Antarctic Exploration.

By C. E. Borchgrevink.

NANSEN'S remarkable and successful expedition forms an epoch in the history of Polar exploration, as well as a beginning of a new era in our knowledge of the globe we live upon, and of the laws that rule it. Of what is published up to date of the results of the Nansen expedition, we know that many former theories about those high latitudes have by Nansen's work been turned into facts, whilst others of them must now needs be abolished.

Some of the most important problems will, however, still remain unsolved mysteries; and they will be such until the time comes when observations within the Antarctic Circle will be at hand to distinguish between rules and exceptions. Only when we have sufficient news from the Antarctic regions will the work done in the Arctic acquire its value, by the comparison of the conditions which exist at the two Poles. And proportionally with the growth of our knowledge of Arctic phenomena, the want and necessity of Antarctic work is felt.

C. EGEBERG BORCHGREVINK.
From a Photo. by Johnstone & Co., Melbourne.

Apart from the tremendous geographical interest which Antarctic exploration possesses, there is a vast open field for scientific research in those southerly regions, with the maximum interest of the whole scientific world concentrated on magnetical observations. On South Victoria Land, 2,500 miles south of Australia, or as far from that British Colony as New York is from Liverpool, lies the yet undiscovered South Magnetic Pole, the culminating point of terrestrial magnetism in the south.

It was one of the main objects of the *Erebus* and *Terror* expedition to determine the exact position of this Pole, but although its variable position was approximately determined by Sir James Clark Ross by help of the dip-compass, the main work is yet to be done. Until this work has been accomplished, our knowledge of terrestrial magnetism and navigation will be at fault, in so far as the periodical variations of the direction of the magnet-needle can only be approximately reached by calculations.

It is an interesting fact that the north-eastern point of South Victoria Land is not situated much farther south of the Equator than is the north of Norway north; that is, the 7th parallel. The regions of the southern hemisphere are, however, comparatively colder than the corresponding ones in the northern hemisphere. The great difference in the average temperatures in the corresponding latitudes of the northern and southern hemispheres is partly to be ascribed to the existence of great warm currents in the north which are lacking in the south, and partly to the existence of much more land on the northern part, and to the equality of its distribution over the area of that semi-globe. In the 70th parallel north, trees up to 30ft. are to be found; while at Cape Adair, that is, in 71° 23′ south, I only found lichen. The presence of lichen does,

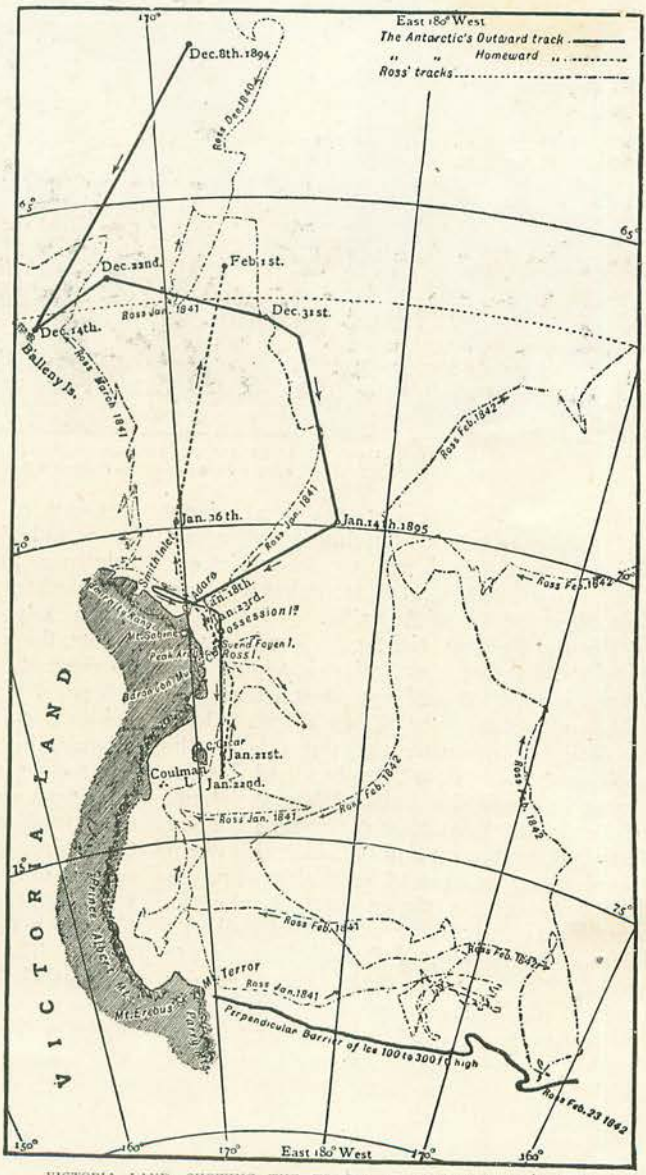
however, in a considerable degree increase those possibilities of successful exploration which we, from Sir James Clark Ross's expedition, should expect.

