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The Swedish Antarctic Expedition

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regard to the scientific publications. But in polar expeditions there must always be times when all must work for the common good regardless of department; at such times there has been no need to ask for volunteers in the *Discovery*. On the sledges or on the saws, in coaling or watering the ship, or at any task that needed to be done hurriedly, officers and men have worked alike, and grudged no labour till the work was finished. The conduct of the men has been beyond praise. By them the monotony of the second winter was met with unflinching cheerfulness. Most arduous sledge journeys and the most severe weather were encountered in the same spirit, and with an intelligence that freed the officers from all anxiety as to their welfare. But the qualities of the ship's company has never been more evident than since our release from the ice. The difficulties I have mentioned, and many others which might naturally be expected after such a long captivity in the ice, were overcome only by incessant labour. It was, in the sailor's expression, 'Watch, and stop on,' and though many were almost worn out with fatigue, there was neither complaint nor demur when a fresh task was imposed. I shall hope to make their services better known to you on the return of the expedition. Although, as was shown, our small company were so thoroughly able to take care of themselves, and naturally felt some embarrassment at the extent of the relief expedition, I would not have it appear that we undervalue the services of the relief ships. Everything that could possibly be done for us they were only too willing to do. Captain Colbeck's arrangements with regard to stores, etc., appear to have been excellent, and this year, as last, he has shown himself ever ready to sacrifice his own interests to ours. His conduct of the relief expedition deserves the thanks of his former as well as his present employers. His services were ably seconded by those of Captain M'Kay of the *Terra Nova*. Of the officers and crews of both ships, I can only add that I believe they were almost as anxious as ourselves to see the *Discovery* released, and almost as pleased when that event was happily accomplished."

THE SWEDISH ANTARCTIC EXPEDITION.*

By Dr. OTTO NORDENSKIÖLD.

It is with a full consciousness of the great honour accorded me, that I have accepted the invitation of the Royal Geographical Society to submit to you this evening the first account given outside Scandinavia of the Swedish Antarctic Expedition, of which I was head.

* Read at the Royal Geographical Society, March 21, 1904. Map, p. 128. The map is only a provisional sketch-map, as it has not yet been possible to draw up a map embodying the exact measurements of the expedition.

It was as a representative of your great Society that Sir James Ross, upwards of sixty-five years ago, embarked upon an expedition to the south polar regions that, as regards its results, has not to this day been surpassed. When, further, at a recent date, the determination was arrived at to renew in earnest the exploration of the least-known regions of the globe by means of an international effort, in which my expedition formed a part, the first vessel to leave European waters on that quest was the one towards the equipment and despatch of which the Royal Geographical Society contributed so materially. The splendid achievements of that expedition in the first year of its work no one can better appreciate and admire than I and my companions, who have had an opportunity of acquiring first-hand knowledge of the difficulties and dangers that Antarctic conditions of climate and ice present.

It would, consequently, be a work of supererogation to say anything in this audience as regards the importance and objects of modern south polar exploration work. I will merely recall the fact that, whilst England and Germany were the first nations to come forward with proposals for carrying into effect the resolution adopted at the International Geographical Congress held in London in 1895, by organizing exploration expeditions destined respectively to the Antarctic regions lying south of the Pacific and Indian oceans, it appeared for a time as though nothing was to be done towards equipping any vessel for similar work in the Antarctic region situated south of the Atlantic ocean, the region nearest to Europe, and possessing, besides, features of great importance, as being the only part of the Antarctic area containing large tracts of land free from snow, and as bearing a striking and particularly interesting analogy to the continent of South America, from which it is not far removed. That was the state of affairs that led me in 1899 to draw up the first plan for the expedition whose fortunes and results I now propose roughly to detail.

The numerous and manifold difficulties to procure in Sweden from private donors the wherewithal for the equipment of so extensive an enterprise, entailed a postponement of our departure from Gothenburg until October 16, 1901. When once fairly started, however, we lost no time *en route*, and by New Year's Day, 1902, we were able to leave Port Stanley in the Falkland islands, and so bid good-bye to civilization. It would not be too much to say that we had then drawn up level with our sister expeditions, which had sailed from Europe in advance of us. A brief call at the Argentine Observatory on Staaten island unfortunately proved of no avail, inasmuch as their instruments had not yet been set up, consequently it was not possible for us to compare our magnetic instruments until our return home.

On January 10, after a good passage, with no ice in sight, we reached King George island of the South Shetland group. In spite of all descriptions of those islands, the most accessible of the south

polar lands, I must confess that I was surprised upon seeing them. I had expected to find a strip of shore free from snow, and showing a collection of the scanty vegetation found there. But, on the contrary, I beheld one glittering sheet of ice, bluish-white in colour, with only a few ruggedly steep peaks standing out dark against the white mass, which ends against the sea with a precipitous wall of ice.

There is surely nowhere in the world such a startling transition from one nearly adjacent shore to another as exists between the ever-green virgin forests of Cape Horn and this ice-desert, a counterpart to which is scarcely to be found in the northern hemisphere, and which commences at a latitude equivalent to that of the central parts of Sweden. A very short study of the region was sufficient to convince us that all previous estimates regarding the character of the climate prevailing there must infallibly be in error, and that a greater severity than has hitherto been assumed must be prevalent. The experience gained by our expedition has fully justified this first impression.

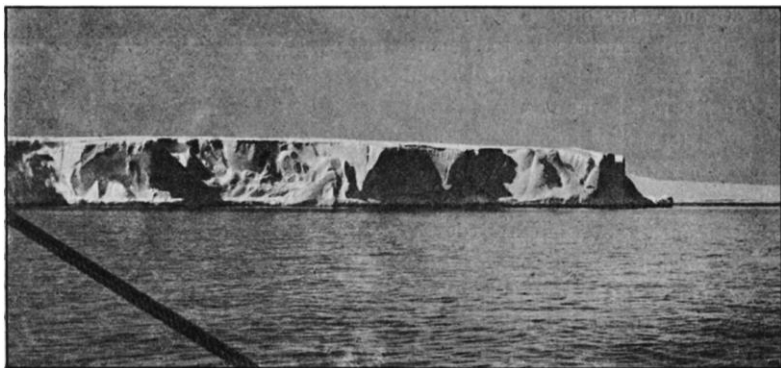
On the morrow we landed for the first time in our new world. By that time we had discovered, in Harmony cove on Nelson island, a small sheltered bay; the land behind was fairly free from snow, and the shores were populated by a large number of seals, penguins, and other representatives of an animal-life quite new and unknown to us. It may easily be imagined with what eagerness we hastened to make acquaintance with all these novelties. The botanist of the expedition secured a fine harvest, though the vegetation was not so luxuriant here as in some more sheltered spots on the Orleans channel. The bedrock proved to be a porphyrite, the age of which it is difficult to determine.

The first task that now lay before us was to investigate the so-called Orleans channel, discovered by D'Urville. There were good reasons for assuming that we should find that the channel formed a direct communication with the east coast. That, however, was not the case; we discovered that it turned off to the south-west and ran into the Gerlache channel, with no perceptible boundary between the two, the one consequently forming, in reality, a continuation of the other. At the same time we discovered the stretch of land uniting Louis Philippe Land and Danco Land, and I was already able in my report at the time to state my conviction, which our work of the succeeding summer afresh confirmed, that the former piece of land constitutes a continuation of Biscoe's Graham Land; thereby the existence of the so-called Dirk Gherritsz archipelago may be considered to have been disproved once and for all.

