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The British Arctic Air Route Expedition.[1]

By the Late H. G. WATKINS.

(Read before the Alpine Club, May 3, 1932.)

THE object of the British Arctic Air Route Expedition was to investigate the possibility of an air route between England and Canada across the Arctic *via* the Faroes, Iceland, Greenland, Baffin Land and Hudson Bay. The advantage of this route over the direct crossing of the Atlantic would be that a long, dangerous sea crossing would be avoided, and the distance would be less, since the Arctic route would practically follow the Great Circle route between Scotland and Winnipeg.

The least known part of the route was the E. coast and Central Ice Plateau of Greenland. The whole of the interior of Greenland consists of an Ice Cap rising to the height of, in the centre, between 8000 and 9000 ft. In some places this plateau comes down to the sea along the coast, but in most places there is a coastal mountain belt between the Ice Cap and the sea.

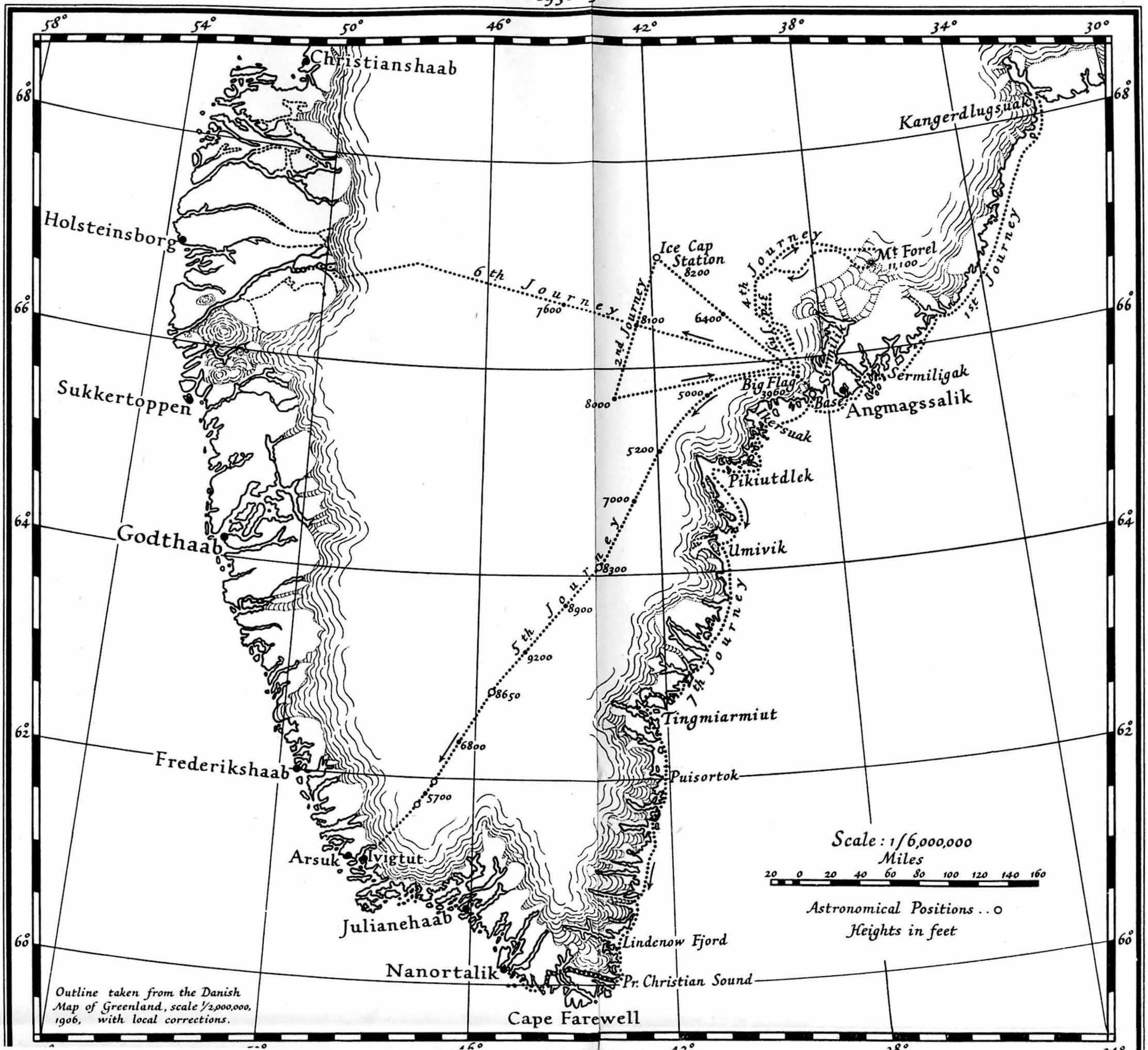
On the E. coast there are only two settlements, one at Scoresby Sound of about 100 Eskimos, and one at Angmagssalik of about 800. The most likely place for the proposed air route

[1] The paper is published exactly in the form of the original MS. The map we owe to the courtesy of the R.G.S.—*Editor*.

