliant and so beautiful as that on the floes. I also observed, in several places, little heaps of black earth, which had apparently been squeezed up by the enormous pressure exerted by this frozen river, as it gradually flowed onwards towards the sea. From observations made in this bay, I came to the conclusion that the proximity of discharging glaciers was inimical to the presence of organic life at the bottom. I arrived at this opinion from the examination of the stomachs of some seals shot in the bay, and also from the poor results of my dredgings.

The following morning we weighed, and with a fair fresh breeze made rapid progress to the northward. The next morning Admiralty Peninsula was passed, and sailing on between Berg Island and the mainland we reached the northern extreme of the western Pankratjeff Island, where, as agreed with Captain de Bruyne, a cairn was erected, and a record deposited detailing our movements so far, and proclaiming our further intentions.

There appeared to be little alteration in the aspect of the country since our visit some weeks before, except perhaps there was less snow, for although there was little, if any, lying in the valleys, the summits of the hills still preserved their white covering. No ice was to be seen in any direction.

Whilst employed constructing the cairn we sighted the *Willem Barents* to the north-west, but at too great a distance to afford us the opportunity of communicating.

The next morning we rounded Cape Nassau, but whilst attempting to get into Russia Bay, a furious gale from the south-east sprang up, compelling us to lay-to under very reduced canvas.

On the 30th of August we succeeded in finding shelter under the lee of the Barents Islands, and the next day, the wind having moderated, we landed in order to examine the depôt of provisions established on one of these islands by the Austro-Hungarian Expedition in 1872. Although we made a very careful and diligent search for the "*cache*," it was quite unsuccessful; no signs, or any indications whatever, could we find of the depôt.

A westerly gale necessitated a speedy departure, and after a couple of hours' rapid run we found good anchorage in Russia Bay.

During our stay in this harbour it blew so furiously from the south-west that for three days it was quite impossible to leave the ship in order to explore the coast. On the 1st of September it blew with great violence, accompanied by a heavy snowstorm. Such was the fury of the gale that we dared hardly venture on deck. Although anchored within 200 yards of the shore, the land was invisible during the whole day, and everything on our upper deck was completely buried under the snow. The barometer during these gales was unusually low.

Taking advantage of a moderately fine day, we again got under weigh on the 5th of September, and shaped our course northwards. The scenery of this part of Novaya Zemlya is very grand, and is made all the more so from the number of large glaciers that extend along the coast. The hills appear to be from 1000 to 2000 feet in height.

During the day we passed through several light streams of fresh-water ice, the fragments and débris that are constantly falling from the faces of the glaciers. At first these streams were mistaken for the out-lying portions of the pack; but, on approaching, the nature of the ice was unmistakable. Fresh-water ice is always much more transparent, and, when not of a blue colour, is darker than salt-water ice, sometimes almost black. Salt-water ice is rarely if ever seen without a covering of snow, except in a very advanced state of decay. At a distance an accumulation of this glacier ice will not unfrequently be mistaken as an indication of the proximity of the pack, and it is only by a close inspection that the real character of it will be detected.

On the 6th of September we passed Ice Cape, and at noon the same day landed and constructed a cairn on one of the Orange Islands, leaving a record for the Dutch. We thus had the honour of carrying the British flag, for the first time, to the northward of Novaya Zemlya.

The Orange Islands are two in number, besides numerous rocks. They are not more than half a mile in length each, by a few hundred



yards in breadth, and about 100 feet above the level of the sea. The sides are nearly precipitous, but the summits are flat. They are of limestone formation, and, unlike the Barents and other islands on the north-west coast, the limestone is unfossiliferous.

As there was every chance of our being able to reach Ice Haven, a course was steered, very much against the inclination of our crew, for that interesting spot. The next morning, however, meeting with a few loose streams of ice, the men positively refused to proceed in the required direction. Ice Haven had to be given up, and a course was shaped to the north-west in order that we might examine the edge of the pack from east to west. The reason that our crew exhibited so much timidity, or perhaps I had better call it by the milder term of prudence, was that they were afraid of the Kara Sea ice closing in upon the north-east point of the island, and thus cutting off our retreat. I am of opinion, however, that the Kara Sea pack was well to the southward, and that a vessel would have had little or no difficulty in reaching a high latitude to the north-east.

