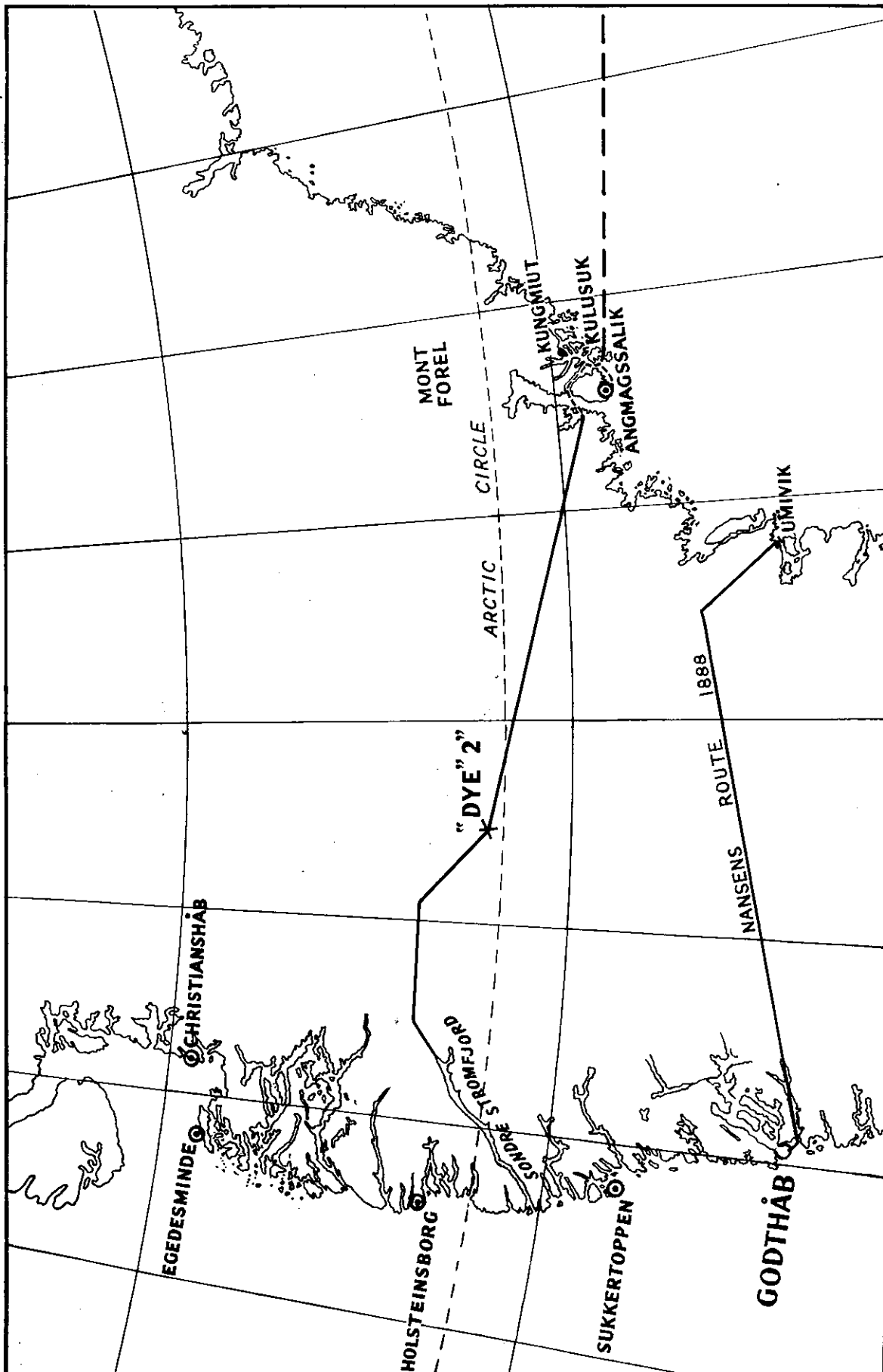


678 e 35

w/57

35

# SCOTTISH TRANS-GREENLAND (PHYSIOLOGY) EXPEDITION, 1965



w/57

SCOTTISH TRANS GREENLAND EXPEDITION REPORT 1965

Hugh W. Simpson, Ph.D., M.D.,  
3 Dundonald Road,  
GLASGOW, W.2.

## SCOTTISH TRANS GREENLAND EXPEDITION 1965

### INDEX

#### Summary of Expedition

Personnel	1
Objectives	1
Achievements	1

#### Crossing of the Ice Cap

Medical Research Report	2
Grønland Langrenn - a personal impression	6
Diary	14
Navigation	25
Meteorology - instruments	25
Meteorology - observations (coding)	26
Meteorology - observations (mean data)	28
Meteorology - observations (individually)	31
Altitude by the traverse method	57
Weather and topographical conditions	57
Journey log and averages	58
Profile of ice cap	62
Comparison graph of mileages with Nansen and Lindsay	63
Sledge journey - food	64
Sledging equipment	67

#### Canoe Journey

Maps of route	70
A personal impression	72
Diary	80
Daily camps and mileages	87
Equipment	89
Comment on rations	90

#### Expedition Accounts

General comment	91
Expenditure - summary	92
Expenditure - detailed	93
Income	96

### PERSONNEL

Roger Tufft, Dr. Hugh Simpson, joint leaders, Myrtle Simpson and William Wallace.

### OBJECTIVES

(1) The geographical aim was to cross Greenland from Angmagssalik on the East Coast to Christianshaab on the West (Nansen's original objective). Three men and one woman were to complete the route in two stages: in the first the whole party would ski from Angmagssalik to Søndre Strømfjord (400 miles) and in the second the men would complete the journey to Christianshaab by canoe (250 miles) using inland waterways and portaging where necessary.

(2) The main scientific objective was to make continuous physiological observations on the party. These were concerned with the impact of the prevailing stresses and consequent adrenal gland stimulation. The activity of the gland was to be assessed by making daily urine collections and later analysing these for 17-hydroxycorticosteroid content in Glasgow.

This research was to increase understanding of the effects of stress on the individual by an objective index. This would be one of the longest continuous experiments of this nature ever carried out. More particularly the prolonged, relatively constant stress while sledging over the ice cap would test Selye's adaptation theory: that is, one would expect the initial high adrenal activity to fall. Persistent high activity for the whole of the crossing would be evidence against this theory. Such research is relevant not only in the field of polar physiology, but also in the understanding of the part played by stress in certain disease states, e.g. high blood pressure.

- (3) Subsidiary scientific objectives were to record
- (a) An altitude profile of the ice cap
  - (b) Full meteorological observations (ice cap)
  - (c) Plant species and make a botanical collection from Angujartorfik, Søndre Strømfjord.

### ACHIEVEMENTS

All the expedition objectives were achieved as planned.

THE MEDICAL RESEARCH REPORTH. Simpson

The scientific object of the expedition was to study the response pattern of the adrenal cortex gland to a very prolonged stress, i.e. skiing 400 miles across the Greenland ice-cap. Would the activity be high at the start then fall even though the stress was sustained or alternatively would there be a plateau of response throughout the expedition?

The stress hormones liberated by the gland were assessed by collecting daily urine specimens from each subject throughout the trip and then retrospectively analysing small samples of each in Glasgow for 17-hydroxycorticosteroid content.

From this pattern of response I thought information about the actions of these hormones would be forthcoming. Large sums of money have already been spent in studying these substances and yet we know little about their action in stress. Are they necessary only at the initial impact of the stress, then having effected a change in peripheral cells are no longer necessary? (e.g. concerned with the formation of new intracellular protein). This is one concept of adaptation. Alternatively are they required to sustain stressed cells for the full duration of the adverse stimulus?

Control data (normal hormone levels) were obtained while the party waited at Angmagssalik on the East Greenland Coast for a week. During this period we were living comfortably doing social rounds; all expedition preparations were complete. The mean of these determinations for each subject has been called 100%. In Subject A (female) this refers to 9.2 mg/day, in B (male) 17.2 mg/day, in C (male) 10.7 mg/day and in D (male) 15 mg/day. In 3/4 subjects the authentic (non-stress) nature of these control values was confirmed by comparison with previous readings made while on holiday in Scandinavia. These latter values are not significantly different (see fig.).

During the first five days of the ice-cap journey when we sledged over hazardous sea-ice then up a steep glacier, there was a dramatic rise of output in the 17-hydroxycorticosteroids (pooled mean = 161%) and these high levels were sustained over the next five days when we were still climbing towards the 8150' ice cap summit (pooled mean = 167%). During the subsequent fifteen days the party travelled fast over easy level surfaces and the five day means fell successively (158%, 141%, 133%). Stress during this stage was largely physical - 250 miles were covered in 12 days. In the later 3 five-day periods when we descended off the ice cap, the hormone levels rose again to 154%,

151% and 148%, and this increase corresponded closely to the traverse of the thaw zone when rivers, morasses, crevasses and finally giant ice hummocks made progress desperately slow.

After reaching the security of the U.S. Base at Søndre Strømfjord lower but above normal levels were still observed over the week of measurement (mean = 128%).

It is concluded that no adaptation took place since throughout the traverse the hormone levels paralleled the stress of each stage. It was noticeable that Subject B, physically the strongest member of the party, had the least change during the crossing whilst Subject A, the woman, showed the greatest. It was also interesting that Subjects C and D, the joint leaders, recorded their highest levels in the first five day period. At this time they made a critical decision about the route to the ice cap which might have proved disastrous. It was also interesting that Subject B's highest readings were recorded at the time when he made a navigational mistake resulting in a detour. During the post stress period Subject A's readings were high and it was noticeable at this time that she was extremely exhausted with the final efforts of reaching safety. There was thus a striking clinical correlation between the steroid results and the apparent impact of the stress on each individual.

When attempts were made to obtain control results in the U.K. completely unexpected levels were obtained. These were remarkably high - as high in fact as the ice cap readings in many instances. The 12 observations on each individual were made on random days while doing normal routine (A is an author and housewife, B is a Company Secretary, C is a Clinical Lecturer and D a School Teacher). All might be regarded as holding responsible and to a certain extent competitive jobs. The inescapable conclusion is that the routine work in at least these occupations may result in far more stress and adrenal cortical stimulation than has been hitherto realised. This observation is in keeping with the fact that people in a western civilisation tend to have high 17-hydroxycorticosteroid outputs contrasting less highly developed societies; it also accords well with my own observation that food-gathering Amerindians in the Surinam jungle have much lower corticoid outputs than medical students in Glasgow.

DAILY OUTPUTS OF 17-HYDROXYCORTICOSTEROIDS BEFORE, DURING AND AFTER SKI CROSSING

	W.L.S. Mean	Standard Deviation	n=	W.W. Mean	Standard Deviation	n=	H.S. Mean	Standard Deviation	n=	R.T. Mean	Standard Deviation
East Greenland Control	9.2	± 0.7	7	17.2	± 1.8	6	10.7	± 2.9	6	15.0	± 2.3
<u>Ice Cap Journey</u>											
1st 5 Days	16.6	± 3.8	5	22.2	± 3.6	5	18.4	± 3.6	5	24.2	± 3.1
2nd 5 Days	22.9	± 5.2	5	21.5	± 2.0	5	15.1	± 1.6	5	23.2	± 1.5
3rd 5 Days	21.0	± 2.1	5	19.8	± 2.3	5	15.7	± 1.8	5	21.1	± 2.6
4th 5 Days	16.4	± 1.8	5	18.5	± 1.1	5	14.8	± 1.8	5	21.0	± 2.5
5th 5 Days	14.2	± 0.9	5	17.7	± 1.6	5	14.4	± 1.4	5	21.1	± 2.3
6th 5 Days	16.6	± 3.1	5	22.3	± 2.9	4	16.2	± 3.2	5	23.3	± 4.1
7th 5 Days	16.7	± 2.6	4	28.4	± 7.9	5	14.6	± 1.6	5	18.2	± 1.6
8th 5 Days	19.5	± 2.7	5	24.0	± 1.8	5	11.5	± 1.3	5	19.8	± 1.8
West Greenland Control	15.9	± 2.4	7	20.1	± 4.0	7	12.7	± 2.1	7	15.7	± 2.5
Scandinavian Holiday Control	9.6	± 1.8	9	NO DATA			10.9	± 1.7	8	16.4	± 0.9
U.K. Normal Routine	14.0	± 2.2	12	21.4	± 2.9	12	19.0	± 3.8	12	24.1	± 4.2

All means and standard deviations refer to the 24 hour output of total 17-hydroxycorticosteroids in the urine (in milligrams).

PERCENTAGES:DAILY OUTPUTS OF 17-HYDROXYCORTICOSTEROIDS BEFORE, DURING AND AFTER SKI CROSSINGCONTROLSSUBJECTS (Percent outputs of control values)

<u>NON-STRESS</u>	A	n	B	n	C	n	D	n	MEAN
Holiday Levels	104	9	No data	-	102	8	109	4	105
Before Journey (E. Greenland)	100	7	100	5	100	7	100	7	100
<u>ICE-CAP JOURNEY</u>									
<u>STRESS</u>									
First Five Days	180	5	129	5	172	5	161	5	151
Second Five Days	249	5	125	5	141	5	155	5	157
Third Five Days	228	5	115	5	147	5	141	5	158
Fourth Five Days	178	5	108	5	138	5	140	5	141
Fifth Five Days	154	5	103	5	135	5	141	5	133
Sixth Five Days	180	5	130	4	151	5	155	5	154
Seventh Five Days	182	4	165	5	136	5	121	5	151
Eighth Five Days	212	5	140	5	107	5	132	5	148
Immediate Post Stress Period	173	7	117	7	119	7	105	7	128
Normal Routine in U.K.	152	12	124	12	178	12	161	12	154

EXPLANATION:

All percentages refer to average daily outputs of 17-Hydroxycorticosteroids (17-OHCS) in the urine for respective environments. These levels have been reduced to percentages of the Control Non-stress values obtained immediately before the expedition. Thus, for Subject A 100% = 9.2 mg/day, for B 17.2 mg/day, for C 10.7 mg/day and for D 15 mg/day. 'n' refers to number of 24 hour urine collections and estimations of 17-OHCS.

GRØNLAND LANGRENNA Personal Account of the CrossingH.W. Simpson

The expedition pocket was light by the return Glasgow-Copenhagen fare. I regarded the two uncompromising representatives of the Grønland Ministeriet. "No!" they said it certainly wasn't possible to grant permission for our Greenland Expedition. The outcome of our plans to ski across the ice cap now appeared dismal. Our medical research programme to make a study of prolonged stress hadn't impressed them in the least - even though an eminent Danish physiologist had given enthusiastic support. My mind raced over concessions we might make. Was their frigid attitude due to the fact we weren't taking dogs and were taking a woman, I wondered? I suggested insurance to cover rescue operations but even as I started speaking I realised their minds were made up. The door was already closed. The trouble is, of course, you can't really put a price on the value of scientific work and their angle that it might endanger the lives of locals, was really impossible to discuss.

But fortunately I had appointments to see not only the established ministry but also other senior Danish citizens. That night as I sat drinking the whisky of one retired Greenland explorer, he pointed out that no-one could stop us. There were no immigration formalities. After the third whisky I realised that we were actually in a position of strength since the ministry in refusing permission had lost all its bargaining power. Later that night I cabled the rest of the expedition - All systems go!

The beauty of a manhauling skiing expedition is its simplicity; all you need is a sledge, food and camping equipment and a party to pull it. Of necessity everything is ultra-light and therefore easy to take by aeroplane. By early June 1965 the three man and one woman party stood on the Reykjavik tarmac with all the gear wondering which of the Dakotas was our private plane to Greenland. A dazzling blonde, full bosomed Icelandair hostess beckoned us forward and we soon realised that she too was included in the £474 air charter to Angmagssalik. We made a very shabby comparison. Our boots were falling to bits and our windproofs, ragged, as our intention was to abandon this equipment when the last rocky nunatak was reached, and don new Blacks' Everest Anaraks, windproof trousers and ex-Korean war canvas boots (purchased from the Headquarter and General at 10/6d., but size variable).

The plane droned on over the vast pack ice belt for an hour or two and soon the Alpine fringe of the East Greenland mainland came into view. As we lost height my political fear became stronger. Would the local officials turn us back? Would we be able to hire local transport from the island airstrip to a suitable starting point on the coast? The plane lurched to a halt and we jumped out onto the dusty runway. No-one expected us or had heard of us. There were no formalities. No-one knew we had arrived.

The greatest friend of climbers in South-East Greenland is Carsten Berg-Sorenson the government architect at Angmagssalik. A keen climber and sledger himself, he is sensitive to the peculiar aims and ambitions of explorers and is in a position to help. I spent a cosy night on his bearskin rug and after an hour or so of chat all our outstanding problems of local transport were cleared up. In a few days time his boat would be near the point on the coast where we wanted to start our crossing and he would be glad to 'bend' its course a bit to oblige us.

A week later we chugged our way out of Angmagssalik in his robust tug-like boat. Its gaudy orange hull made a fine contrast to the blue skies and white icebergs. Our plan was to land at Gino Watkins' 1931 base and to use his route over the difficult and steep crevassed glaciers that lead to the inland ice. We had poured over the relevant aerial photos all winter - American of course - and we could almost have gone up this route blindfold. All seemed well with the expedition and we were certainly congratulating ourselves at this early departure from Angmagssalik.

Just then the boat lurched to a halt. We rushed on deck. A band of water-logged old bay ice now stretched right across the strait. The captain backed away the boat and we charged with a full  $5\frac{1}{2}$  knots. But the ice was remarkably solid and soon we once more came to a feeble stop. Our progress was now punctuated by a charge with racing engines, a juddering halt, and a slow back away. After several hours delay we pushed into the clear water on the far side. But now so much time had been wasted that we couldn't possibly make the old British base and allow the boat enough time to get back. It was needed tomorrow.

The situation boiled down to the fact that either we would be dropped here on the sea ice shore (i.e. in Johan Pedersen fjord) or go back to Angmagssalik and perhaps wait another week for transport. It was all very well being dumped on the sea ice but there was no guarantee of a route through the crevasses and icefalls of the local glaciers; moreover there were no land settlements we could reach on foot and once landed it was really a one-way ticket to the West Coast. But psychologically a

return to Angmagssalik was so appalling that there was nothing really for it but to accept the risks and be landed at once.

The boat now nosed its way into the fjord ice until it stuck and we jumped down onto the slush delighted to have something to do other than stand having futile discussions on the chilly deck. Our two 12' Nansen sledges were handed down, boxes of dehydrated rations, the Antarctic pyramid tent, and the navigation box with bubble sextant (ex-W.D. £3 at Franks), Japanese transistor radio direction finder and Altimeters.

The Eskimo crew, of course, couldn't see why we didn't have dogs. So we fitted on the lightweight nylon harnesses and soon the two sledges with a total load of 800 lbs. were sliding over the slushy sea-ice away from the ship. They were amazed how easy it was but being the sensible people they are, they couldn't see the point of it all.

Finally we walked back to the ship for the goodbye and hand shakes all round. Quite a moving moment since this was to be our last human link for some time. I had a tip for the captain and unfortunately gave it to the only passenger - a point which the others thought wildly amusing. One Eskimo looks much like another in moments of stress!!

The little orange boat now backed away from the ice and had soon chugged its way round the end of the fjord. The four of us now looked rather insignificant on the sea ice. We summed up the large loads. Two hundred pounds to pull each. Roger Tufft and I, the joint leaders, had had much Antarctic manhauling experience and we looked optimistically into the future, while Myrtle, my wife, and Bill Wallace remained extremely sceptical about being able to move the stuff at all. Half of the load was consumable - about 9 lbs. of food per day - but it would be some time before this made a significant difference to the total.

There were about 12 miles to do over the sea ice to the fjord head and here we hoped and prayed would be a glacier leading to the inland ice. The map seemed to indicate that there was. As a sledging surface the sea ice was appalling - two feet of slush with a random scatter of numerous black holes where the thaw was complete. As soon as the initial manic phase wore off and we got down to reality we found that the loads had to be laboriously relayed with all four on the one sledge. Then as we rounded the last point the fjord head came into view. Not only was there no glacier but a steep rocky slope lay ahead with no obvious weaknesses. Just then Roger stumbled onto a patch of thin ice and went up to his neck in the icy water. Bill managed to haul him out just in the nick of time. In all it was a pretty depressing start.

Two long days later - midsummer - we camped at the head of the fjord. It was a beautiful twilight evening with a flat calm and the tent was

pitched above the shore on a level site. Soon the gallon size primus was roaring and in the cosy warmth of the tent all the hazards of the sea ice were rapidly forgotten. Outside we could now see that the apparently impossible rocky slope had a weakness to one side - a steep snow filled gully; and already the clear sky and low sun had resulted in a crisp, fast-sledging surface.

The route, in fact, turned out to be excellent. No back-packing was necessary and four relays saw all the loads over the steep rocky rise to a frozen glacial lake at 1500'. Moreover we found a glacier beyond which was smooth and unfissured and after transferring our food out of the heavy plywood boxes into woven nylon bags, only two relays took us up to a nunatak 3000'. Already we were well ahead of our planned schedule, and fears of ice falls or bad crevasses in the upper glacier proved quite unsubstantiated.

