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MARCH, 1898.

VOL. XI.

JOURNEYS IN NORTH GREENLAND.

By Lieut. E. A. PEARY, U.S.N.*

I ASSURE you it was not because I did not wish to come that I have not been here before this. I did wish to get here and have the pleasure and the honour of addressing this the first Geographical Society in the world. But, as your President has just said, one thing or another prevented. I have that pleasure, that honour, to-night. I feel that my subject to-night is one that puts me in sympathy with you and you with me. It is a subject in which the British nation is interested, and in which it has felt the deepest interest for centuries. I feel that I stand here to-night in the focus of centuries-long efforts in the arctic regions, and I believe that I speak within bounds when I say there are no pages in England's history of which she is prouder than those on which are written the splendid efforts of her gallant sons in the region of midnight suns and noonday nights.

It is of course impossible, in the limits of one evening, to cover all the points of interest or meet all the interrogations which occur to a large assembly of intelligent minds in connection with such an attractive subject. I have more ground than is usual to cover, from the fact that I have several expeditions to speak of. What I shall attempt this evening is to give you very briefly, yet I trust clearly, a *résumé* of what I have done thus far in the arctic regions, and a synopsis of what I propose to do in the future; and then, with the assistance of the illustrations which I have, endeavour to give you absolutely accurate and

* Paper read at the Royal Geographical Society, December 6, 1897. Map, p. 235. See also map, *Geographical Journal*, vol. ii. p. 384.

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definite ideas of the land, the people, and the real phases of life and work in the northern portions of Greenland.

My arctic work comprises—

1. A summer voyage and reconnaissance of the Greenland inland ice in 1886.

2. A thirteen months' sojourn in Northern Greenland, including a 1200-mile sledge journey across the ice-cap, and the determination of the insularity of Greenland—1891-92.

3. A twenty-five months' stay in North Greenland, including a second 1200-mile sledge journey across the ice-cap; the completion of the study of the Whale sound natives; a detailed survey of that region, and the discovery of the great Cape York meteorites—1893-95.

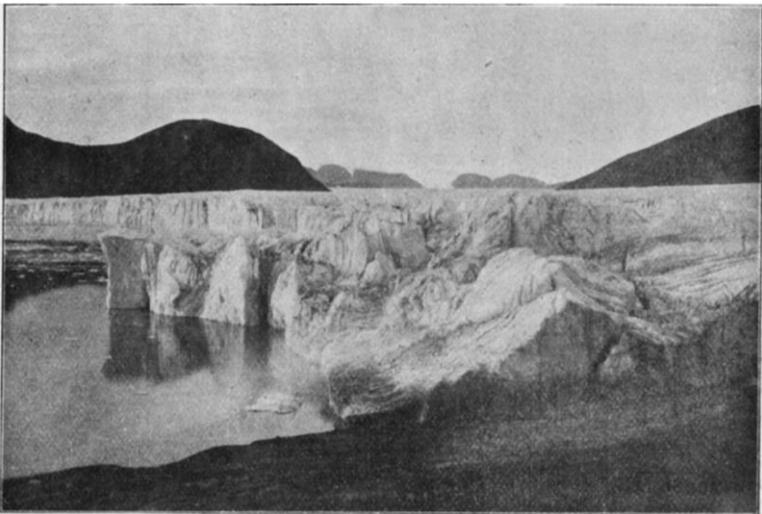
4. Summer voyages in 1896 and 1897, including the securing of the last and the largest of the great meteorites, the 90-ton mass.

Before taking up these expeditions in their order, I will attempt to bring home to you a realistic conception of what Greenland is actually like. Of course we all have a general idea of Greenland, and know that its interior is covered with snow and ice, yet the actual facts are so different from anything existing in lower latitudes, so entirely dissimilar from anything with which we are personally acquainted, and which we might use as a foundation from which to start our conception, that I doubt if one in ten even of the best-read has a true conception of the actuality of this great arctic island continent.

All that there is of land, as we understand the term, in Greenland is simply a ribbon 5 to 25 (and in one or two places 60 to 80) miles in width, made up of mountains and valleys and deep branching fjords; ribbon surrounded by the arctic sea, playground of the iceberg and the pack-ice, and itself in turn surrounding and supporting, like a Titan dam, the great white ice-cap beneath which the interior of the country is buried. When I say this, I am sure most of us immediately think of some particularly mountainous region with which we are familiar, as, for instance, the highlands of Scotland, the Alps or the Pyrenees, covered several hundred feet deep in snow and ice, yet still retaining the original irregularities of the region. Such a mental picture, however, would in no way represent the conditions of interior Greenland. There the accumulated snow-precipitation of centuries, in a latitude and altitude where it is practically correct to say that it never rains, and the snow does not melt even in the long summer day, has gradually filled all the valleys of the interior until it has levelled them even with the mountain summits, and, still piling higher through the centuries, has at last buried the highest of these mountain summits hundreds and even thousands of feet deep in snow and ice.

The interior of Greenland to-day is simply an elevated unbroken plateau of snow lifted from 5000 to 8000 and even 10,000 feet above the level of the sea; it is an arctic Sahara, in comparison with which

the African Sahara is insignificant. For on this frozen Sahara of inner Greenland occurs no form of life, animal or vegetable; no fragment of rock, no grain of sand is visible. The traveller across its frozen wastes, travelling as I have week after week, sees outside of himself and his own party but three things in all the world, namely, the infinite expanse of the frozen plain, the infinite dome of the cold blue sky, and the cold white sun—nothing but these. The traveller, too, across this frozen desert knows that at no time during his journey are the highest rocks of the mountain-summits below him nearer than from 1000 to 5000 feet down through the mighty blanket of snow. Such is the interior of Northern Greenland; and it is upon the surface of this



BOWDOIN GLACIER.

uplifted desolation, in nearly straight lines at a constant elevation of from 5000 to 8000 feet above the level of the sea, that my sledge-journeys have been made, in widest contradistinction to the road of the usual arctic sledge-party—the frozen surface of the polar sea, at the sea-level, along and outside of the ragged periphery of an arctic coast-line.

The object of my work in 1886 was to satisfy myself by personal observation as to the actual character of the Greenland inland ice, in regard to which there were conflicting reports. The summer's work covered a voyage from Newfoundland to Disco bay, Greenland; a stay of three months in that country, in which time was effected a reconnaissance of the inland ice; and then two and a half months on a whaler along the west coast of Baffin's bay and Davis' strait. Lack of space compels me to note only the work which was the main object

of the voyage—the reconnaissance of the inland ice—and that in the briefest manner.

This reconnaissance was made from the head of Pakitsok fjord, about the middle of Disco bay. Starting July 5 with one companion, Christian Maigaard, a young Danish officer resident in Greenland, ourselves dragging the sledges, on which were loaded our provisions and equipment, we reached, at the end of twelve days, a point 100 miles from the edge of the ice and 7525 feet above the level of the sea. Our course had been true east the entire distance. Here we were storm-bound four days, and then consumed five days returning to the land. The details of this journey are to be found in the proceedings of the



GNOME GLACIER.

American Geographical Society. I shall note here only the significance of, and results flowing from, this journey.

The elevation reached was greater than that attained by any previous explorer on the inland ice. For the first time the deep, unchanging, incoherent snow of the central plateau was reached, and my upward and return journeys between the land and this interior *névé*, separated as they were by a period of some three weeks, enabled me to present for (to the best of my knowledge) the first time, a clear conception of the different zones and varying conditions existing between the edge of the "Great Ice" and the unchanging snow of the interior.

The characteristics of such portions of the "ice-blink" as came under my personal observation may be stated as follows: The coast-line shows a great diversity of features dependent upon the altitude, the season, and the elevation and configuration of adjacent mountains.