Southern Greenland, showing the Seven Journeys of

THE BRITISH ARCTIC AIR ROUTE EXPEDITION

1930-31



to cross the E. coast seemed to be somewhere near Angmagssalik, and it was decided that the expedition should have its base within 50 miles of this settlement. It was planned to keep continuous meteorological observations at the base, and to establish another station for the same purpose on the highest part of the Ice Cap, between the base and the W. coast. Long journeys were to be made over the Ice Cap in various directions in order to find its height and to study its weather conditions. Also it was hoped that it would be possible to map a long stretch of the coast and the coastal mountain belt, both N. and S. of Angmagssalik; and lastly, if time and conditions permitted, a flight was to be made along the route between England and Canada.

The expedition consisted of fourteen men: H. G. Watkins, Leader; J. M. Scott (in charge of sledge dogs); A. Courtauld, Surveyor; Capt. P. Lemon, R.E., Wireless Officer; Flight-Lieut. N. H. D'Aeth, Chief Pilot; Surgeon-Lieut. E. W. Bingham, R.N., Medical Officer; A. Stephenson, Chief Surveyor; L. R. Wager, Geologist; J. R. Rymill, Surveyor; F. S. Chapman, Ornithologist; Q. Riley, Meteorologist; W. E. Hampton, Engineer and Second Pilot; Flight-Lieut. I. Cozens, R.A.F., Photographer; Lieut. M. Lindsay, Royal Scots Fusiliers, Surveyor.

It is unnecessary to describe the journey in our ship, the *Quest*, from England to Greenland. We passed through the pack ice without much difficulty, and established our base at a place about 40 miles W. of the main Angmagssalik settlement. This place had an easy approach to the Ice Cap, and there was usually open water in the fiord where we could use our seaplanes.

As soon as we had decided on the place for our house we started unloading our stores. We worked in two shifts so that the unloading could go on day and night. Everything had to be loaded from the *Quest* into small boats and then rowed ashore and carried up to a level patch of ground. Apart from the material for the house, the instruments, aeroplanes, food, and sledging equipment, there were also 15 tons of coal to be landed. It took us 14 days from the time we started work until the last case was landed, the hut finished and the seaplane ready to fly.

When this was done we were free to start preparations for the first journey. This was for the purpose of establishing the Ice Cap Station on the highest part of the Ice Cap, between our base and the W. coast of Greenland. A preliminary recon-

naissance on foot and a couple of flights in the seaplane had shown the best route from the fiord to the Ice Cap.

At this point I will give a brief summary of the work and journeys done in Greenland. This list will make the narrative easier to follow :

First Journey.—Survey of the coast from Angmagssalik to Kangerdlugsuak ; this was done in the summer of 1930. The *Quest,* motor-boats and the seaplane were used. About 200 miles of coast-line were mapped, and a strip of air photographs of this whole coast-line was taken. These photographs were oblique and took in most of the mountain country between the sea and the Ice Cap. A high range of mountains was discovered just N. of Kangerdlugsuak : we judged their height to be between 10,000 and 15,000 ft., but we were never able to get near enough to measure, and they were never seen except from the aeroplane. Apart from the mapping, a careful geological and ornithological survey was made on this journey.

Second Journey.—A journey was made in September and October 1930 on the Ice Cap. The party went 125 miles inland in a north-westerly direction from the base. From here the party turned S. and followed the highest part of the Ice Cap for 100 miles, then turned out to the coast and back to the base. A careful record of the height of the Ice Cap was kept, and meteorological observations were made throughout the journey. Total length of journey, about 370 miles.

Third Journey.—An attempt to reach Kangerdlugsuak by sledge in the early spring 1931. This failed owing to the bad blizzards.

Fourth Journey.—To the Mount Forel district (about 100 miles N. of the base) in the late spring 1931. This journey resulted in a survey of the mountain region surrounding Mount Forel (the highest known mountain in the Arctic), an accurate determination of its height, and an attempt to climb it. The party did not reach the top, but succeeded in reaching the highest point ever attained in the Arctic. A geological study was made in this region, and meteorological observations were made on this journey. Total length of journey, about 360 miles.

Fifth Journey.—The crossing of the Ice Cap from the base to Ivigtut on the S.W. coast, July 1931. This journey was made down the eastern edge of the Ice Cap as far as Umivik, and thence across to Ivigtut. Height observations were kept the whole time, also meteorological observations. Several new

nunataks were discovered. Total length of journey, about 500 miles.