At the nunatak we abandoned our old leather boots and pulled on the felt sock inners and gleaming white canvas mukluks. Ahead, now lay the inland ice with its smooth surface. This was the moment to abandon the second sledge and I was extremely nervous as box after box was loaded on the remaining one. It does Nansen's design tremendous credit that the apparently flimsy 42 lb. structure of runners and bridges - lighter than 4 pairs of skis - was able to take the full 700 lb+ load. We harnessed up and anxiously took up the strain. Would we manage it in a one-er? It moved forward majestically on the night frost crust and once more the expedition optimism moved to a 'new' high. Surely now we would manage the 400 miles to the West edge of the ice.

All went well until about 4000' and then our weight, instead of being sustained by the crust, broke the surface, and then we were floundering along at  $\frac{1}{2}$  m.p.h. We tried the skis but on the gradient there wasn't enough traction and they slipped back. Some miserable days followed and simple arithmetic showed we would obviously run out of food going these diminutive distances. Ropes tied under the skis helped a bit but even the sledge carved its way through the flimsy crust. We didn't have skins.

At 5750' it started to rain. Nearly all parties crossing the ice cap have rain at some time but this shower was extraordinarily persistent. The surface turned into a quagmire so we all gave up the struggle and retired to the warmth and security of the pyramid tent. The downpour went on for 36 hours. Continuous rain whilst camping on snow is probably the greatest test for any tent, but our double walled pyramid did magnificently; at no time was the inner wet and we were able to get a fabulous sleep instead of having to fend off the elements.

At last it stopped and the tent, because of the thaw, was now perched on a mound. The clouds dispersed and with the clear sky came the keen night frost. Already the waterlogged surface was crisping up and as we slipped on the long Norwegian cross country skis, a wave of optimism swept through the party. Though the crust began to form at 5 p.m., four hours elapsed before the surface was at its best. Our skis slid along easily and with a strong shoulder push on the bamboo poles, a continuous rhythm was set up. The sledge drag was now so light it could be forgotten. Often the horizon ahead looked like an uphill but these appearances turned out to be mirage. Later in the evening a cold wind sprung up and most of us needed cagouls on top of ventile anaraks. With the wind came rivers of low drift through our feet, and as the sun fell to the horizon the scatter of light in the drift made the surface seem like velvet. We felt marvellous.

On this new surface we never looked back. Twenty miles was now easily possible, and at the back of the sledge the wheel happily spun out the tenths on the milometer. In fact we managed to hold this average and so covered 250 miles in only twelve days.

I loved the feeling of the desert with its infinite horizons and wide fantastic skies. We watched the sun and moon through all their phases. The utter simplicity of the scene was such a tonic to our muddled and competitive ordinary life. Occasionally birds visited us - Arctic terns and skuas - and once a handsome white Arctic fox. These would almost jolt oneself out of the dream and make one realise that there were other living things too.

As the days went past we noticed the altimeters climbing slowly past the 8150', the summit of the cap at this point. Roger by a brilliant piece of sextant work navigated us to an American DEW line radar post whose position had been given us by the Foreign Office (although denied by the locals). It was a grotesque and ugly war machine and we stayed just long enough (8 hours) to let the Danes know we were alive and heading in the right direction. Later I heard how important this move had been - one Danish daily had written a week after we left the East Coast "No news of the Scottish party.....are they lost?".

We were now on the downhill side and even though the angle of slope was only impressive by railway standards, it was just that bit easier to pull the sledge. Moreover we now had help from following winds which spill off the ice cap and the moment came for our experiment in sailing. Roger, of course, was in charge of the arrangements since he has had much experience with Tilman, the explorer, in his pilot cutter. A bamboo mast was stepped between boxes and the aluminium shovel used to attach the ski

black cross spar. Guys went to all corners of the sledge. I can remember thinking it was all just an interesting diversion rather than something likely to be of use, when the square orange sail billowed out and the stays jiggled at the sledge with pounds of pressure. When one skier in front broke the inertia, the great ghostly galleon moved off and soon we were skiing flat out to keep it away from our heels. At best, now, we covered 4 miles per hour though usually about  $3\frac{1}{2}$ .

All of us were now anticipating the last stage of the journey through the low lying summer thaw belt of the inland ice. We knew this was likely to be the most difficult part of the journey because of slush, morasses, rivers and hummocks. Possibly we would find a maze of hazards with no way out. And we had to strike land at exactly the right place or be trapped between tundra rivers which there was no hope of crossing.

Just under 5000' the first lake appeared in the evening gloom as a black line across the horizon. Roger estimated we had still 40 miles to go and it appeared that the thaw zone was unusually wide. As we approached it our skis sank into slush and since we had to detour the sail could no longer be used.

Out of the lake came a stream and I was glad of the long sledge which was able to bridge it completely. We lost a few more hundred feet and soon we were in a hopeless area of slush bogs. Mirages made it difficult to see the way the water should flow. Suddenly the sledge sank through the crust and we were all floundering in slush and icy water. The sledge still weighed 500 lbs. and was desperately difficult to move. We camped as best we could almost floating the campmats on the quagmire. Bill and I went on a recce only to find that a vast river blocked our way - fully 50 yards across.

The next day there was nothing for it but retrace our steps, a most depressing thing when victory seems in sight. We muddled on for several days and Roger of course, had the greatest difficulty in plotting the position since we were always changing direction.

But just when things seemed hopeless, patches of hard dry glacier ice became more noticeable and it was evident we had passed the morass. Rivers now became the main worry. Many ran in deep ice gorges sometimes 100' deep. One slip on the bank would have been fatal. We followed down the banks of these making detours at each tributary. Often we were  $90^{\circ}$  off course.

Then the first crevasse appeared - just a crack - but we welcomed these since soon the rivers now disappeared down swallow holes.

Of course the main topic of conversation was on the question of land ahead. Time and time again a black horizon smudge would drift off as

oud. We hadn't seen any birds but we found various old meteorological balloons on the ice, also ptarmigan droppings, feathers and even gravel. Although we couldn't see land definitely there was a line of towering cumulus cloud in the distance and since these can only occur with hot rising air we surmised they must be over land.

At last we came over a crest and there was no doubt about the dark distant line. Little lakes shone like jewels out of the darkness and at one place there was the appearance of smoke. Later we found this was glacier dust thrown up from the valley by the afternoon breeze.

As we converged on the ice edge and the great glacial sheet became thinner, the surface became more and more hummocked. Laboriously the 500 lb. sledge was pulled up one side of these and after tetering on the crest it would come tearing down out of control. Our mileage fell to about two per day and the sledge was beginning to break up with the strain. The front bridge was replaced with a spare and the main longitudinal had to be glued in two places by Araldite baked in the primus. Skis were abandoned. They had almost worn through. We had still two weeks food but there remained the possibility of a complete impasse - a large river or a broken up glacier. We were also worried about our precise position since the slightest error in north or south became more and more difficult to correct. Sextant sightings were only accurate to 5 miles and this wasn't good enough. The compass was also rather drunk in its movements owing to the nearness of the magnetic pole.

However, the small radio-direction finder was now able to pick up the Søndre Strømfjord airbase signal and this aid proved critical. We headed southwards, and in order to try and break the bogey of the last few miles Myrtle and Bill back packed loads on foot to try and reach land - since one could still make good speed walking. Only occasional step-cutting was necessary on steep banks. It was agreed that they would only leave the loads if a safe depot was established on land, since in the maze of glacier hummocks it was all too easy to lose oneself, let alone the gear.

Roger and I manhandled on the light sledge as best we could and every time a crest was reached we peered out into the distance for a view of the others. Roger saw them first - just two dots - making in our direction. Quickly we focussed the binos - they didn't have packs and must have reached land - the bogey was broken.

Actually land was nearer than we thought - only 4 hours on foot and the next day it was our excitement to see and feel the first rocks, moraines, greenery and wild life since leaving the East Coast 32 days previously. Our enthusiasm was almost childlike as we pegged the tent

out on the warm dry tundra grass. A white stone moved off as an Arctic hare and a distant scuffling of scree proved to be a herd of reindeer making away from their virginal feeding place. Flowers were everywhere and buntings twittered happily around, collecting seeds from the many grasses.

With the tent pitched and all the gear off the ice we then toasted the second unassisted ski crossing with champagne, and also Myrtle who had become the first woman to do it. The fact that we had still 30 miles to go was tomorrow's problem.

## CROSSING OF INLAND ICE

Diary by W. Wallace

### Saturday, 12th June

All four members of the Expedition assembled at Benfrew at 19-30 hours for boarding the 20-00 hours plane to Reykjavik. There was an almost complete cloud cover below us for the whole of the journey but a small break gave a brief glimpse of the Vestmann Islands. After landing the navigation box was found to be missing but was located in the aircraft's baggage compartment. Valur Johannesen, a friend of Hugh and Myrtle's from previous visits to Iceland, met us and, after pitching the tent close to the terminal building, drove us round Reykjavik.

### Sunday, 13th June

The food and equipment was checked before lunch. Our charter plane a 'Dakota' took off at 13-00 hours. The cloud layer thickened as we climbed, heading west over the Denmark Strait towards Kulusuk airstrip in East Greenland. When still 150 miles out from the coast the clouds thinned then disappeared giving excellent views of the 60 mile broad pack ice, the shore leads and the east coast mountains. After landing we walked over to Kap Dan settlement from where Hugh boarded a small boat bound for Angmagssalik. He was to arrange for a boat while the other three ferried the food and equipment to a point on the shore accessible to the boat.

### Monday, 14th June

In clear, bright weather the gear was ferried almost onto a col from where it would not be difficult to reach the shore at a point where there was both deep water and little ice. Hugh arrived with Carsten Berg-Sorensen, the local government architect in 'Ulimaut', a fishing type boat belonging to the government. Carsten was on a routine visit to Kumgiut, a settlement 20 miles up Angmagssalik fjord. We spent the remainder of the day sailing up the ice-free fjord and exploring the environs of Kumgiut including a visit to the fish factory. We slept aboard 'Ulimaut'.

### Tuesday, 15th June

A sea-mist, cold and damp, had come down overnight. As we sailed down the fjord towards Angmagssalik the mist lifted but ahead were banks of grey mist rolling in from the pack ice. All too soon we were enveloped

cept slowly along close to the shore and into Angmagssalik harbour. Gear was loaded onto a lorry and taken to an empty hut which had been at our disposal. From the ship we had spotted a tented encampment of Greenlanders. This site was unsuitable due to lack of running water so we settled for a site just west of the town. The Berg-Sorensens invited us to dine with them.

#### Wednesday, 16th June

The weather was cold with rain, snow and sleet. This was quite convenient as there were no distractions to prevent us getting on with tasks which remained to be completed. As numerous huskies roamed free one of us stayed at the tent to protect the food.

#### Thursday, 17th June

Once again the weather was poor but the wind, cold and blowing off the pack ice, had risen. As this would drive the pack even harder against the coast, it lessened our chances of reaching Siportoq from where we planned to ascend the glaciers. We once again busied ourselves with the equipment and purchasing sufficient food to last until the ascent of the glaciers had been accomplished. The Thorsens who lived in the house nearest to the tent invited us in for coffee in the evening.

#### Friday, 18th June

The weather was now improving and the mists dispersing. The work on the equipment was almost complete. It was now obvious that we would not be able to reach Siportoq for some time as the ice was hard up against the coast west of Angmagssalik. A possible solution was to sail round Angmagssalik Island and cross the iceberg-filled Sernilik fjord to land on the fjord ice in Johan Petersen's Fjord from where we would have to find a route to the 'Inland Ice'. Even this route might not be possible due to ice. Carsten brought the news that the boat 'Johan Petersen' would make the attempt next day.

#### Saturday, 19th June

We decamped and had all our food and equipment loaded onto 'Johan Petersen' ready for a 9-00 hour start. Eventually we sailed at 10-00 hours with Carsten aboard but were re-called when only one hour out threading our way through the pack. A plane was arriving unexpectedly at Kulusuk and 'Johan Petersen' was required to transport Danes who were returning to Denmark. The Thorsens invited us for lunch after which we walked up the valley west of our camp site. All our gear was now in a hut at the harbour so it was arranged that we sleep at the Berg-Sorensens and make a second attempt in the morning.

#### 20th June

The weather was again cloudless. This time we sailed at 6-00 hours and progressed without a hitch until we reached the north-west corner of Nagssalik Island where we ran into fjord ice. Battering our way through a mile of this took over an hour. We called in at a small settlement for which 'Johan Petersen' was carrying supplies and then sailed across Sermilik fjord to Johan Petersen's fjord. At the mouth of the fjord we were put down on the sea-ice. Before pitching camp we made 6 exhausting miles along the melting surface of the fjord ice.

#### Monday, 21st June

Although we rose at 6-00 hours it was too late as the surface was by then completely soft and wet. The route continued up Johan Petersen's fjord for one mile then turned south-west up a subsidiary fjord. Oppressive sun radiation and a deteriorating surface eventually forced relaying of the sledges with half loads. We turned in at 16-30 hours, having reached the head of the fjord.

#### Tuesday, 22nd June

Starting at 01-45 hours we sledged everything in four loads up to and across a small lake to a moraine near the glacier snout. The sun shone from a cloudless sky and again the snow deteriorated rapidly. At this camp we packed most of the gear into nylon bags and abandoned most of the boxes. We were all suffering from excessive radiation.

#### Wednesday, 23rd June

We rose at 23-00 hours. As our two sledges with their load weighed about 500 lbs. each, it was essential that the surface should be crisp. It could not be better and with all the crevasses covered or well-bridged steady progress was made up to a nunatak at 2600 feet. Once again the sun shone from a clear sky.

#### Thursday, 24th June

We rose again at 23-00 hours. Conditions were exactly the same as on 23rd June. The depot nunatak was reached by 05-00 hours then we moved on to the last nunatak at 3100 feet, returning for the second sledge immediately. As planned, a sledge was abandoned along with other minor items.

#### Friday, 25th June

The weather continued cloudless and windless. Rising late at 01-15 hours we were not moving until 03-00 hours - not nearly early enough. Although the surface was firm and crusted at the start and we gained 750 feet and 3 miles in 2 hours the sun was affecting it and soon we were breaking through 18 inches at every step. After 3 hours of this we were exhausted and pitched camp. Later a reconnaissance showed that we should

to avoid the Bruckner glacier. We estimated the weight on the  
to be 750 lbs.

#### Sunday, 26th June

The weather had changed by midnight. The sky was still clear to the  
and we could see Mount Foral and the midnight sun but, to the south,  
clouds were threatening. Good speed on ski for the first time was  
initially over a well frozen surface but soon it started to snow and  
8 hours we had travelled only 6.7 miles. It was still snowing very  
and progress was becoming slower so we pitched camp. We were now at  
feet.

#### Monday, 27th June

About 7 inches of new snow had fallen. We started off on foot but  
most immediately changed to ski as we were breaking through at almost  
every step. To the south we could see the tops of several nunataks near  
the coast but were unable to identify them. The temperature rose rapidly;  
the surface became very wet, and the sledge very difficult to pull. By  
01-30 hours we had travelled for 8 hours and made only 6 miles.

#### Monday, 28th June

We were up before midnight and off by 01-30 hours. The temperature  
had dropped sharply to 19°F and wet snow had frozen to the runners.  
Although we had scraped the runners we found, when we set off, that the  
scraping had not been thorough enough and we were obliged to unload the  
sledge and re-scrape them. The surface was hard and icy and we could not  
obtain sufficient traction but this was overcome by tying ropes round the  
skis underneath our feet. Bad weather with snow caught up with us in mid-  
morning and until 14-00 hours when we stopped, we travelled in white-out  
conditions. Distance travelled was 12 miles and we were now at 5000 feet.

#### Tuesday, 29th June

It was 01-30 hours before we were up. Visibility was good when we  
started but soon deteriorated. In the mist we were surprised to see an  
Arctic fox at close quarters. As the temperature rose our progress became  
slower until, despite pulling hard, we were making very little progress. We  
stopped at 09-15 hours after moving only 5 miles.

#### Wednesday, 30th June

We were prevented from moving by falling snow which continued  
throughout the night. Consequently we slept the clock round and rose  
in mid-morning when the clouds cleared. As the undersides of the plastic  
foam mattresses were very wet with condensation, we dried and aired them  
outside the tent. We set off that evening at 21-20 hours with the  
temperature dropping rapidly and a strong wind bringing drift snow out

North and making the scene very bleak indeed. After sunset we pitched the tent and had a brew. Three Arctic skuas flew over during the day.

#### Friday, 1st July

The bleak weather conditions made us reluctant to resume our march. After starting it appeared that we were pulling up a considerable slope which obliged Koger to fall back and push from the rear - an exhausting business but at least we made a few miles and rose 500 feet during the night. Our milometer was now reading 50 miles.

The strenuous pulling on poor surfaces was making us very tired but despite this we moved off at 17-30 hours in increasingly cold conditions and moved on until 22-00 hours. Our altitude was now 5500 feet.

#### Saturday, 2nd July

We started sledging at 05-30 hours and by 10-00 hours, when we stopped, had made 6.2 miles. By then the temperature had risen and the surface became sticky. Behind us to the east dark clouds were gathering.

The thick overcast prevented the temperature from dropping below freezing. Little snow had fallen but the surface was very sticky. Snow frozen onto the running surfaces of both skis and sledge necessitated halts. Thereafter speed improved and by 22-00 hours, when we stopped, we had covered a further 6.8 miles in 5 hours.

#### Saturday, 3rd July

Despite being at almost 5000 feet it rained heavily all day making movement impossible. The temperature remained at 35°F and we caught up on much needed sleep.

#### Sunday, 4th July

Rain had continued all night. Expedition members took advantage of the respite from sledging to have a wash. In mid-morning the weather cleared and allowed food and equipment to be dried out. Three Arctic terns flew over the tent in the afternoon.

Though the surface was not freezing we set out at 17-00 hours and progressed slowly apart from two halts for re-lashing the sledge. As the temperature dropped below freezing our speed improved and by midnight when we stopped, we had travelled 10 miles and gained 300 feet.

#### Monday, 5th July

We finished our meal and started sledging by 01-15 hours on a much improved surface. Cloud effects were really beautiful and, we hoped, indicated a spell of settled weather. It was decided to sledge until 90 miles were on the clock which was accomplished by 07-45 hours. Mileage

night was 20.9 and we had gained a further 650 feet.

After the previous night's experience sledging was postponed until 01-00 hours after which we made good progress on a steadily improving surface. Soon after starting three Arctic terns flew overhead, flying from west to east.

#### Tuesday, 6th July

Just before midnight frost mist enveloped us making navigation difficult. Even after our normal halt we still had difficulty in staying on course but determined to complete 20 miles for the night - this we did by 07-45 hours. During the night we had gained a further 400 feet.

In the evening conditions were ideal. In excellent visibility on a first class surface we covered 9 miles before midnight and by then had climbed to over 7000 feet.

#### Wednesday, 7th July

We continued sledging until 01-00 hours before stopping for the usual nightly meal. Soon after starting a young Arctic skua passed overhead and also a U.S. ice reconnaissance aircraft. By stopping time - 07-45 hours - we had travelled 22½ miles and reached a height of 7450 feet.

Mist had come down when we started sledging in the evening but as the surface was good we made good speed despite having to check our compass bearing frequently.

#### Thursday, 8th July

As the mist became thicker we sledged until 02-00 hours before stopping for a meal. It was snowing intermittently, the fresh powder snow making sledging more difficult and reducing our speed. At 07-15 hours we stopped having sledged 17.7 miles for the night and were now at an altitude of 7850 feet.

Due to the mist no thaw had materialised during the day and we soon ran into frost fog. As there was no wind the temperature at 19°F did not feel cold. Hugh and Roger took off their skis and pulled on foot for a time. By midnight our altitude was 8100 feet.

#### Friday, 9th July

Due to the adverse weather conditions, we slept until 03-30 hours and started moving at 05-00 hours in a world encased in hoar frost. This made sledging more difficult but soon the pulling was easier - we were going downhill - and so we put on our skis. During the night we covered only 13.8 miles, sledging until 09-00 hours.

In the evening we started early at 18-00 hours and averaged 3 m.p.h. for the first 3 hours. By midnight we had sledged 14.9 miles mainly through a belt of sastrugi in which the good light enabled us to avoid the worst of the ridges.

20

10th July

In we slept until 03-30 hours. After a brew we started sledging but the weather had deteriorated and light was poor, casting no shadows. Frequently we were unable to see the sastrugi and had to move forward by compass bearing crossing ridge after ridge. We stopped at 08-30 when the snow became sticky. We had now dropped to 7750 feet and covered 22.7 miles overnight.

In the evening, in good light, we started at 18-10 hours. Eventually the sastrugi became less frequent and by midnight we were sledging on a good surface having crossed the Arctic Circle.

Monday, 11th July

As the surface was good we were sledging again by 02-00 hours. The light was poor, however, and continued to deteriorate until snow started to fall at 03-30 hours. By stopping time 06-35 hours this morning, we dropped to 7350 feet and travelled 24.1 miles overnight.

We started our evening run rather late, at 20-00 hours. After three miles Myrtle spotted a constant pin-prick on the horizon  $13^{\circ}$  off course to the left. This we assumed to be the U.S. D.E.W. station, known as "Dye 2", and changed course to head for it.

Monday, 12th July

We started sledging again at 02-00 hours having eaten a leisurely meal. "Dye 2" slowly grew larger but as we had no means of knowing its actual size we were unable to estimate the distance remaining. This turned out much further than expected and by 08-30 hours, when we reached the aircraft runway, we had travelled 26 miles overnight. It was fortunate that visibility had been good.