The reason why so few expeditions have investigated those southern lands is principally to be ascribed to their great distance from the centre of civilization, and to the fact that the civilized population of the south has hitherto had both thoughts and energies entirely occupied by its nearest surroundings, through the necessity of conquering the difficulties and securing the riches of those new countries where they landed as emigrants, and where immediate gain, with the least possible risk, was the one purpose.

At present there seem to be on foot both national and private attempts to organize Antarctic expeditions, and I venture to say that those observations I personally made at South Victoria Land in 1895, and had the honour of laying before the International Geographical Congress, in the Imperial Institute, have stimulated the interest which the world at present takes in Antarctic work — partly because most of my observations corresponded with those made on board the *Erebus* and the *Terror*, and partly because I succeeded in bringing new facts to light. From being an imaginary mine on the scientific "Exchange," South Victoria Land commands at present both scientific and commercial attention. Since men of thought directed the force of their philosophy towards the Poles of the earth, it has been expected to discover land round the southern end of the axis of rotation; it was naturally to be expected, according to the rules of gravitation.

In my opinion the great southern continent is the Greenland of the south, with just as many possibilities. I do fully believe that hitherto unknown animal life will be found on South Victoria Land. Captain Larsen on the whaler *Jason* brought back petrified wood from Graham Land, south of Cape Horn, which fact of course proves great climatic changes in those regions during succeeding periods.

As our knowledge of the great southern continent now stands we must believe it really to be a continent, and not a mere accumulation of islands; as well from the appearance of the land, as it has been sighted nearly all round, as also from sea-



VICTORIA LAND—SHOWING THE TRACKS OF BORCHGREVINK'S SHIP, THE "ANTARCTIC."

BORCHGREVINK GIVING THREE CHEERS FOR SIR JAMES CLARK ROSS ON POSSESSION ISLAND.
From a Drawing by C. E. Borchgrevink.

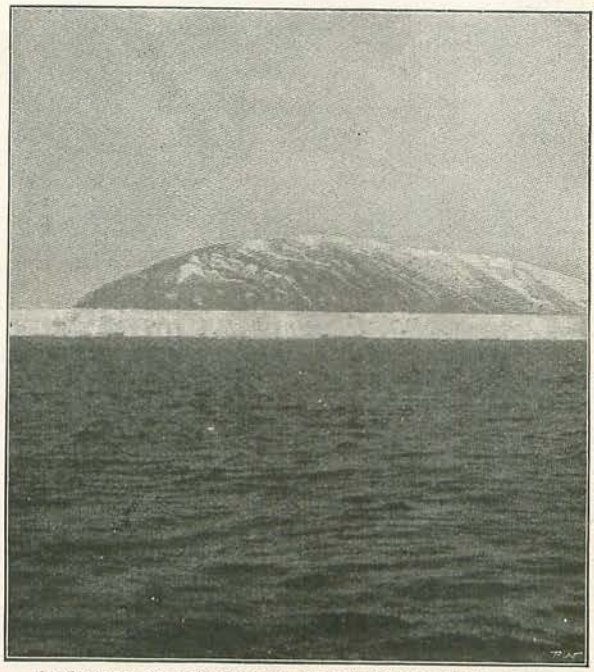
soundings; and last but not least, from the nature of those specimens of rocks which I brought back with me from Victoria Land. If it is all land it is probably of an area twice the size of Australia.