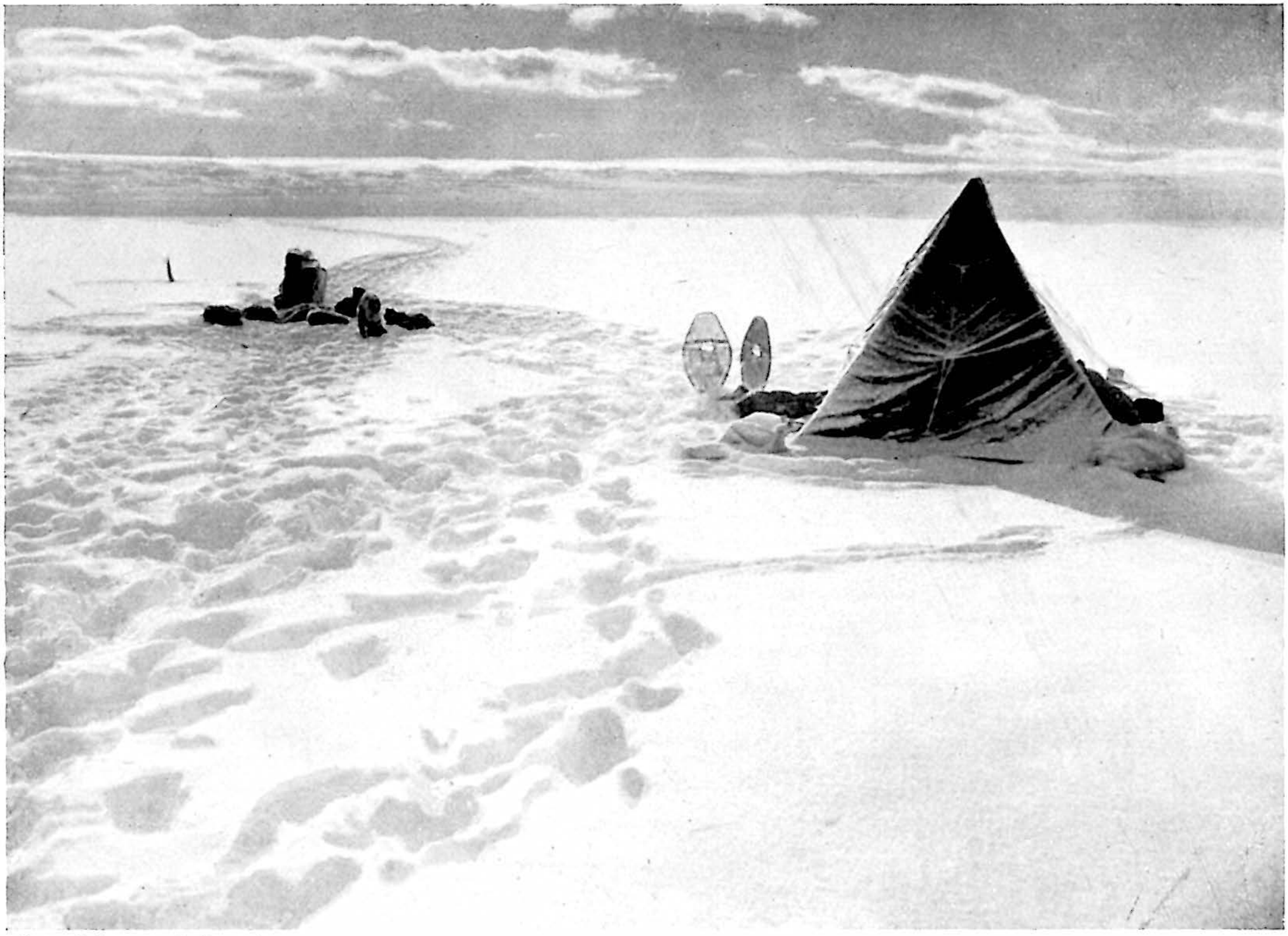
Sixth Journey.—Across the Ice Cap from the base to Holstensborg on the W. coast, late summer 1931. Height observations and meteorological observations were kept the whole time. The journey also demonstrated the possibility of a new form of travel, as Eskimo kayaks were carried across the Ice Cap on sledges so that the party could reach the settlement (a journey of about 90 miles by sea from the edge of the Ice Cap). Total length of journey, about 470 miles.

Seventh Journey.—From the base round the S.E. coast to Juliannehaab on the W. coast. Detailed mapping was done on the first 140 miles of the journey, as far as Umivik. A strip of air photographs had already been taken from the base to Umivik. These photographs were used for filling in detail on the ground survey. Amongst other things an island about 40 miles long was discovered on this journey. A new method of Arctic summer travel was used : the journey was done in two 18-ft. boats fitted with outboard engines. Since petrol for 600 miles had to be carried, very little food could be taken. Instead of food kayaks were taken, and food for the journey was secured by hunting seals with the kayaks and harpoons. Total length of journey about 560 miles.

Apart from these journeys a careful survey was made of the district round the base, and also the southern part of Sermilik Fiord, and air photographs were taken of all this country. Detailed geological and ornithological surveys were also done round the base and Angmagssalik. Meteorological observations were kept at the base for the whole year.