The welcome accorded us was lavish, after a brief hiatus during which it was ascertained that we were permitted to enter the building. We were fed, then we washed and were entertained. Myrtle even phoned her mother in Edinburgh using the special communications system.

We had decided not to spend the night there and so set off with a strong wind behind us soon after 21-00 hours. Our direction instead of slightly north of west was now approximately north west. As well as having the wind behind us we were moving down a slight slope and covered 10 miles by just after midnight when we stopped for a much needed sleep.

Tuesday, 13th July

To catch up on lost sleep we didn't rise until 17-00 hours, had a meal, and, with the wind still behind us, hoisted the sail. This latter took longer than it should as we had lost the boom for the sail two days previously and had to improvise one. At one stage during the evening we were maintaining a steady 4 m.p.h.

#### Thursday, 14th July

halted for a meal between 02-00 and 03-30 hours after which conditions steadily deteriorated until we were once again in a white out. It started to snow and by 07-00 hours the snow had become very wet so we stopped. Our mileage for the night was 25 and our altitude 5300 feet. For the first time we all slept through the 14-00 hours for urine problems. New snow made sledging less easy but with the sail still attached we made reasonable speed. Our direction was now  $310^{\circ}$  true - even more to north-west than formerly.

#### Friday, 15th July

For once the weather had improved during the night's halt and we set off downhill at a fast pace. The wind had swung round slightly and was now right behind us, filling the sail. At one stage both Myrtle and Hugh stopped back to steer and brake when necessary. We had now covered 395 miles and during the night had sledged 23.6 miles. Our altitude was 5550 feet.

We were loathe to get up and so it was 20-00 hours before we started. It was 12 miles ahead that we were to turn west and this we covered by midnight once again with the aid of the sail. On the way we passed our first melt pool.

#### Friday, 16th July

The sail was now useless. We passed several pools lying in large hollows in the ice and eventually pitched the tent at 07-00 hours on a ridge overlooking a very large pool. Visibility had been good but there had been practically no frost. Mileage for the night was 25.3 (250 miles in 12 days) and our altitude 5000 feet.

In the evening the temperature was slow to fall and so it was 23-00 hours before we moved along the ridge and down into the succeeding basin in which we easily crossed the next melt stream.

#### Saturday, 17th July

Thin mist descended but we continued sledging through. Another melt stream, larger this time, was crossed by relaying in four loads. Immediately after we found that ice on both the skis and runners was making progress almost impossible. Aided by the sun which had now risen and dispersed the mist we scraped the runners. We climbed another ridge on which we found several empty oil drums, left over from the French weasel expeditions of past years, skirted a lake to the right, crossed another ridge and descended into a very large basin containing two huge lakes and a river. In trying to reach the lakes we were caught in very bad morasses which resulted in a very wet retreat. Hugh and Bill reconnoitred the river and found it impassible.

It was agreed that this river and lake system which crossed our path south to north was impassible and that a detour round its headwaters was necessary. In the evening the temperature had dropped to freezing by 20 hours but rose again when the sky became overcast. We started to trace our steps at 22-20 hours.

#### Sunday, 18th July

All morning we followed the main river, crossing several tributaries. Eventually the main stream divided into two approximately equal tributaries which were not flowing fast and which we were able to ford. Several of the tributaries had been fairly large and required relaying loads. We had travelled 11.7 miles during the night, all in the wrong direction. Our altitude was 4700 feet.

In the evening the temperature remained above freezing point and when light intermittent rain started we decided not to move.

#### Monday, 19th July

By 05-00 hours the rain had stopped. We split into two parties to reconnoitre a way across the small stream immediately ahead and to have a look at the ground beyond. Thereafter we spent the day in bed.

We started sledging again at 21-15 hours and advanced 6 miles by midnight. The temperature was just below freezing despite an overcast sky.

#### Tuesday, 20th July

Our route was a good one and we moved forward steadily. Once or twice we broke through the crust of a morass but otherwise the crust held. After 15 miles we passed three separate oil drums and came out on the crest of a slope from which we looked straight down to the mountains beyond the ice edge.

Two miles later the snow cover disappeared and we were obliged to take off our skis and continue on foot across razor sharp glare ice. We had breakfast and decided to continue but soon encountered a river system. Hugh and Bill went forward on a reconnaissance almost failing to get back to the tent due to rising water in the melt streams.

#### Wednesday, 21st July

We decided to revert to travelling by day. To start we moved upstream vainly hoping to find a crossing point at which we could keep our feet dry. After crossing the stream we headed north for the crest of a ridge along which we moved westwards. Later in the day our path was barred by a large river. By moving parallel to this we had to cross several streams and eventually camped on a heavily crevassed ridge from which we could see the waters of Søndre Strømfjord.

22nd July

From the ridge camp we moved down, over further crevasses, into a basin at the far side of which was a bad area of hummock ice. In crossing several streams before camping. The weather was excellent. Roger and Bill went forward on a reconnaissance and found that the streams did not join and flow into a river flowing to the north of us. All disappeared into crevasses; the latter into a huge ravine.

23rd July

In the morning we moved forward through ice which became more crevassed and hummocked as we progressed. At lunch an examination of the ice revealed a broken longitudinal. This was splinted and the traces crevassed but no sooner had we re-started than the same longitudinal without the protection of the cow-catcher, broke in another place. After, while Hugh and Myrtle relayed half the load, Roger and Bill manhandled the sledge through very bad hummocks.

Tuesday, 24th July

It was essential to overhaul the sledge. While Roger and Hugh did this, Myrtle and Bill went forward on a reconnaissance, the object of which was to decide which of the low hills ahead was that marked as 660 metres on the map. This was successfully accomplished and they returned to help Roger and Hugh who were slowly moving the repaired sledge through big hummocks. It was in these hummocks that we found a litter of beer cans. The weather continued warm and sunny.

Sunday, 25th July

In continuing good weather we set out rather late to cover the last few miles to land. For the first two hours we made good progress but then entered an area of hummocks steeper and bigger than any previously encountered - some being 30 feet from dip to crest. Myrtle and Bill relayed half the load while Roger and Hugh slowly worked the sledge through. Eventually we reached easy downhill slopes to the moraine which we crossed to the solid ground beyond. The crossing from fjord to ice-edge had been accomplished in 33 days.

Monday, 26th July

This was a rest day. We moved only  $1\frac{1}{2}$  miles to a pleasant site beside a small lake. The country was alive with reindeer which several times passed close to the tent. In the evening we walked over to a point from where we could see the glacial river which we would have to cross in the morning.

27th July

After the rest day we rose early and by 09-30 hours had all our gear  
 to the river which we crossed partly by wading and partly by constructing  
 a ropeway. Thereafter we relayed our gear several miles down the  
 valley. In the evening two Arctic foxes came nosing round the tent looking  
 for food. The excellent weather continued unbroken.

Wednesday, 28th July

Two miles further down the valley we came to the end of a rough but  
 passable road where there was a small hut opposite the glacier snout.  
 We left most of our gear and continued eight miles down the  
 valley towards Søndre Strømfjord, having a swim on the way. That  
 night we slept out on a piece of higher ground between two small lakes.

Thursday, 29th July

As this was the day for our return to civilisation we rose early, had  
 breakfast and washed and tidied ourselves as best we could, then walked  
 down the track past the Sugar Loaf. From there we were following a  
 road when suddenly a musk-ox rose from the bushes just ahead. This was  
 totally unexpected and after more than a little hesitation we quickly  
 slipped past. On arrival we were welcomed, introduced to and interviewed  
 by numerous people. Our journey was over.

Navigation (R. Tufft)

The sextant used was an ex-U.S.A.F. Mark 9A Bubble Sextant. To reduce weight, the lighting and clockwork averaging mechanisms were removed. Two observations were taken daily whenever possible - at noon and during the evening. A check was received on most days and a Timex electric wristwatch used as a chronometer. A Nova Pal portable battery receiver was used for communication purposes (size 9" x 5" x 2" - weight 2 $\frac{1}{4}$  lbs.) This set can be used as a direction finder and proved useful in confirming the position of the Gribbestrom Beacon during the final descent of the ice-cap.

Our sextant was accurate to some two or three miles. Since the West coast, at the point of our descent, has no prominent landmarks, good navigation can save many days of hard work in the hummocks and seracs of the final miles of ice-cap. We arrived some five miles north of our intended finishing point. This mistake cost us some one to two days extra sledging.

Dead reckoning was done by means of a 27" light-weight cycle wheel and cycleometer. This was lashed to the outer longitudinal. Under ideal sledging conditions such as ours these can be remarkably accurate. Despite the maker's claims, however, they are not waterproof and can soon be rendered useless by freezing rain. During the march, direction was maintained by means of the sun, clouds, or occasionally, features on the ice-cap. We carried 2 ex-Army liquid filled prismatic compasses and one ex-W.D. (Howard Pattern Mk 2) sun compass. However, it is impossible to read a sun compass whilst moving and virtually impossible to read a prismatic compass and pull a sledge. On one or two occasions of bad visibility, we halted for an hour or two for conditions to improve.

During the crossing, magnetic variation changed from some 45°W to 53°W. No figures for variation were available for the ice-cap. Lines of magnetic variation were interpolated on an aeronautical chart. These were checked by taking a compass bearing to the sun at local noon. The difference between the compass reading and the true bearing of 180° showed the current magnetic variation.

For working the sights, the Admiralty 'Tables of Computed Altitude and Azimuth' were used. From these sun and moon azimuths at hourly intervals were extracted. These were used as a check on the course whilst on the march.

Meteorology (R. Tufft)

- Instruments -
1. Negretti & Zambra whirling psychrometer.
  2. Luft pocket aneroid
  3. Ex-W.D. pocket aneroid
  4. Air Ministry Aneroid Mk II

Metrical Observations (contd.)

## Codes

The codes used are those found in the Meteorological Office Handbook  
Weather Messages (MO 510b).

The codes for surface and drift are as follows:-

S <sub>4</sub> '	Character of snow cover	
	light fresh snow	
	fresh snow blown into drifts	
	fresh compact snow	
	old snow loose	
	old snow firm	
	old snow moist	
	loose snow with surface crust	
	firm snow with surface crust	
	moist snow with surface crust	
0	even snow cover, ground frozen, no drifts	
1	even snow cover, ground soft, no drifts	
2	even snow cover, state of ground unknown, no drifts	
3	snow cover moderately uneven, ground frozen, slight drifts	
4	snow cover moderately uneven, ground soft, slight drifts	
5	snow cover moderately uneven, state of ground unknown, slight drifts	
6	snow cover very uneven, ground frozen, deep drifts	
7	snow cover very uneven, ground soft, deep drifts	
8	snow cover very uneven, state of ground unknown, deep drifts	
923S <sub>5</sub> '	Drift snow	
0	drift up to 20 cm. (no snow falling)	} visibility not
1	drift up to 20 cm. (snow falling)	
2	drift 20-150 cm. (no snow falling)	} reduced by drift
3	drift 20-150 cm. (snow falling)	
4	drift, slight or moderate - no snow	
5	drift, slight or moderate - with snow	
6	drift, moderate or heavy - no snow	
7	drift, moderate or heavy - with snow	
8	drift, heavy, impossible to observe whether snow falling	
9	violent drift snow	
S <sub>5</sub> '	Evolution of drift snow	
0	drift snow ended before hour of observation	
1	intensity diminishing	
2	no change	
3	intensity increasing	
4	continues apart from interruption lasting less than 30 minutes	
5	general drift snow has become drift snow near the ground	
6	drift snow near the ground has become general drift snow	
7	drift snow has started again after an interruption of more than 30 minutes	

Wind speed is estimated.

Visibility is estimated.

- Present weather
- 01 clouds becoming less developed
  - 02 state of sky on the whole unchanged
  - 03 clouds generally developing
  - 20 drizzle } not freezing } during the last hour
  - 21 rain } but not at the time
  - 22 snow } of observation
  - 36 slight or moderate drifting snow - generally low
  - 41 fog or ice-fog in patches
  - 42 fog or ice-fog sky discernible } has become thinner during
  - 43 fog or ice-fog sky not discernible } preceding hour
  - 44 fog or ice-fog, sky discernible } no appreciable change
  - 45 fog or ice-fog, sky not discernible } during preceding hour
  - 46 fog or ice-fog, sky discernible } has begun, or has become
  - 47 fog or ice-fog, sky not discernible } thicker during preceding
  - 48 fog, depositing rime, sky discernible } hour
  - 49 fog, depositing rime, sky not discernible
  - 51 drizzle, not freezing, continuous - slight at the time of observation
  - 60 rain, not freezing, intermittent - slight at the time of observation
  - 61 rain, not freezing, continuous - slight at the time of observation
  - 63 rain, not freezing, continuous - moderate at the time of observation
  - 70 intermittent snow - slight at the time of observation
  - 71 continuous snow - slight at the time of observation
  - 77 snow grains - (with or without fog)
  - 78 isolated star-like snow crystals (with or without fog)

- W Past weather
- 0 cloud covering one half or less of the sky during preceding three hours
  - 1 cloud covering more than one half of the sky during part of the period and covering one half or less during part of the period
  - 2 cloud covering more than one half of the sky throughout the period
  - 3 blowing snow
  - 4 fog, ice-fog or thick haze
  - 5 drizzle
  - 6 rain
  - 7 snow or rain and snow mixed

- Cloud
- St stratus
  - Sc stratocumulus
  - Cu cumulus
  - Ac altocumulus
  - As altostratus
  - Ns nimbostratus
  - Ci cirrus
  - Cc cirrocumulus
  - Cs cirrostratus

Meteorological Observations (Mean data)Temperatures

Month	Maximum	Time	Height	Minimum	Time	Height	Mean
June	47	23rd 1500	550'	24	25th 0900	3850'	33.0
July	47	25th 1500	2350'	15	1st 0600	5200'	32.7
All Observations							32.8

Cloudiness (in oktas)

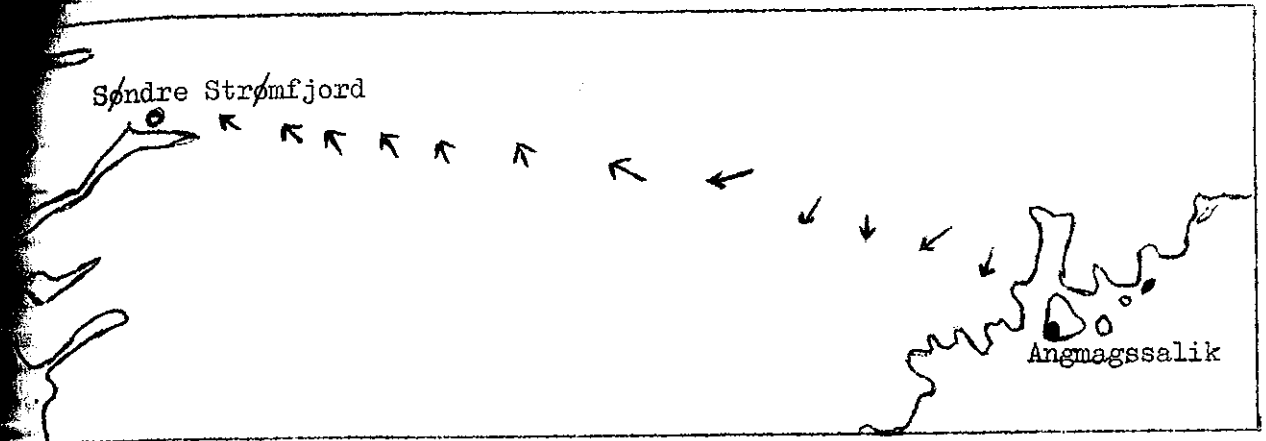
Month	Observations	Mean
June	35	4.6
July	169	5.3
All Observations		5.2

Wind Strength

Month	Observations	Calm	1 to 5 knots	6 to 10 knots	11 to 20 knots
June	35	10	21	4	0
July	169	23	58	53	35
Total	204	33	79	57	35
Expressed as Percentages		16.2%	38.7%	27.9%	12.2%

27

Wind Direction



Precipitation

Month	Observations	Snow	Rain	Drizzle	Total	Percentage
June	35	15	0	0	15	43%
July	169	13	4	2	19	11%
Total	204	28	4	2	34	16.7%

Fog & Bad Visibility

Fog (not connected with bad visibility as a result of precipitation)

Month	Observations	Fog	Percentage
June	35	01	.03%
July	169	20	11.9%
Total	204	21	10.3%

Fog (including bad visibility resulting from precipitation)

Month	Observations	Vis. less than 5 m.	Vis. less than 1 mile	Total	Percentage
June	35	5	10	15	42.8%
July	169	5	26	31	18.3%
Total	204	10	36	46	22.1%

Meteorology (Individual Observations)

Time 0900 22.VI.65 Altitude Sea Level  
 Temperature 40 Total Cloud 1/8  
 Visibility 5 miles 1/8 St6 700  
 (Mist at mouth of fjord) Wind Calm  
 WW<sub>02</sub> W<sub>0</sub> Surface 92284

Time 1200 Altitude 550  
 Temperature 39 Total Cloud 1/8  
 Visibility 880 yards 1/8 St6 500  
 WW<sub>41</sub> W<sub>4</sub> 1/8 Cc9 15000  
 Wind Calm  
 Surface 92255  
 Small patch of fog

Time 1500 Altitude 550  
 Temperature 38 Total Cloud 1/8  
 Visibility Unlimited 1/8 Cc9 15000  
 WW<sub>02</sub> W<sub>0</sub> Wind Calm  
 Surface 92255

Time 1800

NO OBSERVATION

Time 0900 23.VI.65 Altitude 550  
 Temperature 33 Total Cloud 1/8  
 Visibility Unlimited 1/8 Cil 15000  
 WW<sub>02</sub> W<sub>0</sub> Wind Calm  
 Surface 92282

Time 1200 Altitude 550  
 Temperature 43 Total Cloud 0  
 Visibility Unlimited Wind Calm  
 WW<sub>02</sub> W<sub>0</sub> Surface 92252

Time 1500 Altitude 550  
 Temperature 47 Total Cloud 0  
 Visibility Unlimited Wind 05K WSW  
 WW<sub>02</sub> W<sub>0</sub>

Time 1800 Altitude 550  
 Temperature 46 Total Cloud 0  
 Visibility Unlimited Wind 10K WSW  
 WW<sub>02</sub> W<sub>0</sub>

Time 0900 24.VI.65 Altitude 3100  
 Temperature 34 Total Cloud 2/8  
 Visibility Unlimited 1/8 Ac3 10000  
 WW<sub>02</sub> W<sub>0</sub> 1/8 Cil 15000  
 Wind Calm  
 Surface 92285

Time 1200 Altitude 3100  
 Temperature 36 Total Cloud 2/8  
 Visibility Unlimited Trace Ac3 10000  
 WW<sub>02</sub> W<sub>0</sub> 1/8 Cil 15000  
 Wind 01K S  
 Surface 92255

Time 1500 <u>24.VI.65</u>	Altitude 3100
Temperature 38	Total Cloud 6/8
Visibility Unlimited	6/8 CiCc9 15000
WW <sub>02</sub> W <sub>1</sub>	Wind 02K S
Time 1800	Altitude 3100
Temperature 37	Total Cloud 2/8
Visibility Unlimited	1/8 Ac3 10000
WW <sub>02</sub> W <sub>1</sub>	1/8 Ci1 15000
	Wind Calm
Time 0900 <u>25.VI.65</u>	Altitude 3850
Temperature 24	Total Cloud 0
Visibility Unlimited	Wind 05K W
WW <sub>02</sub> W <sub>0</sub>	Surface 92245
	9/10 Pack ice at sea
Time 1200	Altitude 4100
Temperature 33	Total Cloud 0
Visibility Unlimited	Wind 05K W
WW <sub>02</sub> W <sub>0</sub>	Surface 92265
Time 1500	Altitude 4100
Temperature 34	Total Cloud 0
Visibility Unlimited	Wind 05K W
WW <sub>02</sub> W <sub>0</sub>	
Time 1800	Altitude 4100
Temperature 34	Total Cloud 0
Visibility Unlimited	Wind 10K W
WW <sub>02</sub> W <sub>0</sub>	
Time 0900 <u>26.VI.65</u>	Altitude 4000
Temperature 26	Total Cloud Sky obscured
Visibility 200 yards	Wind 05K NNE
WW <sub>71</sub> W <sub>7</sub>	Surface 92222
	S.S. 0430 -
Time 1200	Altitude 4250
Temperature 26	Total Cloud Sky obscured
Visibility 100 yards	Wind 05K ENE
WW <sub>71</sub> W <sub>7</sub>	Surface 92222
	Drift 92352
Time 1500	Altitude 4250
Temperature 32	Total Cloud Sky obscured
Visibility 100 yards	Wind 05K ENE
WW <sub>71</sub> W <sub>7</sub>	Surface 92222
	Drift 92352
Time 1800	Altitude 4250
Temperature 28	Total Cloud Sky obscured
Visibility 100 yards	Wind 05K ENE
WW <sub>71</sub> W <sub>7</sub>	Surface 92222
	Drift 92352

Time 0900 27.VI.65  
 Temperature 29  
 Visibility 2 miles  
 WW<sub>70</sub> W<sub>7</sub>