Wherever the ice projects down a valley in a long tongue or stream, the edges contract and shrink away from the warmer rocks on each side, leaving a deep cañon between, usually occupied by a glacier stream; and the upper surface, disintegrated by the reflected heat of the mountains above, and shattered by the daily change of temperature—more, perhaps, than by the outward flow—presents a chaotic labyrinth of crevasses, gullies, and ragged pinnacles, increasing in magnitude in direct proportion to the length of the tongue and its approach to sea-level. Smaller tongues or teats, rounding down into shallow indentations in the crest of the mountain-dam, are apt to leave only their tips ragged, and their upper surfaces covered with a network of narrow



ESKIMO HOUSE-BUILDING.

crevasses. Higher up, along the unbroken portions of the dam, where the rocks have a southern exposure or rise much above the ice, there is apt to be a deep cañon between the ice and the rocks. The bottom of the cañon is almost invariably occupied by water. Where there are no adjacent rocks higher than the ice to push it back with their reflected heat, the ice will reach down upon the rocks in a dome-like slope. Frequently drifts of fine hard snow extend like causeways from ice to rock, through the bases of which the littoral glacier streams tunnel a passage. Still farther up, at the very crest of the dam, the ice lies smoothly against the rocks. As to the features of the interior within the coast-line, the surface of the "ice-blink" near the margin

is a succession of rounded hummocks, steepest and highest on their landward sides, which are sometimes precipitous. Farther in, these hummocks merge into long flat swells, which in turn decrease in height towards the interior, until at last a flat gently rising plain is reached, which doubtless becomes ultimately level.

In passing from the margin of the "ice-blink" to the remote interior, from one to five distinct zones may be noted, the number and width varying with the season, the latitude, and the elevation. In winter the entire surface is undoubtedly covered with a deep unbroken layer of fine dry snow. Late in the spring, the warmth of the sun at mid-day softens the surface of the snow along the lower borders of the ice, and this freezes at night, forming a light crust. Gradually this crust extends up the interior, and with the advance of the season the snow along the borders of the "ice-blink" becomes saturated with water. A little later this zone of slush follows the zone of crust into the interior, the snow along the borders of the "ice-blink" melts entirely, forming pools in the depressions, and streams which cut deep gullies in the ice; water cavities form, old crevasses open, and new ones appear. This zone rapidly widens and extends into the interior in the footsteps of the others, and behind it the immediate border of the ice gets ragged and soiled; pebbles, boulders, and moraines crop out of its melting surface; and by the end of the arctic summer it is eaten and shattered by the heat, and eroded by the streams into impassable roughness.

This journey satisfied me as to the general characteristics of the "Great Ice;" showed me that ideas and theories which I had advanced, previous to undertaking the voyage, were in the main correct; impressed upon me that the inland ice presented an "imperial highway" by means of which to reach and determine the northern extension of Greenland, a problem which your distinguished President has characterized as second only to the attainment of the pole itself; gave me an invaluable fund of actual personal experience; enabled me to formulate a general plan for the complete exploration of Greenland; and laid the foundation for the persistent and systematic attacks which I have made and shall still make upon the unknown portions of Greenland and the adjacent lands to the north.

Returning from this voyage, I prepared three or four desirable routes for overland sledge journeys, which should complete our knowledge of Greenland:—

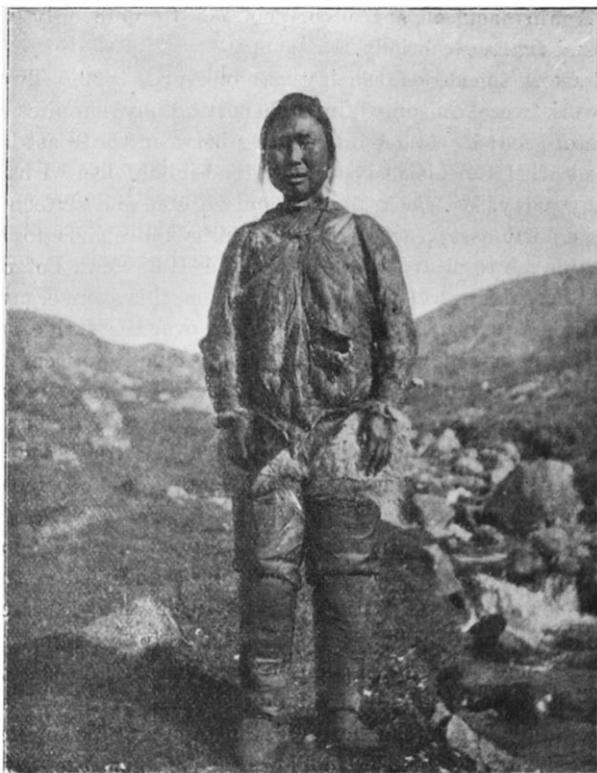
1. For the simple purpose of accomplishing the feat of crossing Greenland—the route from the south-east angle of Disco bay to Cape Daw (this route was attempted two years later by Nansen, but, deflected by hostile conditions, he effected a crossing much farther south on a shorter route).

2. For the purpose of obtaining a transverse profile of Greenland—

the route from the base of Nursoak peninsula to the head of Franz Joseph fjord.

3. For the purpose of determining the northern extension of Greenland and completing the gap in its northern and eastern coast-line—a route from Whale sound parallel with the north-west coast to the northern terminus (this journey was accomplished by me five years later).

Returning from the voyage of 1886, the demands of the service kept



ESKIMO WOMAN, WHALE SOUND.

me fully occupied for five years. At last, in 1891 I found the opportunity of carrying out my constantly cherished project of a march from Whale sound across the inland ice of Northern Greenland to the northern terminus of that country, and the result was the North Greenland Expedition of 1891 and 1892.

The main object of this expedition was the determination of the northern limit of Greenland, and its fundamental feature was the utilization of the surface of the interior ice-cap as my highway to the objective point. My party comprised seven persons: Dr. F. A.

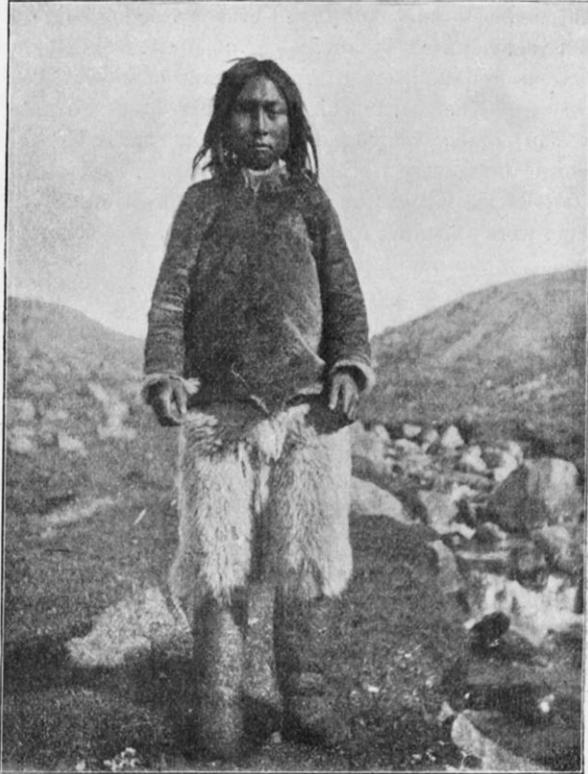
Cook, Langdon Gibson, John M. Verhoeff, Eivind Astrup, Matthew Henson, Mrs. Peary, and myself. My programme was to proceed in my ship to Whale sound, winter there, start early the next spring, make my northern journey over the ice-cap, and return to my winter quarters the same season. This programme was carried out on schedule time, in spite of the serious handicap resulting from the breaking of both bones of my right leg on the upward voyage, my landing a helpless cripple strapped to a plank, and my consequent incapacitation for serious exertion during the remainder of the first season. Again lack of space compels me to note only the ice-cap journey, and that very briefly.