It would have been of great interest to have been able to continue our labours there, but we were constrained to hasten on to the east coast, where our main researches were to take place. Before passing on to the description of them, I will tarry a moment to point out the characteristic differences in the rock formation in these zones. To the

west there stretches a lofty range of mountains, with bold jagged peaks surrounded by glaciers, which run into one another along the shore forming a narrow ice-foot. Further east, and also on the islands, the land is lower in elevation, and, as a rule, much more consistently covered with ice, so that, save for a few isolated points that rise like noonataks, and some perpendicular rocks, only occurring along the actual edge of the shore, the solid fundament is not visible at all. Of the very different nature in the environs of Seymour island, I shall later have an opportunity to speak.

On January 15 we entered Erebus and Terror gulf through the channel separating Louis Philippe Land and Joinville island. To this channel, undoubtedly the best access to the region, I have later given



AN ANTARCTIC ICEBERG.

the name of Antarctic sound. Our intention now was to go along the coast as far south as possible. On our way we established a *dépôt* at Cape Seymour, leaving at the same time a record of the progress of our journey. Even at this stage we could perceive that the condition of things as regards the ice was anything but promising, and only two days later I was roused early in the morning to climb into the crow's-nest and observe the ice-conditions. It was at once clear that our chances of being able to advance further were non-existent. To the south and south-east there was to be seen an almost solid mass of pack-ice, while to the west was rising a lofty ice-barrier, obstructing all view of the interior. At that juncture we were a trifle south of the 66th degree of latitude.

We now turned back northwards, and in vain endeavoured on our way to reach the Seal islands, which were completely ice-locked. There now remained two courses open to us—either to stay for the rest of the summer in the northern archipelago for the pursuit of scientific research, or to carry out our original programme by trying to find a way

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southwards through the ice further east, as Weddell once succeeded in doing. Unfortunately the summer was already far advanced, and as it was essential to avoid having to spend the winter frozen up in the ice, and we required, moreover, a fair margin of time for preparing and arranging our winter quarters, there was no great prospect of our being able to progress any great distance southwards on that tack. I was, nevertheless, loth to relinquish the matter entirely, and during the remaining days of January we continued our course eastwards. By the end of the month—thanks to fog and contrary winds—we had not got further than the 45th degree of longitude, and the only important result of our efforts was the discovery we made that the sea there has a very considerable depth, viz. of nearly 2000 fathoms.

It now behoved us to retrace our steps to Seymour island, in order that we might secure a fitting place for our winter sojourn. This procedure was entirely in accordance with my original plan, but, besides that, the idea I had formed of the region from the little I had already seen, convinced me that a more interesting district in which to winter, whether from a geographical or geological point of view, could not be imagined. On our way we paid a brief visit to Sidney Herbert bay, which I, even then, found reason to suppose was a channel rather than a bay. On February 12, early in the morning, we entered Admiralty inlet, where we soon found a small and, as we thought, sheltered bay, situated just where the snowless tract of country ends, and the extensive level ice-area of Snow Hill commences. There we determined to establish ourselves for the winter.

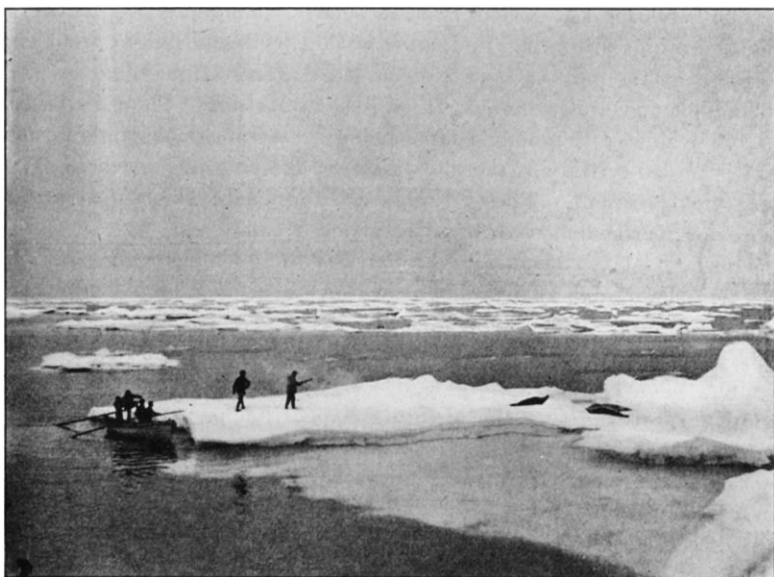
The members of the expedition who were to be my companions here were Dr. Bodman, meteorologist and magnetician; Dr. Ekelöf, physician and bacteriologist; Lieut. Sobral, assistant meteorologist; and two sailors, Jonasen and Åkerlundh.

A wind that began blowing from the north-east commenced to drive the ice down upon us ominously, so that only two days after our arrival, on February 14, the *Antarctic* had to set sail rather suddenly, leaving us behind on shore—not insensible, to be sure, to the feelings that the parting with our comrades under such circumstances inevitably gave rise to, but so full of work for the immediate future, that we had little time to indulge in wonderings as to the respective fates before us, and when, if ever, we were destined to rejoin our forces. There was an abundance of tasks awaiting our united efforts: the erection of a house and observatories, the arranging of all our properties, and the mapping out of the various scientific pursuits we were intending to take up. All hands were, consequently, fully occupied, but the success of our endeavours was very materially impeded by the state of the weather. From the very first we were exposed to severe storms and great cold, and that in spite of the season being what for that part of the world is the height of summer. Thus, ere it could be completed, our magnetic

observatory was blown down, and one night all our Greenland puppies, which we were relying upon for very essential assistance, were frozen to death.

The same storm that played such havoc with our preparations and property on shore, dealt very harshly, too, with the good ship *Antarctic*, at that time in Bransfield sound. She was very much knocked about and damaged, lost the best of her boats, and only just succeeded in keeping off the rocks lining the coast. Our experience of both years seems to prove that there is no counting upon any summer from and after so early a date as the middle of February.

By the middle of March we had made sufficient progress with our



EDGE OF THE ICE-PACK, WITH SEALS, IN THE WEDDELL SEA.

labours to enable me to set out on a boat-expedition down Admiralty inlet, partly for the purpose of reconnoitring our surroundings, and partly to establish a depôt, to be of service on coming sledge expeditions. On the second night we were out a violent hurricane overtook us, and what with the cold—the thermometer registered zero Fahrenheit—and the heavy sea that smashed up the ice-floe upon which we had sought refuge, we came very near destruction. As it was, we had to remain for twenty-four hours exposed to the elements, for to put up our tent was quite out of the question. On the following day, however, we managed to put out again into open water, and return to our starting-point before the severe frost had time to effectually bar our passage.