Altitude 4400  
 Total Cloud 8/8  
 5/8 St7 4000  
 8/8 As1 8000  
 Wind 05K NNE

Time 1200  
 Temperature 31  
 Visibility 1 mile  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 4500  
 Total Cloud 7/8  
 5/8 St7 4000  
 7/8 As1 8000  
 Wind 05K NNE  
 Surface 92255

Time 1500  
 Temperature 37  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>7</sub>

Altitude 4850  
 Total Cloud 7/8  
 1/8 Sc5 3000 (4/8 As 8000  
 7/8 AcAs7 8000 (7/8 Ac 9000  
 Wind calm

Time 1800  
 Temperature 34  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4900  
 Total Cloud 7/8  
 1/8 St5 2000  
 7/8 AcAs 7 (6/8 As 8000  
 (7/8 Ac 9000  
 Wind calm  
 Surface 92255

Time 0900 28.VI.65  
 Temperature 22  
 Visibility 5 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4950  
 Total Cloud 6/8  
 1/8 St6 2000  
 3/8 Ac 8000  
 5/8 CiCs8 20000  
 Wind 10K N

Time 1200  
 Temperature 30  
 Visibility 5 miles  
 WW<sub>78</sub> W<sub>7</sub>

Altitude 4950  
 Total Cloud 8/8  
 8/8 Sc7 3000  
 Wind 05K N

Time 1500  
 Temperature 35  
 Visibility 2 miles  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 4950  
 Total Cloud 8/8  
 8/8 St7 1000  
 Wind 01K ENE  
 Surface 92255

Time 1800  
 Temperature 30  
 Visibility 3 miles  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 4950  
 Total Cloud 8/8  
 8/8 St7 1000  
 Wind 02K ENE  
 Surface 92255

Time 0900 29.VI.65  
 Temperature 27  
 Visibility 200 yards  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 5050  
 Total Cloud Sky obscured  
 Wind 02K ESE  
 Surface 92205  
 S.S. 0830 -  
 o o

Time 1200 29.VI.65  
Temperature 29  
Visibility 440 yards  
WW<sub>71</sub> W<sub>7</sub>

Altitude 5000  
Total Cloud Sky obscured  
Wind 05K E

Time 1500  
Temperature 29  
Visibility 440 yards  
WW<sub>71</sub> W<sub>7</sub>

Altitude 5000  
Total Cloud Sky obscured  
Wind 05K ENE  
Surface 92205

Time 1800  
Temperature 29  
Visibility 440 yards  
WW<sub>71</sub> W<sub>7</sub>

Altitude 5000  
Total Cloud Sky obscured  
Wind 10K ENE  
Surface 92205

Time 0900 30.VI.65  
Temperature 26  
Visibility 440 yards  
WW<sub>71</sub> W<sub>7</sub>

Altitude 5000  
Total Cloud Sky obscured  
Wind 05K N  
Surface 92205

Time 1200  
Temperature 31  
Visibility 2 miles  
WW<sub>71</sub> W<sub>7</sub>

Altitude 5000  
Total Cloud 8/8  
1/8 Sc6 1000  
8/8 As2 4000  
Surface 92205  
Wind calm

Time 1500  
Temperature 36  
Visibility Unlimited  
WW<sub>02</sub> W<sub>7</sub>

Altitude 5000  
Total Cloud 2/8  
1/8 Sc5 2000 below camp  
96361  
2/8 Ac3 8000  
Wind 01K SSW  
Surface 92205  
S.S. ceased 1230  
0 0

Time 1800  
Temperature 35  
Visibility Unlimited  
WW<sub>02</sub> W<sub>0</sub>

Altitude 5000  
Total Cloud 1/8  
1/8 Sc5 2000 below camp  
96361  
Trace Ac4 10000  
Wind 02K SSW  
Surface 92205

Time 0000 1.VII.65  
Temperature 22  
Visibility Unlimited  
WW<sub>36</sub> W<sub>3</sub>

Altitude 5100  
Total Cloud 1/8  
1/8 Ac4 8000  
Wind 15K NNE  
Surface 92215  
Drift 92302

Time 0300  
Temperature 16  
Visibility Unlimited  
WW<sub>36</sub> W<sub>3</sub>

Altitude 5100  
Total Cloud 1/8  
1/8 Ac4 8000  
Wind 20K NNE  
Surface 92265  
Drift 92302

Time 0600 1.VII.65  
 Temperature 15  
 Visibility Unlimited  
 WW<sub>36</sub> W<sub>3</sub>

Altitude 5200  
 Total Cloud 0  
 Wind 20K NNE  
 Surface 92265  
 Drift 92302

Time 0900  
 Temperature 16  
 Visibility 10 miles  
 WW<sub>36</sub> W<sub>3</sub>

Altitude 5300  
 Total Cloud 0  
 Wind 20K NNE  
 Surface 92265  
 Drift 92342

Time 0900 2.VII.65  
 Temperature 28  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5450  
 Total Cloud 8/8  
 3/8 St6 1500  
 7/8 Ac 8000  
 Wind 01K ENE  
 Surface 92265

Time 1200  
 Temperature 29  
 Visibility 5 miles  
 WW<sub>70</sub> W<sub>7</sub>

Altitude 5450  
 Total Cloud 7/8  
 5/8 St7 1500  
 7/8 AcAs7 8000 (1/8 Ac 8000  
 (7/8 As 10000  
 Wind Calm  
 S S 0915-1030 is<sub>o</sub> 1145 -  
 Parhelia 94731  
 Maximum intensity 1020 - strong

Time 1500  
 Temperature 35  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>7</sub>

Altitude 5500  
 Total Cloud 8/8  
 8/8 St7 1500  
 Wind 05K E  
 is<sub>o</sub> ceased 1230  
 Surface 92255

Time 1800  
 Temperature 33  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5500  
 Total Cloud 7/8  
 7/8 AcAs7 8000 (4/8 Ac 8000  
 (7/8 As 10000  
 Wind Calm  
 Surface 92255

Time 0900 3.VII.65  
 Temperature 35  
 Visibility 200 yards  
 WW<sub>21</sub> W<sub>6</sub>

Altitude 5700  
 Total Cloud Sky obscured  
 Wind 10K E  
 Surface 92255  
 r<sub>o</sub>r<sub>o</sub> 0800-0845

Time 1200  
 Temperature 35  
 Visibility 440 yards  
 WW<sub>63</sub> W<sub>6</sub>

Altitude 5700  
 Total Cloud Sky obscured  
 Wind 10K E  
 Surface 92255  
 r<sub>o</sub>r<sub>o</sub> 0910-0945 1030

Time 1500 3.VII.65  
 Temperature 35  
 Visibility 440 yards  
 WW<sub>61</sub> W<sub>6</sub>

Altitude 5700  
 Total Cloud Sky obscured  
 Wind 10K E  
 Surface 92255

Time 1800  
 Temperature 34  
 Visibility 440 yards  
 WW<sub>60</sub> W<sub>7</sub>

Altitude 5700  
 Total Cloud Sky obscured  
 Wind Calm  
 Surface 92255  
 is<sub>o</sub> 1600

Time 0900 4.VII.65  
 Temperature 34  
 Visibility 440 yards  
 WW<sub>51</sub> W<sub>6</sub>

Altitude 5750  
 Total Cloud, Sky obscured  
 Wind Calm  
 r<sub>o</sub> r<sub>o</sub> - d<sub>o</sub> d<sub>o</sub> 0800

Time 1200  
 Temperature 37  
 Visibility 10 miles  
 WW<sub>01</sub> W<sub>5</sub>

Altitude 5750  
 Total Cloud 6/8  
 1/8 St6 2000 - below camp  
 6/8 Ac3 8000  
 Wind Calm  
 d<sub>o</sub> d<sub>o</sub> ceased 1030  
 96360

Time 1500  
 Temperature 39  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5750  
 Total Cloud 6/8  
 1/8 Sc5 5000  
 4/8 Ac3 8000  
 6/8 CiCs6 20000  
 Wind 01K N  
 Solar halo 94720  
 Maximum intensity 1400 - moderate

Time 1800  
 Temperature 38  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5750  
 Total Cloud 8/8  
 1/8 Ac4 8000  
 8/8 Cs7 20000  
 Wind 05K N  
 Solar halo 94720  
 Maximum intensity 1730 - moderate

Time 0000 5.VII.65  
 Temperature 32.0  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6000  
 Total Cloud 8/8  
 2/8 As1 8000  
 8/8 CiCs7 15000 (2/8 Ci2 15000  
 (8/8 Cs7 20000  
 Wind 05K NW  
 Surface 92285

Time 0300  
 Temperature 30  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude  
 Total Cloud 8/8  
 4/8 As1 8000  
 8/8 CiCs7 20000  
 Wind 10K N  
 Surface 92265



Time 0900 6.VII.65  
 Temperature 27  
 Visibility 3 miles  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 6850  
 Total Cloud 2/8  
 F dispersed 0800  
 2/8 Ac3 10000  
 Bank of fog to the East  
 Wind 01K NE

Time 1200  
 Temperature 36  
 Visibility 5 miles  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 6850  
 Total Cloud 5/8  
 2/8 Ac4 10000  
 6/8 Ci2 20000  
 Bank of fog to South East  
 Wind 01K W  
 Surface 92262

Time 1500  
 Temperature 40  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6850  
 Total Cloud 8/8  
 1/8 St6 2000  
 5/8 Ac7 (3/8 Ac 8000  
 8000 (5/8 Ac 10000  
 8/8 Cs7 20000  
 Wind 01K W  
 Surface 92252

Time 1800  
 Temperature 37  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6850  
 Total Cloud 8/8  
 8/8 Cs7 20000  
 Solar halo - weak  
 Calm

Time 2100  
 Temperature 35  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6850  
 Total Cloud 8/8  
 8/8 Cs7 20000  
 Wind 01K W  
 Surface 92252

Time 0000 7.VII.65  
 Temperature 30  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6950  
 Total Cloud 5/8  
 4/8 Ac3 8000  
 6/8 Ci2 20000  
 Wind 02K NW  
 Surface 92262

Time 0300  
 Temperature 25  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7100  
 Total Cloud 3/8  
 1/8 Sc5 2000  
 1/8 Ac3 10000  
 1/8 Ci2 20000  
 Wind 02K N  
 Surface 92252

Time 0600  
 Temperature 25  
 Visibility 15 miles  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 7200  
 Total Cloud 1/8  
 1/8 Sc5 2000  
 Trace of Ac4 8000  
 Bank of fog to South West  
 Calm  
 Surface 92262

Time 0900 7.VII.65  
 Temperature 27  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7400  
 Total Cloud 1/8  
 1/8 Ac4 10000  
 Wind 10K N  
 Surface 92262

Time 1200  
 Temperature 34  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 7450  
 Total Cloud 2/8  
 1/8 Ac4 8000  
 1/8 Ci1 20000  
 Wind 10K NNE  
 Surface 92262

Time 1500  
 Temperature 34  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 7450  
 Total Cloud 1/8  
 1/8 Ac4 10000  
 Wind 10K ENE  
 Surface 92262

Time 1800  
 Temperature 34  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 7450  
 Total Cloud 3/8  
 1/8 Ac4 8000  
 2/8 Ci2 20000  
 Wind 05K E  
 Surface 92262

Time 2100  
 Temperature 31  
 Visibility 200 yards  
 WW<sub>47</sub> W<sub>4</sub>

Altitude 7450  
 Total Cloud Sky obscured  
 F 1900 -  
 Wind 10K ESE

Time 0000 8.VII.65  
 Temperature 27  
 Visibility 200 yards  
 WW<sub>45</sub> W<sub>4</sub>

Altitude 7450  
 Total Cloud Sky obscured  
 Wind 10K SSE  
 Surface 92272

Time 0300  
 Temperature 25  
 Visibility 200 yards  
 WW<sub>45</sub> W<sub>4</sub>

Altitude 7650  
 Total Cloud Sky obscured  
 Wind 10K ESE  
 Surface 92272

Time 0600  
 Temperature 24  
 Visibility 880 yards  
 WW<sub>77</sub> W<sub>7</sub>

Altitude 7750  
 Total Cloud Sky obscured  
 Wind 10K SSE  
 Surface 92202  
 Drift 0430 - 92312

Time 0900  
 Temperature 24  
 Visibility 2 miles  
 WW<sub>77</sub> W<sub>7</sub>

Altitude 7850  
 Total Cloud 8/8  
 8/8 St7 200'  
 Surface 92202  
 Wind 10K SSE  
 92312

Time 1200 8.VII.65  
Temperature 24  
Visibility 5 miles  
WW<sub>77</sub> W<sub>7</sub>

Altitude 7950  
Total Cloud 8/8  
8/8 St7 500'  
Wind 10K SSE  
Surface 92202

Time 1500  
Temperature 32  
Visibility 15 miles  
WW<sub>02</sub> W<sub>7</sub>

Altitude 7950  
Total Cloud 6/8  
3/8 Sc5 2500  
2/8 Ac3 8000  
5/8 Cil 20000  
Wind 10K S.

Time 1800  
Temperature 33  
Visibility 15 miles  
WW<sub>02</sub> W<sub>2</sub>

Altitude 7950  
Total Cloud 7/8  
7/8 AcAs7 8000 2/8 Ac 8000  
5/8 Ac 10000  
7/8 As 12000  
Wind 10K S

Time 2100  
Temperature 32  
Visibility 15 miles  
WW<sub>02</sub> W<sub>2</sub>

Altitude 7950  
Total Cloud 7/8  
1/8 Sc5 5000  
5/8 AcAs7 8000 4/8 Ac 8000  
5/8 As 10000  
1/8 Cil 20000  
Wind 10K S

Time 0000 9.VII.65  
Temperature 19  
Visibility 5 miles  
WW<sub>40</sub> W<sub>4</sub>

Altitude 8000  
Total Cloud 2/8  
1/8 Sc5 2000  
1/8 Ac4 10000  
Calm  
Surface 92222  
Banks of fog to West and North  
Fog bow 94710. Maximum  
intensity 2345 strong.

Time 0300  
Temperature 22  
Visibility 200 yards  
WW<sub>45</sub> W<sub>4</sub>

Altitude 8100  
Total Sky obscured  
Surface 92232  
Entered fog bank 0130

Time 0600  
Temperature 23  
Visibility 200 yards  
WW<sub>45</sub> W<sub>7</sub>

Altitude 8100  
Total Cloud Sky obscured  
Wind 02K N  
Surface 92205  
is<sub>o</sub> 0400-0500

Time 0900  
Temperature 24  
Visibility 100 yards  
WW<sub>45</sub> W<sub>4</sub>

Altitude 8050  
Total Cloud Sky obscured  
Calm  
Surface 92205

Time 1200 8.VII.65  
 Temperature 24  
 Visibility 5 miles  
 WW<sub>77</sub> W<sub>7</sub>

Altitude 7950  
 Total Cloud 8/8  
 8/8 St7 500'  
 Wind 10K ESE  
 Surface 92202

Time 1500  
 Temperature 32  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>7</sub>

Altitude 7950  
 Total Cloud 6/8  
 3/8 Sc5 2500  
 2/8 Ac3 8000  
 6/8 Cil 20000  
 Wind 10K S.

Time 1800  
 Temperature 33  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7950  
 Total Cloud 7/8  
 7/8 AcAs7 8000 2/8 Ac 8000  
 5/8 Ac 10000  
 7/8 As 12000  
 Wind 10K S

Time 2100  
 Temperature 32  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7950  
 Total Cloud 7/8  
 1/8 Sc5 5000  
 5/8 AcAs7 8000 4/8 Ac 8000  
 5/8 As 10000  
 1/8 Cil 20000  
 Wind 10K S

Time 0000 9.VII.65  
 Temperature 19  
 Visibility 5 miles  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 8000  
 Total Cloud 2/8  
 1/8 Sc5 2000  
 1/8 Ac4 10000  
 Calm  
 Surface 92222  
 Banks of fog to West and North  
 Fog bow 94710. Maximum  
 intensity 2345 strong.

Time 0300  
 Temperature 22  
 Visibility 200 yards  
 WW<sub>45</sub> W<sub>4</sub>

Altitude 8100  
 Total Sky obscured  
 Surface 92232  
 Entered fog bank 0130

Time 0600  
 Temperature 23  
 Visibility 200 yards  
 WW<sub>45</sub> W<sub>7</sub>

Altitude 8100  
 Total Cloud Sky obscured  
 Wind 02K N  
 Surface 92205  
 is<sub>0</sub> 0400-0500

Time 0900  
 Temperature 24  
 Visibility 100 yards  
 WW<sub>45</sub> W<sub>4</sub>

Altitude 8050  
 Total Cloud Sky obscured  
 Calm  
 Surface 92205

Time 1200 <u>9.VII.55</u>	Altitude 8025
Temperature 30	Total Cloud 0/8
Visibility 440 yards	Calm
WW <sub>44</sub> W <sub>4</sub>	Surface 92255
Time 1500	Altitude 8025
Temperature 30	Total Cloud Sky obscured
Visibility 880 yards	Calm
WW <sub>78</sub> W <sub>7</sub>	Surface 92255
	Snow crystals
Time 1800	Altitude 8025
Temperature 32	Total Cloud 3/8
Visibility 1 mile	3/8 Sc5 3000
WW <sub>40</sub> W <sub>4</sub>	Banks of fog to West + South West
	Wind 01K SE
	Surface 92255
Time 2100	Altitude 8025
Temperature 29	Total Cloud 8/8
Visibility 5 miles	8/8 St7 500'
WW <sub>70</sub> W <sub>7</sub>	Calm
	is. 2030 -
Time 0000 <u>10.VII.55</u>	Altitude 7950
Temperature 25	Total Cloud Sky obscured
Visibility 100 yards	Calm
WW <sub>47</sub> W <sub>4</sub>	Surface 92278
	Sastrugi running S - N
	Fog 2300 -
Time 0300	Altitude 7900
Temperature 18	Total Cloud 3/8
Visibility 5 miles	2/8 Ac4 8000
WW <sub>42</sub> W <sub>4</sub>	1/8 Ci1 20000
	Calm
	Surface 92278
Time 0600	Altitude 7900
Temperature 24	Total Cloud 8/8
Visibility 5 miles	8/8 Ns2 500
WW <sub>02</sub> W <sub>4</sub>	Wind 02K W
	Surface 92278
Time 0900	Altitude 7850
Temperature 27	Total Cloud 8/8
Visibility 5 miles	8/8 Ns2 300
WW <sub>02</sub> W <sub>2</sub>	Wind 02K WSW
Time 1200	Altitude 7750
Temperature 35	Total Cloud Sky obscured
Visibility 100 yards	Wind 02K W
WW <sub>71</sub> W <sub>7</sub>	s. s. 0930 -
	Surface 92285

Time 1500 10.VII.65  
 Temperature 39  
 Visibility 5 miles  
 WW<sub>02</sub> W<sub>7</sub>

Altitude 7750  
 Total Cloud 8/8  
 8/8 AcAs7 5000  
 6/8 Ac 5000  
 8/8 As 8000  
 Wind 02K W  
 Surface 92285  
 s s. ceased 1300  
 o o

Time 1800  
 Temperature 34  
 Visibility 5 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7750  
 Total Cloud 8/8  
 8/8 AcAs7 8000  
 6/8 Ac 8000  
 8/8 As 10000  
 Wind 01K WNW  
 Surface 92285

Time 2100  
 Temperature 31  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7750  
 Total Cloud 8/8  
 8/8 AcAs7 8000  
 6/8 Ac 8000  
 8/8 As 10000  
 Wind 01K WNW  
 Surface 92275

Time 0000 11.VII.65  
 Temperature 28  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7600  
 Total Cloud 7/8  
 3/8 St6 1200  
 5/8 Sc5 2000  
 7/8 Ac3 8000  
 Wind 01K NW  
 Surface 92275

Time 0300  
 Temperature 27  
 Visibility 5 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7500  
 Total Cloud 8/8  
 7/8 Sc5 5000  
 8/8 Ac3 8000  
 Wind 05K E

Time 0600  
 Temperature 26  
 Visibility 880 yards  
 WW<sub>70</sub> W<sub>7</sub>

Altitude 7450  
 Total Cloud 8/8  
 7/8 Ns2 500  
 8/8 Ac3 8000  
 Wind 10K SE  
 is 0545 -  
 o

Time 0900  
 Temperature 32  
 Visibility 440 yards  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 7350  
 Total Cloud 6/8  
 4/8 Ns2 400  
 6/8 Ac3 8000  
 Wind 10K S

Time 1200  
 Temperature 35  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>7</sub>

Altitude 7350  
 Total Cloud 6/8  
 6/8 AcAs7 8000  
 4/8 As 8000  
 6/8 Ac 10000  
 Wind 02K S  
 Surface 92255  
 s s. ceased 0930  
 o o

Time 1500 11.VII.65  
 Temperature 37  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7350  
 Total Cloud 5/8  
 4/8 Sc5 2000  
 5/8 Ac3 8000  
 Wind 01K S

Time 1800  
 Temperature 36  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7350  
 Total Cloud 8/8  
 1/8 Ac4 8000  
 8/8 Cs7 20000  
 5/8 Ci 15000)  
 8/8 Cs 20000)  
 Wind 01K S  
 Surface 92285