A station was established on the highest part of the Ice Cap between the base and the W. coast. This was about 125 miles from the base. Continuous meteorological observations were kept at this station for seven months. Flying was carried out during the summer and winter for the purpose of reconnaissance.

I will not describe the whole work of the expedition, but will simply take three or four typical journeys : First, a winter relief of the Ice Cap Station when Courtauld was left alone to occupy it for the winter months. Secondly, the relief of Courtauld at the beginning of the spring. Thirdly, the journey to Mount Forel. Fourthly, the coastal journey from Angmagssalik to Juliannehaab. These journeys will give three different aspects of travel in Greenland—Ice Cap travel, mountain trvael, and summer coastal travel.



Photo, British A. A. Route.]

DAWN ON ICE CAP.

[*To face p.* 180.

Photo, British A. A. Route.]

EXPEDITION AEROPLANE ON THE COAST.

Winter Relief of the Ice Cap Station.

The Ice Cap Station had been established by a sledging party 125 miles inland. During the early part of the expedition, while other work was going on, this station had been regularly relieved and the observers changed. We had hoped that we should be able to relieve this station about once a month during the winter. We knew that the low temperatures alone would not stop us, since there is no difficulty in travelling even in 100 degrees of frost, if suitable clothes are worn, but wind at a low temperature makes travel quite impossible. Before leaving England the only information we had been able to get about weather near Angmagssalik was from the Air Ministry. This information stated that we need not expect any strong winds near Angmagssalik.

Towards the end of October a party under Chapman was due to set out from the base to relieve the Ice Cap Station. Early in October bad blizzards started to blow from the Ice Cap. The first of the blizzards reached a speed of over 100 miles per hour at the base. It became obvious that relief parties would not be able to travel on the Ice Cap all the winter. It was, therefore, decided that Chapman should take as much food as possible and leave either two men or one man to occupy the station for the winter months.

On October 27 Chapman's party left the base. First they had to transport all their stores and sledge dogs across the open fiord in small boats. Then everything had to be carried about half a mile through mountainous country to the big glacier, which gave a path to the Ice Plateau. Here sledging could begin.

From the start of the journey they had extremely bad weather conditions. The first night on the glacier they had to pitch their tents on hard ice free from snow. This meant that they could not get their tent pegs or poles firmly into the ground. In the night a blizzard sprang up and reached a speed of a little over 100 miles an hour: one tent was blown away, and the party spent a very uncomfortable time until the blizzard finished 36 hours later. Then they had to spend a day patching their tents and collecting their gear which had been blown down the glacier.

The next obstacle in their path was a steep 400-ft. ice slope, where the glacier swept over from the edge of the Ice Plateau. Earlier in the year there had been snow on this slope, and it had been possible to sledge straight up with very light loads. This

time neither the men nor the dogs could get foothold, so that pegs had to be driven into the ice and block and tackle used to haul up the sledges. They had almost continuous blizzards from the time they left the base until they reached our big flag depot on the edge of the Ice Cap, 15 miles from the base. Owing to the bad weather this 15 miles had taken 15 days (under good conditions we could do this double journey twice in one day, a total distance of 60 miles).

Chapman saw that if he were going to reach the Ice Cap Station the party would have to be reorganized. He decided to send back three men with no food, so that he and the rest of the party could take all the food on and make sure of reaching the station.

The party which went on consisted of Chapman, Courtauld and Wager. The weather was bad—blizzards every few days. These blizzards always came from the N.W., and usually lasted two days. After a blizzard it often took the party four or five hours to dig out the sledges and equipment, which had become buried under the snow. For the last part of the journey they got better conditions and were able to travel on four consecutive days. They also had a bright moon, and so were able to travel after the sun had set. Eventually, after 39 days' travelling, they reached the Ice Cap Station on December 3.

Owing to the length of time they had taken to reach the station, they had not as much food and paraffin as had been intended. Chapman had three courses open to him:

(1) He could leave two men at the station. Owing to the supply of food these men would have to be relieved early in March. It was obvious that these blizzards might last till the end of March, so he decided against this course.

(2) He might leave one man alone. This man would have food and paraffin until May.

(3) He might abandon the station altogether.

Before we left England I had stated that it would probably be necessary to have one man alone at the station. I have travelled with the trappers of Labrador, who are alone for sometimes eight or nine months, travelling in a much more difficult kind of country than the Greenland Ice Cap. Nothing ever goes wrong with these men through being alone, and indeed there is no reason why it should, since a man travelling alone is always faster and more efficient than he is when travelling with a companion.