Already the first sight of Victoria Land convinces one that it is of volcanic origin. The volcanoes of Victoria Land show a tendency to follow the same line. From Mount Sabine to Mount Melbourne the trend is south-south-westerly. Mount Erebus and Mount Terror lie almost due south of Mount Sabine. Further north from Mount Sabine the great earth-fold, on the septum of which this chain of volcanoes is situated, probably bends a little westwards, as shown partly by the surroundings, partly by the position of Balleny's Island. North-west of Balleny Islands the great fold trends perhaps to the knotting point between the Tasmanian axis of folding and that of New Zealand, the former perhaps running through Royal Company Island, and the latter through or near Auckland Island and Macquarie Island. The knotting point would probably be somewhere (approximately) near the intersection of the 60th parallel of south latitude, with the 150th meridian of longitude east from Greenwich. It would just join the line of extinct volcanoes along East Australia on the west, and, perhaps, the active volcanic zone of the North Island of New Zealand, or at all events, the fold which bounds that continent on the east.

Traced in the opposite direction, the volcanic zone probably runs through Seal Islands, the active volcanoes of Christensen and Sarsee, and through Mount Haddington, an extinct volcano in Trinity Land, to Paulet and Bridgman Islands, active volcanoes. The volcanic zone bends easterly from here on account of the easterly trend in the fold, which appears to make a loop towards South Georgia before it swings back towards Cape Horn. That there is a real easterly trend in the earth-fold at Trinity Land and the South Shetlands is proved by the observations made by the *Astrolabe* and *Zélée* expedition, which record a strike in a north-north-east and south-south-west direction to the greyish-white limestones and phyllite-schists at the South Orkneys. Towards Cape Horn from near South Georgia the fold probably trends west-north-westerly, then follows an approxi-

mately meridional direction parallel with the chain of the Andes.

It may be noted, however, that whereas the Erebus chain of Victoria Land is on the east side of the fold, the Christensen-Bridgman group are apparently on the opposite side. This may be due to the fact that at the latter locality the eastern slope of the fold is steeper than the western, as seems probable from the presence of the deep ocean abyss east of Graham Land, as shown on Dr. Murray's map. It is probable, therefore, that the volcanic chain of Victoria Land will continue towards the South Pole, probably bending somewhat to the eastward, and will thence change its position to the fold on the other side of the Antarctic continent, so as to run through the Christensen-Bridgman line of volcanoes. In any case it is almost certain that high land, covered, of course, more or less by snow and glaciers, will be found at the South Pole.



CAPE ADAIR—THE FIRST AND ONLY PHOTOGRAPH TAKEN OF THE SOUTH VICTORIA CONTINENT.

Many theories have been formed as to the origin of that ice-free bay which exists near Victoria Land, and which stretches from lat. 70 down to 78. I maintain the belief, resting on my own observations, that a north-easterly running warm current is the main cause of it. Dr. Nansen's observations in the North Polar Basin are therefore especially interesting to me, in regard to the existence of relative warm currents at those high latitudes. Thus, when Professor Mohn, at Christiania University, writes that Nansen through his discovery of those currents upset all former oceanographic theories, it is but what my observations in the ice-free basin at Victoria Land did one year before we heard of the *Fram*, and I gave some time to this same discovery in my lecture before the International Geographical Congress in London.