The furthest point reached by us was off the old Vlissinger Hooft of the Dutch, within about 30 miles of Barents' winter quarters. There was no ice, so far as we could see, along the coast from Cape Mauritius southwards, and only a few loose streams to the eastward about 10 miles off the land.

The aspect of the country south of Cape Mauritius is very similar to that on the east coast south of the Matyushin Shar—a low, undulating, and uninteresting-looking land. The noble hills and stately glaciers of the west coast cease at Ice Cape. I was told that glaciers exist south of Ice Haven, but was not in a position to verify the statement.

About 25 miles north-west of the Orange Islands we passed through some loose streams of ice, in some instances closely packed, compelling us to alter course in order to get round the projecting points. As we went to the westward the ice appeared to get lighter, until on the evening of the 7th we lost it altogether.

On the afternoon of the 8th we again sighted the *Willem Barents* standing to the south-west, we, at the time, steering a north-west course. It was blowing too hard to effect communication. Had we done so, we should have heard the pleasing news that she had reached Franz-Josef Land the previous day.

Having accomplished their original intention of placing the memorial stone on Cape Nassau on the 29th of August, the Dutch explorers attempted to reach the Pankratjeff Islands in order to leave a record, as agreed between Captain de Bruyne and myself; but a furious gale of wind (the same we experienced a little further north) prevented this design from being carried out. They then steered north, with the intention of examining the edge of the pack between the 50th and 60th meridians of longitude. In latitude 78°

they met a few loose streams of ice, but to the eastward there was plenty of open water. To the west, as we found to our cost, was pack ice. After proceeding a few miles, they lost sight of the ice altogether, and saw only a few icebergs. On the 7th of September, at 6 P.M., they sighted Franz-Josef Land, extending from N.E.  $\frac{1}{2}$  E. to N.W.  $\frac{1}{2}$  N. The ice was still round M'Clintock Island, and they were only able to approach within about 16 miles from the ice that surrounded it. The weather being threatening, and knowing that there was a good deal of ice to the northward of Novaya Zemlya, it was deemed advisable to return at once, so that no opportunity offered for landing and exploring this interesting country.

On the same evening that we saw the *Willem Barents*, having reached the latitude of  $78^{\circ} 8'$ , a strong northerly gale came on, which obliged us to lay-to for nearly twenty-four hours, during which time we were blown and drifted a long way to the southward. The heavy sea that accompanied this gale was a very sure proof that the pack was a long way off.

A fair wind on the 11th enabled us to regain a little of our lost ground, and on the afternoon of the following day, being in the 47th meridian of longitude, we sighted ice in latitude  $78^{\circ}$ .

Fragments of fresh-water ice were first observed, to some of which the *soil was still adhering*. This, to me, appeared a sure sign that the land could not be far distant, whilst their irregular and angular-shaped sides was another convincing proof. When small pieces of ice have been subjected for any length of time to the action of the sea, they become water-worn and lose their irregularity of outline.

This belief on my part of the proximity of land was further strengthened by the increased number of birds of various sorts that flew around us. Kittiwakes innumerable and Fulmar petrels soared over our heads, whilst ivory gulls, dovebies, rotges, guillemots, skuas, and the Glaucus gull hovered around us. The guillemots were flying in small flocks of from six to twelve in each, which, in itself, was a sure indication that we were in the neighbourhood of loomerics; whilst the presence of the smaller birds, some of which are rarely seen any distance out at sea, was in itself a sign of the proximity of some land.

Determined to remove all doubts, a course due north was shaped. But as we proceeded, the streams of ice became more numerous, and we began to experience a little trouble in threading our way through. To add to our difficulties, the weather, which in the morning had been fine and clear, grew thick and threatening, and before noon we were enveloped in a dense fog. This was most aggravating, for we almost believed, if it had been a clear day, we should have been able to sight the land. However, we still persisted in a northerly course until 3 P.M., when the ice getting gradually more closely packed, and no appearance of the fog clearing, we very reluctantly came to the conclusion that it would be

imprudent to persevere any longer in such thick weather, and the ship's head was turned to the southward. We had then sailed about 25 miles into the ice, that is to say, that for five-and-twenty miles we had sailed in a northerly direction through loose streams of ice. Our highest latitude, by account, was  $78^{\circ} 24'$ . This position was six miles further north than that attained by the Dutch expedition last year, but fell short, by 14 miles, of the latitude reached by Weyprecht and Payer in 1871.