Courtauld volunteered to remain alone at the Ice Cap Station,

in order to do the meteorological observations during the winter. He wrote to me stating that he had ample provisions until May, but that he would like to be relieved before that if possible. On December 6, Chapman and Wager, together with Bingham and D'Aeth, who had been at the Ice Cap Station, started home. Owing to the terrific blizzards the surface of the Ice Cap was cut up by iron-hard snow-drifts. Going over these drifts was a big strain on the sledges, and on the journey up all of them had started to break. They had been mended at the Ice Cap Station, but on the return they started to break up again, so that they had to be mended every evening. The dogs had to be fed on very low rations, since on arrival at the Ice Cap Station only two days' dog food was left. The rest of their food for the return had to be made up from the men's food. Towards the end of the journey they began to run out of paraffin, candles, and man food; and eventually arrived at the base on December 19 with practically no provisions of any sort. The whole journey from the base to the Ice Cap Station had taken them 54 days. Although they had never had very cold weather, they had had appalling travelling conditions, with repeated blizzards on both the outward and return journeys. Eighty-two degrees (F.) of frost was the lowest temperature reached on this journey. This was not nearly as cold as we had expected at this time of the year. In spite of the hard going the party reached the base in good condition except for D'Aeth, who had frost-bitten fingers and toes. This was chiefly due to the fact that there was a shortage of moccasins, and he was wearing fur boots which are only good for temperatures down to about − 30° F. After that the thin Indian type of moccasin is the only thing to wear. This is well known to the Eskimos, who very seldom get frost-bitten feet.

On the return of this party we settled down to winter life at the base. The weather was not too cold to travel, but winds made it impossible. Winter life consisted for the most part of hunting to keep ourselves supplied with fresh meat. Our meat supply consisted mainly of seals with an occasional bear and sometimes a dog.

During all this time Courtauld was alone at the Ice Cap Station. The understanding was that he would be relieved not later than about May 1, but we always thought that it might be possible to relieve him earlier than this. During

February the weather seemed to get better, and I decided to send off a party consisting of Scott, Riley and Lindsay to see if they could get to the station and relieve it early. This was a mistake, as the weather had not improved enough yet for a journey on the Ice Cap.

They made two attempts to start, but were turned back, first by sledges breaking, owing to being heavily loaded on the hard wind drifts; secondly by not being able to find the big flag depot owing to continuous bad weather. Finally, on March 8, they left the base with light loads and reached the big flag in one day. Here they picked up their full load and started towards the Ice Cap Station. They had to cut their loads down to an absolute minimum, and so did not take a time signal set for longitudes. We had found on all journeys that a compass traverse with a sledge wheel checked by latitude observations was extremely accurate for navigating on a course, such as from the base to the Ice Cap Station.

The weather on this journey was appalling, so that they could seldom travel. With these blizzards the temperature was much lower than usual, and this was certainly the coldest and hardest journey that was undertaken during the work of the expedition. They eventually arrived in the vicinity of the Ice Cap Station with only a few days' dog food left. The wind drifts were so high that it was impossible to see far in any direction, and although they undertook an extremely careful search they were further hampered by a six days' blizzard.

Scott was faced with two alternatives: he could stay and make a careful search for the station, which would mean he would run out of dog food and have to kill his dogs, which were all required for future journeys, or he could go straight back to the base without losing a dog and still arrive at the base in time for another party to go up and reach Courtauld at the prearranged time, May 1. He chose the latter course, which was the correct one. In spite of the weather they did an extremely quick journey back to the base and arrived on April 17.

By this time the weather was perfectly good and the blizzards had finished. I therefore decided to set off immediately with Rymill and Chapman to relieve Courtauld.

In order to get there at the prearranged time I decided not to take food for an extra man to remain at the station, since the extra weight would delay us. I will not describe this journey, since there is little to describe. The weather was fine

Photo, British A. A. Route.]

VIEW S.E. FROM MOUNTAIN S. OF MT. FOREL.

[*To face p.* 184.

Photo, British A. A. Route.]

MT. FOREL, SHOWING N.E. RIDGE.

and hot, as we knew it would be, and we had no difficulty whatsoever in relieving Courtauld and bringing him back to the base. We were very surprised on our return journey to see a large aeroplane fly over us. This was Captain Ahrenberg, who had flown out from Sweden to see if he could find Courtauld. It was a magnificent flight on his part, but it was wasted effort, since before leaving England I had especially stated that I wished no 'rescue' expeditions to come out to us unless I specially asked for them. And in this case, before leaving to fetch Courtauld I wirelessed back saying that we needed no assistance, and did not wish for any 'rescue' parties.

The Attempt on Mount Forel.

Mount Forel was first seen by de Quervain, when he crossed the Ice Cap from W. to E. in 1912. He took theodolite observations every day as he came down to the E. coast, and estimated its height at about 11,000 ft. This meant it was the highest known mountain in the Arctic. I decided to send a party to survey the region around Mount Forel, and, if it were possible and time permitted, they were to attempt to climb it.

