

Article VI.—GEOGRAPHICAL REPORT OF THE CROCKER LAND EXPEDITION, 1913-1917.¹

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INTRODUCTION

The following report embraces the geographical work accomplished by the Crocker Land Expedition during four years (Summer, 1913, to Summer, 1917) spent at Etah, North Greenland. Mr. Ekblaw, who was placed in charge of the 1916 expedition, will present a separate report.

The results of the expedition, naturally, depended upon the location of its headquarters. The enforced selection of Etah, North Greenland, seriously handicapped the work of the expedition from start to finish, while the expenses of the party were more than doubled.

The first accident, the grounding of the *Diana* upon the coast of Labrador, was a regrettable adventure. The consequent delay, due to unloading, chartering, and reloading, resulted in such a late arrival at Etah that our plans were disarranged. It curtailed in many ways the eagerness of the men to reach their objective point at the head of Flagler Bay, the proposed site of the winter quarters.

The leader and his party being but passengers upon a chartered ship was another handicap, since the captain emphatically declared that he would not steam across Smith Sound. There was but one decision to be made, namely: to land upon the North Greenland shore within striking distance of Cape Sabine. Therefore, I selected Etah as the nearest practicable point, knowing full well that we were to have our home in a locality admitted by the resident Eskimos as being the most disagreeable along that whole stretch of coast line. In fact, Rear

¹This expedition was conducted under the auspices of The American Museum of Natural History, The American Geographical Society and The University of Illinois, with Dr. Edmund Otis Hovey, Mr. George H. Sherwood, Mr. Herbert L. Bridgman and Professor William S. Bayley acting as the Committee in Charge. The Scientific Staff of the Expedition consisted of Donald B. MacMillan, A.B., A.M., Sc.D., Leader and Ethnologist; Fitzhugh Green, U.S.N., Engineer and Physicist; W. Elmer Ekblaw, A.B., A.M., Geologist and Botanist; Maurice C. Tanquary, A.B., A.M., Ph.D., Zoologist, and Harrison J. Hunt, A.B., M.D., Surgeon. Doctor MacMillan's Report was received in 1919, but, due to lack of funds, its publication has been delayed.—ERROR.

Admiral Peary, upon learning of our choice, declared that we were seriously handicapped in being on the wrong side of the channel.

The converging of the shores of Ellesmere Land and Greenland at this point, forming what is known as Smith Sound, through which flows the southward arctic current, leads to conditions non-existent elsewhere in this region. Above the constriction, Kane Basin becomes early filled with huge masses of ice flowing from the Polar Sea down through Kennedy and Robeson Channels for six months of the year. For the remaining six months this great mass is more or less stationary and presents a highway from shore to shore. Owing to the rapidity of the current at this point and to the configuration of the coast lines south, we find a polynia which is never closed, not even during the extreme temperatures of the dark winter months. Its dimensions depend upon local conditions, which vary considerably from year to year, and upon the season. However, it is never less than thirty miles in length and fifteen in width.

During the winter months there is a constantly ascending column of heated air from the surface of this large body of water of comparatively warm temperature, which, interesting to note, I found to be at $+28.2^{\circ}\text{F}$. throughout the year. Consequently we have here an area of low pressure, to neutralize which violent winds rush southward from the Kane Basin and from the summit of the Greenland ice cap in the neighborhood of Etah and Cape Alexander, causing a rough sea, which constantly acts upon the newly forming ice at the edge of the opening, and at times, during a heavy wind from the south, severs from the parent mass huge fields of several miles in area. Thus the results of the primary cause of the polynia are retroactive and assist largely in the formation of what the English and Scotch whalers for a century have been termed the "North Water."

I mention the above facts because of their intimate association with both our geographical and meteorological results.

Yet, in spite of this very apparent handicap of open water and rough ice in front of our door and between us and our objective point some six hundred miles to the northwest, there were many advantages derived from this enforced selection of Etah as the site for Borup Lodge. First, there was an abundance of fresh meat, invaluable as a preventative against scurvy. Strange that the medical profession of years ago did not recognize the fact that scurvy was unknown among the Eskimos and persisted in prescribing fresh vegetables as an antiscorbutic, when such had never been seen by those healthy northern people. But the explorer

of sixty years ago and the American whalers long before this were well acquainted with this fact. Charles Francis Hall writing in 1860 tells us that when a seaman was ill he was sent at once to the igloo of an Eskimo where he could feast on raw and frozen meat. Invariably he returned a new man. Peary for twenty years has always depended upon plenty of raw, frozen meat for his good health and that of his men. Not a man in all of his expeditions has ever had a case of scurvy. •

A second point to our advantage was a constant communication with the Smith Sound tribe, from which we could select the very best hunters and dog drivers for our various trips. And a third was accessibility every year to a relief ship or to a South Greenland port, from which we could embark for Europe if the relief failed to arrive.

By dint of long hours and hard work, our house, which was probably the most substantial ever built in the far north, was practically completed in three weeks. Its dimensions were 35'×35', constructed of $\frac{7}{8}$ " tongued and grooved spruce. It had double walls, floors, ceiling, and windows, and was covered with Cabot quilting, so that we were very comfortable during our four years. We consumed during that time about thirty-five tons of coal, which had been landed upon the beach in bags prior to the sailing south of the ship.

Following the installation of our electric plant for radio and light, and the establishing of our daily routine of meteorological observations, preparations were immediately begun for the carrying out of the main purpose of our expedition, namely, to prove or disprove the existence of a body of land in the Polar Sea some one hundred and twenty miles due northwest of Cape Thomas Hubbard of Axel Heiberg Island.

Profiting by the wisdom of Peary's plan of advancing provision depots even during the darkness of the arctic night, as early as December 6, Ekblaw and Green were dispatched with attending Eskimos, dogs, and sledges northward to Anoritok with full loads of oil, biscuit, and pemmican to establish Depot A. Orders were also given for a reconnaissance of the ice of Smith Sound with a view to an early spring crossing. To my knowledge no one had ever attempted the passage of this body of water during the darkness of November, December, and January.

Two days later the division returned with the report that the depot had been established and that Smith Sound was apparently frozen over from shore to shore. Although necessarily attended with considerable danger, too much was at stake not to take advantage of this early cementing together of the great pans of ice of Kane Basin. Consequently I gave orders to prepare at once for the crossing and the advancement of

supplies westward to Cape Rutherford in Buchanan Bay. On the eleventh this second step in our work was taken, resulting successfully in the crossing of the Sound and the transportation of 1738 pounds of provisions to Depot B, fifty miles northwest of our winter quarters.

This cache consisted of oil, biscuit, tea, condensed milk, and dog and man pemmican. There was a time when the explorer considered that several articles of food were necessary for good health. To-day we take only two—bread and meat; and upon these two man remains perfectly strong.

The ration was based upon my experience with Peary, where each man received one pound of biscuit and one pound of pemmican per day. The dogs were to receive one pound of pemmican per day.

So much has been said lately by a contemporary upon the "Solution of the Arctic Problem," in other words a plan of living entirely upon the country, that, in justification of my usage of so much valuable food and in defense of Peary, Nansen, The Duke of Abruzzi, Nares, and others who have gone out on to the Polar Sea, I feel it incumbent upon me to cite a few facts of interest.

After twenty years of experience in the Arctic, such as no other man has ever had, and attended and aided by one of the most hardy races of the world, acknowledged by all with whom they come in contact to be highly intelligent, mentally alert, of acute ear and keen vision, Peary sailed away in 1908 from the shores of Labrador having upon the decks and in the hold of the S. S. Roosevelt thirty tons of whale meat and ten tons of pemmican in addition to thousands of pounds of other provisions. Why? Because he needed it, knowing full well from past experience that, from the northern point of Grant Land along that white way stretching for four hundred and thirteen miles northward out over the Polar Sea, the probability was that he would not encounter a living thing during the early spring months of February, March, and April. And he never did.

A summer trip, where one's progress depends upon the progress of the floe, would lead to starvation without the shadow of a doubt, if the floe drifted northward. The experience of the crew of the Jeannette, of the Fram, and of Nansen and Johansen, who were hunters from boyhood, of Captain Cagni, of all *who have had a definite point to reach within a certain time*, protests against the idea of endeavoring to live entirely upon the country. To *live* in the North and to *explore* it are vastly different conceptions of arctic work. The former, man has done for at least two thousand years and will continue to do; the latter, requires

adequate preparation and a certain amount of food, dependent upon latitude, land or ice work, time, and distance to one's objective point.

My work was out over the Polar Sea; and on that traverse of three hundred miles, although I was accompanied by two natives acknowledged to be among the best in the tribe, not a living thing was seen in the open leads or a single track in the snow.

Our proximity to the Smith Sound tribe enabled me to select from the numerous visitors at Borup Lodge as many Eskimos as I deemed sufficient for the successful completion of our plans. Seventeen were finally engaged, many of whom were the very best in the tribe. Several were well known to me, having been my companions on my long trip around the northern end of Greenland in 1909.

Four of the personnel of the expedition seemed well fitted physically for the arduous work, but lacked experience in handling dogs with a heavy load; therefore I again adopted the Peary plan, placing these inexperienced men in charge of their respective divisions, thus relieving them of all care of a team and consequently of a great deal of discomfort.

The time of the start of an expedition depends upon the length of one's journey: the greater the distance the earlier the start. It is not economy, however, to leave headquarters until the duration of twilight affords a sufficient number of working hours to justify the expenditure of food consumed by men and dogs. Arctic work in the far North, however distant the goal, must be accomplished in this interval between the twilight hours of noonday and the first of June; after which date the snow rapidly leaves the coast and the sea ice disintegrates. If one were not compelled to return to winter quarters the work could be advantageously extended well into the summer months and even until the return of darkness in the fall, especially when one is engaged in delineating a coast line or in studying the geology or botany of a new land. If relieved of all care of headquarters, of the scientific collection, of meteorological observations, etc., one could travel on indefinitely with his Eskimos and stop where night overtakes him. Charles Francis Hall demonstrated this more than fifty years ago, Schwatka in 1879, and Peary in 1900 when he left his little shack at Cape Sabine and wintered at old Fort Conger in Lady Franklin Bay.

SLEDGE TRIP ON NORTH POLAR SEA, SPRING, 1914

February 7, 1914, eleven days prior to the astronomical date of sunrise, witnessed the departure of our first division. This date is, I believe, the earliest on which any expedition ever took the field. Two

portending evils influenced me in the selection of this early date, one an early break-up of the ice of Smith Sound, which would cut us off from home, and the other the approach of mumps, which, we understood, was on its way northward. The various divisions of the party consisting of nineteen men, fifteen sledges, and one hundred and sixty-five dogs, all left as planned with orders to rendezvous in Eureka Sound and there await my unit, which left on Friday the thirteenth.

By avoiding the rough ice and following the edge of the open water, a crossing of Smith Sound was accomplished in six hours, an interesting contrast to the journey of Dr. I. I. Hayes fifty-three years before, when thirty-eight days were consumed in passing from shore to shore.

The finding of two dead dogs on the trail so early in the struggle caused me considerable anxiety and was my first intimation of trouble in the advance party. A note found later informed me that E-took-a-shoo, one of our best men, was down with the mumps and unable to walk. In Hayes Sound the whole party were found encamped and in doubt as to just what to do. The men were sick and discouraged, the dogs weak with dysentery. Nearly all agreed that it was unwise to go on; to do so would result in disaster beyond the heights of Ellesmere Land at a stage in the march so late in the year that a second attempt would not be possible.

Fortunately it was so early in the year that we could well afford to return to Etah, condition the men and dogs, and repeat the attempt at a later date. I decided to do this and gave orders that all equipment and provisions should be left in cache and that all should retreat to Etah, with the exception of Dr. Hunt and Ensign Green, who were to remain with two Eskimos who were unable to travel.

Upon our arrival at Etah, the Eskimos were dispatched to Peteravik, where meat could be obtained for their dogs. In view of the probable lateness of our start, I now gave up all thoughts of the *exploration* of Crocker Land, but decided to expend all our efforts toward proving or disproving its existence. If it should be found, a return could be made the next year. By thus curtailing our plans the number of the party could be reduced to ten, consisting of seven Eskimos, Ekblaw, Green, and myself.

As the days went by I tried to persuade myself that warmer weather and consequent better sledging would enable us to add to our daily average the miles lost by the delay. I impatiently awaited the day when dogs and men would be in perfect physical condition for the task. On March 11, the last sledge was away for Cape Sabine, where the boys had the good fortune to kill a bear, which furnished both dogs and men with

a meal of fresh meat. The cache in Hayes Sound was found to be as we had left it.

There are two crossings of Ellesmere Land in this latitude, one by the way of the old migration trail of the Eskimos at the head of Flagler Bay, and the other by the Beitstadt Glacier at the head of Beitstadt Fiord. Knowing that the former was found by Sverdrup to be wind-swept and bare of snow, I decided upon the choice of the latter, which would certainly furnish us with good sledging to the western shores of Ellesmere Land, although considered much more difficult in every way.

At noon on March 16 we arrived at the head of the fiord and at the vertical face of the glacier. To me it seemed quite impossible that we should ever get our dogs and sledges up over that ice wall, but in a few hours the Eskimos had cut steps with their knives and hatchets, up which we bumped our loads, dogs, and sledges.

At this point Mene, of New York fame, decided that hard work at 50 below zero did not agree with him and therefore he preferred to take the trail back for Etah. This withdrawal resulted in the loss of Tauchingwa, one of my best men,—not that he was dissatisfied with the work, but that he cared for his wife more; he had learned from one of the boys that it was Mene's intention to claim his wife. This reduced the number of our sledges to the danger limit and resulted later in sending back to Hayes Sound for additional provisions.

There were certain stages in the ascent of the glacier when our progress was exceedingly difficult owing to the slippery gradient and heavy loads. In two days, however, we camped almost at the summit, which by aneroid proved to be 4750 feet in altitude. With the thermometer at -50° F., we were extremely fortunate in not encountering the violent winds and drift which, judging from the furrowed appearance of the surface, generally prevailed here among these mountain peaks.

Ellesmere Island is not as yet ice-capped, but undoubtedly will be in the centuries to come. In this section practically all valleys are filled with ice reaching within eight hundred feet of the tops of the highest mountains. What was land sixty years ago is now obliterated by the onward march of the ice. The Beitstadt Glacier is a magnificent sheet stretching across Ellesmere Land from shore to shore, and fed by some forty smaller glaciers flowing down through the valleys of the neighboring hills. Its direction is a little south of west.

In our descent on March 20 we did not follow this glacier to its end, but turned to the right toward the head of Bay Fiord, descending to the bed of what was apparently at one time a large mountain lake, but now

encroached upon and diminished in size by the advance of glaciers from nearly every quarter. Such a section would be far more interesting in summer and would furnish more accurate and detailed information as to its physical characteristics; for with the disappearance of snow the dark land would be revealed in contrast to the white ice of the glacier.