Time 2100  
 Temperature 34  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 7350  
 Total Cloud 5/8  
 1/8 Ac4 8000  
 5/8 Ci2 20000  
 Wind 02K S

Time 0000 12.VII.65  
 Temperature 27  
 Visibility 10 miles  
 WW<sub>01</sub> W<sub>2</sub>

Altitude 7350  
 Total Cloud 5/8  
 3/8 Ac7 8000 (1/8 Ac 8000  
 (2/8 Ac 10000  
 4/8 Ci1 20000  
 Wind 05K S

Time 0300  
 Temperature 22  
 Visibility 15 miles  
 WW<sub>01</sub> W<sub>1</sub>

Altitude 7250  
 Total Cloud 1/8  
 1/8 Sc5 3000  
 Trace Ci1 20000  
 Mock sun 0015 - 0030  
 Maximum intensity 0020  
 Calm

Time 0600  
 Temperature 19  
 Visibility 5 miles  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 7250  
 Total Cloud 1/8  
 1/8 Sc5 3000  
 Wind 02K S  
 Fog bank to East

Time 0900  
 Temperature 25  
 Visibility 5 miles  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 7100  
 Total Cloud 1/8  
 1/8 Sc5 3000  
 1/8 Ac4 8000  
 Wind 05K S  
 Fog to East

Time 1200  
 Time 1500  
 Time 1800  
 Time 2100

Dye 2 Radar Station  
 NO OBSERVATIONS

13.VII.65

NO OBSERVATIONS

Time 0000 14.VII.65  
 Temperature 31  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6900  
 Total Cloud 5/8  
 1/8 Sc5 5000  
 6/8 Ac7 8000 3/8 Ac 8000  
 3/8 Ac 10000  
 Wind 10K SSE  
 Surface 92275

Time 0300  
 Temperature 28  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 6750  
 Total Cloud 7/8  
 7/8 AcAs7 8000 { 3/8 Ac 8000  
 7/8 As 10000  
 Wind 10K SSE  
 Surface 92275

Time 0600  
 Temperature 29  
 Visibility 5 miles  
 WW<sub>03</sub> W<sub>2</sub>

Altitude 6600  
 Total Cloud 7/8  
 5/8 St6 1000 { 3/8 Ac 8000  
 7/8 AcAs7 8000 { 7/8 As 10000  
 Wind 10K SSE  
 Surface 92275

Time 0900  
 Temperature 30  
 Visibility 440 yards  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 6350  
 Total Cloud Sky obscured  
 94741 0630  
 Solar Pillar  
 Wind 15K SSE  
 Surface 92275  
 s<sub>o</sub>s<sub>o</sub> 0615 -

Time 1200  
 Temperature 35  
 Visibility 880 yards  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 6300  
 Total Cloud Sky obscured  
 Wind 10K SSE  
 Surface 92255

Time 1500  
 Temperature 38  
 Visibility 200 yards  
 WW<sub>71</sub> W<sub>7</sub>

Altitude 6300  
 Total Cloud Sky obscured  
 Wind 10K SSE  
 Surface 92255

Time 1800  
 Temperature 41  
 Visibility 2 miles  
 WW<sub>22</sub> W<sub>7</sub>

Altitude 6300  
 Total Cloud 5/8  
 3/8 St6 1500 { 4/8 Ac 8000  
 6/8 AcAs7 8000 { 6/8 As 10000  
 Wind Calm  
 s<sub>o</sub>s<sub>o</sub> ceased 1730  
 94721 Solar halo

Time 2100  
 Temperature 33  
 Visibility 10 miles  
 WW<sub>01</sub> W<sub>2</sub>

Altitude 6300  
 Total Cloud 5/8  
 1/8 Sc5 5000  
 2/8 AcAs7 6000 { 1/8 As 6000  
 1/8 Ac 8000  
 4/8 Ci2 20000  
 Wind 10K SE

Time 0000 15.VII.65  
Temperature 27  
Visibility 15 miles  
WW<sub>02</sub> W<sub>2</sub>

Altitude 6300  
Total Cloud 4/8  
2/8 Sc5 2000  
3/8 AcAs7 8000 {2/8 Ac 8000  
(2/8 As 10000  
Wind 10K SSE

Time 0300  
Temperature 26  
Visibility 5 miles  
WW<sub>70</sub> W<sub>7</sub>

Altitude 6150  
Total Cloud 7/8  
3/8 Ns2 800 4/8 Sc5 2000  
7/8 AcAs7 8000 {4/8 Ac 6000  
(7/8 As 8000  
s<sub>0</sub>s<sub>0</sub> 0015-0115 is<sub>0</sub> 0230 -  
Wind 15K SSE  
Surface 92215  
Drift 0245 - 92303

Time 0600  
Temperature 26  
Visibility 15 miles  
WW<sub>36</sub> W<sub>7</sub>

Altitude 5950  
Total Cloud 6/8  
2/8 St5 500  
6/8 Ac7 8000 {3/8 Ac 8000  
(6/8 Ac 10000  
Wind 15K SE  
Surface 92205  
Drift 92302

Time 0900  
Temperature 28  
Visibility 15 miles  
WW<sub>36</sub> W<sub>3</sub>

Altitude 5650  
Total Cloud 3/8  
1/8 Sc5 2000  
2/8 Ac3 8000  
1/8 Cil 20000  
Wind 15K SE  
Surface 92205  
Drift 92302

Time 1200  
Temperature 40  
Visibility 20 miles  
WW<sub>36</sub> W<sub>3</sub>

Altitude 5550  
Total Cloud 6/8  
4/8 AcAs7 8000 {1/8 Ac 8000  
(4/8 Ac 10000  
2/8 Cil 20000  
Wind 15K SSE  
Surface 92215  
Drift 92302

Time 1500  
Temperature 37  
Visibility 20 miles  
WW<sub>36</sub> W<sub>3</sub>

Altitude 5550  
Total Cloud 7/8  
1/8 Cul 3000 (over land to W)  
7/8 AcAs7 8000 {3/8 As 8000  
(7/8 Ac 10000  
Wind 20K SE  
Surface 92255  
Drift 92302  
Solar halo 94721

Time 1800 15.VII.65  
 Temperature 39  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>3</sub>

Altitude 5550  
 Total Cloud 6/8  
 1/8 Cu 3000  
 4/8 AcAs7 (3/8 As 8000  
 (1/8 Ac 10000  
 6/8 Ci 20000  
 Wind 15K SE  
 Surface 92255

Time 2100  
 Temperature 37  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5550  
 Total Cloud 7/8  
 1/8 Sc 3000  
 7/8 AcAs7 8000 (3/8 Ac 8000  
 (7/8 Ac 10000  
 Wind 15K SSE

Time 0000 16.VII.65  
 Temperature 35  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5550  
 Total Cloud 7/8  
 1/8 Sc 5000  
 7/8 AcAs7 8000 (1/8 Ac 8000  
 (1/2 Ac 10000  
 (7/8 Ac 12000  
 Wind 15K SE  
 Surface 92285

Time 0300  
 Temperature 32  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5300  
 Total Cloud 7/8  
 5/8 AcAs7 8000 (3/8 As 8000  
 (5/8 Ac 10000  
 7/8 Ci 20000  
 Wind 15K SE  
 Surface 92285

Time 0500  
 Temperature 31  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5100  
 Total Cloud 5/8  
 1/8 Sc 5 2000  
 3/8 Ac 7 8000 (1/8 Ac 8000  
 (2/8 Ac 10000  
 4/8 Ci 1 20000  
 Wind 15K ESE  
 Surface 92285

Time 0900  
 Temperature 34  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 5000  
 Total Cloud 8/8  
 5/8 St 6 1500 (2/8 Ac 8000  
 8/8 AcAs7 8000 (3/8 Ac 10000  
 (8/8 As 12000  
 Wind 05K SE

Time 1200  
 Temperature 38  
 Visibility 15 miles  
 WW<sub>50</sub> W<sub>6</sub>

Altitude 4950  
 Total Cloud 7/8  
 3/8 St 7 1500  
 7/8 AcAs7 8000 (4/8 As 8000  
 (7/8 Ac 10000  
 Wind 05K SE  
 Surface 92255  
 ir<sub>0</sub> 1150 -

Time 1500 16.VII.65  
Temperature 38  
Visibility 15 miles  
WW<sub>02</sub> W<sub>6</sub>

Altitude 4950  
Total Cloud 6/8  
1/8 St6 1000  
1/8 Sc4 2000  
6/8 Ac7 8000 { 2/8 Ac 8000  
                  { 6/8 Ac 10000  
Wind 10K SE  
Surface 92253  
ir<sub>o</sub> ceased 1300

Time 1800  
Temperature 37  
Visibility 15 miles  
WW<sub>02</sub> W<sub>2</sub>

Altitude 4950  
Total Cloud 8/8  
5/8 St6 1000  
8/8 Ac7 8000 { 1/8 Ac 8000  
                  { 8/8 Ac 10000  
Wind 15K SE  
Surface 92255

Time 2100  
Temperature 36  
Visibility 10 miles  
WW<sub>21</sub> W<sub>6</sub>

Altitude 4950  
Total Cloud 7/8  
5/8 St6 1000  
7/8 Ac7 8000 { 1/8 Ac 8000  
                  { 7/8 Ac 10000  
Wind Calm  
ir<sub>o</sub> 2000-2015

Time 0000 17.VII.65  
Temperature 34  
Visibility 10 miles  
WW<sub>02</sub> W<sub>2</sub>

Altitude 4950  
Total Cloud 7/8  
5/8 St6 1000  
7/8 Ac3 8000  
Wind Calm  
Surface 92208

Time 0300  
Temperature 32  
Visibility 5 miles  
WW<sub>40</sub> W<sub>4</sub>

Altitude 4900  
Total Cloud 7/8  
1/8 St6 1000  
1/8 Sc5 2000  
7/8 Ac3 8000  
Wind Calm  
Fog to West

Time 0600  
Temperature 31  
Visibility 440 yards  
WW<sub>02</sub> W<sub>7</sub>

Altitude 4800  
Total Cloud 6/8  
4/8 Sc5 2000  
6/8 Ac3 8000  
is<sub>o</sub> 0430-0500  
Wind 02K ESE  
Surface 92208  
Hoar Frost 92001

Time 0900  
Temperature 28  
Visibility 880 yards  
WW<sub>01</sub> W<sub>1</sub>

Altitude 4600  
Total Cloud 2/8  
1/8 Cu1 2000  
2/8 Sc5 5000  
Wind 05K E  
Surface 92282  
f. dispersed 0700  
Hoar Frost 92001



Time 0900 18.VII.65  
 Temperature 33  
 Visibility 15 miles  
 WW<sub>01</sub> W<sub>2</sub>

Altitude 4750  
 Total Cloud 5/8  
 2/8 St6 1000  
 5/8 Ac7 8000 (1/8 Ac 8000  
 5/8 Ac 10000  
 Wind 15K SE

Time 1200  
 Temperature 37  
 Visibility 5 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4750  
 Total Cloud 7/8  
 1/8 Cu1 1500  
 4/8 St6 3000  
 7/8 Ac5 8000  
 Wind 15K SSE  
 Surface 92282

Time 1500  
 Temperature 38  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4750  
 Total Cloud 7/8  
 1/8 Cu2 1500  
 7/8 Ac7 8000 (1/8 Ac 8000  
 7/8 Ac 10000  
 Wind 15K SSE  
 Surface 92252

Time 1800  
 Temperature 40  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4750  
 Total Cloud 7/8  
 1/8 Cu2 1500  
 7/8 Ac7 8000 (1/8 Ac 8000  
 7/8 Ac 10000  
 Wind 15K SSE  
 Surface 92252

Time 2100  
 Temperature 36  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4750  
 Total Cloud 7/8  
 1/8 Cu1 1500  
 5/8 St6 2000  
 7/8 Ac7 8000 (1/8 Ac 8000  
 7/8 Ac 10000  
 Wind 15K SSE  
 Surface 92252

Time 0000 19.VII.65  
 Temperature 34  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>5</sub>

Altitude 4750  
 Total Cloud 8/8  
 4/8 St6 1500  
 8/8 AcLs7 8000 (3/8 Ac 8000  
 8/8 As 10000  
 Wind 10K SSE  
 Surface 92252  
 id<sub>o</sub> 2130 - 2200

Time 0300  
 Temperature 34  
 Visibility 880 yards  
 WW<sub>51</sub> W<sub>5</sub>

Altitude 4750  
 Total Cloud Sky obscured  
 Wind 15K SSE  
 d<sub>o</sub> d<sub>o</sub> 0200 -



Time 0300 20.VII.65  
 Temperature 32  
 Visibility 15 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 4600  
 Total Cloud 7/8  
 6/8 St6 1000  
 7/8 Sc5 2000  
 Wind 15K SE  
 Surface 92282

Time 0600  
 Temperature 30  
 Visibility 15 miles  
 WW<sub>01</sub> W<sub>2</sub>

Altitude 4200  
 Total Cloud 5/8  
 1/8 Sc4 1500  
 2/8 Sc5 2500  
 3/8 Ac3 8000  
 Wind 15K S  
 Surface 92282

Time 0900  
 Temperature 33  
 Visibility 20 miles  
 WW<sub>02</sub> W<sub>1</sub>

Altitude 3950  
 Total Cloud 3/8  
 1/8 Cu1 1500  
 3/8 Ac7 8000 { 2/8 Ac 8000  
 1/8 Ac 10000  
 Wind 05K SE  
 Surface - ice - no snow cover

Time 1200  
 Temperature 36  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>1</sub>

Altitude 3800  
 Total Cloud 2/8  
 1/8 Cu + Sc4 1500  
 2/8 Ac4 8000  
 Wind 05K ESE  
 Surface - ice

Time 1500  
 Temperature 39  
 Visibility Unlimited to W.  
 (Fog to E + W - 5 miles)  
 WW<sub>40</sub> W<sub>4</sub>

Altitude 3800  
 Total Cloud 2/8  
 1/8 Cu2 1500  
 Tr Ac4 8000  
 Wind 10K SE  
 Fog to S, SE, E.

Time 1800  
 Temperature  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 3800  
 Total Cloud 2/8  
 1/8 Cu + Sc4 1500  
 1/8 Ac4 8000  
 Wind 01K SE

Time 2100  
 Temperature  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 3800  
 Total Cloud 2/8  
 1/8 Cu2 1500  
 1/8 Ac3 8000  
 Trace Ac4 10000  
 Wind 01K SE

Time 0000 21.VII.65  
 Temperature 31  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 3800  
 Total Cloud 5/8  
 2/8 Cu + Sc4 2500  
 5/8 Ac7 8000 { 1/8 Ac 8000  
 5/8 Ac 10000  
 Wind Calm  
 Surface - ice - hummocks



Time 0300 22.VII.65  
 Temperature 34  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 3300  
 Total Cloud 5/8  
 2/8 St6 3000  
 2/8 Ac4 8000  
 3/8 Ci1 15000  
 Wind 15K SE

Time 0600  
 Temperature 28  
 Visibility 10 miles  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 3300  
 Total Cloud 1/8  
 1/8 Ac4 8000  
 Trace Ci1 20000  
 Wind 15K ESE

Time 0900  
 Temperature 32  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 3300  
 Total Cloud 2/8  
 1/8 Ac4 8000  
 2/8 Ci1 20000  
 Wind 10K ESE

Time 1200  
 Temperature 37  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 3300  
 Total Cloud 1/8  
 1/8 Ci1 20000  
 Wind 15K SE

Time 1500  
 Temperature 38  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 3300  
 Total Cloud 1/8  
 1/8 Ac4 8000  
 Trace Ci1 20000  
 Wind 10K ESE

Time 1800  
 Temperature 39  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2950  
 Total Cloud 1/8  
 Trace Sc4 1500  
 1/8 Ac4 8000  
 Wind 15K SE

Time 2100  
 Temperature 40  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2700  
 Total Cloud 1/8  
 1/8 Ci1 20000  
 Wind 10K SE

Time 0000 23.VII.65  
 Temperature 37  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2700  
 Total Cloud 1/8  
 1/8 Ac4 8000  
 Wind 10K SE  
 Surface ice - hummocks -  
 crevasses

Time 0300  
 Temperature 32  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2700  
 Total Cloud 1/8  
 1/8 Ac4 8000  
 Wind 10K SE

Time 0600  
 Temperature 34  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2700  
 Total Cloud 1/8  
 1/8 Ac4 8000  
 Trace Ci1 20000  
 Wind 10K SE

Time 0900 23.VII.65  
 Temperature 36  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2700  
 Total Cloud 1/8  
 1/8 Ac4 8000  
 Trace Cil 20000  
 Wind 15K SE

Time 1200  
 Temperature 38  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2500  
 Total Cloud 2/8  
 1/8 Ac4 8000  
 2/8 CiCs8 20000  
 Wind 10K E

Time 1500  
 Temperature 41  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2450  
 Total Cloud 2/8  
 2/8 CiCs8 20000  
 Wind 10K ESE

Time 1800  
 Temperature 41  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2450  
 Total Cloud 1/8  
 1/8 Cil 20000  
 Wind 15K ESE

Time 2100  
 Temperature 39  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>0</sub>

Altitude 2450  
 Total Cloud 3/8  
 1/8 Ac4 8000  
 3/8 CiCs5 20000  
 Wind 10K ESE

Time 0000 24.VII.65  
 Temperature 37  
 Visibility Unlimited  
 WW<sub>03</sub> W<sub>1</sub>

Altitude 2450  
 Total Cloud 6/8  
 2/8 Ac4 8000  
 6/8 CiCs6 20000  
 Wind 10K SE  
 Surface - ice - giant  
 hummocks - crevasses

Time 0300

NO OBSERVATION

Time 0600

NO OBSERVATION

Time 0900  
 Temperature 38  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2450  
 Total Cloud 8/8  
 1/8 Ac4 8000  
 8/8 Ci Cs7 20000  
 Wind 20K E

Time 1200  
 Temperature 41  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2450  
 Total Cloud 8/8  
 8/8 Cs7 20000  
 Wind 15K E  
 Solar Halo 94721

Time 1500  
 Temperature 43  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2450  
 Total Cloud 6/8  
 1/8 Ac3 8000  
 6/8 CiCs8 20000  
 Wind 15K E

Time 1800 24.VII.65  
 Temperature 41  
 Visibility Unlimited  
 WW<sub>03</sub> W<sub>2</sub>

Altitude 2450  
 Total Cloud 6/8  
 3/8 Ac3 8000  
 5/8 Ci2 20000  
 Wind 10K E

Time 2100  
 Temperature 40  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2350  
 Total Cloud 6/8  
 5/8 Ci2 20000  
 Wind 10K ENE

Time 0000 25.VII.65  
 Temperature 38  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2400  
 Total Cloud 7/8  
 4/8 Ac3 8000  
 6/8 Ci2 10000  
 Wind 10K E  
 Surface - ice - hummocks -  
 crevasses

Time 0300  
 Temperature 36  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2400  
 Total Cloud 6/8  
 4/8 Ac3 8000  
 6/8 CiCc9 20000  
 Wind 10K E

Time 0600  
 Temperature 37  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2400  
 Total Cloud 6/8  
 3/8 Ac3 8000  
 6/8 CiCc9 20000  
 Wind 05K ENE

Time 0900  
 Temperature 39  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2400  
 Total Cloud 6/8  
 4/8 Ac7 (1/8 Ac 8000  
 (4/8 Ac 10000  
 6/8 Ci1 20000  
 Wind 05K E

Time 1200  
 Temperature 40  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2400  
 Total Cloud 5/8  
 3/8 Ac7 (1/8 Ac 8000  
 (3/8 Ac 10000  
 5/8 Ci2 20000  
 Wind 05K E

Time 1500  
 Temperature 47  
 Visibility Unlimited  
 WW<sub>02</sub> W<sub>2</sub>

Altitude 2350  
 Total Cloud 6/8  
 6/8 AcAs7 (1/8 Ac 8000  
 (3/8 As 10000  
 (6/8 Ac 12000  
 Wind 01K E  
 Surface - seracs and melt  
 streams

Time 1800 25.VII.65  
Temperature 45  
Visibility Unlimited  
WW<sub>02</sub> W<sub>1</sub>

Altitude 2300  
Total Cloud 3/8  
3/8 AcAs7 (1/8 Ac 8000  
(1/8 As 10000  
(2/8 Ac 12000  
Wind 05K E

Time 2100  
Temperature 44  
Visibility Unlimited  
WW<sub>02</sub> W<sub>0</sub>

Altitude 2000  
Total Cloud 2/8  
1/8 Ac4 8000  
1/8 Cil 20000  
Wind 05K E

### Altitude by the Traverse Method (R. Tufft)

This method assumes that during any three hours the barometric change is due entirely to a change in height. In periods of stable weather conditions this is a reasonable assumption. An exception to this is probably the barometric reading for 11th July. The rapid fall was possibly due to weather rather than topographical variations. Barometers were checked at the American ice-cap station (where they showed a discrepancy of some 50 feet with the calculated height). On arrival at Point 660 metres at the edge of the ice-cap, the barometers showed a discrepancy of less than 10 feet. It seems reasonable to assume that the heights recorded are accurate to 100 feet.

### Weather and Topographical Conditions (R. Tufft)

Few figures are available for the ice-cap, but it would appear that our conditions were somewhat warmer (though not unusually warmer) than normal.