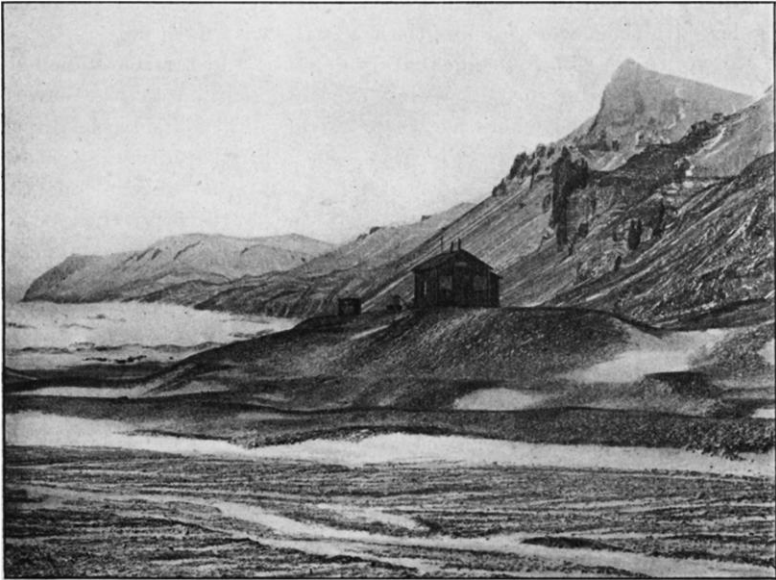
By that expedition I was able to establish that Admiralty inlet is in reality a channel, branching indeed to the south into two arms, which enclose the island on which Cape Lockyer is situated. This may be a suitable point to insert a brief geographical description of the surroundings of our winter station, such as we gradually discovered them to be in the course of our stay. The station was situated on an island, Snow Hill island, consisting for the most part of one unbroken dome of ice, named by Ross, Snow Hill. I made a thorough study of this land-ice, taking systematic observations with reference to its movement, registering the temperatures of different depths, variations in its structure at different seasons, etc. On all sides the ice displays a fine stratification, traceable to the original snow deposit. The ice forms one continuous mass, save for three small "noonataks;"* on the sea side it terminates in a perpendicular wall, varying in height from 10 to 100 feet; at the point where we had fixed our station, however, there is a sudden and abrupt break, the northern portion of Snow Hill island and the whole of Seymour island being free from snow, thus forming what is probably the largest snowless area existing in the whole of the Antarctic continent. These islands are formed of richly fossiliferous sandstones, permeated with basaltic dykes.

The two islands situated in Admiralty sound, Cockburn island and Lockyer island, and also the land facing them, to which I later gave the name of James Ross island, are mainly formed of beds of basalt tufa, which rest upon the same fossiliferous sandstone as exists in Snow Hill island.

On our return from the sledging expedition mentioned above, the winter closed in upon us, and for upwards of half a year we were practically confined within the four walls of our domicile. The house, constructed in Stockholm, had double walls of boarding, separated by an air space, and lined both inside and out with tar-board. We found the accommodation afforded us by this building quite adequate to its purpose upon the whole. In the middle was one large room occupying the whole breadth of the building, flanked on either side by two smaller ones; three of the latter served us as bedrooms, with sleeping accommodation for two in each, while the fourth was the kitchen. Over the whole extended a large garret. The space was limited even for our small party, but we considered ourselves well off, and could devote ourselves to whatever employments we had on hand. Nor did we lack for occupation. There was mapping work to be done, astronomical, magnetic, geological, bacteriological, and physiological researches to be

* This is quite contrary to the statement of Sir James Ross ('Voyage to the Southern Seas,' ii. 344) that there are "no projecting rocks through it." It would be very important to know if this is due to a diminution of the thickness of the ice since that time.

carried out, and observations on the tides to be taken; so that our time and attention were fully engrossed. First and foremost we were concerned with the meteorological observations, which as a general rule were registered every hour all through both day and night. And here it is fitting to pause a moment to consider the results that these observations led to, for they go to prove that the climate that prevails in that region must be regarded, by reason of its unexpected severity, as possessing an exceptional interest. It was for a long time assumed that the winter in the south polar regions was, comparatively speaking, a mild one, and even the experiences of Gerlache and Borchgrevink had not given rise to any supposition that at a latitude of only $64\frac{1}{2}^{\circ}$



THE WINTER STATION AT SNOW HILL.

a winter temperature averaging for the months of June to August (1902), -21.7° C. (-7° Fahr.) would be registered. The average temperature for the whole year worked out at -12° C. ($+10^{\circ}$ Fahr.), approximately equivalent to those of the Lena valley and of the Hudson strait territory, the two coldest regions at the same latitude in the northern hemisphere. The temperature proved, moreover, to be lower than that noted by Gerlache and Drygalski for more southerly latitudes than ours, and only 3° higher than Borchgrevink found 7 parallels nearer the pole, and 9° warmer than Scott on board the *Discovery* registered at almost 14 parallels further south. These facts would seem to render it very probable that the southern pole of maximum cold has a considerable

bias towards the Atlantic side of Antarctica. This observation, in itself, may be fairly deemed to demonstrate the significance of an expedition having been organized to that region contemporaneously with the two others to different parts of the Antarctic seas.

To judge, however, of the characteristics of a climate, it is not sufficient to consider the conditions of temperature alone; the conditions of wind, especially its force, must likewise be taken into account. A temperature of from -30° to -40° , which in still weather is by no means unpleasant, becomes well-nigh unendurable if a gale is raging. In regard to the frequency of high winds, I have no hesitation in asserting that our first winter was quite unique. At all events, the statements made with reference to Gerlache's, Borchgrevink's, and Drygalski's expeditions, denote that the average force and prevalence of gales with them were far less than was the case with us.

No words can suffice to adequately describe the terrible violence of these south-west hurricanes, which are accompanied by the severest cold ever experienced where we were. Everything outside is calm and fine; the barometer, however, is to be seen falling rapidly, though, after a time, it suddenly stops. On looking around the horizon, one then becomes conscious of a slight mistiness in the south-west; then come a few violent gusts of wind, and, within the space of a few moments, without any further interval of transition, the hurricane is upon one in all its fury. The atmosphere has become so thick with the fine snow-dust which is being hurled along in immense clouds, that it is impossible now to see more than a few paces in front of one. The snow comes driving through every chink and cranny, and settles everywhere and anywhere. To be outside the house is an impossibility, for one cannot proceed against the wind, which takes away one's breath, and the sharp crystals of frozen snow sting one's face beyond endurance. Bits of board, wooden boxes, and other trifles, become the sport of the gale that whirls them about on the floor, while even heavy articles are shifted from their appointed places. On the velocity of the wind increasing yet more, to as much as 70 or 90 miles an hour, the destruction and disturbance it causes become yet more formidable. Stones pelt upon the walls of the house, and the whole building is shaken; when all had become calm again, we were often obliged to use up the brief intervals of fine weather in searching for articles that had been blown away. Barrels of bread, big boxes with all their contents, one might then find far away on the ice. On one occasion the roof of the observatory had been transported about 1000 feet through the air, to be then smashed against the rocks. After one of the very severest of the storms, we made the disagreeable discovery that our largest boat had been carried along the shore for 100 feet and demolished against the ice-crags, while the oars and other material lay strewn about on the space between.

Descriptions of violent storms are familiar enough to the reader of reports of south polar research expeditions; the novelty, as far as we were concerned, consisted in the frequent occurrence and protracted duration of the storms that visited us. The average velocity of the wind for the eight winter months (March to October) in 1902 was 31 feet per second, which is probably a record for so cold a climate.

We were worst off in July and the first half of August, the temperature then falling as low as -42° Fahr.

From the middle of August things improved, and on the 18th we sighted and accounted for our first seal.