Upon our arrival at the head of Bay Fiord, we found it impossible to descend to the sea ice below because of the height of the vertical face of the ice upon which we stood. At length our guide, Pee-a-wah-to, luckily discovered a crevice worn deep into the ice by a summer stream. Although it was slippery and a bit treacherous, we succeeded (by chipping holes in the ice and reeving in rawhide lines) in lowering everything to the surface below, which we found to be a river bed covered with a light layer of snow. The hardest kind of work was demanded of our dogs to pull our sledges over this rocky bottom.

We pitched camp upon a point of land one mile distant, at the suggestion of Pee-a-wah-to, who declared that we would certainly get musk-oxen the next day. He was right. The first man out of the snow house in the morning yelled, "Oo-ming-muck-suit!" There they were, seven black dots on the white slope of a distant headland on the northern side of the fiord! Within a few hours the meat and skins were at our door, enabling us to economize on our pemmican, which was needed for our work on the Polar Sea.

Now that we were in the musk-ox country and our loads safely landed, I could dispense with two men and their dog teams, thus reserving for future use the twenty-four pounds of provisions consumed daily. In the ascent of the glacier on the eighteenth and nineteenth, Ekblaw had the misfortune to freeze both his feet so badly that he should have been returned to Etah at once in order to avoid more serious complications later on. However, he pluckily plodded on and signified his desire to reach Bay Fiord and the musk-ox herd. Now that his desire had been gratified, it seemed wise that he and Ki-O-ta should return to Etah. With them went Green and two Eskimos with orders to load up their sledges from the big cache in Hayes Sound and follow our trail on to Cape Thomas Hubbard, the most northern point of Axel Heiberg Island.

Prior to our leaving Etah, I had been encouraged by the Eskimos to believe that one could subsist entirely upon the game of this country. This could easily be done if one had the time to deviate from the trail to find it; this we could not do, but were compelled to go straight at our mark, picking up what we could en route. The second day from Camp Ekblaw, a few miles north of the junction between Bay Fiord and Eureka

Sound, it was our good fortune to kill four musk-oxen only a few steps from our camp door. Both white and blue foxes were seen, arctic hare were numerous, and white wolves wherever musk-oxen were found.

The surface ice of Eureka Sound was remarkably good, and evidently always is good as judged by our three successive years of travel in that vicinity. This is due no doubt to the force and the sweeping power of the prevailing northerly winds. We easily covered a degree in two days, and by the thirtieth we were in camp on the southern shores of Schei Island.

On the thirty-first the boys were instructed to get meat if they possibly could; for two days we had seen nothing but a blue fox. At three in the morning of April 1 they were back in camp reporting "a great many killed," and endeavored to inform me by the use of their fingers as to just how many. Upon visiting the slaughter grounds later I counted thirty-five. It is hard to prevent Eskimos from killing an excess of meat. In his own country where there is no waste, the surplus always being donated to feed the dogs and family of one less fortunate, the habit of getting all that he can possibly get is so deeply rooted that it will take years of argument by more level heads to persuade the northern native that life should not be taken if not absolutely necessary.

On this day twelve white wolves rushed at us as we were driving into camp; but upon discovering that we were not musk-oxen, they took to their heels and disappeared over the crest of the nearest hill.

Five days we slept on Schei Island awaiting Green and his party, and in the meantime strengthening our dogs with a liberal allowance of fresh meat. Deploing the loss of every good day and realizing that many things might have happened to prevent a reunion, I decided to go on, after leaving a note stating that I would await him at Cape Thomas Hubbard up to a certain date.

Within a few miles of Kvitberg on the Axel Heiberg shore, the sharp eyes of my Eskimos discovered a small cache of pemmican and condensed milk, which was undoubtedly left by Sverdrup in 1902. Its twelve years' sojourn in the arctic in freezing and melting temperatures had left it practically as good as when manufactured.

In a smothering drift, we groped our way up the coast on the sixth, not knowing at times whether we were on sea ice or on the low sloping shore. Tracks of caribou were seen, and two animals were secured the next day by E-took-a-shoo; they proved a welcome change in diet for both men and dogs. Three more on the eighth were as gratefully accepted and disposed of by our dogs, which were always hungry.

On April 9 we received a drubbing—twenty below zero, and a strong wind and drift right in our faces all day long. The end of the day found three figures huddled in a snow drift with clothes driven so completely full of snow that they shivered and shook throughout the night. I have omitted to state that to economize on weight we had left all sleeping bags on our igloo at Schei Island and henceforth would sleep in the clothes in which we walked. Naturally such a plan results in many an uncomfortable hour, especially if one be covered with perspiration at the end of the day, following the working of a heavy sledge through rough ice; but this is to be expected and is deliberately planned for as productive of the best results for the expedition.

The eleventh was even worse, snowing, blowing, drifting. We dug into the snow beneath a high cliff and wondered just where we were. Had we reached Peary's Cape Thomas Hubbard and the point of our departure for the Polar Sea? The next day was but a repetition of the last and so blinding that it was deemed unfit to proceed until we knew something definite as to our location. To our astonishment, mingled with the driving of the drift over our heads was the sound of a voice. Green and his two Eskimos had arrived! And with them on their sledges was all that we required for Polar Sea work. For four hundred miles they had followed our trail, walking nearly every step of the way, their dogs slowly dropping with fatigue! Noo-ka-ping-wa had lost five, Arklio, three, and Green, two.

As if repenting of its misbehavior during the last two or three days, the Cape furnished us on Monday, April 13, with one of the fairest days ever made. Here was an excellent opportunity to search for the Peary cairn and record and for signs of land far away on the distant horizon seen from this very point. We were off, the boys to the hills after a possible caribou, and Green and I to the summits of the neighboring cliffs.

Within one mile from camp we met Arklio running back for his dogs and sledge; he had killed four caribou. All day we walked and searched but without results; no cairn could be found, leading us to the conclusion that the Cape still lay several miles beyond us to the west. During the night one more dog died, simply worn out with hard work. As a result of some careful figuring over the distance to be attained on the sea ice, average miles per day, amount of food, etc., I came to the conclusion that four sledges could do the work fully as well as six, in consideration of the fact that two of the teams were practically worn out. Arklio and Noo-ka-ping-wa were ordered to return to Etah in the morning.

On April 15 we traveled for twenty miles along the northern shore of Axel Heiberg, to a point where the shore began to trend southward, and from here we took our departure the following day. As we swung out over the Polar Sea, Cape Thomas Hubbard was easily recognized from the photograph in "Nearest the Pole." It lay about eight miles to the southwest of our camp.

This first day's march netted us fourteen miles; our course let us out over very old blue rolling ice, the billows so smooth in places that with difficulty we prevented skidding into the hollows and splitting the sides of our sledges. We camped against a large pressure ridge with the temperature at -17° F.

On the seventeenth we worked through the rough ice ahead of us out on to a beautiful stretch of good going; too good to expect for any great distance. At the end of two miles we encountered a lead one quarter mile wide and extending at right angles to our course as far as the eye could reach. New ice was forming at the edges and at twenty below zero should be strong enough to bear us in fifteen hours or so. No provision had been made or should be made for crossing open leads in cold weather. A wooden boat would be out of the question. A canvas boat is cumbersome; the ribs are easily broken and the canvas easily punctured. In rough ice such as I have seen on the Polar Sea, resulting in our sledges being capsized a dozen times a day, even the thought of such an article is ridiculous. If launched in the smoking waters of an open lead at fifty and sixty below zero, it would become so augmented in weight with forming ice as to materially reduce the length of march per day. If, however, one is fortunate enough to encounter good sledging and thus preserve the boat intact as did Nansen and Captain Cagni, it might be the means of bringing back the expedition.

One other method has been employed by the Eskimos for centuries and also by white men for fifty years or more, namely, that of stretching a piece of canvas or skin beneath the sledge, thus converting it into a boat. The skin or canvas can be neatly folded at the start, but when once dipped in water at low temperatures one is very glad to get rid of this material.

Peary's device for crossing leads on his return is far superior to any which I have ever seen or read about. He lashes two sledges together, thus converting them into a raft, and places beneath them the inflated skins of the little ringed seal, which is a part of the hunting equipment of the Smith Sound Eskimo. They pack flat, are easily inflated, weigh but a few pounds, and have great supporting power.

On the eighteenth we crossed safely over the bending ice, to find beyond, a beautiful level stretch of good ice, over which we traveled at a rapid clip until held up by open water only twenty yards or so in width. Walking to the southwest, I found everything in motion and rising into the air with the closing of the two edges. There was not a moment to be lost. Calling to the men to come on, I ran back for my sledge and followed the two Eskimos into the grinding mass. It was by far the roughest ice and the hardest work which we had had since leaving Etah. As our reward we encountered another long stretch of good going, which netted for the day eighteen miles, giving us a total of thirty-four from land. Another lead fifty yards in width lay across our path but this we knew would freeze before morning.

I quote from my journal:

"Sunday, April 19th.

"40th Day

"Crossed over on the run this morning at half past ten when we had about given up hope. It has been a succession of leads throughout the day, one at 12:30, at 2:45, at 3:30, and at 4. We found all covered with the same dangerous thin ice, which bends and buckles like rubber.

"As we crossed the last it came together and rose beneath our feet, lifting dogs, sledges, and men with such a grinding, crushing noise that I could not hear the Eskimos yelling their instructions.

"Two of my dogs dropped into a crack. Thought that they would be crushed before we could pull them out. Running back I yelled to Fitz to hurry. By the time he arrived our bridge was completely destroyed, compelling him to cross some distance below.

"Temperature—18° F. 52 Miles off shore by dead reckoning."

On Monday, April 20, we traveled for seven and one half hours with excellent going throughout, crossing nine newly frozen leads. Two dogs dropped from Pee-a-wah-to's team and were not seen again. Our pemmican seemed to lack stamina-producing qualities; therefore I double-fed the dogs almost throughout the trip.

April 21 was a beautiful day and furnished us with the very best of going. Eight hours was our time to travel, at approximately three miles per hour, giving us a total of twenty-four miles. In the morning before leaving camp we had our last sight of the tops of the mountains of Grant Land, evidently lifted by mirage, and at the same time there was every appearance of land far to the west. I quote from my journal notes written on the spot.

"This morning Green yelled in through our igloo door that Crocker Land was in sight. We all rushed out and up to the top of a berg. Sure enough! There it was as plain as day—hills, valleys, and ice cap, a tremendous land extending through 150

degrees of the horizon. We had even picked out the point to head for when Pee-ah-to remarked that he thought it was mist in the sky resembling land. As we watched it more narrowly its appearance slowly changed from time to time, so we were forced to the conclusion that it was a mirage of the sea ice. . . . Two or three days more will tell. Clear weather and good going is our prayer."

On the twenty-second we got our first meridian altitude for latitude, which I here submit:

$2\odot \begin{cases} 40^\circ 00' 00'' \\ 40 06 00 \\ 40 06 00 \end{cases}$		Polar Sea. Wednesday, April 22, 1914.	
		Temp. -32°C . I.C. $-4'.0$	
		$2\odot 40^\circ 06'. 00''$	
		I.C.— 4'	
		<hr/>	
		2)40 02	
		<hr/>	
		20 01. 0	
		p&r —2. 9	
		<hr/>	
		19 58. 1	
		S.D.+ 15. 9	
		<hr/>	
		20 14. 0	
		Z 69 46	
		d 12 06. 2	
		<hr/>	
Dec. $12^\circ 00'. 3$			
+ 5. 9			
<hr/>			
Corr. Dec. 12 06. 2			
Approx. Variation 160° W.		Lat. $81^\circ 52'. 2$	

100 miles from land by dead reckoning.

Cape Thomas Hubbard last seen on morning of April 21, bearing S.E. true.

On Monday, April 20, sighted Cape Thomas Hubbard, bearing 292° magnetic and S.E. true, giving approximate variation of 157° West.

On this day there was the same appearance of land in the west, but it gradually faded away toward evening as the sun worked around in front of us.

Following is Green's observation for longitude taken on the morning of April 22, 1914:

A.M. 2⊙ for Longitude		“Polar Sea		Wednesday, April 22, 1914.	
		Temperature—24° C.			
D	9 ^h 06 ^m 07 ^s	2 Alt.	⊙ 30° 52' 30''		
R	9 07 07		30 59		
D	9 08 13		31 02 30		
R	9 09 27		31 07 30		
W	9 07 43	2⊙h	31 00.4	Dec.	12° 00' 19''.1
				+	3 23
C-W	5 14 19	I.C.—	05.0		12 3 42.1

				2)30 55.4	P	77 56 18
C	26 22 02			15 27.7		
		S.D. +		15.9	Equation T.1	23.49
CC	17 41			15 43.6		
		p&r—		3.9	+	2.02
G.M.T. 26 ^h 39 ^m 43 ^s				15 39.7	C. Eq. T.	1 25. 5
h	15 39.7					
L	81 45	sec.	.84317			
p	77 56.3	cosec.	.00969			
2) 175 21.0						
s	87 40.5	cos.	8.60823			
s—1	72 00.8	sin	9.97824			
				2) 9.43933		
				9.71967		
G.A.T.	7 46 58					
Eq.T.—	1 25.5					
L.M.T.	7 45 32.5					
G.M.T.	26 39 43					
6 54 10.5	Long.	103° 32' 37.5" W.				

April 23, our forty-fourth day from Etah, was a beautiful clear day enabling us to get good sights, also furnishing an excellent sledging surface. I had had a long talk with the two Eskimos the day before, making it very emphatic that I was going to the "brown spot" on the map, which I showed them, that we were not to turn back until we did get there, and that the faster we traveled the sooner we would turn back toward land. They both seemed to think that we would turn back when we encountered open water and rough ice as Doctor Cook did ten miles from land, and expected it at the end of every march. As a result of this talk they worked hard all day, urging on their dogs and running behind their sledges.

At noon Green stopped for a sight, and reported at night when he had rejoined us that he was absolutely certain that we had passed the edge of the supposed land and were well into the interior of what has been indicated by our latest maps as land.

S.D.	<u>0</u> 14 38.4				W.T.	5 ^h 45 ^m 27 ^s .3
	15.9				C-W	6 02 25.3
	14 54.3				C	11 47 52.6
p&R—	3.9				CC	17 34.8
h	14 50'.4				G.M.T.	12 05 27.4
L	82° 30'	sec.	88430		L.A.T.	4 53 50
P	77° 11''.2	cosec.	01095		Eq.T.—	1 52.6
2	174 31.6				L.M.T.	4 51 57.4
	87 15.8	cos	8.67894		G.M.T.	12 05 27.4
s-h	72 25.4	sin	9.97924			7 13 30.0
			2)9.55343			
			9.77672		Long.	108° 22' 30"
					Lat.	82° 30' 00"

From the summit of a pressure ridge near our last snow house, we swept the whole horizon with a powerful pair of binoculars; not the faintest resemblance of land was seen. The day was perfect; not a breath of air; the sky a deep cloudless blue; even all mist had disappeared from the surface of the ice, indicating that all leads had frozen. I was confident that there was no land within fifty miles of our position.