Although the ice was getting more packed as we advanced, I am of opinion that a steamer would have experienced no difficulty in getting through, for a ship provided with steam power is able to push on when it would be extremely rash for a sailing vessel to attempt to do so. The chances of a calm, of a change of wind, or the ice closing in astern must never, in the latter case, be lost sight of, more especially at such a late season of the year as the middle of September. We saw no floes of any kind, or indeed any piece of ice which, by the most imaginative person, could be magnified into a floe!

The ice appeared to be of two descriptions mixed up indiscriminately with each other; a few heavy pieces of from 8 to 12 feet in thickness, the remainder of a much lighter character, apparently only of one season's formation. According to the chart, the position we reached was about 80 geographical miles from the land sighted by Payer, but as that explorer only saw this land from the eastward, I am inclined to think that it extends in a south-west direction, and that we were therefore much nearer land than we were aware of.

This virtually ended our cruise in the little *Isbjorn*. The season was already advanced, the nights were getting dark and long, and with an unwilling crew it was hopeless expecting to do more. Had we known of the success of the Dutch we should, undoubtedly, have made another attempt to push north further to the eastward, but we naturally thought that the ice we met extended pretty nearly in the same latitude to the east and to the west. The cruise of the *Willem Barents*, however, is quite sufficient to prove the accessibility of Franz-Josef Land, except in extraordinary years like 1872. I am, most decidedly, of the same opinion as Payer, that the latitude of  $78^{\circ}$  can, in all probability, be reached every year, provided a vessel remains out late enough in the season. I also agree with him that the ice in the Barents Sea is at its minimum during the month of September; therefore, in spite of long nights, that should be the month selected for a dash northwards. But with a sailing ship it would be highly injudicious to carry on the work of exploration in the ice, beyond the 15th of that month. During our last days in high latitudes, the temperature was never above freezing point at any time for eight days, our rigging was coated with frost rime, and our ropes were frozen hard. Although the cruise of the *Isbjorn* was undertaken with sport as the main object, still the result of the voyage forms a link

in a very important chain of evidence which goes conclusively to prove that Franz-Josef Land is not so difficult of approach as has heretofore been considered, and the thanks of all geographers are due to our Associate, Sir Henry Gore-Booth, for having forged that link. As it is not probable that the British Government will, for some time at any rate, interest itself in the glorious work of Arctic exploration, it remains only for private individuals, men like Allen Young, Leigh Smith, and Gore-Booth to follow the good example set them by that munificent gentleman, Mr. Oscar Dickson of Gottenburg, who, by the late brilliant geographical success achieved by Nordenskiöld, has reaped the reward of patient perseverance.

It is only by perseverance that success can be commanded in the Arctic Seas. I would now propose that a vessel, and one is quite sufficient, should be sent out to Franz-Josef Land, prepared to winter. Should the season be unfavourable, and the vessel be unable to reach her destination, the commander ought to be instructed to return to England, and be sent out the following year. But from a comparison of all the voyages which I have enumerated in this paper, I am inclined to think that a steamer would have no difficulty in reaching the south coast of Franz-Josef Land during the last week in August, or during the first two weeks in September. It is not for me to say what success will be achieved if a vessel is once able to establish herself in winter quarters on the west coast of Zichy Land. Suffice it to say, that a very large tract of hitherto quite unknown land would be explored, and a great deal of useful and important scientific information obtained. I sincerely trust that the brilliant successes achieved this year by the Swedes and the Dutch, will inspire English gentlemen and those interested in Arctic exploration to uphold the honour of our flag in those regions where it has hitherto always been displayed in the van.

In addition to our natural history collection, a great many soundings were obtained in the Kara and Barents Seas, serial temperatures were taken, and dredgings collected.