In the middle of September a strong warm wind from the north-west



A VALLEY NEAR SNOW HILL STATION. MOUNT HADDINGTON VISIBLE IN THE DISTANCE.

commenced to blow, and lasted a few days; it drove the ice away from the land, and we began to imagine that spring was already at hand. The gales and the cold returned, however, and at the end of September everything was as wintry as ever.

In spite of its severity, the winter passed rapidly away, and we were happy enough in our surroundings; but it is easy to see that the conditions of the weather forbade my embarking on any extensive excursions from our winter quarters. In April, July, and August I made a few sledging expeditions, for the purpose of investigating Seymour island and Admiralty Sound inlet, but venturing further afield seemed too foolhardy and risky to be thought of.

With the approach of spring, however, I became anxious to be off,

at as early a date as possible, to explore the unknown coast running southwards, and on September 30 we were at last able to start.

My companions were Lieut. Sobral and Jonasen. According to the plan I had worked out, I had hoped to be able to extend my absence from headquarters to a period of fifty or sixty days. Unfortunately, we had been unlucky with the dogs we had brought with us, and now the number available for our trip was four Greenland dogs, and one of these we had brought from the Falkland islands. It seemed an utter impossibility to do in any way with less than two sledges, and so I arranged that the dogs should all be harnessed to the heavier-laden of the two sledges, and that Lieut. Sobral and myself should lead the way, dragging the other sledge ourselves. Furthermore, it was clear that it would be out of the question for us to have with us sufficient equipment for so long a period as fifty days, if our rate of advance was not to be retarded altogether too much, so that I determined only to take dog-pemmican for three weeks, confidently hoping that we should encounter on our route along the coast both seals and penguins, which might serve as food for the dogs.

For the first week we were favoured with excellent weather and capital ice. Our rate of progress was, nevertheless, not equal to my expectations; I had good reason to observe how very much more advantageous it is to employ dogs as beasts of draught, in place of discharging that labour one's self, more especially when it is desirable to advance quickly.

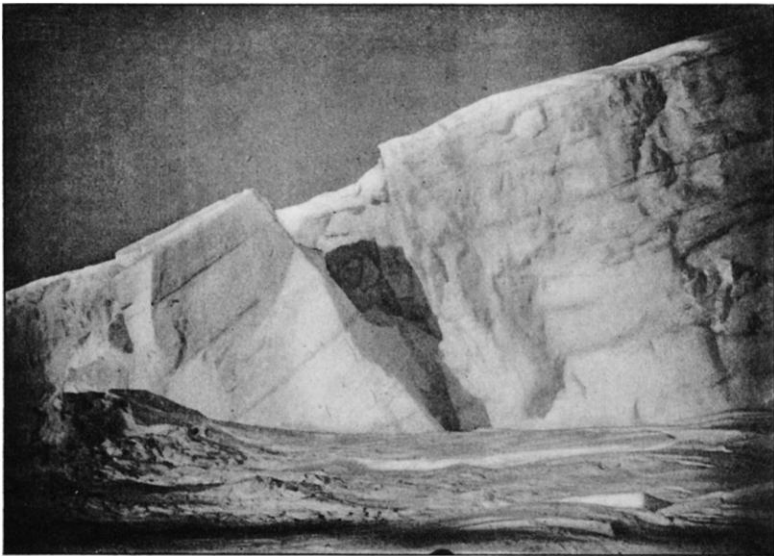
The course we followed during that first week led us parallel to, but at some distance from, the coast of an elevated mountainous country. The configuration of it was a series of rugged jagged crests, behind which there extended a large ice plateau, from which immense glaciers descend, leaving only the highest peaks snowless.

This coast territory forms a continuation of the land discovered by Larsen, and named by him King Oscar II. Land, and I consider that that designation should be applied to the whole coast territory as far as to 64° S. lat., where the Louis Philippe peninsula may be considered to begin.

On October 7 we reached Christensen island, which we found to consist of the remains of an ancient crater. I climbed to the top of it, and obtained a capital survey of the surroundings. A phenomenon was from this point of vantage presented to the view, which, so far as my own experience goes, has no exact counterpart anywhere else, though it is probable that it somewhat corresponds to the ice-terrace which is terminated by Sir James Ross's celebrated ice-barrier. The islands known by the name of the Seal islands are in reality a species of noonataks projecting above a low level ice-terrace, which at this latitude has a breadth of from 40 to 50 miles, and which extends as far south as we have knowledge of, at any rate, for more than one degree of latitude.

Its boundary with the sea is an ice-barrier of varying altitude. It seems probable to me that this ice in part rests upon land, but also in part, and principally, covers a shallow sea, and that it has been for the most part formed *in situ*. From a scientific point of view the phenomenon above briefly described is of exceeding interest, though for our purposes at the time it presented a material inconvenience, inasmuch as we had now to cross it, and knew that we did not stand the least chance of being able to replenish our scanty supplies of food for the dogs meanwhile.

We pushed on, however, at an increasing pace as our burdens diminished in natural course, though the difficulties we had to contend



THE ICE-BARRIER NEAR SNOW HILL STATION.

with now began to thicken. A fresh period of storms set in, the temperature sinking to -20° to -25° Fahr. We had the wind in our teeth, and were fain, even for several days at a time, to lie still in our sleeping-bags on account of the storm. At length, on October 18, we neared the land. The last piece of our way across was the worst by far. Here the ice rose considerably higher, and was traversed by broad deep cracks, which we only succeeded in crossing with great danger and difficulty. We found ourselves, however, finally at the end of our troublesome journey, and were able to pitch our camp in the shelter of a lofty headland that apparently formed the south-easternmost point of King Oscar II. Land.

The very same night a hurricane arose that caused us great

discomfort. Our tent was torn by the wind, so that we had the utmost difficulty in repairing it in the dreadful weather and in getting it set up again in a sheltered spot high up among the rocks. To crown our misfortunes, Jonasen fell down and injured his arm while engaged in carrying a big stone to help steady the tent. The provisions we had brought for the dogs were now at an end, and we were obliged to share our own pemmican with them. In this state of affairs, with a dearth of provisions and the broken and stormy weather, it could not be considered other than perilous to pursue our expedition, and I resolved that it was incumbent upon us to make our way back again.

The severe weather still kept on, but as we now had the wind behind us, we were not so often under the necessity of remaining stationary on account of it. We covered a great deal of ground every day, and had already reached our winter station once more on November 4.

Our journey out and home again amounted to about 400 miles in distance. The chief results we obtained were the discovery and the mapping of the inner coast-line as far south as 66° S. lat., and also the discovery and investigation of the great ice-terrace. We had, however, also carried out geological and meteorological work of considerable interest.

November was principally devoted to the pursuit of scientific research work in the vicinity of the station. At the beginning of December I undertook a sledging expedition to the northern portion of Seymour island, to study its geology. The strata there are characterized by the absence of ammonites, which occur in such large numbers in all the older strata which belong to the Middle or Upper Cretaceous; I assume that they are of the earlier Tertiary age.