The character of the ice, however, would lead one to believe that this whole mass had been either forced over shoal ground and thus broken into small pans, or had been in the grip of powerful cross currents, which exist only in the immediate vicinity of land. To test the former theory, at our farthest north and west I lowered my small pemmican hatchet, held with three-ply linen thread, through a hole in the ice to a depth of 150 fathoms or 900 feet, and found no bottom. I believe that the ice which we found at this point had been forced around the northern point of some land far to the west. I specify *northern* point, for throughout our outward march level fields seemed always to lie to our left, tempting us to bear to the southward to avoid leads and pressure ridges. These fields were evidently in the lee of a distant land and were thus protected from the pressure of the arctic current flowing northward from Bering Strait.

On Saturday, the twenty-fifth, we turned back toward land, contending against a strong wind and drift which was covering up our outward trail. Within a few hours even the sharp eyes of our Eskimos failed to detect the slightest sign of it. To insure long outward marches

by lightening the sledges and thus aiding the dogs, I had risked caching at No. 4 igloo a sufficient supply of food to take us to the land. Therefore it was quite necessary to stick to the trail. After scrutinizing the surface for more than an hour, I was about to give orders to return to our last igloo in the hope of picking up the trail at the door and thus getting a new start, when E-took-a-shoo's voice was heard far to the south telling us to come on. That day's work by my two men, clinging to the trail in driving snow, stands out as something more than an incident in my four years' work. It was nothing short of marvelous and a distinct credit to the keen vision and intelligence of the Polar Eskimo. We were content with a single march.

Sunday, the twenty-sixth, was more favorable. We were up at 3:15 A.M. and out into the bright sunshine ready for the long march from No. 7 to No. 5. On the outward march I had carved on the inside of each igloo its number and also the time consumed in marching from one to the other. Thus if leads should widen or a field of ice should drift from its position, compelling us to deviate from our course, upon discovering the trail again and arriving at an igloo, I should know instantly just which stage of the journey we were on and the number of miles from shore.

On this day we had our first touch of snow-blindness, warning us that henceforth we must wear our snow glasses constantly. In my arctic work I have discovered that it is not necessary to wear snow glasses until the sun has attained a certain altitude in the sky with reference to one's geographical position. Snow-blindness is caused by the constant reflection from the surface of the snow of the bright rays of the sun into the eyes. But when the angle of incidence of the sun's rays is less than 20° , the reflected light coming from such a remote point has lost much of its injurious effect. I have traveled in March and April under a bright sun over stretching ice fields for ten and twelve hours continuously without suffering in the least; and I have seen an Eskimo return from a four-hour bear hunt so blind that we had to lead him in and out of our tent for three days.

On the twenty-seventh we marched from No. 5 to No. 3 and doubled our dogs for their hard work. Three had dropped on the outward trip, but thus far on the return trip one only had given up and was left behind.

The tops of the mountains of Grant Land were now seen far inshore, and as we traveled toward land on the twenty-eighth we decided to make a detour to the right around the leads and rough ice in the vicinity

of No. 2 igloo and strike straight for the top of what we judged must be Cape Thomas Hubbard. At the end of fifteen hours we stood upon the shore beneath the Cape. A quarter of a mile to the south a cairn could be seen outlined against the sky. We knew this to be the cairn described by Peary as being on the "low fore shore."

Although very tired with our long march, Green and I both felt that we should take advantage of the perfect weather and stand for our last examination of the Polar Sea where Peary stood in 1906.

Cape Thomas Hubbard, as we learned almost to our discouragement, rises out of the Polar Sea and recedes in three terraces. As these terraces were covered with a crust which broke at every step, naturally their crests were attained with considerable difficulty. At length we arrived at the last and were rewarded with the sight of a substantial cairn. A stick protruded from the top. At the base of this a cocoa tin was found containing a section of a silk flag and a brief record which read: "Peary, June 28, 1906."

The flag and the record were presented to the American Museum upon my arrival in New York. In the cairn I replaced a copy of the record, also a small American flag and a record of my own which read:

"April 28, 1914.

Arrived here to-day from point on Polar Sea 125 miles northwest true from here. Leave to-morrow for Cape Colgate, thence for Etah, Greenland.

(Signed) D. B. MacMillan
Fitzhugh Green."

At the time I wrote this record, Green's observation for longitude on the twenty-fourth had not been worked out, as it would be necessary to check up our watches with our standard chronometers at headquarters. We were both very confident that we could with safety put our position at least 125 miles from land.

Standing beside this cairn Peary saw and reported Crocker Land to lie one hundred and twenty miles due northwest. We looked toward the distant horizon. Glasses were not necessary. There was land everywhere! Had we not just come from far over the horizon we would have returned to our country and reported land as Peary did. The chief objection to one's positiveness was the tremendous size of the tract, stretching as it did from southwest true to north-northeast. In fact it extended so far easterly that we of the Peary expedition would certainly have seen it on our outward march in 1909 had it existed.

Reluctantly we were forced to the conclusion that what so strongly resembled land was simply a loom of the sea ice. This is a form of

mirage, a phenomenon extremely common in the arctic regions, especially during the early spring and summer months, when warm layers of air arriving from the south overlies the cold surface of the sea ice. Below our line of vision was a cold dense layer of air in contact with the ice of the polar sea. Above was a lighter and comparatively warmer layer. The common surface of the two media acted as a mirror in which was reflected and refracted that which was below it, such as rough ice and pressure ridges with all their shadows and high lights, newly frozen leads dark grey in color, and dark open pools with their overlying clouds of vapor; all bore a striking resemblance to a snow-covered land with its outcropping of wind-swept hills and dark cliffs.

Atmospheric conditions may be such as to bring into view that which is far below the distant horizon. Layers of air of different densities may be in close proximity, with the result that we see objects in multiple and inverted, the former *erect* caused by refraction, and the latter caused by reflection.

We also have in the Arctic the true mirage, when distant lands seem to be floating in a great intervening sea. Here we have the denser medium above and the warmer, lighter layer below, as in the arid deserts of Lower Egypt and Persia.

We retraced our steps to our snow house on the ice foot, and within a few minutes were having a well-deserved rest. In the morning there was every indication of a storm brewing. I felt that we had reached that stage of our journey when go we must, however violent the storm. I decided now to send Green south for the survey of the twenty-five miles of unknown coast-line between this point and Sverdrup's farthest north of 1901, also instructing him to visit the cairn which we could see to the south of us, and to bring back Peary's record.

Consulting Peary's "Nearest the Pole," page 210, I find the following:

"A small cairn with a piece of box embedded in the top of it was built not far from the ice foot upon the low fore shore. . . . No previous cairn exists on or near this cape, nor does it appear from Sverdrup's narrative or his map that he reached this point."

I agree with Peary that Sverdrup did not travel along this stretch of coast line when he followed up the eastern shore of Axel Heiberg Island with Cape Colgate as his objective point. He must have left the northern shore of this land on his northward journey from a point at least twenty miles east. On his return from "Lands Lokk" or "Lands End," his farthest north and the most western end of Grant Land, on

May 9, 1902, he states that "We laid the course *east* of Bergholmen, straight across Fridtjof Nansens Sund to the northern extremity of Heiberg Land . . . we started on our way next morning with our course on a high steep cliff, which we reached latish in the afternoon." Cape Thomas Hubbard is not on the northern extremity of Heiberg Land but at least ten miles *west*, nor does it in any way resemble "a high steep cliff." The name Cape Thomas Hubbard should stand. I mention these facts because I notice that in certain publications Peary has not been given credit for being the first to reach this point, and that from recent maps the name has been erased.

The record found in the cairn on the shore read as follows:

"Peary 1906

"June 30, 1906.

"Arrived here . . . A.M. June 27th from the Peary Arctic Club's S.S. Roosevelt, which wintered at Cape Sheridan, Grant Land.

"Killed two deer within half an hour of landing & have secured eleven in all.

"The 27th and 28th fine clear days giving good view of northern horizon, from the summit of the cape.

"The 29th and 30th southwesterly gale with rain and snow.

"Have with me 2 Eskimos & 12 dogs. Expect to start back to-night.

"(Signed) R. E. Peary, U.S.N."

On the twenty-ninth, Green and I separated, I heading to the north with E-took-a-shoo, Green to the south with Pee-a-wah-to, with the understanding that we should meet at the "dug out" about fifteen miles east. It was the first time in my experience, I think, when I have disregarded the advice of my Eskimo companions. It was the judgment of both that we were to have wind and plenty of it. Within an hour there was a raging blizzard. We fought our way north and east along the base of the big cliffs crowning the northern end of Axel Heiberg Island in a perfect smother, at times being unable to see our dogs on a sixteen-foot trace. Our sledges were blown over repeatedly. How E-took-a-shoo found our old igloo I shall never know. The roof had partly fallen, but it was still a home. We crawled in, kicked out the snow, and jammed a grass bag into the open doorway. The dogs were uncared for, not even unhitched from the sledges. The snow eddied and whirled about them and soon they were white shapeless masses.

Our tea and biscuit over, we lay back on the snow bed and listened to the distant roar of the wind and the rushing of the drift. We slept, we told stories, we ate, then slept again, with the roof ever sagging lower. A look through the peephole above our door, and that same "Pilt-suck-suah!!" (Heavy drift) from my Eskimo companion. Thirty hours went

by and I could stand it no longer. It was agreeable to E-took-a-shoo that we try to reach the dugout ten miles east. At four in the morning of May 1 we arrived, having been fairly blown along the shore by the violent gusts from the cliffs. My Eskimo boy, craving fresh meat, started at once for the hills and was back in ten hours with two caribou.

All through the first, the second, and the third, it continued to blow so hard that I considered it a crime to pound my tired dogs over to Cape Colgate and back for a mere record. And every day increased my anxiety over Green. He arrived on the fourth to relate that his experience in the storm had been similar to ours. His dogs were buried under the drift and were never seen after he had tied them for the night.

It was now a race against the breaking up of the ice of Smith Sound, which would cut us off from home for five months or more. Pemmican and musk-ox meat were in cache along our backward trail, thus permitting us to travel straight toward our destination without deviating in search of food, which can easily be found if one has the time for it. Several dogs dropped on the trail, worn out with the long continuous work. Eureka Sound presented the same hard wind-blown surface, over which we raced with the wind at our backs, now and then noting on a distant hillside a multitude of black dots which we knew to be musk-oxen, rich red meat for our dogs and ourselves. But that would wait until a better day.

Bay Fiord was a nightmare of deep snow. In gaining the head of this on our last day we walked every step of the way for thirteen hours, and arrived at our old camp bareheaded, in shirt sleeves, and covered with sweat. Evidently the wolves had occupied our home, as our musk-ox skins were torn to shreds. One wolf watched us during our stay here and followed us over the heights of Ellesmere Land into Beitstadt Fiord.

It was a hard climb for our tired dogs to the height of land. I was glad for them when our traces slacked and the sledges began that long descent to the sea. Our last quarter-mile on the glacier was a bit dangerous. Wind and the warm sun had removed from its surface all loose snow and now it was nearly as smooth and as slippery as glass. The sledges were rolled over on their sides, roped together, and held back with a heavy drag. With careful work all were lowered safely to the sea ice below.

We arrived at Cape Sabine on the twentieth. Here we were met by two Eskimos whom I had requested to come to me when the little auks had arrived from the south (about May 15). Faithful to their trust, they had left their wives and children, had headed west over the ice of Smith Sound, had crossed the heights of Ellesmere Land, and had kept on until they found us.

We left Cape Sabine at midnight of the twentieth, our tired dogs now drawing empty sledges, following the two well-fed teams which had arrived from home to help us. We reached Etah at three o'clock on the afternoon of the twenty-first. We had covered the 1200 geographical miles in seventy-two days.

For our sights on the Polar Sea we used a $6\frac{1}{2}''$ Navy sextant. For our time, we used six twenty-four-hour pocket chronometers supplied to the expedition by the Waltham Watch Company. Other equipment consisted of three thermometers made by Green of Brooklyn, registering to -90° F., and two aneroid barometers.

ASTRONOMICAL OBSERVATIONS

SLEDGE TRIP ON POLAR SEA, SPRING, 1914

Mer. alt. for Latitude

Wednesday, April 22, 1914.

$2\odot \begin{cases} 40 & 00 & 00 \\ 40 & 06 & 00 \\ 40 & 00 & 00 \end{cases}$

Temp. -32° C.

approx. comp. var. 160° W.

$2\odot \quad 40^{\circ} 06' .0$

IC. $\quad \quad - 4 .0$

$2)40 \quad 02 .0$

$\odot \quad 20 \quad 01 .0$

d $12^{\circ} 00' .3$

p&r $\quad - \quad 2 .9$

$\quad + \quad 5 .9$

$19 \quad 58 .1$

S:D. $\quad + \quad 15 .9$

d $12 \quad 06 .2$

Tr- $\odot \quad 20 \quad 14 .0$

Z $\quad 69 \quad 46$

d $\quad 12 \quad 06 .2$

$\begin{cases} \phi & 31^{\circ} 25.2' \# \\ \text{Long.} & 104^{\circ} 00' \text{ W.} \end{cases}$

Sight taken on eighth march on Polar Sea and forty-third day from Etah. Distance to Cape at time of sight, 100 miles by dead reckoning.

Cape Thomas Hubbard last seen yesterday, Tuesday, April twenty-first, bearing S.E. true, distance approximately 80 miles by D.R. Land lifted by mirage.

Since leaving land, weather was bad and the Cape in sight often enough to obviate necessity of sights.

This day clear and cold; no land in sight.¹

A.M. $2-\odot$ for Longitude

Wednesday, April 22, 1914.

Temp. -24° C.