The start was made on the last day of April, 1892. Two weeks of hardest work were consumed in transporting my supplies across the succession of great ice-domes intervening between the coast-land ribbon at the head of McCormick bay and the true inland ice. I had with me three of my party, Mr. Cook, Astrup, and Gibson, and sixteen dogs. My course was north-east true, which, assuming the charts to be correct, should enable me to clear the heads of the Humboldt, Petermann, and Sherard Osborn indentations. Advancing on this course, much to my surprise, I found myself almost immediately over the divide, at an elevation of somewhat less than 5000 feet, and gradually descending toward the Humboldt glacier basin. Hardly had I lost sight of the Whale sound land before the distant peaks of the Rennselaer harbour coast rose into view. After a gradual descent to an elevation of about 3500 feet, the surface of the ice became nearly constant as to elevation across the Humboldt glacier plateau.

On May 24, at a distance of 130 miles from McCormick bay, all my boys having volunteered to accompany me, I selected Astrup as my companion for the long journey, and Gibson and Cook returned to Redcliffe. Two marches beyond this we began climbing again, and on the last day of June had passed out of the Humboldt depression, and from the plateau south-east of Petermann, at an elevation of 4200 feet, looked down upon the head of that fjord and the great glacier discharging into it. Still ascending, we reached the divide at an elevation of 5700 feet, June 5, and then began descending into the St. George's and Sherard Osborn depressions. Unfortunately, the next two marches were made in cloudy weather, and I got too deeply into the depression and too near the centre of ice-movement. As a result, about ten days were lost in getting out again and back on to the crevasse-free level heights farther inland.

Again setting my course to the north and north-east, everything went smoothly for several days. We climbed gradually and easily over the highest divide we had yet encountered—something over 6000 feet in elevation—and were descending slightly towards the north-east, when, on June 26, in lat. $82^{\circ} 12' N.$, I was discouraged to see the land which

had been occasionally visible to the north-west rise into view north and north-east. Advancing a short distance farther, the entrance of a large fjord came into view in the north-west, and soon after the land rose into view north and north-east, with the depression of the fjord beyond it. I then deflected my course to the east, and soon found the land, and the fjord beyond it, again confronting me; deflecting still more, this time to the south-east, I advanced until July 1, when a broad break in the land beyond the fjord was visible



ESKIMO YOUNG MAN, WHALE SOUND.

opening out to the north-east, and I immediately made for the land, with the intention of reaching this opening. After reaching the inner edge of the land-ribbon, where the inland ice came down against the slope of the mountains at an elevation of about 4000 feet, we were obliged to travel some 25 miles over the mountain crests and ridges before reaching a summit which gave us an unobstructed outlook over the great bay stretching out to the north-eastward. These 25 miles, over a surface consisting of sharp rocks of all sizes, were extremely trying to Astrup and myself. The fatigue of climbing

with our heavy packs and hampered by the dogs, which we were obliged to take with us, was greatly increased by the enervating effect of what was to us an almost tropical temperature, accustomed as we had been to the clear, cold, searching atmosphere of the inland ice. When, however, we reached at last the summit of the great bronzed cliff, some 3500 feet in height, guarding the head of the great bay, we forgot all our fatigue in the grandeur of the view before us. To our right, across a great glacier, rose other vertical bronze cliffs 4000 feet or more in sheer height, and ending in a wild promontory. Northward and north-eastward stretched a bold, bluff, red-brown line of shore, the nearest portion of it surmounted by an ice-cap of limited extent, but the more distant portions free of all cresting ice-cap and of snow. To our left lay the depression of the fjord which had barred our passage, and still further to the northward we could make out the entrance of a second fjord, reaching apparently to the north-westward. At our feet, beyond the great fan-shaped face of the glacier, which I estimated to be 20 miles in periphery, were scattered numerous icebergs, prisoned in the still unbroken surface of the bay ice. Beyond this the bay ice seemed perfectly smooth and unbroken, and stretched away uninterrupted to the distant white horizon of the north-eastern arctic ocean. Far out in the centre of the bay I could make out a clouded appearance, undoubtedly due to the formation of water-pools upon the surface of the ice, the first signs of approaching disintegration. Our position was $81^{\circ} 37'$ N. lat., $34^{\circ} 5'$ W. long.

The bay itself I named, in honour of the day on which we first looked down upon it, Independence bay. The great glacier at my right I called Academy glacier; the giant cliff on which we stood, and upon which I afterwards erected my cairn, I named Navy cliff; and the detached land-masses to the north, Heilprin and Melville lands respectively. My equipment was adapted to inland-ice work only, and was too light for the stress of sea-ice work. If I were to proceed further I must descend to the sea-level, with a practical certainty that in a few miles my sledges would be destroyed by the roughness of the sea-ice. Consequently, from that point I turned back.

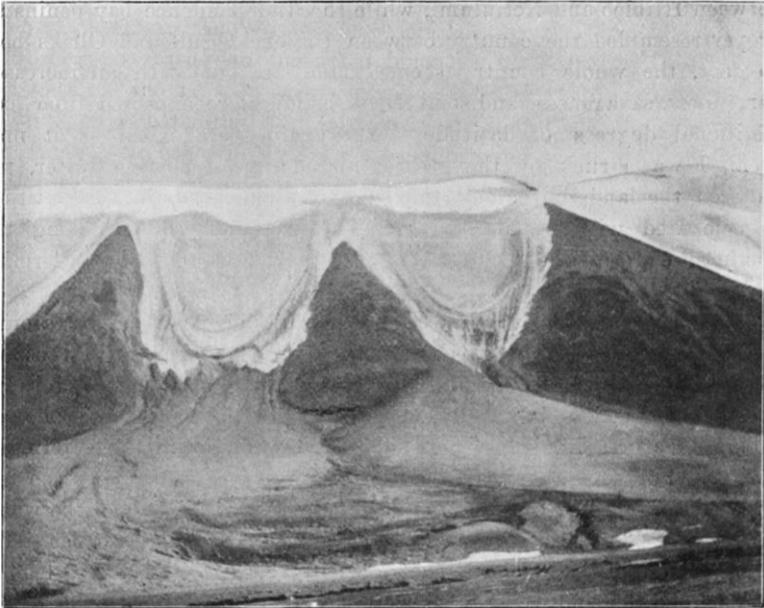
July 7 we were back at the edge of the inland ice, and on the 8th began our uneventful return journey.

As to the character of the northern land-ribbon in the vicinity of Independence bay, paradoxical as it may sound, its appearance, as seen from the heights of the ice-cap, was much less forbidding than that of the Whale sound ribbon seen under the same circumstances. This I judge to be principally the result of local orographical features, but partly also due to the reversion of the point of view.

The northern shores of Whale sound are almost continuously bold, and the plateau above the cliffs is almost completely covered either by tongues of the main inland ice, as in the peninsula between Bowdoin

bay and Inglefield gulf, or by detached ice-caps, as on Redcliffe peninsula, Herbert island, etc., the edges of which in many places are less than a mile from the shore-line. As a result, the traveller, descending from the heights of the "Great Ice," sees only the rolling snow-domes of these tongues and isolated caps, with the crests of the black cliffs intersecting them in irregular lines, until he has almost reached the edge of the ice, and is able to look down into the bays and see the warm and contracted slopes along their shores and the little valleys at their heads.