On the termination of the paper the following discussion took place:—

The PRESIDENT said the Council had hoped to have had the pleasure of seeing present at the meeting Captain De Bruyne, who commanded the *Willem Barents*, but he had unfortunately not been able to attend. The Netherlands Minister, Count Bylandt, however, had again done them the honour of attending, thereby showing the interest he took in the proceedings of the Society, and his desire to make more evident the cordiality that existed between the explorers of the two nations. Englishmen claimed for themselves the credit of being the discoverers of Novaya Zemlya, through Sir Hugh Willoughby, more than three hundred years ago. Since that time English, Dutch, Swedes, and Russians, had engaged in friendly rivalry in those seas, and he was sure the Meeting would listen with interest to any observations which Count Bylandt might make.

COUNT BYLANDT said, in addressing a few words to the Meeting on the subject of the paper, he was sorry to have to begin by announcing the sad intelligence that

reached him a few days ago of the untimely death of one of his countrymen, Lieutenant Koolemans Beynen, whose name as connected with Arctic exploration was not unknown to the Society. He was quite sure that all who had known him, and especially Sir Allen Young, would agree that he was a most promising young officer, full of pluck and spirit, always putting his whole heart and soul into the work before him. The best way in which his country could show honour to his memory would be by continuing his work; and after listening to the paper which had just been read, he thought it might be fairly expected that such would be the case. No doubt the Society would be interested in hearing what was the real impulse which had revived the spirit of Arctic exploration among his countrymen, after that spirit had slumbered for nearly three centuries. They would be pleased to hear that England was connected with it. After his arrival in England in 1871, he happened to hear that an English gentleman, Mr. Lister Kay, had just returned from a yachting trip to Norway, where he had met the Norwegian Captain Carlsen, who had returned from a cruise round Novaya Zemlya, where he had found the hut in which Barents and his crew passed the winter of 1596-7, and many interesting relics belonging to those gallant navigators. Mr. Lister Kay decided at any price to buy the whole collection, expecting that it would be repurchased from him for one of the English museums. In this, however, he was disappointed, so that the collection remained on his hands. As soon as he (Count Bylandt) heard of it, he wrote to his Government on the subject, and received instructions to enter into negotiations with Mr. Kay in order to secure the collection. He therefore called upon that gentleman in Dorsetshire, and saw the relics, which consisted of an old Dutch clock, the bell of the ship, candlesticks, spoons, knives, forks, a map, and two or three books, which were in a remarkable state of preservation, notwithstanding they had been buried under the snow for 275 years. Mr. Lister Kay, in the most gentlemanlike manner, said that if the collection could not remain in England, Holland had the next claim to it, and not wishing to make any profit out of it, he was quite ready to sell it to the Dutch Government for the same price he paid for it. The purchase was made, and the whole collection was now to be seen in one of the museums in the Hague. Another English gentleman, Mr. C. Gardiner, owner of the *Glowworm*, also made a trip round Novaya Zemlya, and found other relics, which he most generously presented to the Netherlands Government, so that now the collection was complete. Unfortunately, according to the existing regulations in this country, it was not possible to confer upon Mr. Gardiner the knighthood of the Order of the Netherlands Lion, but it was decided to have struck for him a solid gold medal of large size, which he (Count Bylandt) had the honour and pleasure of presenting to him. The medal was the more valuable, because only two copies of it existed in the world, namely, one in the possession of Mr. C. Gardiner, and the other in the Numismatic Collection of the Netherlands Government. These two circumstances, and the publication of a book by an American gentleman of Dutch origin, Mr. Van Campen, whose name was not entirely unknown to the Society, were the cause of the revival of the spirit of Arctic enterprise in the Netherlands. Lieutenant Koolemans Beynen requested the favour of joining Sir Allen Young in the *Pandora*, and when he returned from that expedition he could not rest until he had induced his countrymen to send out the *Willem Barents* on a national expedition. He wished to mention also that the British Government had kindly lent to that expedition some instruments which had been used on board of the *Challenger*. This fact was a new proof of the friendly assistance and co-operation which the British Government manifested to the Netherlands Government on every occasion when it could possibly be granted. Lieutenant Koolemans Beynen was very sorry he could not take part in the expedition of the *Discovery* and the *Alert*, under Captain Sir George Nares.