The party consisted of Stephenson, surveyor; Wager, geologist; and Bingham, doctor. They left the base on May 6. Mount Forel is only about 96 miles in direct line from the base, but in order to avoid crevassed areas near the coast, the party had to do a journey of 176 miles to reach it. The weather was warm and sunny, so that during the day the snow was soft and the men had to wear skis or snow-shoes. They were surprised at being able to sledge almost to the foot of Mount Forel without encountering any bad crevasses. They decided that the only feasible approach to the summit was from the S.W. The summit is an ice dome, which everywhere caps a rock wall of about 1600 ft., rising up from the almost flat glacier below. Where the rock rises steeply the ice dome ends abruptly in an overhanging wall of 200 or 300 ft. But above the easier S.W. ridge the edge of the ice dome was less steep. This ridge ran up from a snow col between Forel and an adjoining mountain, which they called Camp Mountain. On their first arrival they went straight to the W. side of the col, but from here the ridge, which they proposed to climb, appeared to be more accessible from the E. of the col; so they sledged round to the S. of Camp Mountain, so as to approach it from the E. But on this side of Forel they discovered a hollow

3000 ft. deep, encircled by mountains rising precipitously from the glaciers below. Beyond this were many fine peaks and glaciers, the latter draining into a glacier 8 or 9 miles wide, running S.E. to the coast. From this immense system of glaciers they were cut off by a very steep rock wall of 3000 ft. This difference of level between two glacier systems so close together was most unexpected, and they had to return to the western approach.

Camp was pitched within a quarter of a mile of the foot of the col, at a height of 8800 ft. The next day, leaving Bingham in camp to look after the dogs, Stephenson and Wager set off at 6 A.M. for a reconnaissance of the col. Progress was slow, as the snow was from 12 to 18 ins. deep, and the slope up to the col fairly steep. There were two bergschrunds to be crossed before they could get to the top ; the first presented no difficulty as there was a firm snow bridge. The upper lip of the second, which extended to the top of the col, proved difficult. It was snow-free ice and at a slope of 75°. The angle of slope was so steep that in order to cut a step 6 ins. wide the back wall of the step had to be 2 ft. deep. This took a long time, and they did not reach the ridge of the col, 700 ft. above the camp, until 10 A.M. The other side of the col was a smooth ice slope, which narrowed rapidly and fell steeply down to a couloir to the glacier some 3000 ft. below, which they had looked down upon from the southern end of Camp Mountain on the previous day. To get to the ridge they had to cross this steep ice slope. Steps were difficult to cut, and Wager, who was leading, had to return once or twice to rest before he reached the foot of the rock ridge about 60 yds. away, two hours later. They then spent an hour on the rocks, looking for the best way up, before returning to camp.

During the next two days the weather was unsuitable for climbing, and the party occupied itself with surveying the surrounding country. On the third day after their first attempt on Forel the weather was good enough to try again. They left camp at 5 A.M., and, the steps being cut, were able to reach the foot of the ridge by 6.15. The first 200 ft. of the ridge consisted of rotten rock, and they had to go up either the gullies or the arêtes between them. Above this was steep but good rock, which meant climbing up a steep ridge about 60 or 80 ft. at a time. They then came to patches of snow and rock, the snow being treacherous, but fortunately only once was it necessary for both of them to be on the snow at the same time. Beyond these patches of snow the rock was rotten again, and

great care had to be taken in selecting a route. The rock itself is a gabbro, rusty brown on its weathered side. Frequently as they climbed up, their eyes were attracted to small vivid patches of green, red, or yellow lichens, sheltering in niches of the rock. Apart from these lichens there was no sign of any vegetation or life whatsoever.

They reached the top of the rocks after 6 hours' climbing, but the ice dome, which from below had appeared to slope down gently, was much steeper than expected. It came to an end at the top of a steep pitch of rock, and they had little room to experiment. Stephenson belayed to the rock and Wager cut steps diagonally across the slope for one rope's length ; but the ice was of such a texture that, instead of being able to cut a step with five or six strokes of the axe, it took twenty or thirty. In very cold weather certain types of ice always become like this. To get to the top of the steep part about 300 steps would have been necessary. The party decided that their time would be better spent in surveying the surrounding country. Before starting the descent, they boiled the hypsometer and read the aneroids, from which they subsequently found their height to have been 1600 ft. above the camp, which, after a week's observations, was determined as 8800 ft. Thus they had reached a height of 10,400 ft., 800 ft. higher than the summit of Petermann Peak, until then the highest point reached in the Arctic.

They took about 5 hours to descend, reaching camp by 7 P.M. Before they left this camp site they spent another day climbing five domes and nunataks in the area, for surveying and geological purposes. They then sledged in a northerly direction. They noticed in passing that the approach to Forel from the N. was no easier than from the S. They climbed many peaks for surveying purposes, and from the top of one of these had an excellent view of the mountains to the N., which form a wide belt stretching inland 400 miles from the coast. This mass of mountains lies in a region which the existing maps portray as Ice Cap with no mountains. There are many peaks and high ranges comparing favourably in height with Forel, and one, which they named de Quervain's Peak, is a possible rival to it. Unfortunately it was too far away to fix accurately by an intersection. The height of Forel was determined as 11,100 ft., by theodolite observations based on original heights by aneroid and hypsometer.