The Independence bay land, on the contrary, is, though elevated,



FÆTAL GLACIER, MCCORMICK BAY.

rolling and devoid of ice-cap, and broad areas of the red and dark brown land surface meet the eye. Another thing in favour of this region is that it is approached from the front, as it were—*i.e.* from the south—while the other is approached from the back, or the north.

The geological features of the country are practically the same as those of Whale sound, and nearly, if not every, feature of the one region could be duplicated in the other. The lateral moraine of the "Great Ice" in Independence bay contains the same rocks and has the same appearance as that at Bowdoin bay; the level tops of the high mountains and ridges show the same hard, compacted gravel surface (as if formed by a heavy road-roller) that can be seen on the Redcliffe plateau back of Cape Cleveland. The eastern slopes of Heilprin Land remind me

very strongly of the south-eastern shore of McCormick bay; and the giant cliffs which tower over the Academy glacier, though much higher, resemble strongly those of Academy bay. Dark granite and gneissose cliffs and trap-dykes, running in various directions, may be seen here as about Whale sound. Wave-marked slabs of red sandstone, identical in colour and size of markings to those I have picked up on the shore of Bowdoin bay, I saw over 3000 feet above the sea on the Independence bay land.

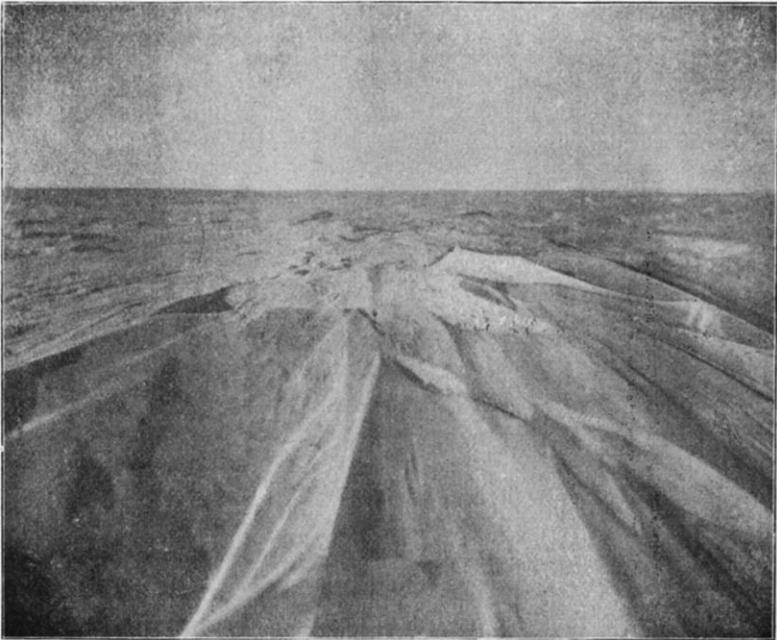
The country east of the Academy glacier, with the dark cliffs surcharged with a continuous ice-dome, would, but for the absence of exuding glaciers, be strikingly similar to the shore of Whale sound, between Ittibloo and Netiulumi, while the Independence bay peninsula proper resembled the country between Inglefield gulf and Oliks bay. In fact, the whole country seemed familiar, but with an increased barrenness, savageness, and sombreness, as might be expected from four additional degrees of latitude. Yet again, paradoxical as it may seem, I was struck by the greater abundance of flowing water, not only on the land, but along the edge of the ice-cap in this latitude as compared with Whale sound. The zone of wastage along the northern edge of the ice-cap was as wide as it was at McCormick bay.

The Academy glacier, while showing in its upper portion and around the circumference of its great *névé* basin features similar to those of the glaciers of Jacobshavn and Tossukatak in Disco bay, and the Heilprin and Tracy glaciers in Inglefield gulf, in its lower portion showed peculiar features like those noted by Dr. Coppinger in the Petermann glacier. For several miles from the extremity of the glacier the ice-stream is intersected by great vertical-walled canals, in which the water has frozen many feet below the glacier surface. As may be imagined, the discharge of the glacier is controlled by these canals, and instead of fragments of ice and icebergs, as we understand them, great fields of the glacier, miles in extent, are detached and gradually move out into the bay.

The uniformly smooth surface of the bay ice might be accounted for in two ways: either on assumption that the ice did not break up every year, and that the combined effects of partial surface melting in summer and the drifting snow of spring and fall would smooth all irregularities; or that it does break up, and the moment it is loosened is driven out to sea by the wind, which is always blowing out of the bay. The absence of icebergs in the bay, except near the end of the glacier, inclines me to the latter idea. Small lakes and ponds are numerous over the land, and rushing brooks in summer-time are everywhere. The presence of nearly continuous sharply marked tumuli and embankments of moraine material, miles in advance of the present edge of the "Great Ice," indicate more clearly than I have noticed anywhere to the

south, the undoubted retreat of the ice from a considerable area of terrene.

During our traverse of this northern land I found flowers of numerous varieties blooming in abundance, conspicuous among them the ever-present arctic poppy. Snow-buntings, two or three sandpipers, a single gerfalcon, and a pair of ravens were observed. Two bumble-bees, several butterflies, and innumerable flies were also noted. As for musk-oxen, their traces are to be found on every mountain and in every valley; without making any search whatever for them, we saw about twenty, and all these could have been obtained without the least difficulty.



SASTRAGI OF THE INLAND ICE.

Bearing more to the south into the interior, in order to avoid the obstacles near the coast, the crevasses and steep slopes of the glacier basins, in four marches we were on the great central plateau, cloud-capped and deep with snow. Here, at an average elevation of about 8000 feet, we travelled for two weeks; then, bearing to the westward, came down to the 5000-foot level east of the Humboldt glacier, and thence parallel to the outward route to the head of McCormick bay. Just before midnight of August 5 we met Prof. Heilprin and his party some ten miles from the edge of the ice, and early in the morning of Saturday the 6th we touched the shore of McCormick bay. I had five dogs remaining.

A carefully studied feature of my project was the entire dependence upon the game of the Whale sound region for my meat-supply; and though I took an abundance of tea, coffee, sugar, milk, corn-meal, and evaporated fruits and vegetables, my canned meats were only sufficient to carry us over the period of installation, with a small supply for short-sledge journeys. In this respect, as in others, my plans were fortunate of fulfilment, and we were always well supplied with venison. With fresh meat and fresh bread every day, we could smile defiance at scurvy.

The accident to myself on the upward voyage, and my consequent incapacity for work during the season of 1891, was a serious blow to me, destroying, as it did, my opportunities for geographical work in the neighbourhood of Redcliffe House, and, what I regretted most keenly, rendering it impossible to make velocity measurements of the extremely interesting glaciers of that region. Fortunately, the accident did not affect the long sledge journey, which was the main object of the expedition.

The principal geographical results of the expedition may be briefly summarized as follows:—

The determination of the insularity of Greenland, and the delineation of the northern extension of the great interior ice-cap.

The determination of the existence of detached land-masses of less extent to the northward.

The determination of the relief of an exceptionally large area of the inland ice.

The delineation of the unknown shore of Inglefield gulf, and the imperfectly known shores of Whale and Murchison sounds. The variance of existing charts from the real configuration of this region is so great, that I found it difficult to locate satisfactorily the names appearing upon the charts. I have, however, retained all these names, and I think that in future there will be no difficulty in distinguishing them.

The discovery of a large number of glaciers of the first magnitude.