The PRESIDENT said there were some distinguished naval officers present who had taken part in Arctic explorations, but before they expressed their opinions as to the results of the two cruises which had been described in the paper, he was sure the Meeting would like to hear a few words from Sir Henry Gore-Booth, who was the promoter of the voyage in which Captain Markham had taken part. Captain Markham had not stated the circumstances under which he joined in the cruise, but it appeared that Sir Henry Gore-Booth was on the point of starting when his intended companion failed him. Lady Gore-Booth very properly refused to allow him to go alone, and he therefore came to London in hopes of finding some one who would share in the trip. Naturally enough he went to see their Honorary Secretary, Mr. Clements Markham, to ask him if he knew of anyone who would join him. Mr. Clements Markham happened not to be at home, but Sir Henry Gore-Booth heard that his cousin, Captain Markham, was in the house. He told him of the difficulty under which he laboured, and Captain Markham said he would endeavour to find him a companion, but if he failed to do so he would go himself. The upshot was that at a very few days' notice he started on the trip. This gave an additional interest to the paper, and the spirit shown by Captain Markham proved that British sailors were ready under any circumstances to go on any voyage of adventure that was presented to them.

Sir HENRY GORE-BOOTH said he feared that as a sporting trip the voyage was a failure, but if it had assisted in any way towards furthering the objects of the Society, he was fully rewarded for the expense and trouble to which he had been put. Captain Markham had given such a good account of the state of the ice, and of the theories in which they were agreed, that nothing remained for him to do but to state that he quite concurred with everything that had been stated in the paper. He was extremely lucky in securing the companionship of Captain Markham. On a Saturday, at four o'clock, he found that he had no one to accompany him on the trip, but by Sunday morning Captain Markham had given him his answer that he would go with him, provided he could obtain leave from the Admiralty. Fortunately the leave was not refused, and if he had to take another trip he would rather have Captain Markham as his companion than anyone else he knew. A more cheery companion there could not be, or a more energetic collector of specimens of all descriptions—nothing came amiss to his net. He could not allow the present occasion to pass without expressing his thanks to Captain De Bruyne and the officers of the *Willem Barents* for the kindness they showed in the Matotschkin Shar, where the stores of that ship were placed entirely at the command of himself and Captain Markham. He wished to conclude by heartily congratulating the officers of the *Willem Barents* on their success, and he hoped they would next year again visit the Arctic regions and be equally successful.

Admiral Sir LEOPOLD M'CLINTOCK said it afforded him very great pleasure to have this opportunity of expressing the extreme gratification he felt at this addition to Arctic geography. Of course all geographers were delighted at any increase to their knowledge, but more particularly were Arctic geographers pleased with any fresh discoveries in the Polar regions. By merely listening to a paper on the subject, it was scarcely possible to realise the difficulties that had been overcome, more especially when they were accustomed to hear of our own large expeditions fitted out with every possible appliance. If it were borne in mind that Sir Henry Gore-Booth's vessel was only 50 feet long and 17 feet wide, without steam, and that such a little vessel was absolutely helpless whenever there was more than a film of ice on the water, it would be more readily understood how greatly they were indebted to Sir Henry Gore-Booth and Captain Markham for their exertions. Gentlemen who went out in this way and spent time, energy, and means to accomplish such ends,

conferred a great obligation on the geographical world, and it was the duty of the Royal Geographical Society to support in every way such patriotic achievements. Allusion had repeatedly been made in the paper to the Dutch Expedition. He understood that that expedition was a semi-official one, and had been very carefully considered. The object was to make a patient, systematic, and scientific examination of certain portions of the unknown Polar area, in order to ascertain the temperature of the sea, its depths, the movements of the Arctic waters and ice, and some information as to Arctic meteorology. Nothing could assist the advance of Polar geographical knowledge more than this patient and systematic examination of its seabed, and all English geographers would rejoice at the success which, notwithstanding their very limited means, had attended the Dutch Expedition. They would also sympathise in the loss of Lieutenant Beynen. Many who were now present would remember seeing him in that hall on the return of the *Pandora*. He was a most promising officer, and was trained in Arctic service under Sir Allen Young, who was a most skilful, accomplished, and successful Arctic explorer. Great expectations had been formed of his future, and English geographers would feel that they also had suffered a severe loss, and enter most heartily into the feelings of the Dutch naval officers and the Dutch people.