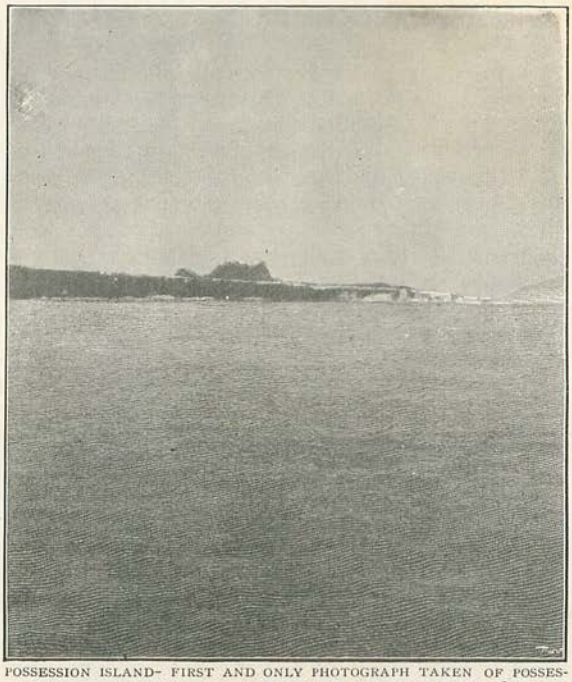
The relatively startling high temperatures which Nansen observed in the northern waters were all taken from great depths, and in so far his observations are not synonymous with mine in the south, which were taken near the surface; but the mere fact that warm currents do exist within the North Polar Basin proves to me that my observations were not merely exceptions but rules; the temperature was even high enough to allow of the existence of a live blue jelly-fish, and to promote the growth of sea-weed on the shores of the southern continent. It is not only the fact that new discoveries in the north are incomplete without similar observations in the south which urges on Antarctic research, but on the southern hemisphere nations are also beginning to see the importance and necessity of knowing the regions where laws of Nature are laid down which not only influence but rule their daily life.

In a country like Australia, the want of meteorological observation within the Antarctic Circle is keenly felt. The good and bad times in the Australian Colonies are, so to say, entirely dependent upon the foresight of the weather. When drought or floods set in, the Australian squatters may in one season lose more than what has been gained during a lifetime.

Although the Government Meteorologist of Queensland, Mr. Clements Wragge, has greatly increased the sources from which he draws his well-known reliable weather prophecies, by the erection of a meteorological station on Mount Wellington, in Tasmania, he himself confesses that his work cannot achieve its full value until news from the Antarctic Circle enables him to finish the construction of the weather isotherms and isobars for the latitudes between 50° and 80° south. Mr.

Wragge is endeavouring at present to raise the funds necessary for the erection of a similar weather station to the one on Mount Wellington, to be put on Mount Kosinsko, in New Zealand.

The honour of being the first man to discover the Antarctic Continent probably belongs to Captain James Cook, who, in the year 1772, reached latitude 71°10′ S. in longitude 106°54′ W., where he sighted the great ice barrier which forms the seaward boundary of Antarctica. Speaking of this discovery, Sir James Clark Ross says: "I confidently believe that the enormous mass of ice which bounded his view when at his extreme south latitude was a range of mountainous land covered with snow." In 1819 William Smith, in the brig *William*, discovered the Archipelago of the South Shetlands, south of Cape Horn. In 1820–23 Weddell visited the South Shetlands, including the active volcano Bridgman. Powell, the discoverer of the South Orkneys, visited the volcanic island of Bridgman in 1822, and found it to be at that time 200ft. high.



POSSESSION ISLAND- FIRST AND ONLY PHOTOGRAPH TAKEN OF POSSESSION ISLAND, WHERE SIR JAMES CLARK ROSS LANDED IN 1841, AND PLANTED THE BRITISH FLAG.

Weddell, who visited it during the following year, estimates its height at 400ft., and describes the island as being of sugar-loaf shape, whereas at the time of Powell's visit there was a crater on the west side of the island. Weddell penetrated to 74° S. in 1823, thus attaining a higher latitude than Captain Cook, but he saw no land anywhere in that neighbourhood. In 1831 Biscoe, in the brig *Tula*, discovered Enderby Land. In 1839 Balleny discovered Balleny Islands, a volcano 12,000ft. high, and adjoining it the active volcano of Buckle Island. In 1839 the important French expedition under Dumont D'Urville explored the South Shetlands. In 1840 Commander Wilkes, in the U.S.A. corvette *Vincennes*, discovered Wilkes Land.