Thawing was barely starting when we ascended from the East Coast. As a result we crossed only one crevasse (at about 2700). On our descent, however, the thaw was well advanced. We met our first pools at about 5000 feet and 60 miles inland. Nansen on his crossing did not meet with any water until he had descended to 3000 and was some 10 miles from the ice edge. By then, however, the season was well advanced (September 1888). We were fortunate in encountering few difficulties with crevasses. Those we met with were easily avoided, and did not appear until we were some fifteen miles from the ice edge. Rymill and Hampton in 1931 met their first crevasse 40 miles from the ice edge. Nansen met crevasses and hard ice some 20 miles from the edge (at 4000 feet). We found that the snow had disappeared at roughly the same height and at the same distance from the edge of the ice. Yet in 1912 de Quervain found crevasses 90 miles from the ice edge and very large crevasses at 80 miles.

Slush and rivers were a source of delay during the descent. These were found between 5000 and 3500 feet over some 50 miles - from 80 to 30 miles from the ice edge. Rymill and Hampton (in virtually the same area) found traces of rivers 40 to 50 feet wide and 4 to 5 feet deep some 25 miles from the ice edge. Rivers were still flowing (though perhaps past their greatest volume) during our descent. Lindsay in June 1934 had passed through the thaw area at 3800' and when 12 miles from the ice edge (he was travelling East). Generally, it seems the thaw area increases between June and the end of July - extending upwards and inwards on the ice.

The last twenty miles of the crossing was through hummocks, sometimes as high as 30 feet. These again seem to increase with the season. Nansen and Rymill had difficulties with them in September but Lindsay was hardly

ed in June. The French had used 'Weasels' on our track in March -  
 possible undertaking in conditions which we encountered.  
 We found no evidence of the steps and valleys between 2000 and 6000  
 mentioned by Nansen, de Quenvain and Lindsay.

### Key Log and Averages (R. Tufft)

#### Direction

Since we were moving some 20 miles a day, no attempt has been made to  
 gauge the wind direction. A sketch map shows approximate wind directions.  
 Generally these conform with those shown by previous expeditions.

#### Journey Log

An attempt has been made to show the travelling conditions on the ice-cap.  
 Temperature, visibility, cloud and wind conditions have been averaged where  
 possible. If any snow or drift occurred during the day's travel, this has  
 been recorded. Distances are by sledge wheel and show distance covered,  
 and distance made good.

#### The Graphs

##### (1) Ice Cap Crossing.

The Graph shows how the speeds of the two man hauling parties  
 were virtually identical in the ascent of and descent from the ice-cap. On  
 the ice plateau it shows that a modern man hauling party can equal the speed  
 of a dog team for quite long distances.

##### (2) Ice Cap Profile.

The 'step' at 4000 feet was due to an error of direction which  
 led to the ascent of an ice dome.

The 'step' at 7800' was possibly due to weather changes (see  
 notes on altitude - page )

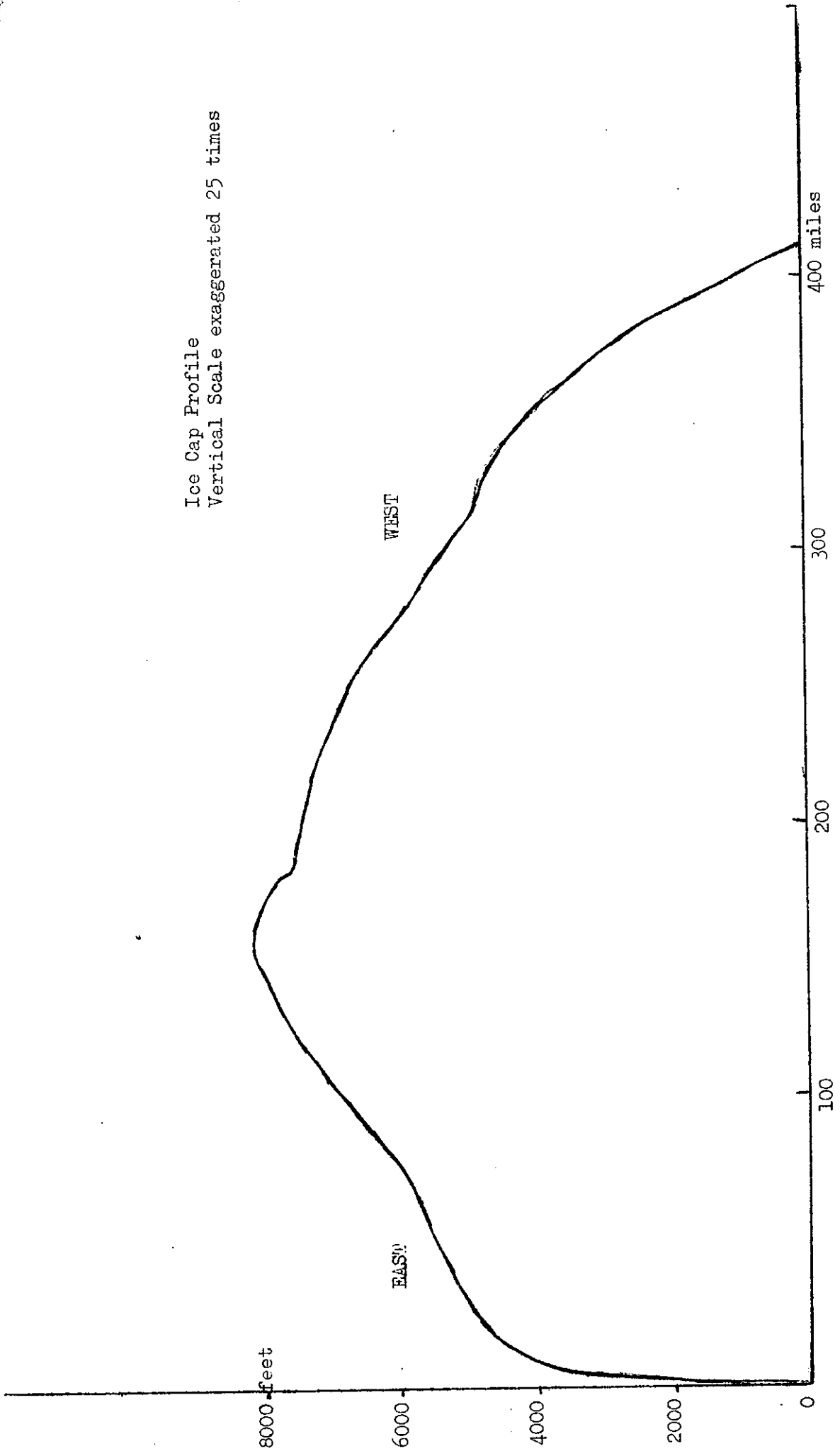
The 'step' at 4700' on the western side of the ice-cap was  
 due to retracing the course due to bad sledging conditions.

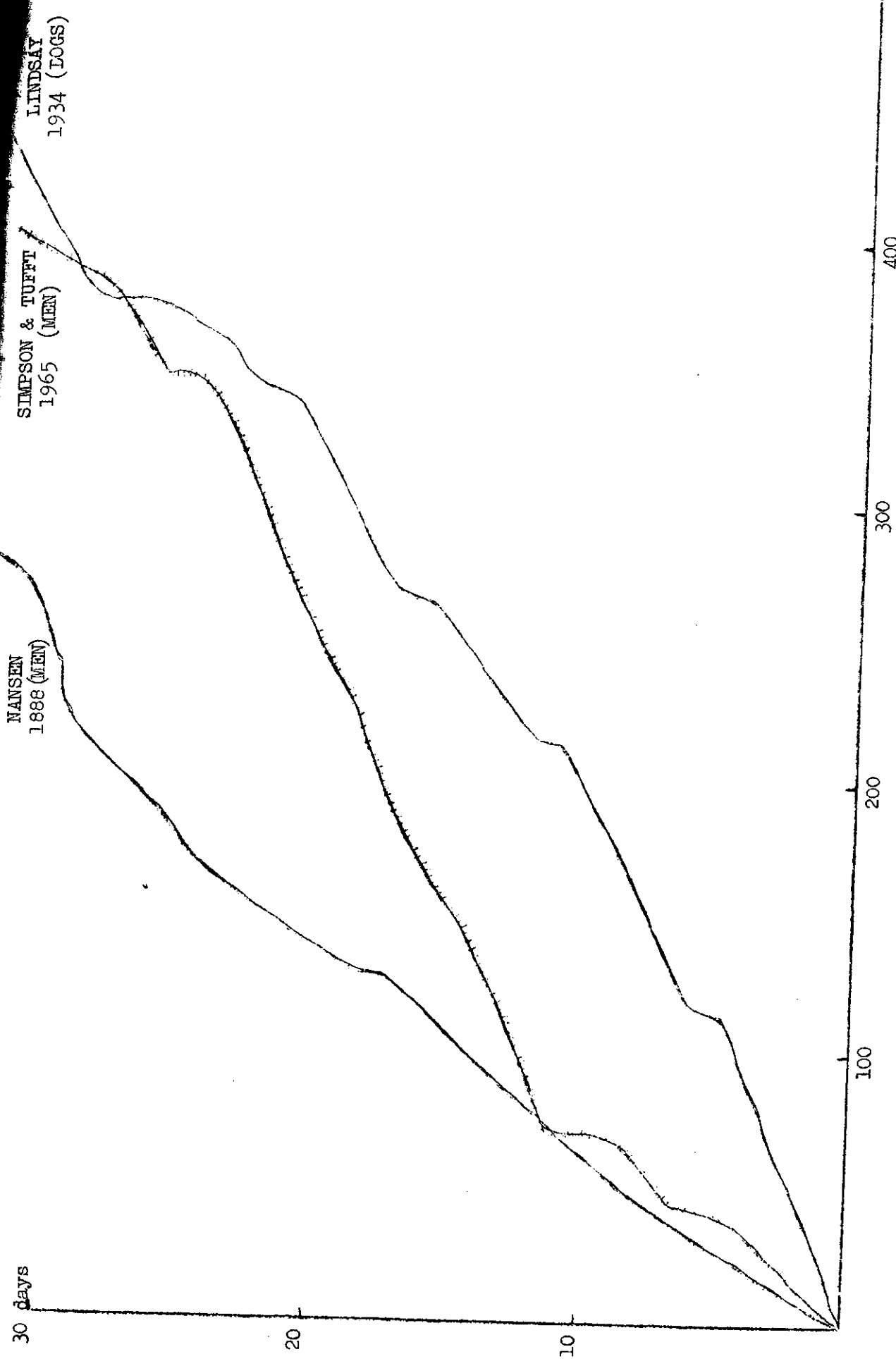
Date	Temp	Visibility	Cloud	Wind	Precipitation	Snow Surface	Drifts	Height	Day	1965	
25.VI.65	31	Unlimited	0	6 knots-West	0	loose: crust	slight	3850	5.1	10.3	Off course. with one sleep 3100 feet. wheel reading.
26.VI.65	28	150 yards	9	5 knots-N.East	S S <sub>0</sub> -ks <sub>0</sub>	fresh snow	none	4250	6.7	17.0	Short day - drift
27.VI.65	33	7 miles	7	2 knots-N.N.E.	S S <sub>0</sub>	moist snow	slight	4850	6.0	23.0	
28.VI.65	29	4 miles	8	5 knots: N + ENE	S S <sub>0</sub>	moist snow	slight	4950	10.7	33.7	
29.VI.65	25	400 yards	9	6 knots-East	S S <sub>0</sub>	fresh snow	slight	5000	6.8	40.5	Short day -
30.VI.65	32	200 yards-40 miles	9 to 1	1 knot-N to SSW	S S <sub>0</sub>	fresh snow	slight	5000	0.0	40.5	No travel un 2230 (soft s
1.VII(30-1)	17	Unlimited to 10m.	0	18 knots NNE	ks <sub>0</sub>	loose: crust	slight	5300	9.5	50.0	Night travel
2(1-2)		NO FIGURES AVAILABLE									
2	31	10 miles	8	2 knots	is <sub>0</sub>	moist snow	slight	5500	6.2	62.3	4½ hours of travel
3(2-3)		NO FIGURES AVAILABLE									
3	35	440 yards	9	calm to 10 knots E	r.r.	moist snow	slight	5700	6.8	69.1	Night travel
4	37	440 yards to unlimited	7	calm to 05K-North	r r <sub>0</sub> + d <sub>0</sub>			5700	0.0	69.1	No movement
								5700	0.0	69.1	No movement

Date	Temp	Visibility	Cloud	Wind	Precipitation	Snow Surface	Drifts	Height	Day	Total	
5(4-5)	29	unlimited	6	10K N to NW	0	moist: crust	slight	6400	20.9	90.0	Changed to night travel wheel jammed
6(5-6)	28	Unlimited to 200 yards	4	calm - 1K NE	0	loose: crust	none	6850	20.2	110.2	Fog
7(6-7)	27	Unlimited to 15 miles	3	calm - 02K N-NNW	0	loose: crust	none	7450	22.4	132.6	Bank of fog
8(7-8)	25	200 yards-2 miles	8	10K-ESE-SSE	is:ks <sub>o</sub>	firm: crust	none	7900	17.7	150.3	Fog
9(8-9)	22	5 miles-100 yards	7	calm to 02K N	is <sub>o</sub>	fresh: compact	none	8025	17.2	163.5	Fog
10(9-10)	24	100 yards-5 miles	7	calm to 02K W		firm: crust	deep	7750	22.7	186.2	Sastrugi run South to No
11(10-11)	26	10 miles-440 yards	7	NW: E: SE: S 1-10K	is <sub>o</sub>	firm: crust	slight	7350	14.1	210.3	
12(11-12)	23	10 miles	2	2 knots-S	0	firm: crust	slight	7000	26.1	236.4	Fog bank to
13(12-13)		NO FIGURES AVAILABLE									
14(13-14)	30	15 miles to 440 yds.	7	10 knots-SSE	S <sub>o</sub> S <sub>c</sub>	fresh: crust	slight	6300	25.0	271.4	Under sail
15(14-15)	27	12 miles	5	15 knots SSE	is:ks <sub>o</sub>	fresh: crust	slight	5550	23.6	295.0	Under sail
16(15-16)	33	20 miles	7	12K:SE-ESE	0	moist: crust	slight	4950	25.3	320.3	Sail taken Changed to West. First pools visible

Date	Temp	Visibility	Cloud	Wind	Precipitation	Snow Surface	Drifts	Height	DISTANCE		Remarks
									Day	Total	
17(16-17)	31	8 miles-440 yards	5	calm 05K-ESE	is <sub>0</sub>	fresh: moist	deep	4450	11.0	331.3	Fog. Melt s numerous
18(17-18)	33	15 miles	7	10 knots SE	0	moist snow	none	4750	12.7	343.0	Retreat to E Numerous str pools
19(18-19)	34	15 miles-880 yards	8	10 knots SSE	d <sub>0</sub> :ir <sub>0</sub>	moist snow	none	4750	0.0	343.0	No travel:
20(19-20)	31	15 miles	5	12 knots: S-SSE	0	No snow		3800	18.5	361.5	Soft snow su Hard ice. Me
21	32	40 miles	4	5 knots E-SE	0	No snow		3300	15.5	376.0	CHANGED TO D Hummocks and
22	40	50 miles	1	10 knots: SE	0	No snow		2700	4.2	380.2	Sledge wheel Giant hummock streams
23	38	50 miles	2	12 knots E-SE	0	No snow		2450	7.0	*387.2	Giant hummock crevasses. streams disa
24	41	50 miles	7	12 knots E-ENE	0	No snow		2400	4.0	*391.2	Crevasses:
25	44	50 miles	4	4 knots East	0	No snow		2000	6.0	*397.2	Made land at 660 metres
											* Distances est

Ice Cap Profile  
Vertical Scale exaggerated 25 times





SLEDGE JOURNEY - FOODW. Wallace

Before leaving Scotland the food was packed into nine sledge boxes each measuring 21" x 13" x 9" and containing 90 man days food making 180 man days in all i.e. sufficient to last 45 days at the full ration of 4,000 calories each per day for each man. In order that these sledge rations would not be broached until the start of the crossing of the 'Inland Ice', supplies were purchased in Angragssalik sufficient for the traverse of the sea-ice and the ascent of the glaciers.

These boxes were lined with polythene and were retained until the Expedition reached the foot of the glaciers at the commencement of the 'Inland Ice' crossing. Boxes were necessary to prevent damage or loss in transit and prevent the food, which itself was either in polythene bags or waterproof wrapping, from being affected by melt water on the fjord ice. This objective was not entirely achieved as water did seep into several of the boxes but no food was damaged. For the ascent of the glaciers the food boxes were abandoned and the food transferred to lightweight waterproof nylon bags measuring 24" long x 11" in circumference. Abandonment of the boxes saved considerable weight (8 lbs. per box) but it was found that in rain the zips along the length of the nylon bags tended to leak despite the flap which tied over them. This, however, was not serious. Initially before the sledge loading, the lashing technique was improved by wrapping the groundsheet around the sledge load - several holes were rubbed in the bags due to rope abrasion. During the descent of the melt area (the final 50 miles on the western side of the 'Inland Ice') water again leaked into the bags while crossing melt streams due to the small holes.

Each food bag contained the following rations:-

	<u>Quantity</u>	<u>Weight</u> (including container)	<u>Container</u>	<u>Brand</u>
1 Lifeboat biscuits	3 x 11b	31b 2oz	Tin	Carr
2 Dried onions or dried peas	1 x 16oz pkt.	11b 1oz	Polythene bag	Batchelor
3 Tea-bags	20	4oz	Polythene bag	McGavin & Selanders
4 Sugar	3lbs	31b 1oz	Polythene bag	Westburn
5 Porage oats	3lbs	31b 1oz	Polythene bag	Scott
6 Soup	To make 2 gls (2 x 11b)	21b 2oz	Waterproof bag	Batchelor
7 Potato powder	2oz	2oz	Polythene bag	Kraft
8 Butter	2 x 11b	21b 1oz	Tin	Unigate
9 Margarine	3 x 11b	31b 1oz	Polythene bag	Danish "Oma"

	<u>Quantity</u>	<u>Weight</u> (including container)	<u>Container</u>	<u>Brand</u>
1 Marmite	1 x 2oz	2oz	Tube	Marmite
2 Milk chocolate	28 x 2oz	31lb 10oz	Wrapped bar	Cadbury & Duncan
3 Meat bars	40 x 2½oz	51lb 8oz	Foil wrapped bar	Batchelor
4 Drinking chocolate	2 x 1lb	21lb 4oz	Tin	Cadbury
5 Lemonade powder	1 x 5oz	7oz	Tin	Creamola
6 Powdered milk	31b	31b 1oz	Polythene bag	Unigate
7 Cheese	1 x 12oz	14oz	Tin	Unigate
8 Fudge	1 x 7oz	8oz	Foil wrapped	Korlicks
9 Nylon bag	1 x 4oz	4oz		
		<u>351b 9oz</u>		
	say	<u>361b</u>		

The rations, inevitably, had to be a compromise between lightness and what was desirable. The basis of the diet was the meat bar which was very palatable although one member of the party had difficulty in eating it towards the end of the crossing. To achieve 4,000 calories per day which was judged necessary a fairly high fat content composed of butter and margarine was necessary. The butter was entirely used for spreading on biscuits while the margarine was added to soups, stews and porage.

No item in the above list was superfluous. The rations, almost without exception, were fully eaten. There were, however, three items of which a larger supply could have been taken. Firstly the potato powder was insufficient for thickening stews and soups; secondly there was insufficient marmite for flavouring stews and spreading on biscuits and thirdly a 1 lb tin of salt was inadequate and had to be carefully conserved. Three times the potato powder and salt should have been taken and an additional tube of marmite per box. These would not have added a significant weight whereas a second tin of cheese instead of marmite would have been much more significant. Although the drinking chocolate was excellent it was agreed that, weight for weight, cocoa would have been more nourishing. The Creamola foam was very popular.

For most of the crossing the Expedition travelled by night. A meal consisting of porage, biscuits and brew, was usually eaten between 5.30 and 7 p.m. A bar of chocolate each was given out each night to be eaten according to individual preference. A halt was made for soup and brew, usually around 1 a.m., and it was found that without this halt the morale and pulling power of the team dropped rapidly between 3 a.m. and 6 a.m. The night's run usually terminated around 7.30 a.m. when the sun began to thaw the surface.

	<u>Quantity</u>	<u>Weight</u> (including container)	<u>Container</u>	<u>Brand</u>
10 Marmite	1 x 2oz	2oz	Tube	Marmite
11 Milk chocolate	28 x 2oz	31b 10oz	Wrapped bar	Cadbury & Juncan
12 Meat bars	40 x 2 $\frac{1}{2}$ oz	51b 8oz	Foil wrapped bar	Datchelor
13 Drinking chocolate	2 x 11b	21b 4oz	Tin	Cadbury
14 Lemonade powder	1 x 5oz	7oz	Tin	Creamola
15 Powdered milk	31b	31b 1oz	Polythene bag	Unigate
16 Cheese	1 x 12oz	14oz	Tin	Unigate
17 Fudge	1 x 7oz	8oz	Foil wrapped	Morlicks
Nylon bag	1 x 4oz	4oz		
		<u>351b 9oz</u>		
	say	<u>361b</u>		

The rations, inevitably, had to be a compromise between lightness and what was desirable. The basis of the diet was the meat bar which was very palatable although one member of the party had difficulty in eating it towards the end of the crossing. To achieve 4,000 calories per day which was judged necessary a fairly high fat content composed of butter and margarine was necessary. The butter was entirely used for spreading on biscuits while the margarine was added to soups, stews and porage.