Sir GEORGE NARES said it struck him that the yachting cruise which Sir Henry Gore-Booth and Captain Markham had undertaken, would be most useful in adding to our knowledge of those seas, in which lies the proposed commercial route to the Obi and Yenisei. Following up the track of Captain Wiggins in 1874, and Professor Nordenskiöld in 1876, an attempt had been made during the present year by half-a-dozen steamers from England to get into the Kara Sea, but it had not met with success. There could be no doubt that a large commerce might be opened up with that sea, but the present year had been a bad one. A Russian steamer, the *Louise*, he believed had got through, and had returned from the Yenisei with a cargo. On the 21st of September, Captain Markham had told them that the ice in the Kara Sea was 30 feet thick, and it was a totally different ice from that which whalers passed in Baffin Bay. Therefore the merchants who tried to penetrate through the Kara Sea must not send out little steamers which were only adapted for reaching St. Petersburg and the Baltic, though the idea in the early spring of this year was that such steamers might make the voyage. No doubt the merchants who had suffered pecuniary loss this year would profit by the lesson, and the Kara Sea would be ultimately opened up to commerce. In the other voyage that had been spoken of, that of the *Willem Barents*, Captain De Bruyne had evidently been most fortunate, for the Austrian vessel, the *Tegetthoff*, was simply drifted to Franz-Josef Land. The present year, however, had been very favourable in that direction, though unfavourable as regards the Kara Sea. It all depended upon the wind. If the little *Willem Barents*, a sailing ship, could get very near Franz-Josef Land, a steamer could in all probability reach that land. The great advantage of Franz-Josef Land was that the investigation of the coast would not only afford information about the Polar Sea, but might point out the best route to the Pole. He was not one of those who wanted merely to get to the Pole. The whole Polar area should be scientifically explored. Captain Markham stated that the great desiderata in Arctic exploration were perseverance and caution. There must be caution. A steamer in making for Franz-Josef Land left the land behind it, and must necessarily pass through a pack as broad as that which cut off the whalers in Baffin Bay from the north-water. If they could once catch the land again they might go on. He (Sir G. Nares) would like to obtain more knowledge about the north-east end of Spitzbergen. It was known that Franz-Josef Land extended considerably in that

direction, and perhaps they could get nearer to Franz-Josef Land from the north-east coast of Spitzbergen than from Novaya Zemlya.

Admiral R. VESSEY HAMILTON had listened to the paper with great pleasure. Admiration had often been expressed with regard to the wonderful work done by the old Arctic navigators three hundred years ago in very small vessels, and well it deserved to be so spoken of; but there was not such a great contrast between life on board those vessels and life at home as there would be now. Gentlemen at home at ease did not live so pleasantly then as now, and when they went abroad their style of living was not much altered. Sir H. Gore-Booth and Captain Markham had made their voyage in quite as small a vessel as the old navigators used, yet they had achieved good results. Few men would like to be cooped up with another person and a dog in a cabin 5 feet 9 inches by 5 feet 6 inches for several months. It appeared to him they had made one mistake. Although they had a plentiful supply of warm clothes, they had taken with them also very wet blankets in the shape of the harpooners, whose sole function appeared to be to inspire the crew with too much prudence. Prudence required to be allied to dash in Arctic navigation, and in any future explorations of this sort he hoped there would be more icemen who would follow the example of Leigh Smith and others. If experienced icemen could not be obtained to enter heart and soul into the feelings of the commander, they had better be left behind, and confidence placed in the energy of an English crew. Of course he did not know but that some excuse might be made for the poor Norwegians who were under two Englishmen into whose feelings they could not enter; but if such men as Captain Adams, Captain David Gray, and Captain Wiggins of Sunderland could be obtained, who would enter heart and soul into the work, great success would be attained.