In January, 1841, Sir James Clark Ross made his memorable discovery of Victoria Land. With the object of trying to find the South Magnetic Pole, as he already had found the North Magnetic Pole, he forced his well-fortified ships through the pack-ice, which he encountered in latitude about 67° S., and longitude 174½° E. It was a very formidable pack. In four or five days, however, he forced his way through it, and entered comparatively open water beyond, a great ocean pool about 600 miles in diameter. Bounding this on the west was the magnificent chain of snow-clad volcanoes of Victoria Land. Ross traced the coast for 500 miles southwards until he encountered the Great Ice Barrier, terminating sea-wards in a sheer wall of ice, from 180ft. to 200ft. high. His dredging showed that marine forms of animal life, especially polyzoa, were abundant right up to the edge of the Great Ice Barrier. Ross states that on January 19th, 1841, when off the coast of South Victoria Land, in latitude 72° 31′ S., longitude 173° 39′ E., the dredge was put over in 270 fathoms water, and after trailing along the ground for some time was hauled in.

In 1874 H.M.S. *Challenger* visited the neighbourhood of the supposed Termination Land of Wilkes. In 1893–94 the whaler *Jason*, with Captain C. H. Larsen, visited the north-western portion of Antarctica.

The important discovery was made by Dr. Donald of lower tertiary rocks within the fossil shells "Cucullœa" Natica and Cytherea *in situ* at Cape Seymour. Fossil wood was found imbedded in the tertiary rocks at a level of 300ft. above the sea-level. A new active volcano, named by Captain Larsen "Christensen" Volcano, was discovered in lat. 65° 5′ S., long. 58° 40′ W. On the

THE "ANTARCTIC" IN THE ICE-PACK OFF BALLENY ISLANDS.
From a Sketch by C. E. Borchgrevink, made December 14th, 1894.

sketch chart accompanying Captain Larsen's paper another active volcano is shown, also Windberg Volcano and the four Seal Islands, all of which are considered to be of volcanic origin, if not dormant or extinct volcanoes.

This is in short what had been done before I visited South Victoria Land in the steam whaler *Antarctic*. South Victoria Land, as it appeared to me, rose from the sea generally in very steep basaltic rocks, but at places we found also that the land ran out into quite low peninsulas, especially near the mouth of the fjords, of which several were observed.

Professor Mohn, in his article on Nansen's discoveries in the October number of the *Geographical Journal* (translated from the Christiania *Morgenbladet*, September 6th, 1896), writes that, during the *Fram's* drift towards the North Pole, "the expedition made its greatest discovery, namely, *a wide deep sea towards the North Pole*, having a relatively warm temperature in its depths."

I have already touched upon the importance of the discovery of the high temperature observed, and upon the similar conditions in the south; but what deserves an equally important space in this work of comparison is Dr. Nansen's *deep-water soundings* in those high latitudes. Although new and of great consequence, they did not surprise me—indeed, they were to be expected, in consideration of the already "known" larger accumulation of land on the northern hemisphere, as well above as under the sea-level. Should even the North Polar Basin have been a shallow pond, I do not see how even a continent like Antarctica (twice the size of Australia) should have counteracted the weight of the northern semi-globe, as nowhere do deep-water soundings result in greater figures than in the southern oceans; thus, whilst 2,000 fathoms are mentioned as remarkable in the north, they are but comparatively shallow measurements in the south.

Why My Antarctic Expedition Plans in 1896 Were Not Realized.

When I arrived in London in August, '95, I was invited to lay the result of my voyage in the *Antarctic* before the International Geographical Congress. Afterwards I intended to work together the funds for a new Antarctic expedition. This plan I followed, and after seeing the hearty way in which my modest work in the *Antarctic* was received at the Imperial Institute, as well as at other scientific meetings all over the world, I expected that only few difficulties would be laid in my road.

A proposal was soon made to me, to the effect of co-operation in my expedition plans, by an Antarctic Company. The company was to utilize the news which I had brought from the peninsula at Cape Adair, and was supposed to be floated with the object of working the guano deposits there. I was to get £5,000 from the Antarctic Company as a reward for my reports upon the guano, and as a remuneration for services granted in connection with gaining a Government concession. The £5,000 I determined to use for the benefit of my proposed Antarctic expedition of discoveries.

Furthermore, my scientific expedition was to be conveyed to South Victoria Land by the company's steam whalers, thus enabling me to organize my enterprise for a much smaller amount than if I had to procure my own vessels. At last I saw a prospect of getting my plans through by going hand in hand with commerce, an illusion from which my bitter experiences in the whaler *Antarctic* ought to have saved me. In all good faith I assisted in obtaining a Government concession of the guano-beds at Cape Adair. The concession was granted with my name left out of it, and, alas! with my co-operator from the City mentioned in the official document as discoverer of my discoveries. However, with my heart in the enterprise I pocketed my pride, collected £4,000 for my scientific expedition, and awaited with eagerness the forming of the Antarctic Company.