No item in the above list was superfluous. The rations, almost without exception, were fully eaten. There were, however, three items of which a larger supply could have been taken. Firstly the potato powder was insufficient for thickening stews and soups; secondly there was insufficient marmite for flavouring stews and spreading on biscuits and thirdly a 1 lb tin of salt was inadequate and had to be carefully conserved. Three times the potato powder and salt should have been taken and an additional tube of marmite per box. These would not have added a significant weight whereas a second tin of cheese instead of marmite would have been much more significant. Although the drinking chocolate was excellent it was agreed that, weight for weight, cocoa would have been more nourishing. The Creamola foam was very popular.

For most of the crossing the Expedition travelled by night. A meal consisting of porage, biscuits and brew, was usually eaten between 5.30 and 7 p.m. A bar of chocolate each was given out each night to be eaten according to individual preference. A halt was made for soup and brew, usually around 1 a.m., and it was found that without this halt the morale and pulling power of the team dropped rapidly between 3 a.m. and 6 a.m. The night's run usually terminated around 7.30 a.m. when the sun began to thaw the surface.

This was followed by a meal consisting of meat bar, stew, biscuits and brew. When travelling by day at the beginning and end of the crossing substantially the same programme as regards meals was followed.

On arrival at Søndre Strømfjord there remained 12 days full ration.

SLEDGING EQUIPMENT R. TufftClothing

All members were equipped with Ventile anaraks and windproof trousers. These were worn almost continuously on the ice-cap. Each member also had one light-weight nylon anarak. These were occasionally used as an extra garment, but never in rain (the main purpose for which they were brought).

Footwear

We were unable to obtain the sledging-boot and ski-overboot (as used formerly by the British Antarctic Survey). Instead we had to be content with ex-Army Mukluks. These proved quite adequate. Their chief disadvantage was their weight. Towards the end of the journey, all mukluks showed signs of wear. This was caused mainly by the side plates and toe straps of the Kandahar ski-bindings. With this type of binding and canvas footwear, such wear is inevitable. In the comparatively high temperatures which we encountered normal climbing boots could have been worn. (Climbing boots were used during the ascent of the ice-cap but discarded at 3000 feet). Ordinary leather boots would undoubtedly have been more difficult to dry but would probably have worn better during the final descent from the ice-cap.

Frames

Two light-weight aluminium frames were carried for use after we had left the ice-cap.

Skis

Four pairs of skis were taken. They were essential for the crossing, as the surface crust was rarely strong enough to bear a person on foot. The skis were Norwegian cross-country with hard wood (Lingostone) edges. They weighed approximately 9 lbs. per pair (complete with bindings). The skis were 215 cms. (three pairs) and 210 cms. (one pair). It was generally felt that an extra 5 cms. on each ski would have been worthwhile especially in soft snow. Some members felt that longer sticks and bigger baskets would have aided the man-hauling.

No skins were taken. This was possibly a mistake. In the soft snow below 5000 feet on the East coast, it was sometimes virtually impossible to move the 700 lb. sledge. This was overcome by tying climbing rope immediately behind the bindings. Generally about three turns of rope were sufficient. This, of course, meant that any sliding with the ski was impossible. Fortunately it was only necessary to resort to this arrangement

on a few occasions and with the better surfaces above 5000 feet, it was never used.

### The Tent

Owing to manufacturing difficulties we were forced to accept a standard 'double-wall' three man tent as used by the British Antarctic Survey. Ideally a light weight double-walled Terylene on nylon tent should have been carried. Had we been less timid we could have started the journey with the 'inner tent' removed. (It was only later we discovered that it was standard practice for British parties in the 1930s to remove the inner tent when sledging on the ice-cap in summer).

### Sleeping Equipment

As with the tent, we were over cautious. All members carried an inner and outer sleeping bag. These were of different types - down and terylene. Everyone agreed that one bag would have been sufficient. Since we travelled by night, our sleep had to be taken during the hottest part of the day. On occasions, the tent was uncomfortably hot and we resorted to sleeping on top of the bags.

### Insulation

Having been let down by air-beds on long journeys, it was decided to take foam mattresses. These were excellent and although they absorbed some moisture, they were very easily dried in the sun. (Temperatures were too high to experience the freezing to the ground-sheet which other sledging parties have reported in extremes of cold).

### Sledges

Two sledges were used for the ascent of the ice-cap. These were the Bailey/Sheary pattern (manufactured by Skeemaster Limited), weighing 34 lbs. per sledge with an overall length of 12 feet. One sledge was abandoned at 3000 feet and the ice-cap journey proper was started with a sledge loaded to 750 lbs. (see heading 'Sledge Loading'). The sledge proved perfectly adequate under this load. During the final descent from the ice-cap, large hummocks were encountered. At this stage, the sledge carried a load of some 150 lbs. The continuous jarring of the last ten to fifteen miles led to a distortion of the sledge runners. One bridge (the front) was replaced and a cracked outer longitudinal repaired.

Sledge Loading

Start of ice-cap crossing 3100 feet.

Sledge, traces and sledge wheel	43 lbs.
Food (45 man days - 9 bags at 40 lbs. per day)	360 lbs.
Equipment - 3 man Pyramid	60 lbs.
Paraffin - 6 gallons in plastic containers	56 lbs.
Tools - complete with bindings and sticks	37 lbs.
Ropes	10 lbs.
Utensils - 1 pressure cooker, 1 large pan, 4 cups, plates, spoons, salt, tin opener, 1 litre primus + spares, sledge repair kit, araldite, pliers, snow brush, spare bridges, methylated spirits, matches, thermometers, 2 tufnol blocks, 2 aneroid barometers, 1 'miniflare' pack (6 flares), aluminium shovel	40 lbs.
Ice Axes (3)	12 lbs.
Sleeping Bags (4) and personal equipment	40 lbs.
10 lengths foam rubber flooring	12 lbs.
Cameras and medical equipment	30 lbs.
Crampons - 4 pairs	8 lbs.
Sextant + 2 compasses	4 lbs.
Mucosac Frames	2 lbs.
Radio Receiver	2 lbs.
Sundries	20 lbs.
	<hr/>
	736 lbs.
	<hr/>
	say <u>750 lbs.</u>

Sledge Sail

A sail 6' x 6' was used during the descent of the ice-cap. This increased our speed by some 5 miles per day. Unlike Nansen, we encountered no high winds. Accordingly, we considered a sail measuring 8 x 8 would have been more useful. It was impossible to sail the sledge when the wind was more than a few points on either side of the stern.

Packing

Food was packed in plywood boxes weighing approximately 50 lbs, and measuring 21" x 13" x 9". At 3000 feet these were transferred to zipped nylon bags (length 24", diameter 11"). This led to a considerable reduction in weight. These bags should be waterproof. Ours leaked slightly in heavy rain.

Sledge Loading

Start of ice-cap crossing 3100 feet.

Sledge, traces and sledge wheel	43 lbs.
Food (45 man days - 9 bags at 40 lbs. per day)	360 lbs.
Tent - 3 man Pyramid	60 lbs.
Paraffin - 6 gallons in plastic containers	56 lbs.
Skis - complete with bindings and sticks	37 lbs.
Ropes	10 lbs.
Utensils - 1 pressure cooker, 1 large pan, 4 cups, plates, spoons, salt, tin opener, 1 litre primus + spares, sledge repair kit, araldite, pliers, snow brush, spare bridges, methylated spirits, matches, thermometers, 2 tufnol blocks, 2 aneroid barometers, 1 'miniflare' pack (6 flares), aluminium shovel	40 lbs.
Ice Axes (3)	12 lbs.
Sleeping Bags (4) and personal equipment	40 lbs.
3 lengths foam rubber flooring	12 lbs.
Cameras and medical equipment	30 lbs.
Crampons - 4 pairs	8 lbs.
Sextant + 2 compasses	4 lbs.
Rucksac Frames	2 lbs.
Radio Receiver	2 lbs.
Sundries	20 lbs.
	<hr/> 736 lbs. <hr/>
	say <u>750 lbs.</u>

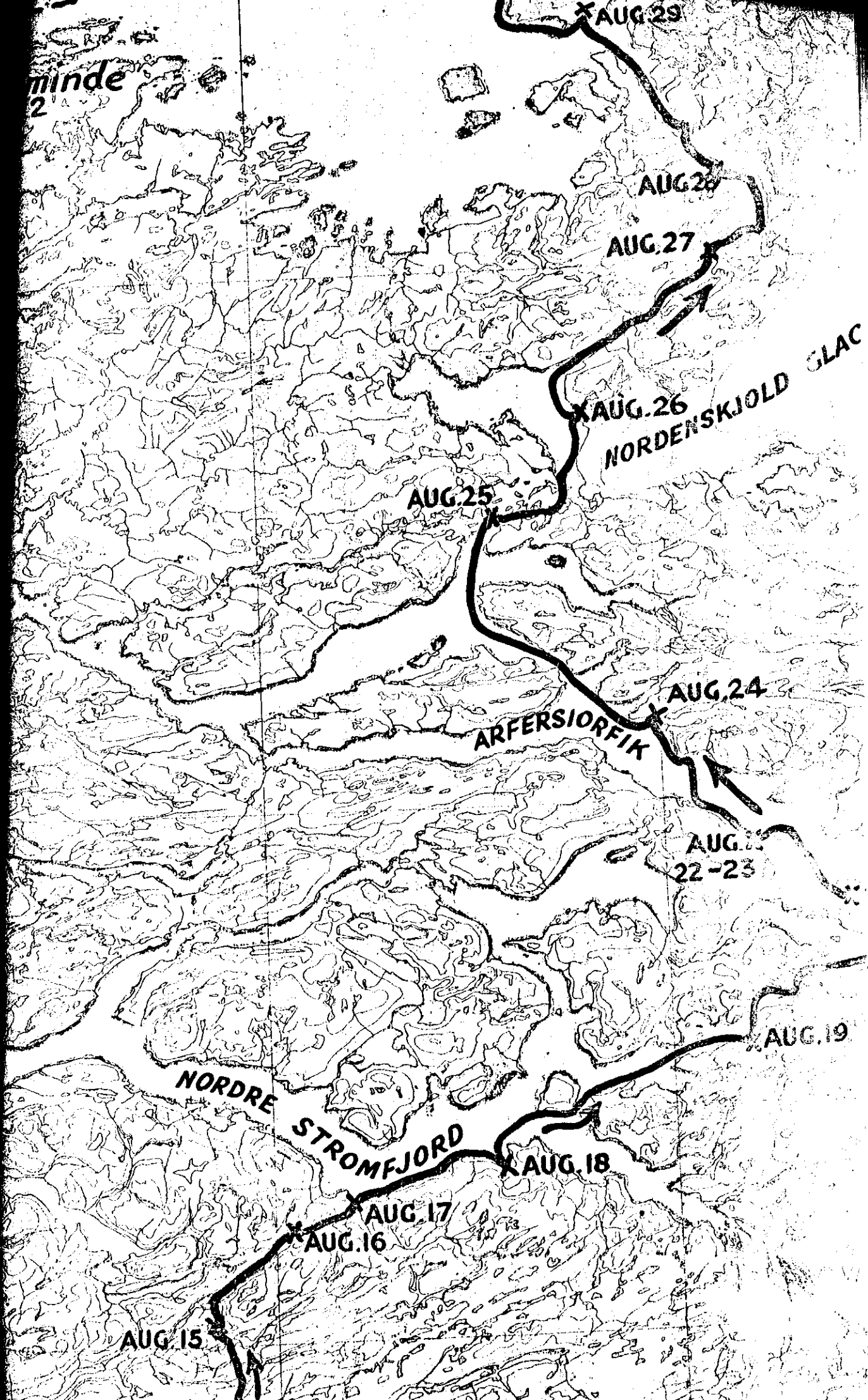
Sledge Sail

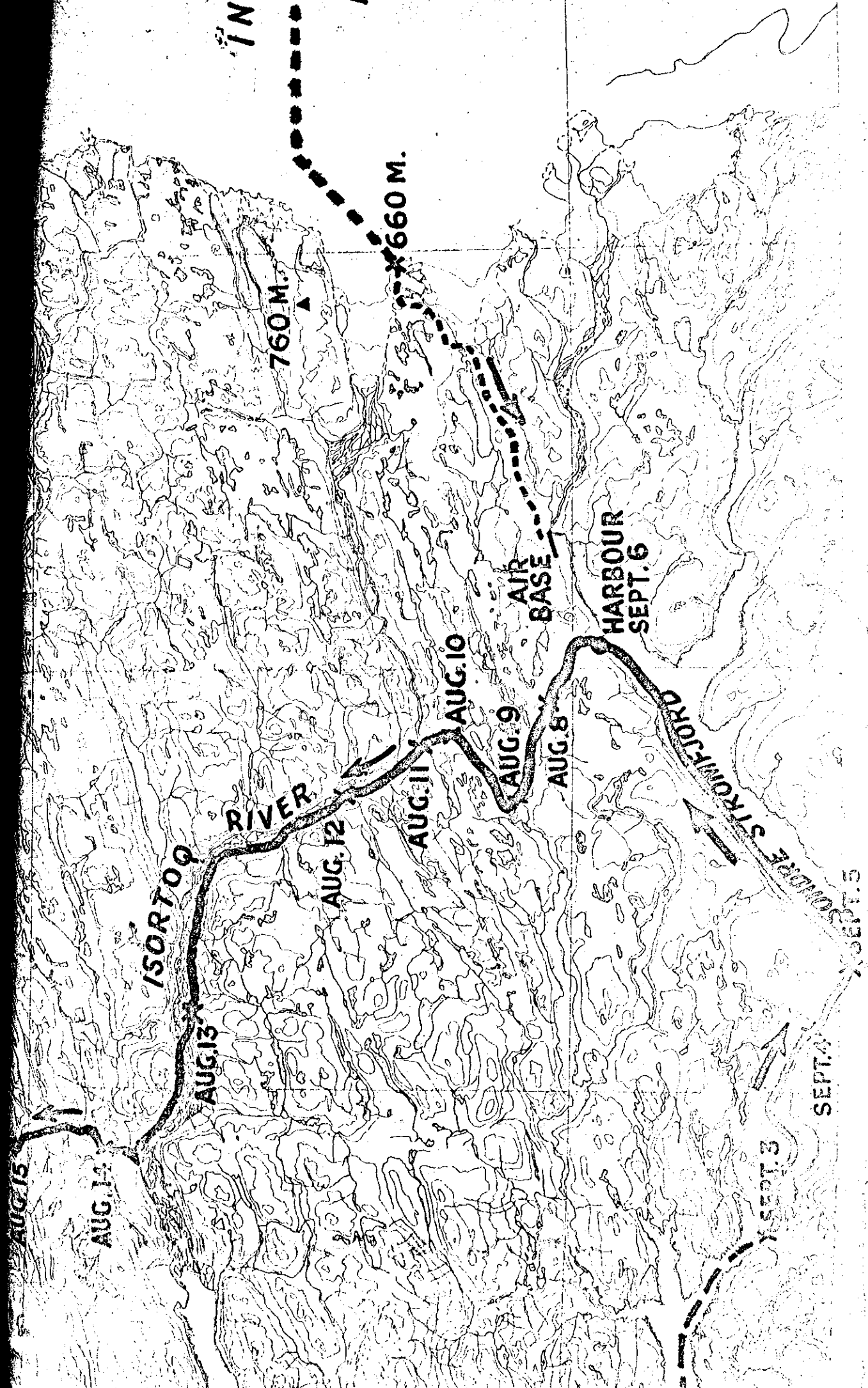
A sail 6' x 6' was used during the descent of the ice-cap. This increased our speed by some 5 miles per day. Unlike Nansen, we encountered no high winds. Accordingly, we considered a sail measuring 8 x 8 would have been more useful. It was impossible to sail the sledge when the wind was more than a few points on either side of the stern.

Packing

Food was packed in plywood boxes weighing approximately 50 lbs, and measuring 21" x 13" x 9". At 3000 feet these were transferred to zipped nylon bags (length 24", diameter 11"). This led to a considerable reduction in weight. These bags should be waterproof. Ours leaked slightly in heavy rain.

minde  
2





INU

760 M.

660 M.

ISORTOQ RIVER

AIR BASE

HARBOUR SEPT. 6

SQAURE STROMFIORD

AUG. 15

AUG. 14

AUG. 13

AUG. 12

AUG. 11

AUG. 10

AUG. 9

AUG. 8

SEPT. 7

SEPT. 6

SEPT. 5

A Personal Impression

Hugh Simpson

The main difficulty of the canoe journey was to come soon after the start. To carry out our plans we would have to descend a large glacier river - possibly the largest in Greenland - for 35 miles. Would the waves be too large in the rapids? What if we overturned? What if the canoes were wrecked? Since the area is uninhabited we would have to be entirely self sufficient. After the river stretch came open exposed fjords; what if there was a week of bad weather? How would the food last out? Was it worth taking life jackets?

At last all the gear was ready and we began laboriously back packing the first load from Søndre Strømfjord wireless station off northwards into the remote interior. In all there was 350 lbs of canoes and provisions and this meant relaying and so covering the ground three times. The sun shone down out of a clear blue sky. The air was quite still and a swarm of flies circled around our perspiring foreheads. Underfoot the tundra was dry and spongy sapping the strength of our strides. We had hoped to pull the canoes on a trolley with bicycle wheels; in fact the contraption collapsed ignominiously after a hundred yards. It was obvious that this venture had suffered in the exhaustive planning of the ice cap trip. We did not even have a proper canoe repair outfit and had to rely on some office type sticky paper tape bought at the U.S. Canteen stores the day before.

But we were tremendously fit after the ice cap trip and had had a good rest in the air base. It didn't seem long before a mile was covered and the first lake reached. The canoes were floated and the gear stowed away under bow and stern. With one thrust of the paddles the streamlined craft glided almost effortlessly through the calm cool water leaving the frustrated flies far behind. The far bank was soon reached and we were ready for the first night.

There was plenty of scrub wood to make a fire and soon Bill had some trout - a gift from the air base - sizzling in the frying pan. We had a long lingering cup of cocoa revelling in the peace of life away from the air base. There was no need for the tent; we just rolled out our sleeping bags on the soft carpet of moss and flowers. I lay on my back and soon felt the cosy warmth that brings early sleep. A large fat old reindeer stag came down to drink in the mirror calm lake and there was also a duck family and small collection of phalaropes. A great northern

diver called in the distance. I could not imagine a better heaven. I fell asleep.

Before being asleep long I was rudely awoken by a crunching noise; nearby a cheeky arctic fox was gnawing over our old fish bones. Angry at the intrusion I slung a stick at him and he vanished into the twilight.

The country between Sondre Stromfjord air base and the Isortoq river is dotted with lakes and little hills. By detouring we kept the laborious portages at a minimum and the extra distance could easily be covered in the canoes. Several days passed of paddling across delightful lakes - sometimes only two stone throws across - and short portages. The constant change of method made the ground pass quickly. Few reindeer were about but one day we saw a hare. Also another evening we were haunted for hours by a strange cry coming from a nearby cliff: could it be a raven or a great northern diver? Very curious I went to investigate and found a fox standing on the moraine at the foot of the crag. Every few minutes it threw back its head and let out a long earie howl. The haunting part of her call was due to an echo off the face. Possibly this was a vixen calling for a mate, and later we often heard this call again in the distance.

After three days, the easy canoeing through the successions of tundra lakes came to an end. Ahead the gentle undulating hill country was cut into two by a deep gash. We had reached the great Isortoq gorge. As we descended down a side valley we could see that the whole of the main valley was just a mass of moving opaque freezing water - the summer spate was at its height. All of us became apprehensive.

We floated the canoes at a quiet backwater and carefully packed everything in plastic bags; life jackets were checked and buoyancy bags fully inflated. All of us were tense as we scanned the first rapids with binoculars. The main stream was deflected by a point of rock and for a hundred yards there was a mass of white water. The sheer size of the river seemed overwhelming and I have never seen such a fast current. Would the turbulent water swamp the delicate craft? In our pockets we carried emergency dehydrated meat and matches but all of us knew an overturn would be fatal. For one thing the far shore was no haven as there was nowhere to walk to. How long could one stay alive on bleberries I wondered? In any event this icy water would surely finish one off pretty fast. Should we turn back? If the others had suggested this I would not have gone against them.

Roger went off first in the single canoe and we anxiously watched his progress through the binoculars. Once out of our bay his craft was gripped like a vice in the axis of the current. Any paddling he made seemed utterly feeble compared with the power of the current. As in a

hideous dream he was irresistably drawn into the worst turbulence and the tiny craft was lost in the standing waves. Sometimes we could only see his head. Soon it would be our turn. My heart thumped at the prospect.

We could now see Roger edge in beyond the rapids and with the binos we saw his 'thumbs-up' sign. As far as he was concerned retreat was already impractible because of the steepness of the gorge.