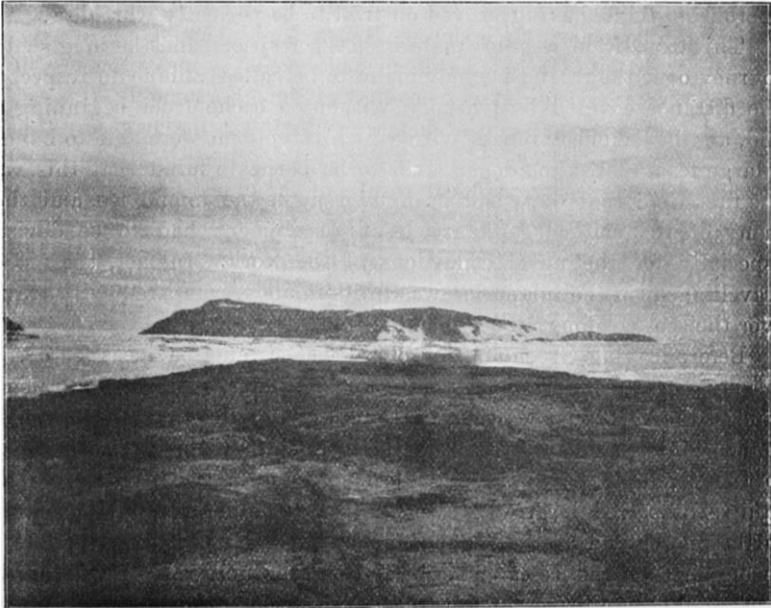
In the field of ethnology, the expedition can claim to be the first that obtained complete and accurate information of the peculiar and isolated tribe of arctic highlanders. Dr. Cook made a complete census of the little community of Smith sound Eskimo, showing the relationship and approximate age of every man, woman, and child in the tribe. The total, according to this census, is 233. He also made anthropometrical measurements of seventy-five individuals, and with his assistance I took a complete series of photographs of the same individuals, comprising portrait, and front, side, and rear elevations in the nude of each subject.

The meteorological and tidal observations by Mr. Verhoeff are among the most complete and painstaking ever made in the arctic regions. An independent set of four hourly tidal and weather observations, kept by

each officer of the watch, will prove of value in connection with the above.

As regards geographical methods during the traverse of the inland ice, my daily reckoning was kept by the compass, and an odometer wheel attached to the rear of the sledge. The circumference of this wheel being a trifle less than 6 feet 1 inch, one thousand revolutions of it made one nautical mile, and the revolutions were registered by the ordinary odometer mechanism.

At four camps on the upward journey and three on the return, not including the observations at Navy cliff overlooking Independence bay,



LITTLETON ISLAND.

this daily reckoning was checked by a complete series of solar sights, taken with a small traveller's theodolite with a special vertical arc of large radius.

The time was obtained from two pocket-chronometers and a high-grade watch, all of which were carefully rated before my departure and after my return, and were compared with each other almost daily during the journey.

That these observations were not taken more frequently was due to the fact that, travelling as we did when the sun was north and sleeping when it was south, the taking of a set of observations meant for me either no sleep at all, or at best but two or three hours of it. That even the field working of my sights was, however, not very far out of

the way may be inferred from the fact that, running on a compass course from my last observation camp, 150 miles north-east of McCormick bay, and supposing myself to be 10 miles to the eastward of my outward course, I found myself, on reaching the head of McCormick bay, but 5 miles to the eastward; in other words, I was 5 miles out in my reckoning.

The freedom of the inland ice from all local attraction, and the consequent reliability of the compass, if its constantly changing declination be carefully watched, is of great assistance to the traveller.

Elevations were determined by aneroids only, a special boiling-point apparatus, which I had ordered for the purpose of checking the aneroid readings, having proved on trial to be perfectly worthless.

This expedition was fortunate in most respects, and the long sledge journey over the inland ice may claim to be called unique in respect to the distance covered by two men without a cache from beginning to end, and in the effectiveness with which those men were able to handle a large team of Eskimo dogs. It is to be borne in mind that this was the first time that dogs had been used upon the inland ice, and that many of the methods and articles of equipment had to be devised especially for the novel conditions of the work. In fact, the art of travelling upon the inland ice was in its infancy, compared with travel over the sea-ice along an arctic shore-line.

Before leaving Greenland in 1892, I had formulated ideas for carrying my work further, and, returning to the States, succeeded in raising funds for a second expedition, my object being to go again to Whale sound, winter there, and start in the spring of 1894 across the ice-cap to Independence bay with enough men to form two parties, and an equipment suited for travel over the sea-ice, and prosecute my work further north and east of Independence bay. Early in March, 1894, I encountered on the ice-cap a series of blizzards unprecedented in arctic work. A climax came in a three days' storm. During a period of thirty-four hours we had an average wind velocity of 48 miles an hour, as recorded by my anemometer, and an average temperature of -50° Fahr., and a minimum of -66° Fahr., as shown by thermograph. The effect of that weather was to freeze several of my dogs as they slept in the snow. My party, well protected with fur clothing, suffered not seriously, beyond frost-bitten toes and fingers. I pushed on until the "piblockto," or Greenland dog madness, induced by the continued exposure, got such a hold of my dogs as to make it absolutely impracticable for me to go further, and I cached most of my provisions and turned back. I was obliged to cache other supplies on the way back, and finally reached the lodge with my remaining dogs in sad condition, and with my party practically used up.

As a result of this mishap, and the discovery by most of the members of my party that arctic work is not quite a picnic, all of the party,

except Lee and my coloured man Henson, returned in 1894 on the ship which had come up for me. With them returned Mrs. Peary and the little girl who first saw the light in the white north. I with my two companions remained another year. I was seriously handicapped, for the greater part of my material had gone to the first year's work, but I felt, as long as I had the time, that I must make the attempt again. There was a chance that I might succeed. Wintering again, I started once more in the spring of 1895. All my pemmican and alcohol were locked up in the cache, 124 miles from the edge of the ice-cap, so I had to start with ships' biscuit and tea, frozen venison for myself and party, frozen walrus meat for my dogs. Those of you who have had experience in arctic work know what a handicap it is to be obliged to carry



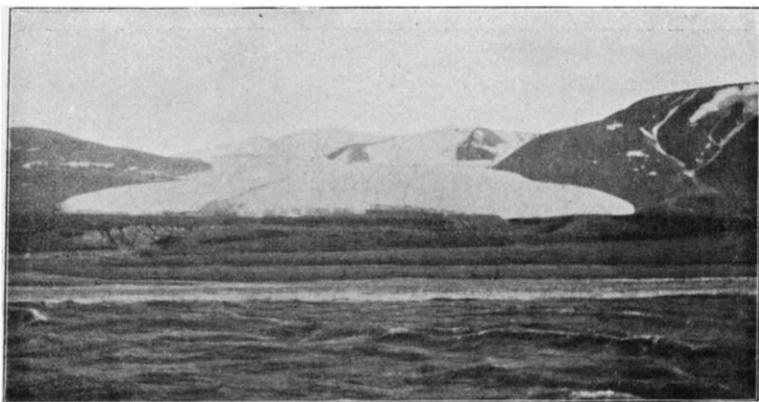
JOSEPHINE HEADLAND.

rations in that shape for your party, 4 lbs. of fresh meat being equivalent to 1 lb. of pemmican. I started on this trip on April 1, and with me, as a result of the confidence I had been able to inspire among the Eskimo, I was enabled to take a supporting party of three of them to accompany me to the cache and return from there alone, while we kept on in the effort to reach Independence bay. I felt I stood an even chance of reaching the bay, and if we did reach it, and musk oxen were in sufficient abundance, we could recuperate, rest awhile, then push on to accomplish something beyond my previous work. The chance was worth taking.