D $9^h 06^m 07^{sec}$

$2\odot 30^{\circ} 52' 30''$

R $9 \quad 07 \quad 07$

$30 \quad 59$

R $9 \quad 08 \quad 13$

$31 \quad 02 \quad 30$

D $9 \quad 09 \quad 27$

$31 \quad 07 \quad 30$

¹Note in Commander Green's handwriting: "O. K." F. Green

Green's Watch, No. 6									
W	9	07	43	2⊙	31°	00.4'	d	12°	00' 19.1"
(22d) C-W+	5	14	19	IC	—	05.0		(+)	3 23
C	26	22	02		2)30	55.4	d	12	03.7
C.C.		17	41	⊙	15	27.7	p	77	56.3
G.M.T.	26	39	43	S.D.	+15.9				
					15	43.6			
				p&r	— 3.9		Eq. T.	1 ^m	23 ^s 49
								(+)	2.02
				Tr. ⊖	15	39.7	(—)T.A.T.	1	25.5
h	15°	39'.7							
L	81	45.0	sec	.84317					
p	77	56.3	cosec	.00969					
2S	175	21.0							
S	87	40.5	cos	8.60823					
S-L	72	00.8	sin	9.97824					
				2) 9.43933					
				9.71967					
L A T	7 ^h	46 ^m	58 ^s						
Eq T	—	1	25.5						
L.M.T.	7	45	32.5						
G.M.T.	26	39	43.0						

6 54 10.5

*Long. 103° 32' 37.5" W. #

Watch rate taken as average between comparisons at time of departure and time of return to headquarters with chronometer B.

Chronometer A rated on return and by daily comparison book. B's error on April 22 determined.

Watch set at approximately 75th meridian time on leaving Etah. Hence $c-w = 5^h r_w T$, where r_w is the average daily rate of the watch and T is the elapsed time since nearest comparison.¹

Mer. alt. for Latitude

Thursday, April 23, 1914.
Temp. —26° F.

2⊙D	39	58'.5							
	39	59.0							
R	40	01.0							
	40	01.0							
	40	02.5							
	40	03.0							
D	40	03.5	2⊙	40	03.5	d	12	20.5	
	40	01.5	I.C.	(+)	1		(+)	5.9	

¹Note in Commander Green's handwriting: "O.K." F. Green.

2)40	04.5	
☉	20	02.3
S.D. (+)	16.0	dec 12 26.4
	20	18.3
p&r (—)	2.3	
Tr☉	20	16.0
Z	69	44.0
d	12	26.4

$$\begin{aligned} \# \phi & 82^\circ 10.4' \text{ N} \\ * \text{ (Long. } 106^\circ 00' \text{ W (by D.R.))} \end{aligned}$$

Sight taken at L.A.N. on ninth march on Polar Sea, and forty-fourth day since leaving Etah.

Weather clear; no land in sight.

Distance to Cape Thomas Hubbard by D.R., 121 miles.

Course N.W. Tr.¹

PM alt. for Longitude

Friday, April 24, 1914.

2☉ D	29° 25'		W	5 ^h 41 ^m 19 ^s	
	29 18			5 44 01	
R	29 20			5 44 56	dec N 12° 40' 30.6
	29 16			5 45 36	cos (+) 8.3
	29 14.5			5 46 02	
	29 13.5	MacMillan's watch		5 46 36	
		No. 1			d 12 48.8
					p 77 11.2
D	29 10			5 47 21	Eq.T. 1 ^m 46 ^s . 91
	29 09.0			5 47 47	5.64

$$\begin{aligned} & 5 \ 45 \ 27.3 \quad (—) \text{L.A.T.} \\ & 1 \ 52.55 \end{aligned}$$

2☉	29° 15'.8		W	5 ^h 45 ^m 27.3 ^s	
IC(+)	1		C-W(+)	6 02 25.3....	(Apr. 24)
			C	11 47 32.6	
	2)29 16.8		C.C.(+)	17 34.8	
☉	14 38.4				
S.D.	15.9		G.M.T.	12 05 27.4	
	14 54.3				
p&r	— 3.9				

$$\text{Tr}(\ominus) \ 14^\circ \ 50.4$$

h	14° 50'.4		
L	82 30.0	sec	.88430
p	77 11.2	cosec	.01095
2S	174 31.6		
S	87 15.8	cos	8.67894

¹Note in Commander Green's handwriting: "O. K." F. Green.

S-L 72 25.4 sin 9.97924
 2)9.55343
 9.77672

L.A.T. 4^h 53^m 50^s
 Eq. T(—) 1 52.6
 L.M.T. 4 51 57.4
 G.M.T. 12 05 27.4

7 13 30.0
 * { Long. 108° 22' 30" W
 { ϕ 82° 30'.0 N Dist. to Cape Thomas Hubbard, 137 miles.¹

ETAH TO POLAR SEA AND RETURN . . . MARCH AVERAGES . . .

		Marches	
		out	in
Etah to cache in Hayes Sound.....	100 miles	4	4
Hayes Sound Cache to Glacier.....	30 "	2	2
Beitstadt Fd. to Bay Fd.....	32 "	4	2
Bay Fd. Ek. Camp to N. side Bay Fd.....	36 "	2	1
N. side Bay Fd. to Skroelingodden.....	90 "	4	4
S'k'n to cache near Cape T. Hubbard.....	90 "	5	4
TOTAL.....			
378 "			
& return.....			
756 "			
On Polar Sea.....			
274 "		9.5	4.5
Cape T. H. to cache.....			
30 "		..	2
		32.5	21.5
TOTAL.....		1060 miles	54 marches

Deviations of trail, with the exception of hunting, should bring this to at least 1200 miles.

Average on Polar Sea.....	19.6 miles daily	} reckoned on 1060 miles
Average per march, 54 marches....	19.7 " "	
Average per day, whole trip.....	14.7 " "	

(72 days)

WINTER AND SPRING WORK OF 1915-1916

With the elimination of the exploration of Crocker Land from our plans, our time and resources were now available for the survey of the region north of the Parry Islands and the confirmation of the non-existence of the Peary Channel. P. Freuchen, however, claimed a prior right to the Peary Channel region, stating that he was planning to continue the work which he and Rasmussen had undertaken in 1912. Therefore I relinquished my plans in this direction and gladly consented to his request that Doctor Hunt be permitted to accompany him.

¹Note in Commander Green's handwriting: "O. K." F. Green.

Our geographical work as planned for the spring of 1915 was as follows:

1. Mr. Ekblaw to cross Smith Sound, cross Ellesmere Land, go north through Eureka Sound, explore and map the Greely and contiguous fiords, visit the Lake Hazen region of Grant Land, and return by way of the Kennedy Channel and Peabody Bay to Etah.

2. Doctor Tanquary to have charge of supporting party of Ekblaw and proceed northward to Lady Franklin Bay and there await Ekblaw's arrival.

3. Doctor Hunt to accompany Mr. Freuchen over the Greenland ice cap to the Peary Channel.

4. Ensign Green to be my companion in the attempt to reach and explore King Christian Island and Finlay Land; the latter was seen sixty years ago but had never been visited by man.

Now that our chief objective point had proved a myth, it was highly important that we should inform the American Museum of Natural History of the fact. This I preferred to do myself by sledging to Upernivik in South Greenland rather than to risk the delay of such important mail by entrusting it to Mr. Freuchen and his Eskimos. The trip would also enable me to purchase two teams of dogs for our spring work and would furnish considerable ethnological data, as I should come in contact with practically every man, woman, and child in the Smith Sound tribe.

Accompanied by Doctor Tanquary and several Eskimos, I left Etah December 24 for Umanak, where we were to meet Freuchen and his Eskimos. We arrived on the twenty-eighth, having covered the one hundred and twenty miles in four marches. In two days we were headed south for Cape York and Cape Seddon across Melville Bay, where we arrived so late in January that I was compelled to return to Etah from this point to condition my dogs for Ekblaw, as I had promised. I instructed Doctor Tanquary to proceed to Upernivik with the mail, in company with Freuchen.

On my return trip I learned that there was scarcely a particle of meat in the tribe; that dogs were dying; that all southern igloos were being abandoned; and that all Eskimos were moving north to the hunting grounds off Cape Chalon. Our dogs traveled for five days without food, passing from one deserted village to the next.

Tanquary arrived back early in March with both feet so badly frosted that amputation of the two big toes was declared necessary by our surgeon. His nineteen dogs, which he had purchased in South Greenland, were walking skeletons. Their use in our spring work was out of the question.

Freuchen on this trip lost half of his team; consequently he was compelled to give up his plans for the exploration of the Peary Channel.

Thus our plans for five of our party to take the field, driving five dog teams, suffered a necessary change. Ekblaw's plans I considered the most important. The entire food supply, the equipment, and all dog drivers were placed at his disposal.

Following his departure in March, I left immediately for the hunting grounds at Peteravik to strengthen our remaining dogs for an anticipated specimen-collecting trip into Eureka Sound and northward to the Humboldt Glacier. These two trips were carried out as planned and netted fifteen musk-ox skins and four polar bear.

Ekblaw returned early in June, reporting a very successful trip.

Following the departure of my men for the south in the fall of 1915 under the care of Doctor Hovey, I immediately began preparations for an extended trip in the spring of 1916. Being well supplied with food and equipment, I decided to undertake, with the valuable help of my Eskimos, the exploration of the region north of the Parry Islands and the attainment of King Christian Island, seen by members of the Sverdrup Expedition in 1901, and Finlay Island, seen in about 1850 by the Sir John Franklin search expeditions. These lands are in 100°–105° West Longitude and in 77° 30' North Latitude, distant by sledge five hundred miles.

As our route led westward always in proximity to land, I felt confident that we could subsist almost entirely upon the game of the country. My plan was to delay the start until rising temperatures assured me of a good running surface for the sledges. The friction of snow at zero on a steel runner is in pleasing contrast to that of dry powdery snow at —60°. With light sledges, a good surface, and plenty of fresh meat, we should make a record.

On March 22 we left Borup Lodge at Etah with eight sledges, ninety dogs, proceeding north in a blinding drift to our first encampment at Ka-mowitz. A bear killed in the middle of Smith Sound upon the following day had its usual effect upon men and dogs; both were in excellent spirits and anxious to continue on into the west where more game could be procured.

To avoid the rough ice which we could see to the southward in the vicinity of Cape Sabine, we headed northwest for Cape Camperdown of Bache Peninsula. Here at this camp I began a series of observations for compass variation, working from the 75th meridian to the 101st.

On March 26, at the end of our fifth march, we encamped at the entrance of Flagler Fiord within a few yards of an open pool of water, although the thermometer denoted ten below zero. This is occasioned by the undercutting of the ice by the swirl of the tides in and out on the bay, assisted by the shallowness of the water, which appeared to be only ten feet in depth. This spot is known among the Smith Sound Eskimos as a favorite hunting ground for seal when on their annual hunting trips into Eureka Sound. Lines were attached to harpoons, and within a few minutes twelve seals were secured, enabling us to feed our dogs generously and also place in cache a large amount against our return weeks hence.

The old Eskimo Pass was found to be as we had anticipated—well packed with wind-driven snow, affording excellent footing for our dogs. Masses of wool in the lee of huge boulders and old tracks were evidence of the presence of musk-oxen a week or so previously.

On the twenty-eighth we arrived at the height of the river valley. My aneroid barometer indicated an altitude of 950 feet above sea level. E-took-a-shoo advised a detour to the left in preference to a descent by the river valley, where formerly he had encountered rocks and deep snow. This necessitated a further ascent to the summit of a glacier, from which a rapid run was possible to the head of Bay Fiord. The twenty-ninth was consumed in sledging our equipment and supplies up the face of this glacier and well back on the summit.

Early on the morning of the 30th a voice was heard at our igloo door. Ark-pood-a-shah-o, a delayed member of my party, had reached Etah from the south three days after my departure, his trail having been intercepted by open water near the village of Net-che-lee-vik. So desirous was he of accompanying us on our trip that he set out at once alone, having on his sledge two things only, a sleeping bag and a three-pound piece of frozen narwhal. He had covered the one hundred and forty-eight statute miles in two sleeps; and, what is more remarkable, he had found in the snow on the trail a quarter-inch lens which I had lost! A few hours' sleep and he was ready to go on with us to the west.

The ascent of the glacier was at a very gentle angle and the going excellent, but the descent gave us our first taste of discomfort. Covered with perspiration from our exertions in climbing the glacier, we arrived at the summit to find a cutting wind at twenty-four below zero. A heavy drift of fine, floury snow was added to this and was driven deep into the fur of our dogs, into every crack and cranny of our sledges, and into our fur clothing. A few minutes of vigorous work with the snow-beater soon relieved us of this extra load.

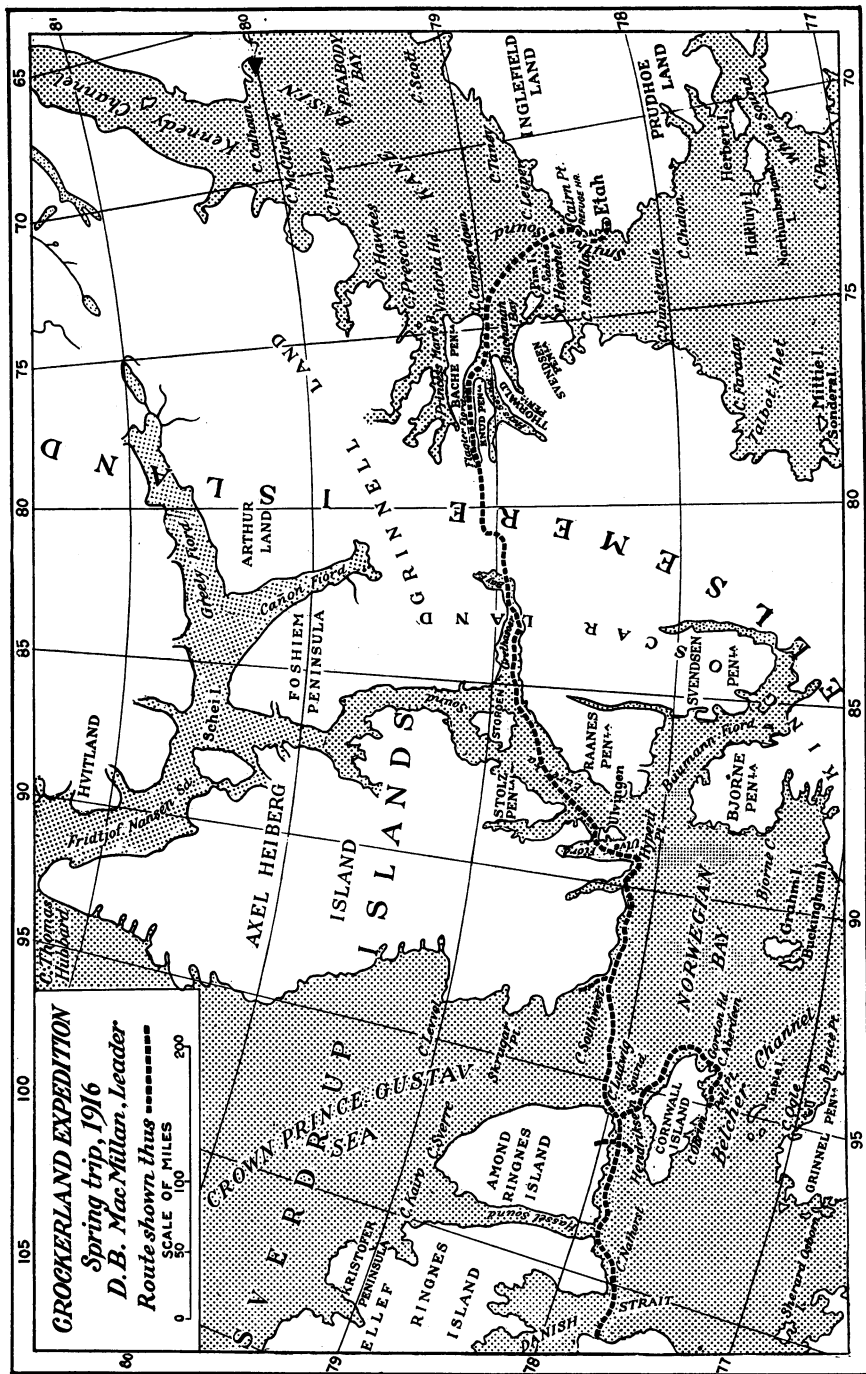


Fig. 2. Route of D. B. MacMillan and party to King Christian and Finlay Island, 1916.