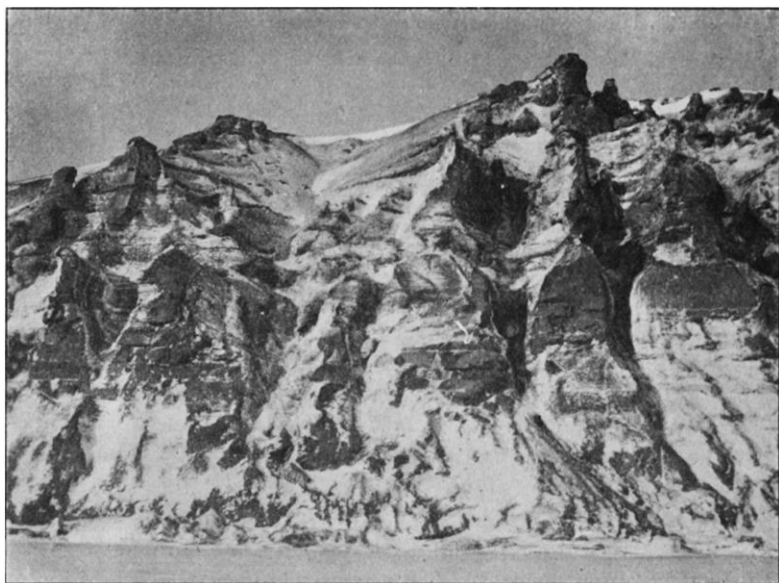
In these strata I made two discoveries on the same day, and they are among the most important of the whole expedition. The first was a number of miscellaneous bones of vertebrates lying scattered about, principally the remains of a penguin, larger than any species now living. The second was a large number of tolerably well-preserved leaf-impressions belonging to a variety of forms. This discovery proves for the first time that in the south polar regions, as has long been known to be the case with regard to those round the north pole, a warm climate with luxuriant vegetation existed at a—in geological sense—recent period. I had, moreover, been able to collect remnants from the animal world that once inhabited that ancient continent.

Now the time arrived when we began seriously to look for the return of the good ship *Antarctic* to carry us away from our voluntary isolation. What a weary time of waiting and expecting that was destined to be! The weather was cold, with fog and gentle winds. Now there came no gales to assist in breaking up and dispersing the ice. Our summer time, spent at that spot 2° north of the polar line, was the coldest ever

known up to that time. The British expedition, which was 14 parallels further south at the time, experienced a still greater degree of cold.

There were some small leads in the ice and a water-sky in the north, but no open channel that would admit of a vessel finding its way to us. Consequently we never became really anxious at the non-appearance of the *Antarctic*, and never thought but that she would eventually reach us. And well it was that none of us were able to surmise what a fateful drama was being enacted during those weeks of waiting almost within sight of our station

At the beginning of February there was a sufficient amount of open water along the shore for us to get by boat to Seymour island to kill



SANDSTONE CLIFFS (CRETACEOUS) NEAR SNOW HILL STATION.

some penguins for our needs in view of the coming winter. The task of slaughtering these strange creatures is by no means a pleasant one, by reason of the resemblance they bear in behaviour to human beings, and from the circumstance that by degrees one comes to regard them almost as companions in the solitude of those regions. We had, however, no choice in the matter. We accounted for some 400, but they had almost entirely disappeared by the time the relief came.

We also killed at the same time all the seals we could get within reach of, partly to use their blubber as fuel, and partly for the sake of providing our dogs with food. Experience showed us, moreover, that we could consume seal-flesh with considerably greater relish than the hard and dry flesh of penguins.

By the middle of February heavy gales and intense cold had already set in, and very shortly we had winter all around us once more. I will not here speak about the winter ; I will only mention that we were very fully occupied, and that we realized that the value of our observations would be very materially enhanced, now that we had a chance of registering them all over again. We naturally often wondered how our sister expeditions were faring, and almost hoped that they too had been constrained to tarry by reason of the ice, for the sake of thereby obtaining a new series of observations from their localities likewise. A comparison of our results and those of the British expedition should be exceedingly interesting, and not less so one between ours and those registered by Mr. Bruce at a spot so close to where we were.

We found the first months the most trying, when the long period of darkness was before us to be looked forward to ; our isolation and the uncertainty as to what awaited us were what occasioned us the greatest anxiety.

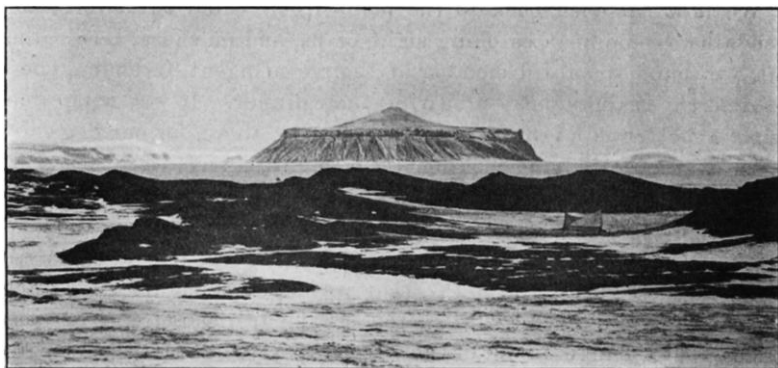
As the spring once more came round, I started off again on a sledging trip, this time to explore the unknown parts north of our station. Profiting by experience, I determined on this occasion to take only so much as the dogs could manage to draw. To that end, I contented myself with only one companion. After one unsuccessful start, when our tent was torn by the wind, we got off on October 4. After passing Admiralty sound, we turned northwards into an inlet we had discovered the year before. The landscape we then had in front of us was of a grand description : to the west, the northernmost part of King Oscar Land, displaying the same bold and sharp outlines of mountains as we had observed further south ; then further on, the hitherto unknown southern edge of Louis Philippe Land ; to the east rises the majestic form of Mount Haddington, with its even-surfaced ice-slopes of opaque blue. As we progressed, it became more and more apparent that my primary supposition had been a correct one, and that we were now in a channel affording a through waterway, the land situated on our right hand consisting of islands. This remarkable channel, to which I gave the name Crown Prince Gustaf channel, derives its chief interest from the analogy it bears to the deep depressions on the eastern side of the South American Cordilleras, where, moreover, the formation of the mountains on either hand resembles that which I found to prevail here.

The passage through the channel occupied us about a week to accomplish. On October 12 we had at length reached its eastern extremity. We were proceeding rapidly on our way, when, under a high and precipitous rock on the shore, we suddenly caught sight of a couple of black objects of strange appearance. They were not seals ; but what were they ? My first idea was penguins, of which we had not seen any that year ; but they were too large, and they moved about, too, in such

a strange manner. I applied my glass to my eye, and at once made out that they were human beings.

Never before have I experienced such emotions as this discovery brought surging upon me. To come upon human beings in this desert wilderness, and for us, who for a period of twenty months had been fain to content ourselves with our own society! And who in the world could they be? Wild suppositions came before my mind in rapid succession, only to be rejected as soon as entertained, each seeming in turn more impossible and unlikely than its predecessor.

The figures had likewise noticed us, and now both parties set off towards each other. The nearer we approached them, the greater became my astonishment. The sight which presented itself to my



CAMP ON SEYMOUR ISLAND, COCKBURN IN THE DISTANCE.

astounded gaze was that of two men who were black from head to foot, having, moreover, long black hair hanging down over their shoulders, and black bushy beards. What rendered them, if anything, still more unrecognizable was the wooden eye-masks which they had probably invented themselves as a substitute for snow-goggles. The only thing about them that seemed to betray a certain degree of civilization was their skis. A feeble "Hurrah!" from them as we drew closer showed that the meeting with us was a source of delight to them.