The details of the march to Independence bay it is not necessary to repeat here. When we started on this journey, we knew that we were relying solely upon our own exertions and the Almighty. Whatever fortune, ill or good, awaited us in or beyond the heart of the "Great Ice," whatever accident or mishap befell, there would, there could, be no rescuing party.

During my journey in 1891, in my effort not to make any more easting than was absolutely necessary, I was repeatedly turned from my course by the unexpected penetration of the glacier basins of the

great fjords of the north-west coast of Greenland into the interior, and in this way experienced much delay and annoyance. On my return the same year, I went well into the interior to avoid these obstacles. In this I succeeded. With two routes having the same starting and objective points, and enclosing between them an elongated elliptical area, it was evident that an intermediate route on my next journey would not only be somewhat shorter, but would avoid the crevasses and steep slopes of the one route and the deep soft snow of the other. This I found to be the fact, and, after the experience of the upward journey, I was able to modify the return route still more, with the saving of a few miles and improvement of the travelling.



GLACIER OF THE SCARLET HEART.

The land clouds of the Independence bay region were visible at least 100 miles in upon the ice-cap, gradually rising above the snow horizon as we approached. When we reached what might be called the actual crest of the ice-cap, a point about 15 miles from the edge, where it begins to slope down rapidly to the land, and I could make out the familiar landmarks, I found that we were approaching the land on a course about 5 miles east of that on which I had descended to it in 1892. This difference of position resulted in a higher elevation, enabling me to look over the eastern edge of the Academy glacier basin, and make out the summits of the east coast land-ribbon considerably further to the south than I had seen them in 1892.

At this time it was entirely clear on the ice-cap and along the inner edge of the Independence bay land. Further out was a heavy, hazy stratum, hanging at a considerable elevation over the land, beneath which I saw due north of us, and distant apparently 75 or 100 miles, what had escaped observation owing to the heavy clouds on my previous trip, a magnificent mountain, massive in form and heavily buttressed,

towering in savage grandeur far above the intervening cliffs and ice-caps. Apparently it was twice their height; as, however, its shape was changing under the mirage effects of these high latitudes, it is very likely that its elevation was exaggerated by the same cause. Increasing haziness soon hid it from our view; a few hours later a dull veil formed, entirely blotting out the sky, clouds sank in great leaden masses on to the land; the ice-cap took on a ghastly hue, and short, sharp gusts of wind followed each other in rapid succession down the slopes of the "Great Ice," and the land was reached in the midst of a roaring blizzard from the ice-cap, which confined us upon the moraine for two days.

In 1892 my route from the moraine to Navy cliff had been selected



ON THE GREAT ICE.

with a view to giving me as good an outlook as possible, and I had travelled intentionally along the crest of the mountains which bound the Academy glacier on the west. Now my chief object was to get the sledges to the bay-ice by the easiest practicable route, and this meant following the valleys of the streams, where the greatest amount of snow was to be found, and the grade certain to be more regular and gradual. For this reason, during our work upon the Independence bay land, hunting the musk ox and transporting the sledges and equipment to a point about 10 miles north of Navy cliff, we saw only the slopes of the valleys which formed our road.

The details of our return journey from Independence bay it is not necessary to repeat here. Somewhat recuperated by the liberal rations of musk-ox meat, men and dogs fortunately started on the return

R 2

journey in fairly good condition, and were thus enabled to make the ascent of nearly 8000 feet to the crest of the "Great Ice."

From this point on, a practically level surface, the absence of storms, the perfection of our equipment, and the use of every expedient known to the Eskimo, or which our own ingenuity could devise, to decrease the friction of our sledges and increase the tractive force of ourselves and dogs, enabled us to travel at speed from $1\frac{1}{2}$ to 2 miles per hour, and to continue these speeds from ten to twelve hours at a time, depending upon the character of the snow. Any sudden or increased exertion, however, would invariably be followed by bleeding at the nose, and a weakness would compel us to stop and rest. Fortunately for us, no ice-cap blizzard occurred during the return march, and we eventually reached the lodge with all our provisions consumed, and one dog out of the forty-one with which we started at the beginning.

While this journey cannot be said to have added much to the information gained during the previous trip of 1892, it has completed the conquest of the inland ice, and has shown that, with the proper supplies and the right kind of men, Greenland can be crossed with safety at any point in a single summer.

Had the discoveries of the first journey across the ice-cap from Whale sound to Independence bay been combined with the perseverance and the determination under the most serious handicaps of the second journey, the combination would, I believe, have been *facile princeps* among all arctic journeys.

There are numerous points of the utmost interest in connection with the inland ice of Greenland, which the limits of the evening will not permit me to touch upon. A comparison of the four profiles between Whale sound and Independence bay is very interesting, and brings out the relief of the "Great Ice" in a very clear manner, showing it is really a very much flattened mountain system in ice, with its main backbone, its radiant spurs, and its intermediate valleys. The first journey was near enough to the ice to cross the great basins of exudation, if I may use the term, and their intermediate divide, and the profile shows a succession of ups and downs, like those of a railroad located along the foothills of a mountain system. The profile of the return journey of the same year shows but one depression, and that in the Humboldt basin. The profiles of the two journeys of 1895 are ideal in that they show a rapid ascent from Bowdoin bay to the surface of the central ice-mass, and then a gradual radiant along the western slope of the continental divide till the summit is reached about 180 miles from Independence bay, when the descent is rapid to the edge of the ice. That the crest of the Greenland continental ice divide is east of the country's median line there can be no doubt. Where it is crossed on the way to Independence bay, it is trending away to the north-west and rapidly decreasing in altitude, to lose itself in the landward slopes of the

“Great Ice” near the convergence of Victoria inlet and the north-west coast. From this continental divide extend spurs into the Cape York peninsula, Prudhoe Land, Washington Land, Hall Land, etc., and between these divides are the enormous basins which feed the glaciers of Melville bay, Inglefield gulf, Kane basin, Petermann and Sherard Osborn fjords.

There is one thing of special interest to the glacialist—the transportation of snow on the ice-cap by the wind. No one who has not been there can have any conception of its magnitude. The wind is always blowing,



MOVING THE BIG METEORITE.