On May 30 they turned their course S. and started for home : unfortunately, the weather was warm and they had slushy

snow, which made travelling slow. However, they reached the base after 12 days' travelling, averaging 16 miles a day. They had no cold weather on the whole journey—and indeed throughout the year we were surprised that it never got as cold as we had expected on the Ice Cap. The lowest temperature recorded on any journey was about —52° (F.), recorded by Scott on his way up to relieve Courtauld.

Journey round S.E. Greenland from Angmagssalik to Juliannehaab.

For the summer of 1932 [? 1931], I had planned a journey round the S.E. coast of Greenland to Juliannehaab on the W. coast. For this journey we had two open 18-ft. whale boats. We had used them a good deal with outboard motors throughout the year in the drift ice and come to the conclusion that they would be excellent for coast travel in heavy pack ice. If the ice starts pressing together, owing to heavy storm, it is quite easy to haul these small boats out on to an ice-floe and wait for the pressure to stop before launching them again. The only difficulty was that in order to carry enough petrol for the full 600-miles journey, it would be necessary to carry such a large quantity that there would not be room for enough food for the whole journey. We saw therefore that the journey would be impossible unless we could learn to live by seal-hunting in the same way as the Eskimos.

In the winter and spring it is a fairly easy matter to live by seal-hunting, and white men have learnt to do this quite successfully. In the summer it is much more difficult. It is practically impossible to get near a seal in a motor or rowing boat, and even if the seal is shot it will immediately sink and be lost. The only way the Eskimos get seals in summer is with kayaks and harpoons. We had been told that white men could never learn to use kayaks safely or hunt with them. But we did not see why it should not be possible for a white man to learn to use a kayak just as well as any native, or even better. Anyhow, we knew that we could not possibly do the coast journey unless we could learn to hunt seals in the summer.

So, for the month and a half before the annual visit of the Danish ship, two or three of us went off to an Eskimo settlement about 5 miles from the base, in order to learn to use the kayak.

Photo, British A. A. Route.]

GOING UP BAGKEN CREEK.

To face p. 188.

Photo, British Arctic Air Route.]

UP THE GREENLAND COAST.
Air photograph.

It is a very narrow canoe, about 19 ft. long, made of a light wooden frame covered with waterproof sealskin. The man sits in a small circular hole, wearing a waterproof coat of sealskin, which has a hood fastening tightly round the face. Waterproof gloves are worn and sleeves of the coat fasten tightly over them. The bottom of the coat fastens over the rim of the circular hole, so that he keeps perfectly dry even if a wave sweeps right over him.

About 90 per cent. of the Angmagssalik Eskimo men end their lives by drowning in their kayaks, through being overturned by an attacking seal or walrus, or by a wave. A kayak is a tight fit, and it is impossible to get in or out quickly. The sensible Eskimos have learnt a special trick which saves them if they are overturned. This trick is to roll right round with the kayak and come up the other side. About one in every four of the Angmagssalik men can do this. Once a man can do this roll with absolute certainty, it means that he is safe to hunt alone, as he will be able to get up again if he is knocked over. I knew that I should have to hunt alone on the coast journey, and I saw that it would not be safe unless I could learn to roll the kayak. It turned out not to be as difficult as it looked, and eventually six of us learnt to roll, and one or two of us learnt to do it without the use of the paddle (with the hands only). This is much more difficult and can only be done by few Eskimos, but it is an essential for safe kayaking, since the paddle might be lost in a fight with a seal, then, if you could not get up with the hands only, you would drown.

On August 15 Lemon, Courtauld and I started off on our journey to Juliannehaab. We had with us two 18-ft. whale boats, driven by 4-h.p. 'Johnson' outboard motors; these boats had belonged to the *Quest*. We took a large quantity of petrol for the motors, and this occupied most of the space in the boats. Besides this we took three kayaks, and all the kayak hunting equipment—rifles, shot-guns and ammunition. We also took two small sledges, in case we lost the boats and had to cross the Ice Cap; and winter hunting gear, so that if necessary we could spend the winter on the coast. We took some emergency provisions, in case we had to cross the Ice Cap, and a little porridge and sugar; but we knew that we should have to rely almost entirely on seal meat for our food.

We had planned to survey as far as Umivik, a distance of about 140 miles from the base, and from there to travel fast

to Juliannehaab. To the S. of our base the Ice Cap comes down to the sea in many places and, as far as Umivik, there is practically no coastal mountain belt. There the sea is covered to a large extent by the pieces of glacier as well as the ordinary pack ice.

From the base to Umivik we travelled slowly, an average of about 5 miles a day. Lemon was doing the plane table survey, and Courtauld the astronomical observations. Luckily the weather for the first fortnight of the journey was good, and they were able to work fast, landing on most of the high points and islands. The main details of this coast had been mapped by a Danish expedition, under Commander Gustav Holm, but we had seen from our aeroplane flights that we should be able to make considerable additions to the maps between our base and Umivik. We found that between Pikiutdlek and Umivik there is an island 40 miles long, which was shown on the map as the coast-line, but we found that it is entirely separate from the mainland, and has two ice caps of its own.