The company's prospectus for private use came out with a proposed capital of £100,000 ready for under-writing. It is unnecessary to say that it never was floated —was it ever intended to be?

Time went on, and it got too late for me to reorganize my expedition plans for the year 1896, as it was necessary for me to reach Victoria Land during the Antarctic spring—that is, in December.

In the meantime I had twice had very good news from Australia, where efforts were being made for the purpose of raising the necessary funds for me, and I put myself in cable communication with the Hon. H. J. Reid, the Premier of New South Wales, who took, and still takes, a vivid interest in my work for the Antarctic cause.

Assistance from Australia did not, however, come in time to allow me to sail southwards last season. Thus has my hard work for a recognised good cause been delayed—who knows for how long? But another fifty-four years will not elapse before justice is done to that work which so bravely was begun by an illustrious Briton, Sir James Clark Ross, and I believe that to some extent I have personally shortened the period of waiting.

I have been reproached because I tried to make commerce serve scientific ends. How long shall then commerce continue to benefit by science without paying its tribute to new discoveries? Edison said, some time ago, "Only when we learn to know electricity and magnetism in their homes in the Arctic and Antarctic regions can we hope to realize the full use of these powers."

From a Sketch by] DOUBTFUL ISLAND—WITH THE COAST OF VICTORIA LAND AT THE BACK. *[C. E. Borchgrevink.*

My Present Plans.

During the next four months, I expect to have raised my funds sufficiently to allow me to charter a steam whaler, for the sole use of my exploring expedition during one year in the Antarctic regions.

While the main object of the expedition will be to collect scientific data, full attention will also be given to further investigation of the commercial possibilities of the southern seas, of the islands, and of the shores of Victoria Land, and the ship will therefore be

fitted out with the necessary implements for such research. I still maintain my belief in a future for commercial energy in those parts, both in regard to the guano-beds and also in respect to whaling and sealing.

However, my scientific staff, which I wish to consist of twelve efficient men, will have their entire energy directed to scientific research. I propose to land at Cape Adair, with an adequate outfit of instruments, provisions, dogs, and sledges, and to establish my winter quarters at that spot. Semi-globular huts constructed on the Eskimo principle, and built out of hardwood, will be taken with us for the purpose of sheltering my staff, and also some live stock, which I intend to take with me.

As soon as the provisions and implements of the main camp have been landed, the vessel will proceed southwards with its crew, myself and three of my staff, if possible, as far as 76° S., where my companions and I will be landed (all must necessarily be snow-shoe runners), with our instruments, dogs, sledges, and provisions and other necessaries for the inland journey towards the South Magnetic Pole.

If I succeed in landing on Victoria Land at that latitude, I shall have to cross about ten degrees of longitude in a westerly direction to reach the place where the South Magnetic Pole (according to dip-compass observations) ought to be situated in lat. 75° 5′ S., long. 150° E., or about 150 English miles; the longitudes at 76° S. being about 15 miles apart.

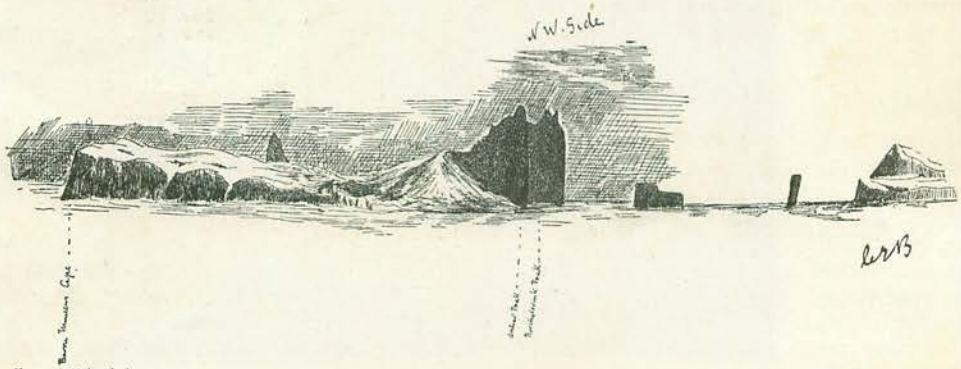
I hope to have covered the distance inland and back in two months, in which time I shall have made the necessary magnetic observations, and again join the camp at Cape Adair before the Antarctic winter sets in.