It was not until we had greeted them, and they had told us their names, that I realized who they were—none other than two of my own fellow-voyagers in the *Antarctic*, viz. Dr. J. G. Andersson and Lieut. Duse. They, together with one other member of the party, had left the vessel during the preceding summer to attempt to effect a junction with us, and now, after a winter spent in solitude, were again on their way to our station.

It would be impossible for me to find words to describe my thoughts

at that moment, as I listened to that bare explanation of who and what those strange-looking creatures were. Surprise, amazement, and curiosity soon yielded place to keen and heartfelt sympathy within me, as I realized as in a moment what these poor fellows had had to endure. There was, indeed, every reason for feelings of surprise and amazement to come upon me. During the long months of our isolation, it was natural enough that I should picture to myself the first meeting with representatives of the human family. But in all my imaginings such a contingency had never presented itself that I should, on that occasion, play the part of the rescuer of individuals who, to all appearances, belonged to one of the lower types of men that live in the natural state, and who, indeed, in many particulars had been constrained to adopt the modes of life of such beings.

We now hastened back to the point from which our two strange friends had come upon catching sight of us, and on shore, beside their tent, we found the third member of their contingent, Grunden, one of the *Antarctic's* sailors, busy preparing their dinner. It was not quite so simple a matter as might be supposed getting there, for our dogs took fright at the forbidding-looking black figures, and were ready for bolting in any and every direction but the one we desired. They were, however, at length reduced to tame obedience, and on arriving we pitched our tent alongside the other one. We determined, further, to remain at the spot for the night, that we might celebrate the strange meeting as best we could with the means at our disposal, and find time besides to exchange news of how each party had fared since our separation.

By degrees we elicited the account of their doings. As Dr. Andersson, in the February issue of the *Geographical Journal*, has already published some information with regard to his and his companions' experiences, it will not be needful for me to do more than give an outline of the same. During the first winter the *Antarctic* had been very successful as regards scientific work, and had collected many valuable results. At the beginning of November, 1902, the vessel left Tierra del Fuego, full of the most hopeful anticipations for what lay before them. But Fate had determined otherwise. While they were still considerably north of the South Shetland islands, they encountered pack-ice, which they had great difficulty in making their way through. Bransfield strait and Orleans channel, on the other hand, were almost clear of ice, and there they spent a couple of weeks, which were very agreeable and fruitful of results. At the beginning of December they pursued their voyage, now bound direct for their destination, our winter station, that they might bring us away, and so accomplish the object of their mission. The distance that separated them from our station was so short that, had the conditions of the ice been as in the year before, they would have reached us in twenty-four hours. As soon as they entered

Antarctic sound, they found the whole of the Erebus and Terror gulfs filled with ice, with hardly a fissure in it. An attempt to go round Joinville island proved unsuccessful, and on their return, at Christmas-time, to Antarctic sound, the ice was as solid as ever.

It was at this time that Dr. Andersson formed the brave resolve to try and make his way to our station. They landed in a small bay on the western shore of the Antarctic strait on December 29; the bay was subsequently christened the Bay of Good Hope. They at once started off on their march, but soon found that the state of the ice at that time of the year was such as to preclude so long a journey, and they were forced to return to their starting-point, there to await the return of the *Antarctic*. Their wait proved, however, long and fruitless; they were never to see the vessel again. At first they worked away eagerly at investigating the neighbourhood from a scientific point of view, and it was at this time that Andersson came upon a well-preserved fossil flora from the Jurassic Period, which proves that the vegetation here at that time was the same as that of India.*

As the summer gradually passed away, and they saw no sign, they began to be uneasy, and commenced to prepare for the coming winter by collecting provisions, and by erecting a hut of stone. The hut was constructed in the following manner: round and about their largest tent they built a thick stone wall, and over the whole they placed a piece of tarpaulin. The abode was thus provided with double walls, and when the snow came and heaped itself all round, they were able to keep up an average temperature inside of but little below freezing-point. They used seal-blubber as fuel, making the fire in a large preserved-meat tin, without employing any wick; by practice they acquired considerable skill in the art of firing by those means. They partook of a small portion of bread every day, and a cup of a brown liquid, supposed to represent coffee; they indulged themselves, besides, in preserved meat or fish once or twice every week, but otherwise their sustenance was derived from the flesh of seals or penguins, boiled in sea-water instead of salt.

The part of their lot they found hardest to bear was the protracted confinement through the long stormy winter; they had often to remain lying in their sleeping-bags for several days in succession without any light, and, moreover, without anything to read, had they been able to see. The winter passed wearily away, and with the advent of spring they began to get in trim once more for a sledging trip to our station. The stores they had carefully treasured up were produced, but they had only one sail-needle between them, and they had to take it in

* According to Prof. Nathorst, these fossils agree pretty well with those from the Upper Gondwana series in India; also with those described by Kurtz from the province of Neuquen, in the Argentine Republic.

turns to have the use of it for the repairing of their various garments. They set forth on September 29, and here we had met in this marvellous fashion out upon the ice.

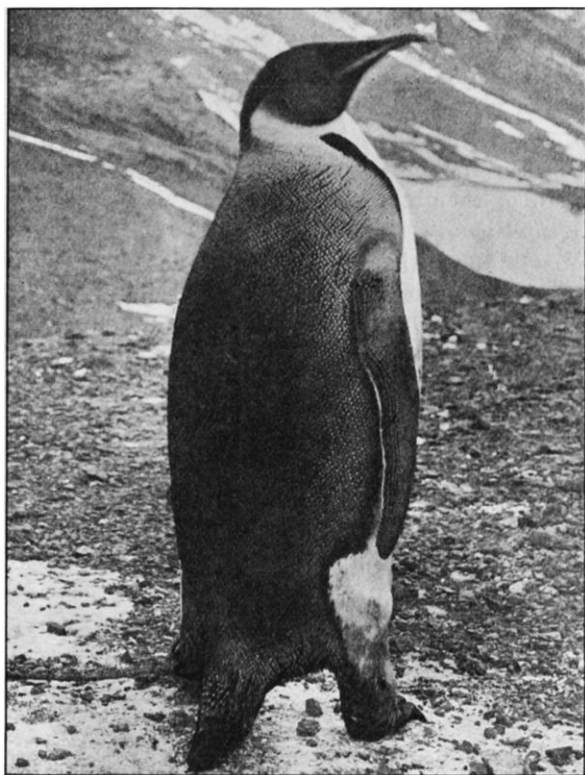
With rapid marches we now hurried back to Snow Hill, choosing a passage further inland, that forms a connecting link between Crown Prince Gustaf channel and Sidney Herbert bay. Our return was, naturally enough, the signal for great rejoicing among those we had left behind. On finding ourselves at home again, we at once recommenced with fresh eagerness our scientific avocations, and not a day passed without some of our party being absent on exploration bent. Dr. Andersson and myself spent most of our time on Seymour island, collecting specimens from its rich strata of fossils. We had never enjoyed such beautiful weather as now since we first arrived in those regions. The sea further out was almost clear of ice, and it was not without a degree of anxiety that we contemplated the possibility of our labours being cut short prematurely by the expected arrival of the rescue expedition. But up to that time we had not relinquished the hope that it would be the *Antarctic* herself that would come to carry us off, and in that case we should be able to look forward to a summer of busy occupation, yielding valuable results.