Upon our arrival at the head of Bay Fiord, musk-ox tracks were discovered leading to the westward. One half of our party I detailed to construct an igloo, which usually consumes about one hour in time, and the other half to follow the trail. Within an hour the latter reported fifteen musk-oxen killed. After feeding our dogs to repletion, a cache was made of skins for the American Museum and of meat for our return trip.

Good bituminous coal is found all through this section in large lumps lying in the river beds. Panikpa informed me that when living on the eastern shores of Axel Heiberg Island in 1910-1911, just south of May Point, he discovered a large vein and heated his rock house with it throughout the winter. This was a comforting thought, for on the morning of the thirty-first our thermometer stood at -44° F., which temperature continued throughout the day and into the next with a -40° F. I have stated in my Crocker Land report that Etah, owing to the presence of a large body of water, is the warmest place in the north. Such is very evident from the fact that a simultaneous reading at Etah on the thirty-first gave only -15° F. The lowest reading on April 1 at the house was -11° F., a striking difference when compared with our -40° F.

April 2 resulted in the killing of a bear and three large musk-oxen, but also in the loss of a fine dog, which was tossed by a bull and killed. Evidently we were to be plentifully supplied with fresh meat, which is synonymous with strength and endurance in our dogs. They gave evidence of this when, on April 4, they covered fifty geographical miles in twelve hours and killed and ate a bear en route. The sledging surface was so good that we rode on our sledges practically all day, excepting when the low temperature compelled us to run behind our sledges to start our circulation. We drove from a point on the shore just inside of Storaen Island of Eureka Sound diagonally across to the Stolz Peninsula and on to Bjornesundet, where we built our igloo on the northern shore of Ulvingen, a dumb-bell-shaped island at the lower end of Eureka Sound.

Two of my Eskimo drivers left for Etah from this point, with instructions to pick up all skins cached on the trail and deliver them to Small at Borup Lodge.

A typical musk-ox country opened to our view as we rounded Hyperit Point on the sixth. Ptarmigan and arctic hare were also very numerous, encouraging us to remain here for two sleeps to secure meat and lay in a cache for our return. Such would enable us to economize upon our small amount of pemmican, which we were reserving for an emergency.

Careful sights for longitude, latitude, and compass variation checked up almost exactly with Sverdrup's work. With but few exceptions our location of salient points agreed remarkably well, considering that exact work at low temperatures is well-nigh impossible. Very little work has been done by the explorer to test the theory of the amount of refraction in extreme temperatures. Furthermore, no work has been done to obtain the temperatures of the different layers of air in the arctic regions, upon which so much depends when dealing with a low altitude of the sun.

It was very interesting to note that our compass variation steadily increased as we proceeded westward into the region between the north and magnetic poles. From 104° W. it had now increased to $128^{\circ} 15'$.

Thus far we had not put on a snowshoe, but, as we proceeded westward on the ninth, we encountered deep snow and a breaking crust which plainly had a tiring effect upon our dogs. Within sight and easy distance of Cape South West, we built our igloo for the night, with one bear on our sledges, secured during the day. The shore we found to be fairly covered with the tracks of fox, ptarmigan, and lemming; and pieces of coal were scattered about everywhere. Evidently Axel Heiberg Island, one hundred and eighty miles long and sixty wide, is one vast deposit of coal.

Five hours' work on April 10 brought us to Cape South West, and to wind-swept ice. As we hitched our dogs we discovered tracks of musk-oxen along the shore. Ark-pood-a-shah-o could not wait until we had finished our igloo, but was off immediately to the north. He was back at 10:30 in the evening with his sledge loaded with skins and meat; he had killed two musk-oxen about six miles north of our camp.

Everything thus far had been exceptionally favorable for a successful trip. We had killed thirty musk-oxen, sixteen arctic hare, thirteen seals, and seven polar bear, only once deviating from our course for game. We were fortunate in losing only four of our dogs; for a bear is quick with his claws and teeth, and the horns of musk-oxen are sharp. Our dogs were in fine condition, as shown by the fact that they had covered with the addition of the trip to the head of Gletscher Fiord, 345 statute miles, an average of seventeen miles for every day since leaving home.

All my men were very anxious to go on. They were as happy as a crowd of schoolboys as we gathered in our snow house at night, had our tea, biscuit, and meat, and lit their pipes for the after-dinner story. What ideal traveling companions they are!

It was hard for me to tell Ark-pood-a-shah-o and Ac-com-mo-ding-wa that they must return to Etah. No one knew just what we were to

expect on the land and on the ice to the westward. An attempt to feed sixty dogs might result in a premature retreat of the whole party. I therefore deemed it wise to limit our number of men to four and our dogs to forty. A party of four is a very satisfactory unit for several reasons. In the ordinary-sized snow house, such as we build on the trail, four men are very comfortable; five are too many. Our tea and pemmican pots are of the right size for four men. The party is easily divided into two pairs if game is scarce, thus covering twice as much territory and doubling our chances for safety.

On the twelfth they left us, with instructions to head west again from Etah when the little auks arrived from the south (fifteenth of May); we might need them to help us with our loads of skins.

From our camp a rounded dome could be seen about due southwest. This I judged to be a headland of North Cornwall. Nothing was visible in the direction of Amund Ringnes Island. At the end of a march of eight hours and forty minutes, I described a snow-covered mountain surmounting a rolling lowland. To the north of us a long low point or island projected eastward. As we proceeded on the next day this land was seen to have no connection with the coast and was pronounced an island by us all. I should judge it to be about one mile in length.

We reached Amund Ringnes Island on the thirteenth, some five miles north of Cape Ludvig. This uncharted coast trended to the west into a large bay, then swung east to a point of land ten miles distant. The island which we had passed the day before could now be seen extending in a southeasterly direction from this point.

The tops of the highest peaks of Amund Ringnes Island may possibly reach a height of 2000 feet. The land as a whole is extremely flat and uninteresting. I have never seen an arctic land more uninviting. It slopes from the interior at such an easy gradient that it is quite impossible to define the shore line accurately. Land and sea merge into one. Undoubtedly during the summer months, when Hendriksen Sound is free of ice, there are numerous outlying small islands, reefs and ledges throughout the whole extent of the sound.

Our camp on the fourteenth was made upon a small uncharted Island one mile off the shore, almost exactly between the Magnetic and North Poles in $96^{\circ} 30'$ West. Theoretically the compass variation should be here 180 degrees, the extreme variation. North should be south and east west. Working with the mean of my fourteen readings (Volume A, pages 119-121), I obtained as a result a westerly variation of $147^{\circ} 28'$. For some unknown reason the compass needle at this point was very

erratic, both on the advance and upon my retreat several days later, often varying five degrees upon the same reading. A magnetic soil is my only explanation.

A polar bear and two small cubs secured here helped out our meat supply and justified a day of rest for the dogs on the fifteenth, the first since leaving Etah twenty-five days before. In hope of seeing game, two of the boys walked back over the flat rolling country toward some snow-capped hills five miles distant. They returned several hours later reporting tracks of caribou, ptarmigan, and hare. In the evening two large white wolves trotted up to our camp but quickly disappeared in the direction of North Cornwall upon hearing the yelps of our excited dogs.

Well fed and well rested, our dogs on the sixteenth easily trotted their forty miles to the middle of Hassel Sound; and at such a rapid clip that we found it rather difficult to walk or run behind our sledges.

From this point at Hassel Sound we should have seen the eastern shores of Ellef Ringnes Island, but, owing to the heavy mist and the low sloping shores, nothing whatever could be seen to the west. The next day we traveled for eight hours west and southwest, at times not being able to tell whether we were on land or sea ice. We encamped at Cape Nathorst, determined to find meat for our dogs if possible, as they had not been fed since leaving Cub Camp on the southern shores of Amund Ringnes Island. The exploration and rounding of King Christian Island depended entirely upon our success in providing our dogs with fresh meat. The low foothills and shores were quartered for hours without result. Wolf, caribou, and bear tracks were common, but none of musk-oxen.

On the morning of the nineteenth we followed the windings of the shore for three hours to the most southern point of Ellef Ringnes Island and then headed directly across for the shores of King Christian Island which we reached in six hours and a quarter. Our work now could be continued only upon the discovery of game.

In the morning we awoke to a southeast gale with heavy drift. In spite of this, however, my men were soon dressed and off with their rifles to the hills. They returned at 4 P.M., reporting that it was impossible to see for any distance. We were encouraged by the tracks of lemming, fox; and the excrement of caribou.

Wind and drift were equally bad on the twenty-first, compelling us to seek the shelter of our snow house throughout the day. On the twenty-second the weather moderated, permitting sights for longitude and azimuth. A further advance with no game would necessitate a

possibly disastrous retreat to our first cache at Cape South West, one hundred and forty miles distant. By retreating at once from this camp there would be a day's reserve food for the attainment and partial exploration of North Cornwall, a land visited but once on its southern shore sixty-three years ago. It was simply a choice between the uncertainty of finding game and the certainty of reaching North Cornwall. We turned back about noon of the twenty-second.

Just before arriving at our camp on the southern shore of Ellef Ringnes Island, a bear was killed, and the dogs were filled to repletion. And before midnight two more bears walked right up to our igloo door and were added to our larder. Had it not been so late in the year, I should certainly have turned back for a further exploration of King Christian Island. Every minute now was precious for the work as outlined for my return.

Enormous bear tracks leading to our snow house on the southern shores of Amund Ringnes Island caused us to have considerable apprehension as to the safety of a mother bear skin and the skins of the two cubs. We found the house demolished and the large skin gone. The cub skins had failed of detection, having been concealed within my sleeping bag cover.

An azimuth obtained here at this camp revealed the same uncertainty in direction of the compass needle as on our visit of eleven days before. Just why the needle should be sluggish or wandering at this point between the magnetic and north poles is hard to explain. At no other point during our four years of sledging was there such inconsistency, the compass needle ranging through six degrees.

On the twenty-sixth we left this camp and headed across for the shores of North Cornwall, which we reached at 4:15 in the afternoon, the *first* to step upon the island for sixty years. On August 30, 1852, Sir Edward Belcher in his search for Sir John Franklin, landed from a boat on the southern shore, but remained for a few hours only. He sailed eastward, touching at one other point before heading for the south.

Along the ice foot there were tracks of wolves, musk-oxen, and hare, which encouraged us to believe that the game supply might enable us to encircle the whole island. Above our head was the prominent headland almost constantly in our view during the last three weeks. I have named this McLeod Head, after my lifelong friend. Upon ascending to the summit we ascertained its height by aneroid to be 1200 feet. Here a large cairn was constructed, and a record of our visit was left in a small bottle. The remarkably clear air of a beautiful day enabled us to extend

our view to the limit of visibility. Three small flat islands were discovered lying off to the west and northwest, one of which we passed when crossing Hendriksen Sound. Over and between the rounded summits of the hills to the south we could discern the sea ice stretching off into Belcher Channel. On the southwestern shore there appeared to be a large fiord, in the center of which was a striking-looking island with its cliffs rising sheer from the sea ice.

At a glance it was seen that the northern and eastern shores of this island were quite different from what is plotted on our latest maps. Owing to the extremely low shores bordering the rolling rounded hills of the center, necessarily this would be so, as the land was seen by the Sverdrup party from a distance of ten miles. An accurate survey can be determined only during the summer months, when shores are free of snow and the surrounding waters of ice. Sledging, however, along the ice-foot as we did for the next six days, keeping the low hillocks of sand on our right and the sea ice on our left, revealed the land extending due east, not southeast, well beyond the 93d meridian before trending southward.

A second cairn was built upon the shore at the foot of McLeod Head and there we deposited a record. Before we departed eastward, E-took-a-shoo was sent into the hills for game but returned with one hare only, which was very disappointing. A fact of interest noted here was the discovery of the tracks of the polar bear at an altitude of 800 feet, confirming the oft-repeated statements of my Eskimo boys that this animal, when hungry in the early spring, resorts to eating grass, which he finds in a frozen state on the wind-swept plateaus and on the mountain slopes.

We proceeded eastward on the twenty-seventh of April, carefully following the coast line and taking some thirty observations with Brunton's Compass for bearing of salient points and the altitude of the sun with a sextant. Throughout this march of eight hours, not a track of any kind was seen. This disappointing lack of game altered my plans somewhat. It was evident that, with a party of four men and forty dogs to feed from our scanty stores, I could never reach the south side of the island. With one man only, I felt that I might do it and reach our cache at Cape South West with dogs in fairly good condition for the homeward trip. Therefore E-took-a-shoo and Arklio were instructed to head directly for Axel Heiberg Island and there endeavor to find musk-oxen and place meat in cache against the return of Noo-ka-ping-wa and myself several days later.

The sloping shores of North Cornwall, northern, eastern, and southern, all consist of intermingled sand, coarse gravel and mud, liberally

besprinkled with various kinds of shells, one of which I recognized as the *Mya truncata*. Bits of coal of excellent quality were found all along the shore. From the general appearance of the shells I should judge this area to be of recent uplift and not to extend far from the shores of the island, as evidenced by the unbroken character of the sea ice, which revealed but one shoal, only one-half mile due northeast of the most eastern extension.

On the evening of the twenty-ninth we rounded the southeast point of the island and headed due west, noting the entire absence of the two large indentations as shown upon our latest maps. Undoubtedly the low land in this section has been mistaken for sea ice. Off the mouth of a small bight on the southeastern shore, we discovered and passed over an island two miles long and a half-mile wide. I have named this Belcher Island in honor of the first man to land here. This so much resembled an old floe in its general appearance and contour lines that I convinced myself that it really was land by digging through its layer of snow in several places, to sand, gravel, and frozen grass.