While Lemon and Courtauld were surveying, I spent my time hunting in my kayak in order to keep us supplied with food. I spent the first fortnight of the journey in shooting ducks, guillemots and gulls. But I also spent a great deal of the time in watching the summer habits of seals. I knew a good deal about their habits before, but before I could hope to get seals regularly from my kayak, I must be able to tell at 100 yards the type of seal, whether it was young or old, and what it was doing, whether playing, travelling, or resting. Each requires a different method of hunting.

The actual hunting of the seal is a long and complicated matter, and, unless you are a very experienced hunter, you will probably only get near enough to take about one out of every six seals that you see. Once you have harpooned the seal the head of the harpoon sticks in the blubber, and then it starts struggling to try and get away, and will even try to attack the kayak. The bladder-nose seal often tries to rip a hole in the under side of the kayak, and many Eskimos are killed in this way. The hunter holds the end of the harpoon line and tries to pull the seal in close enough to kill it with his lance. I once struggled with a seal for about $1\frac{1}{2}$ hours after I had harpooned it, before I could get it close enough to lance and kill it. This seal weighed over half a ton. During the whole journey I got 7 seals and 61 birds from my kayak. Of course I was only hunting occasionally, a total of about

ten days' seal-hunting on the whole journey. Apart from this we got a good many birds as we were going along in our boats. After about a fortnight we were living almost entirely on seal meat, blubber and berries. This is one of the most satisfactory and pleasant diets that I know. We ate up our sugar and porridge as quickly as we could, since I do not believe in rationing luxuries. Once you have no civilized food left you cease to wish for it. So long as you have any at all you want more.

Our survey ended at Umivik, which we reached on September 8, and from here we planned to travel as hard as we could the 450 miles to Juliannehaab. We had been forced to start this journey rather late in the year, and we found that S. of Umivik there was practically no drift ice. This meant that there was a good deal of swell, since there were no floating ice pans to keep the sea calm. Our boats were excellent for travel in drift ice, but they were too small and overloaded for travel in a rough sea, and we had a good deal of difficulty.

At Akorninarmiut we had a bad delay, being caught out in an extremely rough sea ; the engines broke down owing to the waves breaking over them, and it was with the greatest difficulty that we managed to row through a line of tottering icebergs to a small fringe of rocky islands, where we camped. We were delayed here for many days by bad weather and engine trouble, and we eventually decided to abandon one boat, leave all our unnecessary gear behind and travel on in the other boat.

Just past Tingmiarmiut we had the worst delay of the whole journey, due to bad gales, which kept breaking up the front of the big floating glacier and covering the sea with closely packed glacier ice, which made boat travel impossible. It looked as if we almost certainly should have to spend a year here and go on the next summer when the weather was better. It was a good place to live in and hunting conditions were excellent, since there are no Eskimos along this coast. However, we were not forced to stay there, and during the next spell of fine weather were able to make a final dash for the safety of Prince Christian Sound.

We met the first W. coast Eskimos about 5 miles N. of the entrance to the sound, but it was not until we reached the western end that we reached the first big settlement, Augpilagtok. We had arranged by wireless that petrol should be waiting for us at this place, but owing to a muddle in our telegram we found no petrol, but a large depot of paraffin. Luckily we

had just enough petrol left to carry us on to Nanortalik, and so to Juliannehaab. Here we were able to get a ship back to Europe.

As the sole tribute we can pay to the memory of a great explorer, mountaineer and still greater leader of men, we print the covering letter to the above paper received after the writer's lamented death.

s.s. *Gertrud Rask*,

July 31 [1932]. ANGMAGSSALIK.

DEAR COLONEL STRUTT,—I enclose the account for the 'A.J.' I hope it is not too late.

The ice is bad this year, and this ship has taken longer to get here than I had expected. If you want any maps for the account you can get them at the R.G.S. I am afraid the account is almost word for word the same as for the R.G.S. *Journal*, but this was unavoidable.

Yours sincerely,
GINO WATKINS.

THE GERMAN-AMERICAN HIMALAYAN EXPEDITION, 1932.

BY HERBERT KUNIGK.

(*Translated.*)

AFTER long and difficult preparations, our expedition sailed on April 28, 1932, from Genoa in the s.s. *Victoria* of the Lloyd-Triestino line. All, especially our leader, were happy to get off after all our hard work and tiresome delays.

Thirty-seven years ago another man had taken the same road to the East, intending with unequalled zeal and a few companions to attempt Nanga Parbat, one of the giants of the Himalaya. After a splendid attempt on the mountain from the N.W. over the Diamarai Glacier, in which he reached a height of about 19,800 ft., he was obliged to turn back