Captain FEILDEN congratulated the author of the paper and Sir H. Gore-Booth on bringing to a successful conclusion what must be regarded as a somewhat hazardous expedition. Captain Markham had described in very modest terms the surroundings of their little craft when it reached its most northern point, but of course many now present knew what crossing the 78th parallel in the middle of September meant. The author had said that the nights were then getting long and dark. Undoubtedly that was so, for just four weeks later, about October 15th, the sun would disappear below the horizon altogether in that latitude. Captain Markham also mentioned that for eight days the temperature was never above freezing point, that the decks were covered with snow, and the ropes frozen hard. It was therefore something more than a mere yachting cruise, and he was not surprised that the Norwegian crew showed themselves to be "prudent" men, and Sir H. Gore-Booth and Captain Markham in his estimation would have shown themselves very imprudent men if they had remained in that high latitude any longer in such a vessel. However it was a proof, as Admiral Hamilton had said, that British yachtsmen of the present day had in no way deteriorated from their forefathers who first pushed their vessels into those tempestuous, ice-encumbered seas. It was a matter of congratulation to those who in that half twelve months ago advocated the route by Franz-Josef Land, to find that by the voyages of the *Willem Barents* and the *Isbjorn* their predictions had been verified to the letter, so that there now seemed every prospect of a route towards the Pole being found by Franz-Josef Land. In latitude 83° Payer saw a precipitous mountainous land stretching away to the north, while at the same latitude in Grinnell Land it came to an abrupt end. He had very little to say in regard to the natural history collections beyond that when Captain Markham returned he assisted him in distributing them amongst various specialists, who would describe them in due course. With the means at his



disposal Captain Markham could not make a very large collection, but it was a general and extremely interesting one, and the method of distribution he had adopted with regard to it would ensure its being made available in the cause of science.

Mr. ETHERIDGE said, on his return Captain Markham had requested him to examine his geological collection, knowing that he had done the same with the collection brought home by Sir George Nares. Specimens had been brought home by Captain Markham from thirteen or fourteen localities in Novaya Zemlya. Three of those were extremely rich in carboniferous fossils, and curiously enough they agreed almost species by species with those obtained by Sir George Nares and Captain Feilden, at Cape Joseph Henry in latitude  $82^{\circ} 45'$ . The value of such specimens was greatly enhanced when they could thus be correlated with others from different regions. The result was that it might now be safely affirmed that the greater portion of the Polar region was composed of carboniferous rocks, and that the greater part of the Polar Sea north of Franz-Josef Land and Spitzbergen probably covered a large area of coal measures. The connection of Spitzbergen with the great range of the Ural Mountains could now be shown, and the beds found there could be correlated with the beds in Baffin Bay and Grinnell Land, so that a distinct belt of carboniferous and Devonian rocks circled much of the Polar region. It was in consequence of these expeditions and the collections brought back by them, that we were enabled now to draw up general geological maps of the world. The eastern extremity of the carboniferous rocks in the Polar area could now be mapped out with as much certainty as the Pennine chain or any part of the centre of England. This was the real and ultimate philosophy of all geological explorations—to be able to put one's finger on certain points on the globe, and say "This or that is composed of such and such a group of rocks." It was in this way that the great maps of Marcou, Sir Roderick Murchison, Dumont, and other eminent geologists, were made, not only by personal examination of the places, but by examining collections that had been brought home by explorers. It was interesting to know that from Berg Island Captain Markham brought home thirty species of carboniferous fossils, every one of which could be matched in the Pennine chain in Derbyshire and Yorkshire, and the same might be said of the collections of Von Keyserling in Petchora Land in Northern Russia. From Barents Island we have, I think, fourteen or fifteen species, and we now know that the northern extremity of Novaya Zemlya is composed entirely of carboniferous rocks, which dip beneath the sea under Franz-Josef Land towards the Pole. He wondered how Captain Markham had been able to obtain the specimens, for those from the other ten localities were made up of metamorphic rocks, gneiss, clay-slate, &c., which were inorganic. The identification of these fossils, however, was so complete and certain that the history of these northern rocks now began to be perfectly well known.