At 1 A.M. on the thirtieth, we reached our last camp, some two miles east of a prominent-looking headland. Exmouth and Table Islands to the south were plainly seen and appeared to be but a few hours' travel by dog team. The loom of Grinnell Peninsula occupied the whole southern horizon. Upon the summit of a hill one mile inland, we constructed a cairn and deposited a record.

Good weather on the thirtieth enabled us to secure sights for azimuth, latitude, and longitude. Compass variation was $139^{\circ} 15'$ west; the latitude, $77^{\circ} 22'$, which placed us six miles south of the coast line on the map. The mean of ten morning sights gave us a longitude of $93^{\circ} 50'$. I regretted exceedingly that I could not go on westward and finish this southern shore. A lack of food justified our return from this camp.

We arrived at Cape South West on May 2, following an eleven-and-a-half-hours' march across Norwegian Bay. Seventeen stubs of matches sticking in the snow block over the entrance testified to as many hares killed by the other two boys, but a lack of fresh meat in cache was proof that they had been compelled to retreat eastward. They had moved on to our cache at Gletscher Fiord, as I had directed them to do if game failed.

Another cairn was built at Cape South West, and a record was enclosed in a Powell's U.S. Army chocolate tin. This cairn is distant about one hundred yards from the extreme end of the cape and is situated on the west shore.

From this camp at Cape South West, a perfect volcanic crater could be seen about five miles north, and in from the coast about one mile. I regret that lack of time prohibited a thorough examination and absolute proof that this was a crater. During my ten thousand miles of sledge work in the Arctic, I have never before seen anything bearing the slightest resemblance to a cone of elevation or eruption.

On May 4 we headed eastward and homeward with the thermometer at two above zero, bright sunshine and no wind,—conditions too ideal to continue. Within two hours we were fighting wind and drift and closely watching the trail. Halfway between camps we discovered one hundred pounds of bear meat stacked up awaiting our hungry dogs. Arklio and E-took-a-shoo had not forgotten us.

That night we were all together again in our igloo at Gletscher Fiord, listening to and narrating our experiences. A strong wind and drift on the fifth did not prevent our reaching the big cache at Bjornesundet, which we found buried deep beneath our fallen igloo. Here were spare clothing, whips, films, camera, tent, and other equipment for our return trip such as I always plan to cache for an emergency. One can very easily lose everything—dogs, sledges, rifle, fuel, matches, etc.—on a long trip.

Fifty miles on the seventh facing a cold wind for eleven and a half hours, testified to the excellent condition of our dogs and the spirit of my men. We were agreeably surprised at the end of this march to find our old igloo filled with frozen bear meat placed there by the two Eskimos who had returned from Cape South West. Another surprise at this camp in Eureka Sound was the discovery of a caterpillar at eight above zero temperature, recalling to my mind a similar occurrence when sledging around the northern end of Greenland in 1909. This was our second sign of spring, the first being a snow bunting (*Plectrophenax nivalis*) which flew across our trail some ten days previous.

A seal (*Phoca fatida*) secured on the ninth was a promise of fresh meat from now on. The month of May is the best month in the year for exploration and sledge travel in the North because of the fact that food is everywhere and is easily secured.

At the head of Bay Fiord we remained for two sleeps to feed and rest our dogs for the ascent of the Ellesmere Land Glacier. That such a rest was necessary was evident from the fact that on the tenth we consumed two hours in traveling our first mile up out of the river valley. Soft deep snow overlying a rough rocky river bed is a tough proposition for a heavily loaded sledge. Finally we gained the back of the glacier and ran into a thick fog which obscured all landmarks. As our old trail

and that of our returning parties were obliterated by recently fallen snow, there was nothing to do but camp where we were and await better weather.

A partial clearance on the eleventh enabled us to ascend the summit of the glacier and descend on the eastern slope for a mile or so, when we again encountered a heavy mist. Uncertain as to just where we were and how to head to find the only descent into the old Eskimo Pass leading to Flagler Bay, we pitched our tent and delayed until 4 A.M. of the twelfth, when we were again on the march and made a fast run to the sea ice where we arrived at 2:30. At 11 P.M. we were on the trail again, proceeding down Flagler Fiord to the water hole at the entrance. Here we captured four seals in about as many minutes.

We now headed direct for Cape Sabine, hoping to find better sledging at the edge of the ice of Smith Sound than we encountered on the advance when laying our course for Victoria Head. The dogs reeled off their thirty miles, enabling us to camp within two miles of Cocked Hat Island. Upon leaving Buchanan Bay the next day we found to our disappointment open water extending as far north as the eye could see. Yet far to the north we knew that there was a bridge, and we snapped the whips over our dogs to find it. Nevertheless, the condition of the whaleboat left by Peary at Victoria Head eighteen years before occupied most of our thoughts as we trudged northward.

After several hours of sledging, we were glad to see the easterly curving edge of the ice and were finally on our course eastward, wondering whether we were on a large drifting field or were connected with the main pack.

Some ten miles from Victoria Head, my two Eskimos, whom I had instructed to come to me upon the arrival of the little auks, met us and relieved our dogs of their load of musk-ox and bear skins.

We reached Etah on May 16, having been gone from home fifty-seven days and having covered 1140 statute miles, an average of twenty miles per day.

All sights for azimuth, longitude, and latitude, with the results, as determined following my arrival at Etah, may be found in the Expedition's field volume marked A, deposited in the American Museum of Natural History. Many of these were worked out in the field and are in my field note books marked "King Christian Island."

The temperature observations as recorded on the trip may be found in my notes and have also been entered in the meteorological journal with the simultaneous reading at Etah.

SPRING WORK OF 1917

With the coming of our fourth year, little exploratory work remained to be done. The verification of the existence of Peary Channel seemed to be the most important problem to be solved. For this work I had a sufficient number of good dogs, an ample equipment, and sufficient food for a party of four, which is the most satisfactory number for arctic sledge work.

During the winter I was much disappointed to learn that Rasmussen had arrived in the North with this very object in view. Arctic etiquette demanded that I relinquish all my own plans and help him in every possible way, which I proceeded to do by instructing Captain Comer, whom I had placed in charge of Borup Lodge, to supply Rasmussen and party with everything needed for his journey.

Only one trip now remained, but one which might prove profitable in results, namely, a survey of the eastern shores of Ellesmere Land between Cape Sabine and Clarence Head. This I decided to do because of the importance attached to the work by some of our leading geographers. Clements R. Markham, in an address before the Royal Geographical Society on May 28, 1894, remarked, "Next to Northern Greenland, the most interesting part of the unknown region is the land on the western side of the north part of Baffin Bay, between Smith Sound and Jones Sound, and extending along Jones Sound to the west and north. It was named Ellesmere Land by Sir Edward Inglefield, who saw it from the deck of the *Isabella* in 1852. It is called Uming-Mak (the land of the musk-oxen) by the Eskimos. No one so far as we know, has ever landed between Jones Sound and Smith Sound."

In the spring of 1861, Doctor Hayes landed at Cape Isabella and at Gale Point. In August, 1894, Mr. Henry G. Bryant of the Peary Auxiliary Expedition landed at Cape Faraday and at Clarence Head. As this coast was mapped from a ship's deck, naturally the map has been considered inaccurate; this I found to be true.

On March 25, I left Etah with my three Eskimo companions, forty dogs and heavily loaded sledges. Seals were not to be obtained so early in the year and musk-oxen I knew did not exist in a country which to all appearances lay deep in snow.

Our experience in crossing Smith Sound was very different from that of 1914-1915-1916. Overtaken by a blizzard fifteen miles from land, we were compelled to remain in our snow house for three days. Also contrary to our experience of previous years, Cape Sabine was found to be impassable. The long-continued southerly gale had removed

all sea ice, leaving nothing but a dangerous ice foot, and compelling a detour west to Cocked Hat Island and Rice Strait, where we encamped in a small bight which was the site of the headquarters of the Sverdrup Expedition in 1898-99. A heavy rope found here leading from the hills to the water's edge was undoubtedly one of the mooring ropes of the famous Fram.

Proceeding down through Rice Strait on March 31, we attempted to round Cape Herschel but encountered open water which compelled us to make a detour inland. A deep inlet leading from Ross Bay afforded an easy passage south to a low narrow neck of land connecting the high land of Cape Herschel with the mainland. As I reached the summit of this and looked southward into Herschel Bay and northward into Ross Bay, I suspected at once that I had discovered the explanation for the appearance on all our earlier maps of the mysterious Leconte Island of Doctor Hayes. Later this was confirmed when I stood upon the heights of Cape Isabella where Doctor Hayes stood in 1861 and looked northward along the coast.

On p. 421 of his "Open Polar Sea" I find the following:

"The view up the Sound from Cape Isabella was truly magnificent. . . . Off Cape Sabine there are two islands, which I name Brevoort and Stalknecht; and another, midway between them and Wade Point, which I name Leconte."

Viewed from this point, Cape Herschel does look like an island, as the low connecting neck of land cannot be seen and as the sea ice appears continuous between Herschel and Ross Bays. The British Expedition of 1875-1876 passed this point in a thick fog and did not discover the error; consequently Leconte Island was placed upon the maps of that expedition, upon the report of Doctor Hayes. It was not until Greely landed upon this coast in the fall of 1881 that there was doubt as to the existence of the island, and since then the name has appeared intermittently attached to a small ledge within a few yards of the front of Leffert's Glacier. All evidence is conclusive that Cape Herschel and Leconte Island are one and the same mass of land.

Crossing the Cape Herschel Peninsula, I swung westward past the face of Leffert's Glacier in search of Greely's first retreat camp, a spot which has not been visited since the departure of the Greely party in the fall of 1883. It was readily found and identified by the rock outlines of three huts projecting from the snow. Quoting from "Three Years of Arctic Service":

"October 3d,—I selected a general site for building; and, as there was a variety of plans proposed for constructing the houses, I permitted each squad to build its own

house in accordance with its own ideas. The party is divided between three houses—my own, Lieutenant Kislingbury's and Sergeant Brainard's—in assignments to which the wishes of the men have been consulted as far as was practicable. . . . Many Eskimo caches and a number of relics have been found in and around these permanent houses. Among other articles was a toggle of walrus ivory for dog traces, a narwhal horn, and large bones of a whale."

Strange to say that, upon cutting down through the snow of the center house, we uncovered the narwhal horn. Here also was found the stem of a boat with ring bolt attached, probably that of the boat left by the party for an emergency.

A surprise awaited us upon attempting to round Cape Isabella on May 1. The fast-ice was entirely gone, and the ice-foot was buried beneath a jumbled chaotic mass of ice piled high against the rocks. A heavy mist to the south precluded an extensive view of what we might expect by crossing the ice cap to Cadogan Inlet. I decided to return to Etah and, if Rasmussen had not arrived, to attempt the Peary Channel trip. If he had not given up the plan, I would return within a few weeks, hoping to find ice conditions more favorable.

Before leaving, however, I was prompted to search for the cairn and records of the British North Pole Expedition of 1875–1876. On the way northward "Commander Markham accompanied by Captain Feilden landed in a small bay on the south side of the extreme point of the cape. After an extremely rough scramble up one of the gullies, a cairn was erected on the outer spur of Cape Isabella, 700 feet above the water line; a cask for letters and a few cases of preserved meat being hidden away on a lower point, about 300 feet high, magnetic west of the cairn."

On August 6, 1876, Captain Allen Young of the *Pandora* reached this point in an attempt to communicate with the expedition, and there left mail. Unable to reach a more northerly point he revisited the cape on August 24.

The British Expedition returned south sixteen days later and touched at Cape Isabella for mail. Quoting from "*Voyage to the Polar Sea*" by Captain Sir G. S. Nares, R.N.:

"At 10 P.M. we arrived at Cape Isabella and on Commander Markham climbing up to the depot he found the package of letters and newspapers left there by Sir Allen Young a few weeks previously; we gathered from them that a duplicate packet had been carried on to Cape Sabine.

"It was now a consideration whether I should return to Cape Sabine or not; but as it was quite certain that the '*Pandora*' had not advanced north of Hayes Sound, and was not herself in want of assistance, I decided to be content with the letters which we had received, and to push on for Disco while the weather remained favorable.

"Owing to the thick coating of snow on the ground, we failed to find the notice Sir Allen Young had buried twenty feet magnetic north of our cairn, which would have informed me that he had considerably landed the principal mail at Littleton Island. To this oversight on our part the loss of the principal mail was due."

After picking my way for some three hundred yards through the rough ice overlying the ice foot, I readily discerned the "lower point, about 300 feet high." Scattered about among the huge boulders on the summit were numerous barrel staves. The head of a barrel marked "Alert" positively identified the site of the cairn and cache. Twenty feet from a small cairn, which, upon demolishing, I found to contain no record, was a strong cask, open at one end and partly filled with sand, out of which protruded a copper cylinder with cap missing. The contents—rolled paper—I was unable to extricate, it being evidently frozen to the copper. I returned to our snow house at once and with the aid of our Primus stove succeeded in thawing and drying two records, one of which was the official record of the British Admiralty written in six languages and the other as follows:

"Arctic Expedition

"H.M.S. 'Alert'

"(Lat:

North. Long.—West).

"Her Majesty's ships 'Alert' and 'Discovery' here on their way south to Port Foulke. The 'Alert' wintered in Lat. $82^{\circ} 27' N.$ Long. $61^{\circ} 22' W.$ inside grounded ice. The 'Discovery' wintered in a sheltered harbor in Lat. $81.44 N.$ Long. $65^{\circ} 3' W.$

"The sledge crew of the 'Alert,' after a severe journey over the ice, succeeded in attaining Lat. $83^{\circ} 30' N.$ and the coast line from the Winter Quarters of the 'Alert' to the northward and westward was explored to Lat. $82^{\circ} 23' N.,$ Long. $84^{\circ} 26' W.,$ Cape Columbia, the northernmost cape, being in Lat. $83^{\circ} 7' N.,$ Long. $70^{\circ} 30' W.$

"Sledge parties from the 'Discovery' explored the north coast of Greenland to Lat. $82^{\circ} 21' N.,$ Long. $52^{\circ} W.$ (approximately), a distance of 70 miles beyond 'Repulse Harbour.'

"No land was sighted to the northward of the above explorations, excepting a few small islands at the extreme of the Greenland coast explored.

"Lady Franklin Sound was explored by the 'Discovery' and was found to run S. W. 65 miles, and terminated in two small bays, also Peterman's Fiord was explored for 19 miles, and was then found to be impassable (?) for sledges owing to glacier ice.

"A seam of coal 25 yards long, 22 feet thick, was found in the neighborhood of the 'Discovery's' Winter Quarters.