My scientific staff at Cape Adair will meanwhile have been occupied in exploring the Bay at Victoria Land, in taking deep-water soundings, investigating the fjords, and in collecting specimens of the fauna and flora, besides making pendulum observations, taking meteorological data, etc.

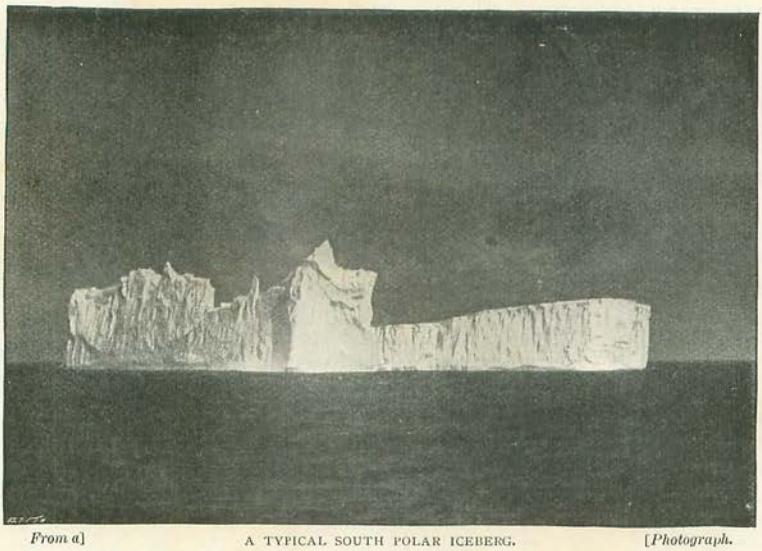
I think it desirable that the whaler should return to Australia, or Tasmania, shortly after having landed my scientific expedition on Victoria Land; both because it would be safer for the vessel, and because it could do some valuable work among the islands between Australia and Victoria Land during the latter part of the Antipodean winter. It would be safer, because it would avoid the danger of the ice-pressure in winter, and because it could start fresh for Victoria Land the succeeding spring for the purpose of bringing the members of the expedition back to civilization.

EAST SIDE OF POSSESSION ISLAND.

In zoological direction I expect great discoveries to be made, especially on the Victoria Continent itself. So far we know that the Antarctic Circle is the home of fish, whales, seals, and birds of the most widely differing kinds, but undoubtedly there are also in those regions hitherto unknown mammals. Amongst the birds, the penguins seem the most numerous, especially the "Eudyptes Adeliæ," which formed the entire



From Sketches by] POSSESSION ISLAND. *[C. E. Borchgrevink.*



From a] A TYPICAL SOUTH POLAR ICEBERG. *[Photograph.*

had stuffed fish down the bird's throat, and also that this unhappy visitor from the Antarctic regions had been condemned to walk about on hot asphalt, with only a small pond of fresh water to cool its Antipodean thirst.

Penguins do not live on fish, as some people believe. I opened the bowels of nearly every penguin we killed on our voyage, and never found fish there, only crustaceans and pebbles, or pebbles only. That small incident could not but strike me as a curious proof of how little we know of regions and conditions which are not alone far from indifferent to us, but which interest us, affect us, and rule our daily life.

population of Possession Island, and of the mainland. In this connection it may be interesting to mention a rather curious incident which came under my notice after my return to London. I visited the Zoological Gardens in mid-summer, where an Emperor penguin (a specimen of "Aptenodytes Forsterii") was in the act of making most alarming preparations for departure to a better and cooler world. The keeper expressed great astonishment at the sudden death of his protégé, an astonishment with which I could not sympathize, after hearing that for the last fourteen days he

From a] A TYPICAL SOUTH POLAR ICEBERG. *[Photograph.*