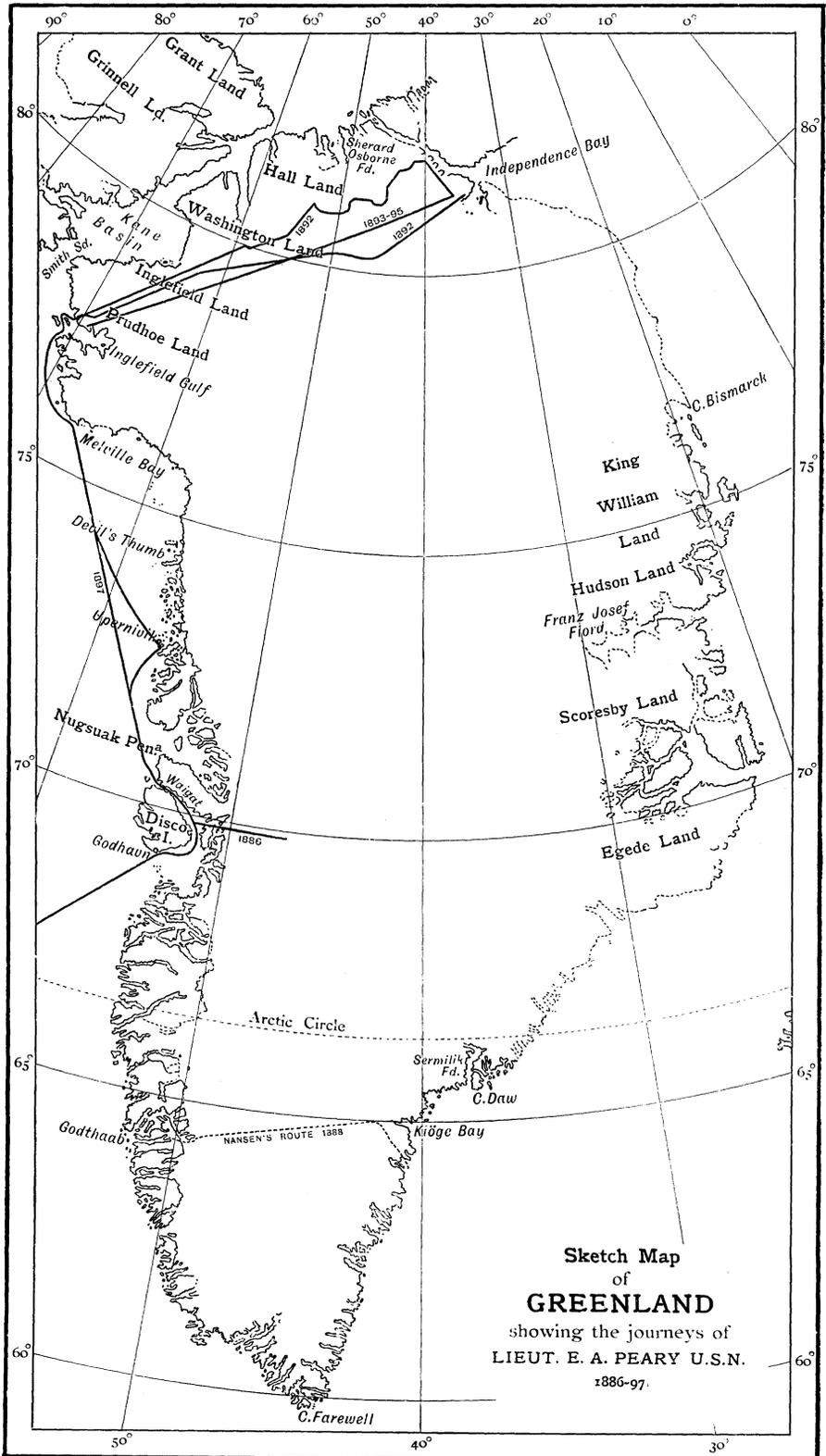
and blowing almost always on lines which would be gravity lines from the interior. The regularity of the winds of the “Great Ice” of Greenland, as I have found them during an actual sojourn of over seven months upon the ice-cap and visits to it of greater or less duration in every month of the year, is phenomenal. Except during atmospheric disturbances of exceptional magnitude, which cause storms to sweep across the country against all ordinary rules, the direction of the wind of the “Great Ice” of Greenland is invariably radial from the centre outward, normal to the nearest part of the coast-land ribbon. So steady is this wind, and so closely does it adhere to this normal course, that I can liken it only to the flow of a sheet of water descending the slopes from the central interior to the coast. The direction of the nearest land is always

easily determinable in this way. The neighbourhood of great fjords is always indicated by a change in the wind's direction; and the crossing of a divide, by an area of calm or variable winds, followed by winds in the opposite direction, independent of any indications of the barometer.

The opinion has been forced upon me that the wind, with its transporting effect upon the loose snow of the ice-cap, must be counted as one of the most potent factors in preventing the increase in height of the ice-cap—a factor equal perhaps to the combined effects of evaporation, littoral and subglacial melting, and glacial discharge. I have walked for days in an incessant sibilant drift of flying snow, rising to the height of the knees, sometimes to the height of the head. If the wind becomes a gale, the air will be thick with the blinding drift to a height of 100 feet or more. I have seen in the autumn storms in this region, round an amphitheatre of some 15 miles, snow pouring down in a way that reminds one of Niagara. When it is remembered that this flow of the atmosphere from the cold heights of the interior ice-cap to the lower land of the coast is going on throughout the year with greater or less intensity, and that a fine sheet of snow is being thus carried beyond the ice-cap to the ice-free land at every foot of the periphery of the ice-cap, it will perhaps be seen that the above assumption is not excessive. I feel confident that an investigation of the actual amount of this transfer of snow by the wind is well worth the attention of all glacialists.

One of the results of the 1893–95 expedition was the location of the mysterious “Iron mountain” of Melville bay. When in 1818 Sir John Ross discovered the existence of the Cape York Eskimo, he found in their possession native iron. That iron, when brought home, was found to contain nickel, and it was supposed to be of meteoric origin, until later the so-called Nordenskjöld irons were found to be telluric, not meteoric, and it was then assumed that this northern iron must also be telluric. Various efforts were made to discover this “Iron mountain,” but I was fortunate in being the first white man to locate it, which I did in 1894. Starting from my headquarters on the north side of Inglefield gulf with an Eskimo guide, and following into Melville bay for some 34 miles, I found the Iron mountain to be, not a mountain, but three great ingots of meteoric iron, one weighing about 1000 lbs., another 6000 lbs., the weight of the other indeterminable.

The Eskimo legend in regard to these masses is that they were originally an Inuit or Eskimo woman, who for some impropriety had been thrown out of high heaven, and, with her dog and tent, had landed in that inhospitable region. The 6000-lb. mass was the woman. This was the one from which the Eskimos have obtained their iron supplies for generations. Heaven seems to have taken pity on these isolated people, and sent them these masses of pure soft iron to enable the entire



Walker & Beutell sc.

tribe to pass from the stone age to the iron age. Without that there was no possible means by which they could obtain metal, any more than you or I could obtain something from the planet Mars; and one of the most striking points in proving the intelligence of these people is the fact that they noted that these great masses were different from any other substance round them, discovered their valuable characteristics, and devised means of utilizing those characteristics. Two of these masses I brought back in 1895. In 1896 I went back with my steamer with the idea of removing the third, my appliances in 1895 having been insufficient; but, though successful in ripping it out of its frozen bed, and moving it something like a quarter of a mile to the edge of the shore, before I could get it embarked, the Melville bay ice began driving in, and I was forced to take my ship out as quickly as I could to prevent her being crushed. In 1897 I made another attempt, and succeeded in embarking the huge mass and transporting it to New York, where it now lies. The dimensions of the largest mass are approximately 12 feet \times 8 feet \times 6 feet, and the estimated weight something like 90 tons.

Returning in 1895, feeling that the capabilities of the Greenland ice were practically exhausted, I formulated a plan for further work, in case the problems of the north had not been solved by the time I returned.

Immediately after my return it would have been premature to have presented any project for further arctic exploration with two magnificent expeditions still in the field, those of Jackson and Nansen.

With the return of Jackson and Nansen, bringing the news that Franz Josef Land was not the southern terminus of an arctic continent, but an archipelago of comparatively limited extent; and that the *Fram*, in her three years' drift through the Siberian segment of the polar basin, had seen no land, I felt that the time was ripe for the presentation of my plan for further work. I believed that the practical demonstration of the non-existence of land of any considerable extent in the Siberian segment of the polar basin practically eliminated that region from further consideration as a possible means of reaching the pole. The land lying north of main Greenland remained the most northerly known land on the face of the globe, and it could now be said that the route along the north-west coast of this land, with *terra firma* for a base, was not merely the *most* practicable route, but that it was the *only* practicable route by which to reach the yet unscaled apex of the Earth, the north pole. Acting upon this belief, my theory was to proceed with my ship to Whale sound, take on board eight or ten of the most effective young men of my Eskimo (I know every man, woman, and child in the tribe and their peculiarities), the most loyal and energetic, with their wives, their dogs, their tents and sledges, their canoes, weapons, and implements—all their belongings, in fact—transport them to the farthest possible point to which I could take my ship, making Sherard Osborn

fjord my objective point. There I would land with my people and supplies and establish a colony, a settlement which would be normal, just like any other Eskimo settlement, except that it would be 200 or 300 miles further north. The environments and conditions of life would be practically the same, and my Eskimo would feel at home. Establishing my settlement there, I shall send my ship back.