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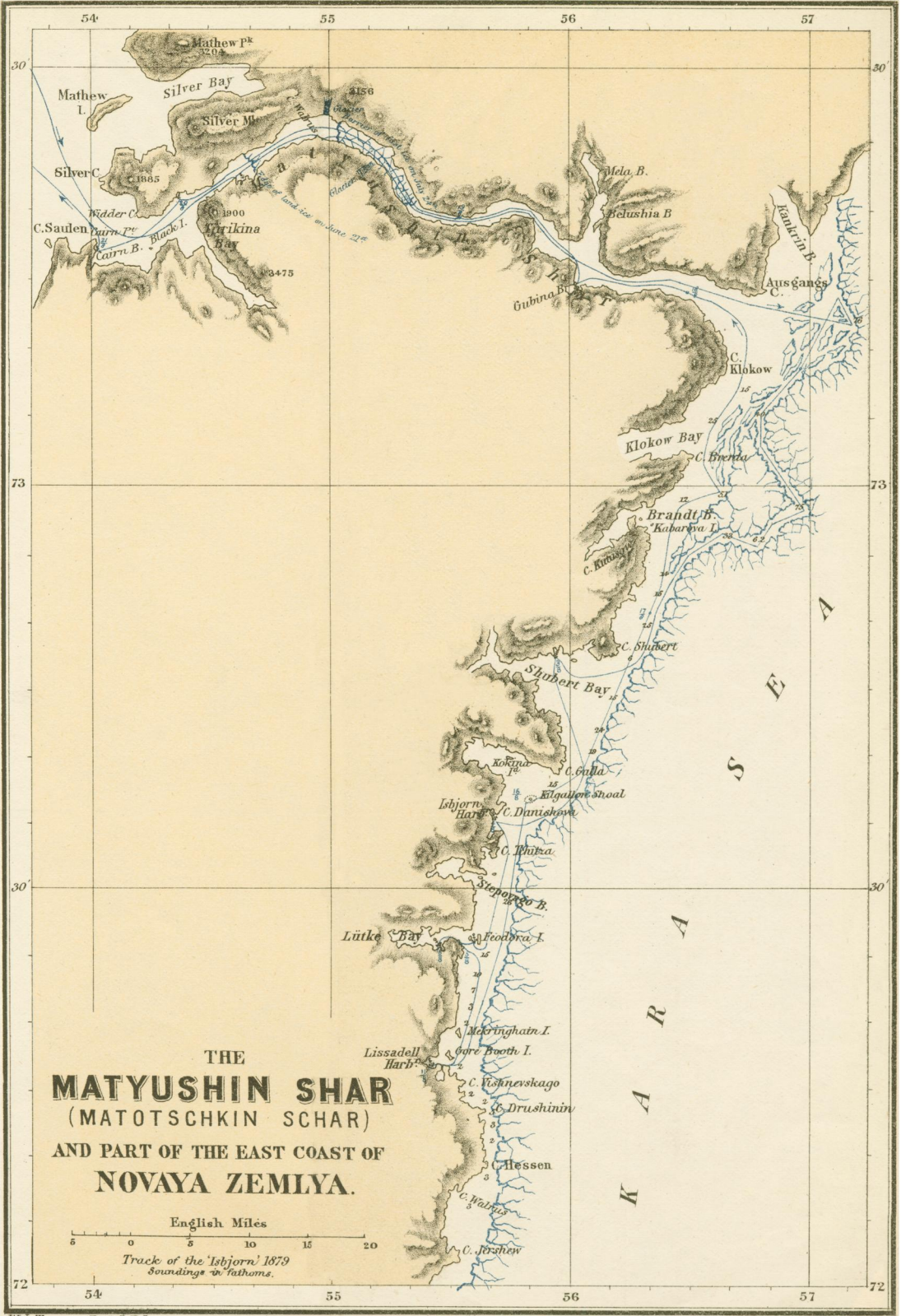




Map of the  
**BARENTS & KARA SEAS**  
 illustrating  
**THE ARCTIC CAMPAIGN  
 OF 1879**

Track of the *Willem Barents* .....  
 Track of the *Isbjorn* .....  
 Approximate line of 100 fathoms depth .....  
 Deep-sea soundings in fathoms. 1470.

Einsamkeit



THE  
**MATYUSHIN SHAR**  
 (MATOTSCHKIN SCHAR)  
 AND PART OF THE EAST COAST OF  
**NOVAYA ZEMLYA.**

English Miles  
 0 5 10 15 20

*Track of the Isbjorn 1879*  
*Soundings in fathoms.*