On November 8, when two of our party were absent egg-collecting, and the rest of us were at home at the station, some one entered my apartment and informed me that there were some people to be seen out on the ice; "but," he added, "it looks as though there were *four* of them." The excitement that ensued, when the telescope confirmed this supposition, is easier imagined than described. We all hurried out, helter-skelter, and down on to the ice, to welcome the new-comers, who we judged could not well be any others than members of the *Antarctic's* contingent, since it was as yet too early, as we calculated, for any vessel to have reached us from Europe.

What by rights should have been the most joyous moment in the whole history of our journey was turned, at a blow, into the most sorrowful and melancholy, on our learning, from the two foreign officers before us, that no news had come to hand of the *Antarctic* or her crew. This intelligence was such a shock to me, that I stood rooted to the spot, as one paralyzed. I could not but own to myself that the chances of ever seeing our comrades again were exceedingly remote.

The officers we were confronted by, who had such gloomy tidings to bring us, were Captain Irizar and one of the officers on board the Argentine frigate, the *Uruguay*. They had made the expedition for our sakes, and now invited us to accompany them home. Through them we learnt of the Swedish expedition, under command of Captain Gylden, also despatched to our relief. The *Uruguay*, however, had brought no letters or official communications for us.

The circumstances being as above related, there was practically nothing for us to do but gratefully to accept the proffered means of returning to civilized parts of the Earth. The day passed quickly, and towards evening the Argentine contingent returned to their vessel. That they might lose no unnecessary time on the way, I instructed Jonasen to put the dogs into the sledge and drive them across. Later in the evening we were each and all of us silently and thoughtfully



EMPEROR PENGUIN.

busy at work in our house, I myself being occupied with the report I was intending to leave behind us at Snow Hill for the guidance of the Swedish Relief Expedition, containing suggestions as to the best means of endeavouring to discover the fates of our comrades on the *Antarctic*, when suddenly the dogs outside began to howl fiercely.

The noise led to one of the party going to the door to look out, and on returning he announced that there were some people down on the ice. I at once framed and announced the supposition that it was merely Jonasen coming back, and that Captain Irizar had sent some of

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his crew with him to render us assistance in packing up our goods and belongings. We were all so engrossed in what we were doing, that we never even troubled to see if it was so or not. Then, however, such a long pause ensued, without anything further being heard, that eventually Bodman got up to make certain as to what was going on. All of a sudden, we were startled to hear from without wild yells and cries and hurrahs, among which the only distinct words we were able to catch were "Larsen, Larsen." We all instantly now left our several tasks with one ado and made for the open—and, lo and behold! whom should we see standing on a knoll in the wondrous half-light of an Antarctic summer night, but Captain Larsen himself and five of his men, weathered of feature and disreputable of garb, but sound and well of body and limb.

After an absence of almost two years, here they were again—turned up in the middle of the night succeeding the very day upon which we had received intelligence causing us to despair of ever seeing them again; they had at length reached us at the very juncture when relief and rescue were offered us, in which they too would now be able to share.

In course of time we obtained from them the details of what they had experienced and gone through during the period that had elapsed since they put Andersson and his companions ashore to make their way to us. They had first tried to circumnavigate Joinville island, but had very soon got stuck fast in the ice. With persistent energy they had nevertheless held to their course, and had succeeded in making some advance, so that, by dint of availing themselves of every opportunity that presented itself, they had ultimately got approximately on to a level with our station, and by help of the telescope had been able to distinguish the low hills in our vicinity. It was then misfortune overtook them. For several days the vessel was wedged fast in the ice, drifting they knew not where, owing to the snow-mist that prevailed all the time.

On January 10 a violent gale from the south arose and compressed the ice in the Erebus and Terror gulfs. The ice-blocks were piled higher and higher all around the long-suffering vessel; the stern was forced upwards more than 4 feet. Then there came a huge block of ice, loftier than the others, and with a long projecting ice-foot under the surface of the water. This monster struck the ship from beneath and broke the keel, tore up the bottom planking, bent the propeller-shaft, and so severely compressed the after-part that its timbers gave way and let in floods of water. The condition of the vessel and of those who manned her was now become desperate. All the pumps were brought into requisition, and everything was made ready for leaving her at the shortest notice, if need arose.

The end, however, was not to be yet. For upwards of a month

efforts were made persistently and continuously, both day and night, in the first place to get the vessel off the ice that had rammed her, and to stop the leak as successfully as might be, and subsequently to escape from the drifting ice, and, if all came to all, to run the vessel on to some shore, where her furniture, the food, and the collections might be brought into safety. All in vain, however. It proved impossible to use the engine, and with sails alone the ship was unmanageable in waters so crowded with ice. Finally, on February 12, it became clear that all hope was at an end. The vessel was moored to an ice-floe, everything that might come in useful was transferred from her on to the floe, the Swedish flag was hoisted, the moorings were let go, and all stood silently watching how the gallant ship, that had braved so many hard tussles with hustling ice and boisterous waves in polar seas both north and south, slowly and solemnly sank into her watery grave.

They now resolved to make for Paulet island, which, besides being the land nearest to their temporary refuge on the ice-floe, had also the reputation of being well supplied with both seals and penguins. The distance that separated them from the island was not more than 25 miles, yet it took them no less than 16 whole days and nights to reach it, though they laboured to the very utmost of their strength the whole time. Three large boats and an exceedingly heavy consignment of goods had to be dragged along across very uneven ice; occasionally they had to cross drifting floes at the mercy of the currents. The worst part of it was, that the whole sheet of ice was in motion, so that it happened sometimes that they were drifted out during the night a greater distance than they had succeeded in advancing during the day.

At last, on February 28, they arrived at an open lead under the shore. The boats were hastily stocked with everything they could carry, while the remainder of the cargo was piled up on the ice. In that manner they succeeded in setting foot upon shore. They were intending on the following day to row out and fetch the pile of possessions they had left on the ice, but unfortunately during the night a gale sprang up, which dispersed the ice in all directions, and they had to rest content with having saved themselves and the few things they had had with them.

Now they were obliged to turn their attention to using the brief period of good weather that still remained to such profit as to provide themselves with a dwelling-place and with food before winter set in. A house was erected with double walls of stone, and with a roof consisting of a couple of sails and some sealskins. Penguins there were great quantities of, but, unluckily, the seals were not so plentiful, and their paucity was a serious matter, as they were so badly needed to yield blubber for fuel. It is an important thing to bear in mind that for purposes of heating the penguins are totally useless. By reason of their

having such a scanty stock of fuel, they were reduced to only cooking once a day throughout the winter.

Time passed but slowly for them under such trying circumstances, with so many hardships to endure, and their spirits were naturally still further depressed when one of their number, the young sailor Wenersgaard, fell ill with some affection of the heart, to which he very shortly afterwards succumbed. In the sombre darkness of the depth of an Antarctic winter, he was laid to his rest beneath a stone cairn upon the shore.

But I will not stay to describe in detail the uneventfulness of that long and weary winter existence, but will rather pass on to the return of activity with the approach of spring. When the sun made its reappearance and began by degrees to climb higher and higher in the sky as day followed day, the penguins returned upon the scene, and the monotonous world around woke to fresh life. The first eggs that were available afforded an immense treat and were duly appreciated. By the close of October the ice had disappeared to such an extent that a boat could be launched. Larsen at once set off for our station, where he had turned up just at the right moment.