As soon as she has left, and the ice has frozen sufficiently for my purpose, I shall, with the assistance of the Eskimo, begin transporting my supplies by comfortable stages north-east along the coast, shifting my village ahead from time to time, until with the return of the sun in the spring I should hope to be, with my people and a large depôt of supplies, at the most northerly point of the land, wherever that may be. We know the land here extends beyond $83^{\circ} 24'$; it is very likely it reaches to 85° N. In February, or perhaps in March, I shall start with two or three still further selected people, the best of those I have taken, with me, my best teams of dogs, with specially constructed sledges, everything in the way of supplies and equipment refined to the minimum limit, and shall endeavour to make the distance from there to the pole and back again. By some it is called a dash; I do not believe in the term myself, and yet, if it is unbroken ice, it must be accomplished, if it is accomplished at all, in a continuous journey. It may take three or four months, and the magnificent experience of Nansen, as well as my own, shows that there are no insuperable difficulties in keeping a party in the field for that length of time. In other words, the programme is to secure every mile of advance just as far as there is land, and then attempt to accomplish the remaining distance in one effort. In case the conditions are unfavourable or impracticable the first season, I shall return to my Eskimo village, winter there, and start again the next spring; and if the conditions are not favourable the second year, come back for the winter and start again, and again. I believe that at any point in the arctic regions, at one time or another, at one season or another, the door is open or can be opened, and the man who is in readiness and waiting for the favourable opportunity can get where he wants to. When an expedition goes north for one or two years only it may not find the favourable opportunity; but if it can stay the four or five years which I am prepared to stay if necessary, some time in that period the favourable occasion is sure to come, and the door will be open or can be pushed open. On my return from the northern trip, or in the interim between successive attempts, I should endeavour to complete the geographical features and characteristics of the northern land and the north-west coast of Greenland, and endeavour also to fill in the outline of the east coast down to Cape Bismarck; in other words, to complete the delineation of the land-masses of this section of the arctic basin. Then I shall retrace my steps along the north-west coast to my original base at Sherard Osborne fjord. From here I shall return in

my ship, if she succeeds in effecting the connection; otherwise I shall ascend to the ice-cap from the head of Sherard Osborne or Petermann fjord, and take the route with which I am so familiar, across the inland ice to Whale sound, where my ship can reach me without difficulty.

Such, in brief, is my project for the proposed work, and I must say, though perhaps I am egotistical, that it does seem to me as if the conditions were favourable. Experience counts for a great deal in arctic work. Success in arctic navigation is the result of that definite, detailed knowledge of coasts, winds, tides, and ice, the same kind of knowledge for each step of the voyage that a harbour pilot has. You must know what the effect of a given wind is upon the ice at any point along the coast, the effect of the ebb and flood tide, as, knowing these things, you can put your ship through with safety, or keep her out until a favourable time comes. I feel that I have, in the last five or six years of my life, obtained a knowledge of some of these details of arctic work, and outside of all that is the fact of my utilization of the Eskimo. You will agree with me that there can be no human beings on the face of the globe better adapted to form the rank and file of an arctic party than members of their little tribe, the most northerly people in the world, whose fathers and grandfathers and great-grandfathers before them have lived in that very region. They know all the possibilities and all the hostilities of their frozen home, and know how to take care of themselves. Further, they have confidence in me and regard me as a friend, and would travel with me, and starve with me should it be necessary. I feel that, with an experienced surgeon and perhaps one other white man, and that material from which to recruit the rank and file of my party, it would come near being an ideal party for arctic work.

The question has frequently been asked me, What do I expect to find north of Greenland? I don't expect. My object is to try and find out. The matter of possible opposing current comes up. I can touch only briefly on that. We know the strong southerly setting current along the east coast of Greenland. That current must have been diverted by something, and it must be land more or less dense to the north of main Greenland. Then the query arises, Why should I not find just the same ice as other explorers have found? Undoubtedly I shall; yet, from what I have seen of arctic ice, I am convinced that particularly rough ice is apt to occur in areas. These areas may be of considerable extent, 50 or 100 miles across, but, with an opportunity for reconnaissance, a way can be found around them on comparatively smooth ice, and the area of rough ice avoided by a *détour*.

Such is the brief outline of my past work and future plans. In regard to the latter, it gives me pleasure to say that already the preliminaries are effected. While north last summer I selected the

Eskimo for my colony, gave them their instructions, and they are preparing for my return, the funds and time for my work are assured, and I shall start late next July.

I thank you for your cordial interest and attention.

Before the reading of the paper, the PRESIDENT said: At last we have Lieut. Peary amongst us. He has been promising to come over here for the last five years, I think, but he has always been prevented by the exigencies of work in the arctic regions. He has given us very good excuses indeed for not coming. However, now that we have him here, I feel quite sure that this meeting will give him a hearty and cordial welcome. I will now call upon Lieut. Peary.

After the reading of the paper, the PRESIDENT said: I think I must first congratulate Lieut. Peary on having been listened to by the audience with greater interest than I have ever seen in this hall. You have Sir Leopold M'Clintock before you, who could tell you something about the route you are about to take; Sir Erasmus Ommanney, Sir Allen Young, Dr. Neale, Mr. Jackson, and at least half a dozen other arctic explorers. I see also very eminent naturalists, Prof. Bonney, Mr. Blanford, Mr. Sclater, and others. They would all have liked to have joined in the discussion of this subject, but I am afraid it is too late to expect a long discussion. We shall, however, be pleased to hear a few words from Sir Leopold M'Clintock.

Admiral Sir LEOPOLD M'CLINTOCK: My first duty is to thank our President for allowing me this opportunity of expressing my admiration of the good work performed by Lieut. Peary, his wonderful endurance, and his wonderful perseverance in carrying out the exploration he has brought so far to complete success. I have only to express at this late hour my hope, in which I am sure every one will join, that he may be thoroughly successful in his next arctic expedition.

The PRESIDENT: Lieut. Peary is, without exception, the greatest glacial traveller in the world. He is also far and away the greatest dog-sledge traveller in the world, as regards rapidity and distance. The important work he has done, the discoveries he has made, are patent to you all. He has found out a mystery of centuries—a mystery even alluded to by the great Lord Burleigh: he has found out the termination of the Greenland glaciers. By what means he has done this you have heard, and he has illustrated what he has done by the most beautiful pictures that we have ever seen on that sheet. Great though that work has been, I cannot help alluding to another piece of work which I look upon as almost as great—that is, the salvation of the Arctic Highlanders. When I went with Sir Erasmus Ommanney in the *Assistance* amongst these people, we found them with sledges, but without any means of catching the walrus, except their arms, to fight with them on the edge of the ice. They had no canoes, no guns, but most remarkable-looking knives, which they cut from these marvellous aerolite boulders, which Lieut. Peary has discovered. The Arctic Highlanders would probably have died out if they had been left alone. Lieut. Peary has provided them with the means of catching their food by going out to sea in canoes. He has provided them with the means, which they never had before, of catching the reindeer; and they are now, as he has told you, certainly since 1850, increasing in population. I concur with him that one of the most interesting points in his projected journey is the company of this most interesting people—the only people in the world who are completely pure in blood and completely isolated. Lieut. Peary tells us that he has made a census of them. He knows every man and woman and child, and all their names and relationships to each other, and their fathers back to their great-grandfathers and grandmothers. I think that the salvation of that people is a great feather in the cap of Lieut.