"Employed in sledge traveling. Four deaths have occurred,—

H. M. Ship 'Alert'	{ Neils C. Peterson, Interpreter, at Winter Quarters on the 14th May, from the effects of a severe frost bite (which necessitated a part of each foot being amputated) followed by exhaustion and scorbutic taint. George Porter, Gunner, RMa. On the 8th June of Scurvy and General Debility, when absent on a sledge journey, and was buried in the floe in Lat. 82°, 41' N.
H. M. Ship 'Discovery'	{ James L. Hand, A.B. of Scurvy on the thirteenth of June, and Charles W. Paul, A.B. of Scurvy on the twenty-ninth of June; both buried in Polaris Bay.

"The ice in the Polar Sea broke up on the twentieth day of July, and on the 31st the 'Alert' left her Winter Quarters, and on the 12th of August joined the 'Discovery.' Both ships left 'Discovery Bay' on the twentieth day of August and proceeded south.

"All well.

"We are homeward bound with very little ice in sight. We shall call at Disco, but not at Littleton Island or Port Foulke.

"G. S. Nares

"Captain R.N.

"Commanding Arctic Expeditions."

On the morning of the following day, in company with my three men, I again visited the spot in order to search for the missing cap of the record case. As the mail barrel was found imbedded in about one ton of sand in a jog between two immense boulders, I naturally inferred that the cap must be somewhere concealed in the sand.

A twenty-minute sifting of the sand through a small hole in the rock brought the cap to light, and our record case was complete.

A few minutes later a packet bound in sailcloth was discovered about fifteen feet due west of the cairn. Its weight instantly revealed the fact that whatever was within was incased in ice. Sending the boys back to the igloo with the packet, I essayed the rather difficult ascent to the cairn on the summit of Cape Isabella. The slope, very precipitous and covered with compact snow, could be negotiated only with considerable difficulty, owing to my lack of a knife or hatchet for cutting foot holes. A slip would have resulted in a long and somewhat dangerous slide to the jagged ice overlying the ice-foot.

Finally, covered with perspiration, I reached the summit, and crouched in the lee of the cairn for breath and shelter against a cold northerly wind. Rock by rock the cairn was pulled apart and every cranny investigated, without detecting the trace of a record. This, I think, must have been removed by Markham and Feilden upon their visit to the cape on the return of the expedition south in September, 1876.

I reconstructed the cairn and inclosed a record of my visit in a Powell's chocolate tin.

Upon my return to our igloo at the end of the cape, I thawed out the sailcloth packet, which proved to be a rust-eaten tin containing three letters frozen into a ball of ice. All were carefully removed and dried, and, strange to say, nearly every word can be deciphered.

"Pandora

"Cape Isabella, Aug. 6, '76.

"Dear Capt. Nares:

Our record here will give you an outline of our proceedings, and you will see that I did my best last year to land your letters in the desired position, but the weather was so bad on all these occasions of our visits to the Carey Islands that I was unable to remove them from their original position on the N. W. Island.

"Your depot on the S. E. Carey Island is all right.

"If you are sailing homeward this year, I think you may safely strike across from C. Yorke toward Upernavik, so ——— is a broad water in the direction. I unfortunately took too northern a route with a S. E. gale and thick weather, and got beset and driven out of sight of water into the head of Melville Bay, but after a series of violent gales I fortunately escaped and came in here.

"The best harbour I can recommend is at the head of McCormick Bight. We thoroughly (?) canvassed (?) Foulke Fiord up to the fast ice just above Etah—I cannot recommend it, and if my opinion is asked as to the best harbour for the relief ship of 77 and if she is to proceed to the East side of ——— I shall give it in favour of McCormick Bight, as the soundings are even and bottom very good stiff mud. We anchored in $6\frac{1}{2}$ fathoms, and rode out a violent south gale.

"We have experienced awful weather on this passage so far, and narrowly escaped leaving our party on Littleton Island, as I was driven out of the anchorage between it and McGary's Island by ice, which soon surrounded the neighborhood during the stay of our landing party on shore. This anchorage between Littleton and McGary Island is quite unsafe and far too small, but as we are obliged by the ice to go between Littleton and the Main, I had no other alternative to ——— the island.

"Everybody at home feels the greatest interest in your glorious expedition, and I sincerely trust that you have been successful in your arduous work. Mrs. Nares kindly came to see 'Pandora' off.

"If I do not find any news of you here later than your outward passage, I shall try to proceed northward to one of your other stations.

"We came across last night in a thick fog through streams of ice, and I have just made out the cairn here. It is blowing hard from the north with much loose ice under the shore, but I hope we shall be able to reach the cairn, which, however, looks an awful way up the hill.

"Wishing to find some news of you hence, I write this in frantic haste with—of everybody of your gallant expedition, and with the assurance of my deep sympathy and interest in your understanding.

"Yours very sincerely,

"Allen Young.

"I shall land here part of the letters, and it will depend upon the information found as to what I shall do with the remainder and the despatches. Lieut. Charles W. ———will land and be guided by the information found."

"Dear Captain Nares:

"On our previous visit here—Aug. 6th, 1876—we were blown off by a gale and drift ice, and have ever since that date been attempting to regain the cape, a solid pack of drift ice extending from Cape Dunsterville on the west shore round to Cairn Point on the east shore preventing our reaching within 10 miles of Cape Isabella.

"I have tried to get northward but have not been able to reach beyond Cape Paterson on this side, or Latitude 78° 45' on the east side.

"On August 6th our landing party were unable to examine the packages and we were thus left in doubt as to whether they were your despatches or some of your provisions, and hence my attempts to regain the cape.

"Failing in our repeated attempts to regain the cape, and seeing no prospect of our doing so this season, I landed the bulk of your letters and despatches on the lower point N.N.E. (mag.) from your cairn on Littleton Island and where I hope they will be even more accessible to you than on this cape.

"After a heavy southerly gale yesterday, we have succeeded in getting back into clear water, I proceed homewards at the end of this month, having cruised here all the navigable season in the event of your sending a boat party to Littleton Island.

"Trusting that you are all well and have succeeded in your arduous work.

"Yours truly,

"Allen Young.

"Landed at 1 A.M. August 25 and on examination found the cask to be empty and the cans to contain preserved meat. They will be left as they were found.

"It is evident no sledge party had visited this place.

"Charles W. ———"

"Pandora

"Off Cape Isabella

"August 5th, '76

"Dear Captain Stephenson:—

"Capt. Young is putting a private note in this record tin for Capt. Nares, so I will just put in a line for you.

"We are landing a cache containing a lot of letters and papers for both ships, that came on board loose at Portsmouth, also 2 wooden cases of periodicals and Naval Chronicles of which there are duplicates on board for the other ship. The letter bags which came on board at Portsmouth, besides sundry boxes of periodicals, etc., we will take on, if possible, to Cape Sabine or one of the other depots named by Capt. Nares further north. The Admiralty despatches I am going to take on shore with us, and it will depend upon what news I find at the cairn whether I put it in the cache here or take it on, but I will leave information which I have done at the cairn. The weather just now looks promising, and I see no reason why we should not at least reach Cape Sabine;—three days ago there was a lot of ice about, but it has all been driven north by a strong southerly gale. I am afraid, if you are trying to come south again this year, it will rather impede your progress, and as we have had strong southerly winds almost continually since leaving Upernavik I expect a great deal of ice has been driven north. We found rather a good harbor at the head of McCormick bight in Hartstene

Bay, and took a rough survey of it. It seems the best place about here, and I think it probable that Capt. Young will recommend it to the Admiralty as a good rendezvous for the relief ships to go to, which will come up next year, should you not return before that. We all hope that you have obtained a high latitude and done good work this spring, and we hope also to get some views of you to take home, although Capt. Young hardly expects that you could have sent a party down this far, if you succeeded in getting as far north as Capt. Nares seemed to hope you would. Your letters and papers will give you as much news from England as I could in here, and this written in a great hurry.

"Things were looking rather warlike just as we left, in the direction of Turkey and the Mediterranean Squadron was being strengthened, but I don't think it could come to much; the latest thing we heard was that the Sultan had been kicked out and his nephew put in his place. The Prince of Wales' tour in India was a great success, and on his return there was great rejoicing. Com. Bedford & Durrant, as well as Hulton, Mann, and Kirkness got their promotions out of it. The Duke of Edinburgh commissioned the Sultan and had just sailed for the Mediterranean before we left, his wife having gone to Russia. Britton went as his commander, and Hallet as First Lieutenant, but you will probably see that in the paper.

"Please remember me kindly to Beaumont and all the other fellows. Everyone in England that I saw wished to be remembered to —— all. Please tell Beaumont that Mr. Bainbridge was on board just before we sailed and that I promised to say that he was looking very well.

"Hoping that you have done well so far, and wishing you all success for the future,

"I remain

"Yours sincerely,

"Charles W——

"—— was on board here and wishes to be remembered to all he knows.

"Edgerton was promoted on Oct. 15th, '75; his commission is in Admiralty Bay.

"I think he is the only one in the expedition."

We left the cape on April 3 for our return trip, swinging up into Baird Inlet, the first, I believe, ever to enter this unexplored region. My Eskimos declared that none of the Smith Sound tribe had ever entered it. I could well understand this after traveling two miles. It was absolutely the worst sledging I have ever experienced. It was very evident that, because of the high hills bordering the fiord, this was a windless area. Consequently the snows remained as they had fallen, deep, light, fluffy, and without bottom. Our sledges went down to the cross bars; our dogs wallowed as if swimming. Unwisely, to save weight, we had cached our snow-shoes at the mouth of the inlet. Upon dismounting from the sledge I sank to the waist and found it impossible to walk. It was a new experience for me in arctic work. There was nothing to do but yell at the dogs, wield the whip, and plod on toward the ice-foot on the northern shore where we hoped for improvement. Ice-foot traveling.

if necessary, is always resorted to when deep snow is encountered. Here the rising of the tide through the tidal crack, the demarkation line between the sea ice and the ice-foot proper, produces a new hard sledging surface twice in twenty-four hours, always to be depended upon during the periods of new and full moon, which produce our highest or so-called spring tides. A knowledge of this fact has economized on many and many a mile of weary sledge work. My time of departure for all spring trips was decided upon with this helpful fact in view.

Reaching the ice-foot, we made rapid progress along the northern shore, a majestic basaltic headland some two miles from head of inlet. We had already despaired of a shelter for the night, the soft snow being altogether unsuitable for building purposes, when the sharp eye of Arkpood-a-shah-o detected a mass of snow at the base of the cliff quite different in character from its surroundings. It was clearly the result of an avalanche, and so compacted by its fall as to be entirely satisfactory for our purpose of constructing a snow house.

On the morning of the fourth, I walked on to the head of the inlet for photographs and sights. On the north side beyond the basaltic cliff there are two glaciers fairly tumbling from the cliffs into the sea, certainly at an angle of 70° . At the head of the fiord, stretching from the sea ice with gentle slope, runs a magnificent glacier back to the sky line, a beautiful white highway leading into the interior of Ellesmere Land. Adjoining the face of this, but separated by a nunatak, another glacier extends into the southwest.

A lofty headland rising almost directly from the sea occupies the inner and southern side of the inlet; this is one of the most striking features of the coast. Adjoining this on the east is a large glacier jutting well into the sea and occupying what has been placed upon our maps as a large inlet. East of this, and separated by nunataks, are two other glaciers nearly as large. All merge into one on the sky line. Evidently all these glaciers are active, as the sea ice, especially at the head of the inlet, was one mass of small bergs. I have named these glaciers at the head of this inlet after my six associates of the Crocker Land Expedition, Small, Ekblaw, Tanquary, Hunt, Allen, and Green.

On the fifth we camped on the northern shore of Cape Herschel and later drove to the end of the cape to search for the record and cairn of A. P. Low of the Dominion Government Expedition of 1903-1904. Here on August 11, 1904, a landing was made and a document read "taking formal possession in the name of King Edward VII, for the Dominion, and the Canadian flag was raised and saluted. Copy of the

document was placed in a large cairn built of rock on the end of the cape." We found the cairn demolished and the record gone, without a doubt the work of Eskimos, who are in the habit now of visiting this coast annually in search of polar bear.

From this camp we directed our course toward Peary's old headquarters at Payer Harbor, in the face of a bad drift and temperature at sixteen below zero. The wooden hut, which was the deckhouse of the S.S. *Windward*, was not at all hospitable. Its windows were out and its door gone; the floor was missing. Rather than remain I preferred to stroll over to historical Brevoort and Stalknecht Islands, which were discovered and named by Doctor Hayes in 1861, but are ever memorable because of the important part played in the Greely tragedy of 1884.

The British cairn of 1875 still crowns the summit of Brevoort. Its record was removed by the Greely party in September, 1883. It was in this cairn that the Greely records were found by Lieutenant Taunt of the U. S. Government Relief Expedition under Commander W. S. Schley, giving the first information as to the location of Starvation Camp.

A visit to Stalknecht on my return revealed on the summit the Greely cairn, which was found by Ensign Charles H. Harlow of the 'Thetis' within a few minutes following the discovery of the records on Brevoort Island. From here I walked on to what has been called Payer Island, which is really a low peninsula stretching from the mainland on the western side of the harbor to within two hundred yards of Stalknecht Island.

On the morning of April 7, we proceeded northward through extremely rough ice, capsizing and breaking our sledges, and exerting ourselves to such an extent that, although the thermometer stood at thirteen below zero, we were soon covered with perspiration. At length we emerged north of the cape out on to a stretch of smooth ice which continued to Greely's camp on the north shore of Bedford Pim Island. The rock walls of the house are still standing. The site of the last tent in which Greely and his companions were found, is plainly marked by a circle of stones which held down the flap of the tent. Cemetery Ridge overlooks the lakelet which was the deciding factor in the selection of the site. The ground is still littered with mementoes of the party.

We arrived at Etah on April 9, prepared to condition our dogs and head either northward for the Peary Channel or southward again for Clarence Head when ice conditions permitted.

Rasmussen and his party arrived on the tenth, bound northward with the Peary Channel as their objective. He was poorly equipped for

such a journey. From our stores he was liberally supplied with everything needed for his trip, such as snowshoes, motion picture film, pemmican, oil, and biscuit. He left on the thirteenth with the intention of returning to Etah about August 1.

While waiting for the seals to appear on the ice, which would furnish meat for ourselves and dogs, I employed my time in developing negatives and in checking up the salient points on the coast from Etah to Nerky in Murchinson Sound.

On Thursday, May 3, we were off again on our western and southern trip. Our hopes of plenty of fresh seal meat were realized; four seals were seen on the ice and one was secured. On the sixth we were back again at the Peary hut at Cape Sabine with dogs and Eskimo companions smelling like a guano factory. Fortunately for them, unfortunately for me, we had discovered a cache of narwhal meat aged two years. It was pronounced right and eaten with gusto!