Amid, and in spite of, all the difficulties that their position entailed, they had nevertheless carried out a number of scientific tasks, as was the case, too, at Dr. Andersson's station. Of special interest are the meteorological readings which they registered, from the fact that they form so valuable a link between those taken contemporaneously at Snow Hill and in Scotia bay. In spite of the short distance, the average temperature on Paulet island seems to be several degrees higher than at Snow Hill.

There now remained nothing for us to do but to make all haste to get ready for embarking on board the *Uruguay*, so that she might proceed to Paulet island and bring off those of his crew whom Captain Larsen had left behind there. In the afternoon of November 10 we took leave of the spot where we had spent such a long time. Our feelings were not exclusively those of joy and happiness at being privileged once more to return to our friends and relatives at home; we could not altogether repress sensations of melancholy and regret at parting with the home we had called our own so long.

In the bustle of getting ready to depart, I had not found time for any sleep for a couple of nights, and the first on board was of brief duration, for I was anxious not to miss the impression that the approach to Paulet island affords. We rounded the last headland and came in sight of the island at about 4 o'clock on a brilliant summer's morning, with the sun just rising in the south-east. All of a sudden the unwonted sound of the vessel's steam-whistle rings upon the ears. Its effect is almost instantaneous, for we can observe how our long-lost comrades, twelve in number, who were doubtless lying dreaming of the

longed-for relief which they thought yet so far away, come hurrying out of the heap of stones which had constituted their abode, to find out whence the strange and all-but-forgotten noise comes from, before they are willing to allow wild hopes to arise in their breasts.

A few hours later we were all collected on the deck of the *Uruguay*, and a week afterwards were walking about in the verdant forests of Tierra del Fuego, with butterflies flitting around us, flowers blossoming at our feet, and birds singing above our heads. On November 23, the telegraph from Santa Cruz was able to convey the news of our safety and rescue to those at home.

It now only remains for me to touch upon the scientific features of our expedition. The time at my disposal, however, does not allow me to attempt to give a comprehensive survey of our results, more especially as reference has been made in the foregoing narrative to the kinds of work we were engaged upon from time to time and in our several localities, and also as I have already found occasion to deal with several points in connection with our work in the February issue of the *Geographical Journal*.

Besides the extensive researches carried out in South Georgia, and also in the Falklands and Tierra del Fuego, as well as in the seas around and between those pieces of land, and in addition to the meteorological and magnetical work pursued with regularity at our stations during two years, the interest of which I need hardly dwell upon in this assembly, the chief significance of the work of our expedition, geographically, lies, I take it, in the circumstance that we had an opportunity of studying the whole of the district in its separate zones so completely, that it should now be possible, not only to establish a detailed comparison between it and the American continent, but also to obtain a definite starting-point for all future Antarctic research work in that hemisphere.

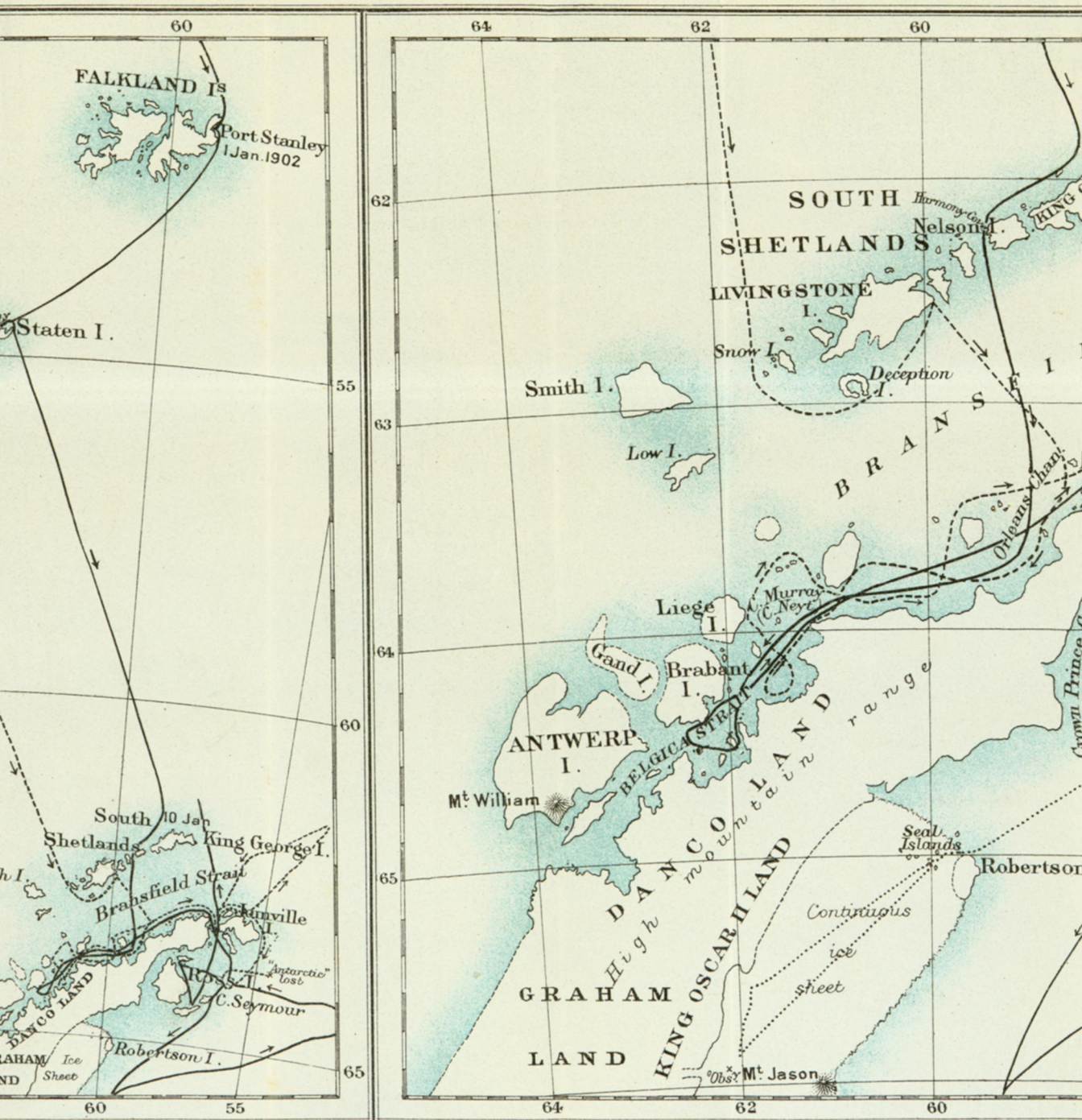
The whole of the mainland, and the majority of the islands lying nearest to it, have been mapped from the 66th parallel of south latitude and in connection with the area investigated by the Belgian Expedition. Furthermore, the seas that encompass those lands have been studied as regards their hydrography and their biology. Of our more detailed work the geological researches must be regarded as the most important.

The discovery of two fossil floras, one from the Jurassic period and one Tertiary, and the finding of richly fossiliferous marine deposits from both Cretaceous and Tertiary, lend a unique interest to this region, which will scarcely be surpassed by any other. If it is also remembered how favourable is the position which the region occupies, and what possibilities arise from the, comparatively speaking, extensive areas to be found here that are free from snow, it can scarcely be doubted that future expeditions will also here find plenty of scope for investigation and research.



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