Conditions for rounding Cape Herschel remained unchanged, compelling us to seek the inland pass again. This I have called the *Elison Pass* in memory of poor *Elison* who with frozen hands and feet was dragged by his companions up over the thin narrow neck.

A gale with drifting snow and a nine-below-zero temperature kept all seals beneath the ice on the eighth; consequently our meal consisted of tea and biscuit only. Good weather on the following day netted considerable progress southward. Open water at Cape Isabella again blocked our passage. To climb up over this high cape with our dog teams seemed at first thought out of the question, but the apparently inaccessible and impossible is often simply a matter of patience and slow toiling. The end of the day found us in camp on the ice-foot at the south side of the cape, having passed over the *Wyville Thompson Glacier* nearly to the summit of *Mt. Bolton*. On the descent I was surprised and delighted to find nestling among the hills two pretty little hills with ice as clear as crystal. To these I have given names of *Abbott* and *Ellis* after the two sons of *Mr. Ellis Spear* of Boston, a patron of the expedition.

We found near our camp the remains of a sledge of a hunting party of two years previous, evidence of the scarcity of game in this region. There seems to be absolutely no land life along this coast; one must depend entirely upon seals and polar bear. In the case of this particular party from Etah, seals failed to appear and bear could not be found, with the result that the dogs nearly all starved. Some were killed and eaten, which enabled the Eskimos to reach home.

The advance of the big glacier at our right between Cape Isabella and Gale Point is of the highest interest. I name this *Blish Glacier*

after Mr. T. Blish of Seymour, Indiana. Fortunately we have the observations of Doctor Hayes of fifty-six years ago on this glacier. We find the following in his "Open Polar Sea":

"Upon going ashore at Gale Point, I discovered traces of Esquimaux much more recent than those at Gould Bay and other places on the shores of Grinnell Land. Indeed they were of such a character as to cause me strongly to suspect that the shore is at present inhabited. The cliffs are composed of a dark sandstone which, to the northward of the point, breaks suddenly away into a broad plain that slopes gently down to the water's edge. This plain is about five miles wide, and is bounded at the north much as at the south, by lofty cliffs, which rise above the primitive rocks back of Cape Isabella. The plain was composed of loose shingle, covered over in many places with large patches of green, through which flowed a number of broad streams of water. These streams sprang from the front of a glacier which bulged down the valley from the mer de glace. It was about *four miles from the sea*, and bounded the green and stony slope with a great white wall several hundred feet high above which the snow-covered steep of the mer de glace led the eye away up to the bald summits of the distant mountains. As I looked up at this immense stream of ice it seemed as if a dozen Niagaras had been bounding together into the valley and were frozen in their fall, and the discharging waters of the river below had dried up, and flowers bloomed in the river bed. My journal compares it to a huge white sheet, hung upon a cord stretched from cliff to cliff."

To-day there is no plain. Its four miles of "loose shingle" and "patches of green" are buried beneath a hundred feet of ice dipping well into the sea. If the distance as estimated by Hayes is correct, we have an advance here of 377 feet a year or practically one foot a day. This advance has been coexistent apparently with that of all glaciers on the western shores of Smith Sound, which are much more rapid than the glaciers of the eastern coast where the progress has been about three inches a day or eighty-three feet a year.

That there is such a difference between the two regions of the same latitude, distant only thirty miles, is easily understood. The eastern shores of Smith Sound, between Cape York, 76° N. and Etah, 78° 20' N., are washed by a current from the south, as evidenced by the fact that drift ice and bergs never move southward along this coast, but northward around Cape Alexander. Thence they swing gradually westward and northward until the latitude of Etah is reached, which is the constricted part of Smith Sound, and then are carried westward toward Ellesmere Land until they are caught by the arctic current already heavily laden with ice flowing southward through Robeson and Kennedy Channels and the Kane Basin along the western shores of the sound.

In addition to this accumulation of ice brought hither by the two currents, we have the natural increase due to the fact that all eastern shores of arctic lands are found blocked with ice when western shores are

free. This is a well-known canon in arctic navigation. The eastern shores of Greenland are so choked with ice that few ships have ever reached them. At the same time the western shores, in spite of the fact that a strong ice-laden current swings around Cape Farewell and flows northward along the coast, are so free of ice that steamers run up and down the coast seven months in the year. In June and July, Labrador and Baffin Land are often inaccessible because of vast fields of ice, when a free passage is offered to Cape York, one thousand miles northward of the most northern point of Labrador. Is this due to prevailing winds, to ocean currents, or to the revolution of the earth on its axis?

There is one other fact of exceeding interest in the above quotation, that relating to traces of Eskimos as being recent. This confirms the tradition in the Smith Sound tribe and substantiates other evidence which I have accumulated in my five years with these people, that a migration from Baffin Land to Greenland took place in 1861-1862.

Before starting southward on this trip, I was informed by my Eskimo companions that this stretch of coast line was practically inaccessible because of the excessive depth of snow everywhere prevalent. The Eskimos on their annual hunting trips always planned to keep well out on the ice fields of Smith Sound, where improved sledging could be expected. The wisdom of this action was first apparent upon my visit to Baird Inlet a few weeks previous. As we passed south it became more so. The inlets, lands, and contiguous ice fields were simply buried beneath a deep mantle of snow. This excessive snowfall I believe to be due to the prevailing northeast winds of Smith Sound, which are exceedingly dry, having descended from the ten-thousand-foot ice cap of Greenland. Sweeping out over the ever-present open waters of the sound, in latitude $78^{\circ} 20'$, they become heavily laden with moisture, and, meeting the cold dry air of Ellesmere Land, cause a precipitation along this whole coast line. Here is the contact point between the cold dry air, flowing gently down from the snow- and ice-covered slopes of Ellesmere Land to the sea, and the moisture-laden air from the open waters of Smith Sound. The result is a precipitation and a neutralization of forces, producing an almost windless area during a large part of the year.

Cadogan Inlet is four miles long and two wide, having upon its northern slopes three tidewater glaciers, upon its southern two, one of which is at least two miles along its face. At the head, as in all inlets, is a large glacier filling the entire valley and fed by ten small ice streams winding through the mountain peaks. I have named this magnificent sheet of ice after Dr. Walter B. James of New York City. Straight into

the west lies a striking-looking mountain about three thousand feet in altitude. I have named this Greenough Mountain, after the President of the American Geographical Society.

Paget Point, and not Cape Isabella, is called by the Eskimos "Nooksuah," the big point. On the maps of to-day this has not received sufficient prominence, though it is by far the most striking point between Clarence Head and Cape Camperdown. It is ice-capped, the bold projecting headlands being nunataks dividing the great flow of ice to lower levels, terminating in a large number of hanging glaciers and in at least five tidewater glaciers, one of which, for a half-mile along its face, extends boldly into the sea at the very end of the cape.

Four hours were consumed in crossing the ice cap, which is in fact a large glacier stretching from shore to shore. To this I have attached the name of Sparks in honor of Edwin W. Sparks of New York, a man deeply interested in arctic exploration and a patron of our expedition.

Arriving at the sea ice on the south side of Paget Point, with the thermometer at 10° below zero, I was astonished to discover a spouting stream of water issuing from the surface of the lower end of the glacier. The result was an elevated cone of ice apparently increasing day by day, similar in its formation to a volcanic cone of elevation. Fissures radiating from the center of the cone indicated the result of enormous hydraulic pressure beneath the glacier.

When descending to the sea ice, I noted a small uncharted island imbedded in the pack ice distant southeast about nine miles. Upon inquiry I learned that my Eskimos had often slept upon it when on their annual bear-hunting trips. I name this Orne Island after a good friend, Mr. William L. Orne of Paterson, N. J.

To the south, distant ten miles, lay what was apparently a magnificent high island one mile from the shore. In spite of the protests of my companions, it was difficult for me to believe that it was a peninsula until we were actually in camp upon its shores. Similar to Cape Herschel, its outer end rises almost directly from the sea to a height of six hundred feet, crowning the end of a low narrow neck of land invisible one mile away. Such formations are common all through the arctic regions and have deceived many an arctic traveler, with the result that many so-called capes have been proved to be islands.

When we were making camp a bear was seen, which changed our plans somewhat; I took a lower meridian altitude for latitude and a line of bearing to all salient points— while the boys went in pursuit of our fresh meat. When this work was completed, noon of the twelfth was so

near at hand that I decided to await a meridian altitude. Twenty-four and thirty hours without sleep became a fairly common occurrence on this trip.

May 13 was a snowshoe day. These indispensable articles were not unstrapped for ten hours and a half. We plodded steadily southward through a perfect maze of bear tracks, snapping out our whips and encouraging the dogs to place another mile behind us. Following a sleep of only five hours, this exercise naturally made us quite ready for bed at the end of the day.

From this camp the whole stretch of coast line from Cape Dünster-ville to Paine Bluff was seen to be one vast glacier with a frontal face of at least twenty miles, the result of the confluent streams of ice from the interior, which could be seen winding from the horizon down between mountain peaks to the sea. The vertical walls of Paine Bluff, now nearly obliterated by a hanging glacier, divide the face, which continues for another half mile toward Cape Faraday.

On the fourteenth we directed our course in toward this great mass of ice and encamped within a few feet of it. I have named this the American Museum Glacier after The American Museum of Natural History of New York. The glacier was found to be resting upon the bottom of the sea in seventy-seven feet of water, which fact helps us to grasp the magnitude of this sheet of ice. It is without a doubt one of the great sources of the Baffin Bay pack ice.

The indentation between Paine Bluff and Cape Faraday as indicated upon the maps of to-day does not exist. It is now a mass of ice, which has flowed down over most of the headland and well into the sea, so changing the general appearance of the point that I passed without recognizing it, but checked it up on my return a few days later.

When passing Talbot Inlet, on the fifteenth, we encountered our first real wind, which was roaring out of the narrow mouth of the inlet with tremendous force, laden with a flour-like drift, and sweeping the surface of the very old billowy ice to such a degree that our sledges tossed about like boats in a heavy sea. For many years this old ice troubled explorers and scientists. In general it is perfectly fresh and some thirty feet in thickness. It is the palæocrystic ice of Greely, which he thought might possibly come from a land in the vicinity of the pole. It is really old sea ice which has remained attached to the northern shores of Grant Land and Greenland or in deep bays and inlets for several years and which the heat of the summer sun or offshore winds has failed to remove. Its surface, subjected to alternate thawing and

freezing, consists of hard, blue, rolling ice, the accumulation of years of snowfall. Finally there comes a year when conditions, such as an unusually warm season, succeed in detaching it from the shore or ice foot.

In view of the fact that the ice foot, or ice collar, which surrounds all arctic lands for ten months in the year, is inaccurately described in our best text-books, a word as to its formation may not be amiss. It is not a "snow bank at the water's edge solidified into ice by spray from dashing waves," but an accretion or growth upon the shore from the extreme low-water mark to the height of the spring tides. Each falling tide contributes its thin layer of ice, which adheres to the parent mass until we have a wall or collar attached to every northern shore, the width of which depends upon the angle of inclination of the beach. It forms upon the vertical face of a sea cliff, often furnishing a great white highway around certain points which in summer would be entirely lacking. In fact, one's progress in the arctic often depends upon this friendly phenomenon, which is resorted to when the rough sea ice prevents all progress.

Arriving at Boger Point on May 15, I saw at once that relatively everything was wrong. Either Boger Point of the map was too far north or Clarence Head too far south. It seemed but a step across to Cape Combermere and Hayter Head. Sonders and Mittie Islands could not be found. Two bold headlands to the south of Smith Bay projected from beneath their great load of ice, now nunataks in the great glacier endeavoring to obliterate all lands bordering Smith Bay. Were these the lost islands? Even so, it is difficult to explain their presence in the great mass of land, with its multitude of high peaks extending well to the east, and which could be none other than the northern shores of Clarence Head.

While measuring a base line, taking sights, and examining a glacier, my boys went across the bay to this land, examined its shores, and reported no islands en route. Consequently I was not surprised when my sights gave me a latitude of $77^{\circ} 10'$ against $77^{\circ} 30'$ of the map. In other words, Boger Point is placed twenty miles too far north.

Boger Point is a striking bit of scenery, with its six towering black peaks studded in the great white ice sheet, which flows about their bases and well out into the sea, ending in a vertical wall of ice some thirty feet in height. The peaks I have named the Thorndike Peaks after my good friend, Doctor Townsend W. Thorndike of Boston. The glacier, flowing through and around and covering the whole point, I have called the American Geographical Society glacier.

Upon the summit of a lateral moraine, one mile south of Boger Point, I constructed a cairn and inclosed a record of my visit.

On the sixteenth we drove northward, swinging well up into Talbot Inlet, for an examination of this section, little-known to white men but well-known to the Eskimos, through tradition, as being the site of one of the encampments of the migration party of 1861 and of the starvation party of 1862 and 1863. At the mouth we encountered a violent wind and drift, similar to that of a few days before. Mingled with the drift were heavy black clouds, giving to this great black hole with its towering black cliffs the appearance of a veritable inferno. I have never seen anything in the north so wild and uncanny as the picture then presented. Afterwards my Eskimos talked for several hours of the previous occurrence of deaths there.

And added to the mysterious effect of the whole scene was a castle-like island standing right in the centre of the midst of the swirling drift as if guarding the secrets of the fiord.

I have named this Bowman island after Dr. Isaiah Bowman of the American Geographical Society.

When we arrived at Cape Faraday, a thorough but futile search was made for the record left here by H. G. Bryant of the Geographical Society of Philadelphia on August 7, 1894. I have since learned from Mr. Bryant that the record was left on top of Cape Faraday and not upon the shore which we searched thoroughly.

On the return trip to Etah, many of my bearings of salient points of the coast and observations for position were repeated and checked. Photographs of practically the whole coast were secured. We arrived at Headquarters on May 25.

GENERAL SUMMARY

Period of exploration.....	1913-1917
Total length of sledge journeys.....	10,000 miles
Total length of coast line explored.....	2,000 miles
Astronomical observations.....	300
Observations for azimuth.....	100
Highest latitude attained.....	82° 30'
Longitude west of headquarters.....	108° 22'
Longitude east of headquarters.....	53°

Geographical areas remapped:

1. Foulke Fiord
2. Coast from Etah to Humboldt Glacier

Number of islands discovered 9

Geographical corrections made:

1. Crocker Land non-existent at 82° 30' N. 108° 22' W.
2. Coast of North Cornwall mapped with exception of small section on southwestern side

Barometric and Thermometric Readings obtained throughout four years with exception of some ten days in the fall of 1915

Records obtained of Kane, Peary, Fielden, Young, and Nares

Soundings made of Foulke Fiord and Alida Lake

Three months' tidal observations at Etah

Rate of advance of Brother John's Glacier determined

Large number of photographs of various types of glaciers, of ice-foot, of icebergs, and of solifluction obtained