Bill pushed off our double canoe. Soon the bank was going past at tremendous speed. I felt rather exhilarated; then I saw the massive standing waves racing up to meet us. Helplessly we headed straight for the biggest ones - great walls of white capped brown water. Then the water was all round us pouring into the cockpit. But the very speed of our descent had saved us from being swamped. We were now gripped by the multiple eddys behind the point. The rudder had little effect and the craft felt hideously unstable. But we managed to slice through the great whirlpools into calm water. Roger's cheery figure appeared on the bank and soon we joined him. The first bogey was past. We had done one mile. Thirty-four still remained. Would the current ease off as we descended? Anyway it couldn't get any worse.

Now at close quarters on the bank the rapids were very impressive. The giant standing waves looked a hopeless proposition because of their sheer size and shape. Often in a smooth stretch of water they would appear, rise to a crescendo, then suddenly subside. They seemed to be formed by the current gouging out a furrow of sand until the whole system became top heavy and collapsed.

Major rapids came every mile or so and the most frightening of all were the ones behind precipices which we could not investigate. Then it was a question of hoping for the best since the current made it utterly impossible to paddle back upstream. After five miles of this river I felt absolutely exhausted and since there was a little flat ground at the bank I was quick to suggest an early camp. It seemed we had done little but the continuous strain of nearby disaster had left me utterly played out. As we fell asleep there was little comfort in the fact that thirty miles of the river still remained to be done.

The next morning was fine and after a few minor rapids we made ten easy miles to a side channel. Even here the current was very rapid, but since there was less water, we were able to relax. We stopped for a prolonged lunch and had a good feast of bleberries while some reindeer grazed happily close above. More side channels led us on and we soon found that the main hazard was in going aground. The side channels have infinite numbers of tributaries, distributaries and in the turbid opaque water it was almost impossible to gauge the depth. When the canoe went aground it was swept quickly broadside to the current and then threatened

to capsize on the ridges of sand underneath. Jumping out was also a frightening procedure since there was quicksand that gripped boots like a vice. But all these difficulties were trivial by comparison with earlier hazards, and by evening we had done a full fifteen miles.

Now that the river was easier one was able to gaze up at the great walls of rock that lined the gorge. It was a classical glacial valley. Great successive slabs of grey rock rose up into a sheer cliff, utterly impossible to climb and not coming to a stop until an escarpment 1,000-2,000 feet above.

The following day the number of eddys increased and though the current was still rapid by ordinary standards the standing waves were less dangerous. It was obvious that the river was deeper and the gradient was slackening off. We were nearing the sea. We stopped talking about the river and now thoughts turned to the next overland stretch - a pass through the mountains to Nördre Strømfjord, the largest fjord in West Greenland.

A side tributary led us conveniently under the bank into a natural harbour and we were able to unload with ease. As we stepped out we felt like mariners going ashore on a new safe landfall.

The canoes were fixed to frames and hoisted on our backs. Soon we were trudging through the tundra flowers towards the pass. Now that the dangers of the river were over it seemed easy to carry the heavy packs. All at once I noticed a large patch of mushrooms - about two dozen enormous ones. Not being absolutely certain about their non poisonous nature we ate a test amount for supper. If we became sick in the night then they could all be discarded. But they tasted fabulous and we all slept soundly. So breakfast consisted of the biggest mushroom fry-up ever.

The route consisted of short portages and long paddles through eight lakes to Nördre Strømfjord. Although carrying the kayacks over this 800' col would normally have been arduous, in fact it seemed easy now that the dangers of the river were behind us. Also the wild reindeer had left a good wide track and the distances between the lakes were trivial. In many places one would have liked to linger but though the days were hot with clear blue skys the nights were becoming noticeably colder. Each night now a heavy dew was left on our sleeping bags. Soon that would be hoar frost and Autumn would arrive in a few days. We had to press on.

One afternoon we were meandering through a sluggish stream system which had steep peaty sides and on the bank were the remains of a Greenlander's hunting camp. Some blackened stones from their fire, piles of shrubs used for bedding and many antlers covered this grassy spot. Lying in the fireplace was the skull and beak of the great sea eagle, one of the rare birds of Greenland. It is a pity that these magnificent creatures are shot - as is every other large bird - by the Eskimos and

this is the worst aspect of their way of life. Shortly after leaving the place we saw a shadow on the water beside the kayak and looking up we saw another eagle soaring above us and warily watching our movements. Possibly this was the mate of the dead bird. During the whole expedition we saw only one other eagle although there were many smaller birds of prey.

After three days we came to the last lake of the pass and now below us lay Nordre Strømfjord - a great expanse of blue water dissected by hundreds of islands and peninsulas. As we descended I noticed with trepidation that although the weather was fine, large waves with white caps could be seen in the middle. What then would the fjord be like in bad weather, I wondered? Had we taken on too much? Would the open fjord canoeing be more dangerous than the river? It seemed then a bleak prospect since our food supplies were limited. At home studying the maps in our cosy flat these fjords had looked so sheltered and surrounded by low lying green land. Had I made a miscalculation? However, it was evening. We were tired and hungry and clearly this was tomorrow's problem.

As we came over the last crest before the water's edge half a dozen tents came into view. Eskimo women and lots of children were busy stewing up the evening meal. Obviously the men were out hunting. Great haunches of reindeer and antlers were everywhere. We tried to talk with them but it was no good - in fact although I have travelled in many parts of the world using sign language, it was dismally unsuccessful with them. Later in the evening we saw the men returning, each staggering under the weight of reindeer meat. The men were utterly exhausted and had a glazed blank look as they passed our orange tent and blue canoes. The women-folk hurried to the river to fetch water. The tent doors were shut and we had no further contact. It seemed odd that our obviously extraordinary visit had not aroused more excitement.

In the morning we swapped a packet of cigarettes for a haunch of meat - an exchange with which they seemed delighted. Obviously meat was plentiful and smokes short. I was very impressed that they brought back all of the animal, not merely the best parts. Even the hooves were being used for jelly. On the other hand the old rusty guns must have been inefficient. One was pre-1900. Many animals must be wounded by these and stagger off to die somewhere else.

It was a lovely morning again and there was only the faintest ripple on the fjord. My fears of last night now seemed unfounded. It was my turn to go in the single kayak - a quite different experience to sharing the double. All one's senses are alerted and the day's events are long remembered. I glided easily through the water below dark steep fjord cliffs.

families along the shore and overhead an Arctic skua was molesting a sea gull.

As usually happened the camp site chosen on the map near a place called Naujagklil turned out to be an old Eskimo hunting settlement. It was a sheltered bay with a fine sea trout stream and anchorage in the corner. Unfortunately we were still too early for the Arctic charr and the river contained only the small resident fish. Several stone graves containing whitened human bones showed that the spot had been used for many years. Even so the natives had only left a day or two before since there were many half eaten dried sea trout on the ground no doubt recovered from a net in the bay. Since the river fishing was no good, and we had no net, I went to look for bleberries on the low hill behind the camp. They were numerous and fat. Suddenly I found a fat ptarmigan and six fledglings intent on the same purpose; they were very reluctant to fly away!

Contrary to our expectation crossing Nördre Strømfjord turned out to be easy. There was a flat oily calm. The only mistake we made was getting into a strong tidal counter current. It soon became obvious that knowledge of fjord tides and currents could help enormously and to ignore them was a waste of energy. Brilliant sunny conditions went on day after day and so we made steady progress from camp to camp. Each evening the tent was pitched in another glorious site and after a short search for wood a fire lit. While one of us made the soup and stew from dehydrated meat, the others would collect bleberries for dessert and these were very plentiful. When this happens day after day it is difficult to imagine any change in the weather. So when one day it was cloudy and overcast we felt cheated. The rain started gently like a Scotch mist, and took some time to penetrate our clothes. But it was absolutely unrelenting and our emergency tent leaked like a sieve. Suddenly we had a brilliant idea - to balance one of the canoes upside down over the tent. The poles took the weight well and the watertightness was made complete by hanging drapes from the side of the cockpit. Soon we had a tent which though pitch dark inside was dry. But it was just as well there was no wind; with the slightest gust the whole thing would have collapsed.

A strong sun finally dried up the rain though for a time patches of puffy white mist stayed in the recesses of the fjord. It was just fabulous canoeing as the mist cleared to reveal a deep blue sky.

We were now canoeing towards the remarkable isthmus which separates the Nördre Strømfjord from Arfersiorfik fjord, its neighbour in the north. This neck of land means that any boat which cannot be carried must make a detour of 350 kms. should it want to reach the Arfersiorfik.

We soon found, however, that our idea of portaging the crafts

over the isthmus was not a new one. As we shouldered our canoes and climbed up over the high tide mark, red and green paint on the rocks showed that the Greenlanders had had similar ideas. I also found a rowlock in the willow scrub which, no doubt, the exasperated owner had spent many hours looking for in some time past.

As we paddled out north into Arfersiorfik I felt as if a new chapter had started. Already we were over half way on our 250 mile journey to Christianshaab. All was not rosy, however, since our food supplies were running down mainly because we had been unable to catch any fjord cod on the spinner that was trawled behind the canoe. In addition the weather was uncertain again with sullen grey clouds taking all the life out of the scenery. We pulled into the west bank of Arfersiorfik to camp and at dinner ate a little further into our reserves of dehydrated meat. Tomorrow we would cross the fjord and go north to Egoalugarssuit river whose Eskimo name means "trout" - surely our fishing would be more successful there. However, 5 miles of open fjord separated us from this river and in the morning high winds and white caps made the crossing unthinkable. The shortage of food made the waiting all the more difficult; would the weather be all right tomorrow? was the question that burned in our minds.

Bill felt the inanition more than the rest of us and he was up at 4 a.m. to make sure of not missing any early morning calm. The dawn was scarcely promising. The sky was overcast and grey. Certainly there were no white horses but it looked as if a gale could appear at any minute. As we supped porridge things improved a little and we reluctantly decided to move up the coast to where the crossing was shortest. Once off there was no real turning back. I swung the rudder round into the bleak greyness beyond and paddling much firmer than normal our canoe was soon leaving the shore and safety far behind. As we approached the middle the waves grew bigger and more turbulent. I just hated every minute of the crossing since there was no real exhilaration, only the cold threat of an overturn and almost certain death. It was a miserable morning for an accident. In the chaotic water Bill and I soon lost sight of Roger in the single canoe. We were on our own. We had to balance the canoe all the time by watching the large waves so there was no time to look for him. While the breakers were still within the capabilities of the craft I knew that if the conditions became worse we might easily overturn and then perish in a few minutes in the icy water. I was almost more worried about the anticipation of a real gale rather than by the immediate dangers. But the great advantage of a canoe is its speed. We were making over 4 miles per hour; therefore the time of risk was short and soon we began to feel some lee from the crags ahead. Although we were out of danger

I had no feeling of relief; only the hollow fear that comes after taking a premeditated unjustifiable risk. And this feeling was substantiated half an hour later when the whole fjord turned into a mass of white horses in a freshening gale force wind.

We climbed up the steep ground shore and soon saw that Roger was safely through the worst.

At the trout river there were lots of old Greenlander encampments. Obviously the fishing was excellent. There were fish bones everywhere. The river stones had been re-organised to make the fish run up narrow channels. There, presumably, the Eskimos had nets waiting for them. I was glad that we didn't have to share it with them as I fixed up a fishing rod and selected a fat juicy Glasgow worm. I could already see the trout in the pools - they had a peculiar grey-blue colour. The only difficulty was that none of them were interested in my delectable bait. Time and time again the worms ran down past them and they took no notice. If they weren't going to play fair neither was I since we were absolutely depending on a fish supper. On the bank was an old Eskimo net fish trap - like a lobster pot - with an entrance hole on one end tapered inwards. The others were sceptical that this Heath Robinson contraption would work and grudgingly helped me move stones so that the main stream led straight into its entrance. I repaired one or two holes in the side then wedged it in position. I knew we had two factors on our side; one was the full moon which would bring an especially high tide and also this last week in August is the height of the Autumn spawning run. Obviously there was no point in watching the trap so I went down to the beach to collect mussels. At least they would provide a certain, if meagre, course. An hour after high water I went to see the score. Looking in the top I could see nothing in the dark water so to make sure I lifted it out - full of flapping fish! The netting was on the verge of breaking so I rushed to the edge and dumped the fish a safe distance then shouted to the others!

With a full stomach and helped by tides we made over 20 miles the next day. It was good to make this big mileage since it meant we had only 60 more miles to do for Christianshaab and apart from the lack of food Autumn was catching us up. We had our first night frost on the 18/19th August and already the blueberries had withered away. The leaves on the willow trees were now deep red. A day ahead we knew we would have a high lake to cross into which glaciers from the inland ice calved many bergs; would this lake be frozen? Even a few centimetres of ice would be a major obstacle to a canoe and the lake was nearly ten miles long.

In fact the weather actually turned warmer for a few days and when we reached this lake there was no fresh ice. We paddled easily through its dull grey muddy water and lingered taking photographs of the numerous

small but spectacular bergs breaking off its sheer wall with a tremendous roar. While enjoying this sight there is always the danger of a particularly large icefall which could swamp the canoes. So having seen our fill, we now paddled briskly away towards the outlet of the lake.

Next day we reached the sea again at a place called Qupigsoq. Our food was running very low and our meals had to be reduced to watery soup. Every biscuit was counted and the meals were looked forward to long in advance. The pressure was now on to reach Christianshaab as quickly as possible. The weather was overcast and the water, as often happens in these conditions, remained a sullen calm. We made fast progress and as the canoes neared Disko bukt we began to feel the goal was in our grasp. But for this last stretch we had to be quick; the sea was open to the west and with a change in weather the water might become dangerous in a few minutes. Moreover high fjord cliffs on much of the coast meant that we could not always land. The final camp was made just 15 miles from Christianshaab. Overnight the clouds disappeared and a brisk on-shore breeze was sweeping in from the east by morning. This freshened during breakfast. We edged along the coast taking every fragment of lee that offered. But after the shelter of Nuk island we entered the full force of the wind coming directly onto our snore. Nor were there any islands off the coast to give a shred of shelter. I glanced quickly at Roger's canoe. The waves were so big that the front third of the craft was sometimes out of the water. Worse still, even with desperate paddling we were only just gaining against the wind. We turned about with difficulty and hurried back into the lee of Nuk. Once in the calm water again it was difficult to believe the size of the waves outside. But when we made a reconnaissance on foot we saw that the waves were actually getting larger. We made lunch out of the last biscuits and soup. Now there was no meat bar left.

As often happens in these regions the wind slackens in the evening though leaving a big sea running. The difficult stretch of water was only about 1 1/2 miles but for the whole of that part shore cliffs meant we would be unable to land. Once we really started there would be no easy turning back. However, strengthened by lunch and an afternoon nap on a sheltered part of the tundra, we felt ready for the challenge. We paddled the two canoes strongly out into the turbulent grey water. All the loads had been reorganised to lower the centre of gravity and I took out my seat so I was sitting on the canoe hull. In this way the chance of an overturn was minimised.

In a few minutes we were in the worst of the water. The little canoes were tossed up and down like corks. But suddenly we realised we were

masters of the situation. Instead of feeling stress we were exhilarated. We paddled strongly and confidently ahead and the great sea cliffs on our right moved past quickly. The sky was quite clear and the sun was setting behind the great icebergs of Disko Bay. Now we were in the lee of the islands off Christianshaab. In the dusk we could just make out the buildings of the little settlement.

When we reached the harbour all the Greenlanders came out to see us paddle the last part. The word had passed quickly around the small community. It was a marvellous welcome and we felt very moved. The Trading Company gave us a splendid meal and as we lay down to sleep between the clean sheets of their guest house we knew the journey had come to an end.

CANOE JOURNEYDiary by W. WallaceFriday, 30th July to Sunday, 1st August

For three days we remained at the hotel enjoying the food and comfortable beds. It was also convenient for receiving and transmitting telex messages and telegrams. Steen Malmquist, the hotel manager, we found to be a mine of accurate information on all aspects of Greenland. The ship with our canoes, clean clothes and food was waiting in the fjord to unload. The weather continued very good. By Sunday the attractions of the hotel had palled and we moved up the steep 1000' hillside above the hotel to sleep out beside a small lake.

Monday, 2nd August

It was agreed that, as the canoe plans depended entirely on the feasibility of canoeing the Isortoq River to the north, Roger and Bill should walk the 15 miles separating it from Søndre Strømfjord while Myrtle and Hugh stayed behind to receive or transmit messages. The reconnaissance showed the river to be very big but possible. It was after midnight when Roger and Bill returned.

Tuesday, 3rd August

Rain started at 03.00 hours. Bill went off down the hill to sleep under a convenient overhang. Soon after Myrtle, Roger and Hugh decided that the rain was not going to stop and made use of a collapsed tent which they had found not far away. Jeeps were to take us to the glacier where most of our Inland Ice gear was cached but due to the rain this was cancelled. That night we slept in the tent.

Wednesday, 4th August

The weather remained poor. It was now imperative that we collect our gear from the glacier as the supply of specimen bottles was finished. A jeep took us as far as the Sugar Loaf from where we had 8 miles to walk to the glacier. The rain became heavier soaking us to the skin, while we tramped slowly down the Sandsflugtsdalen with loads weighing up to 90 lbs. That evening we were glad to stay in the hotel.

Thursday 5th August

Our gear was now off the ship and had to be divided into that for the canoe journey and that for Myrtle and the family who were to camp at Robinson River, an inlet 30 miles down the fjord used in summer as a hunting camp by the Greenlanders. The three children, Robin, Bruce and Rona along with Heather Wheeler arrived in the evening and we all moved

to the harbour in preparation for the journey next day. The weather had considerably improved.

#### Friday, 6th August

The powerful motor boat left the harbour for Robinson River at 06-45 hours. After helping Myrtle and Heather to pitch camp on the opposite bank of the river from the Greenlanders the boat returned to the head of the fjord. The weather continued to improve.

#### Saturday, 7th August

In the morning we transferred the 14 days food from the boxes into bags. It was our intention to live off the land as much as possible on the journey which we estimated might last 28 days. We had lunch at the hotel and went to the base cinema in the evening.

#### Sunday, 8th August

We were late in rising but were given a lift to the Lake Jean wireless station which gave a good start of 2 miles and almost 1000 feet. The canoe trolley proved quite useless, the spindle on the wheel bending within half a mile. In excellent weather we traversed a small lake, a larger one and then another small one before camping for the night. We were cooking over wood fires and sleeping out when possible.

#### Monday, 9th August

The sky was overcast but the weather improved throughout the day. We canoed and portaged through three small lakes then down to a larger lake where we picked blueberries for lunch then followed the lake westwards for over a mile followed by a portage and then another lake of similar size. This detour westwards was to cut down portages to the absolute minimum. There were numerous foxes about and a great many ducks, geese and great northern divers.

#### Tuesday, 10th August

The weather in the morning had considerably improved. We relayed the canoes and gear over a 500 feet col to a small higher lake along which we headed north-east to a short portage and a bigger lake, 5 miles long with a large island in it. We stopped on this island to pick berries before heading for the eastern shore against a very strong wind which made canoeing difficult.

#### Wednesday, 11th August

The wind continued strong necessitating two men to carry each canoe. The route now lay north for four miles to the big bend where the Isortoq River bends north. A small lake and a portage mainly downhill, brought us to the river. There was, once again, an abundance of berries.

#### Thursday, 12th August

The sun shone out of a cloudless blue sky. Before tackling the river there were numerous tasks requiring attention including mending a broken stringer on one canoe. It was noon before we were ready. The first stretch involved canoeing through turbulence in the main current after which we utilised subsidiary channels, in which we frequently grounded. Each grounding involved climbing out of the canoe onto a shifting, sandy bottom and dragging the canoe into deeper water. By late afternoon we had progressed 5 miles.

#### Friday, 13th August

Once again the weather was excellent. The river followed the same pattern of main channel turbulence and many subsidiary channels. We stayed close in to the west bank as from here we would be able to walk back to Spøndre Strømfjord should an accident happen. The river was lined on both sides by many high steep rock buttresses. We passed round the big bend where the river turns west and camped beside a small clear stream. We had canoed 19 miles.

#### Saturday, 14th August

The last 11 miles were covered by 13.30 hours. The last stretch of the river was relatively easy and we crossed from one side to the other at a point where huge cliffs towered 3000 feet on both sides. At the point where we left the river a sizeable stream joined but contained no worthwhile fish. From the stream we struck north for  $1\frac{1}{2}$  miles to a small lake 700 feet above the river. Here we camped.

#### Sunday, 15th August

The day was a mixture of portaging and canoeing in wonderful weather. In the morning we passed through three small lakes portaging between each and then over a col to a larger lake where we had lunch and obtained an excellent photograph of a reindeer which came very close. The next lake was larger and as we paddled along it the country opened out into grassy hills. By the time we had negotiated a river, damaging the canoe skin in the process, and started along another sizeable lake it was getting dark. We camped at a spot with little firewood.

#### Monday, 16th August

The weather was perfect. A mile took us to a short river of 100 yards. The next lake was 12 miles long, narrow and bordered on the south by a long cliff 2000 feet high rising straight from the lake. We camped that night by the side of a little lake beyond the long one. Here we found many berries and had an excellent meal including mushrooms.

Tuesday, 17th August

Three small lakes and portages took us down to Nordre Strømfjord. On the way we stopped to pick berries at a spot where there were more than at any spot we had passed. In the inlet were two Greenlander fishing boats. As any fish would probably be netted by them this disappointed us. We camped close to the Greenlanders. A cold wind blew off the fjord that evening and we pitched the tent for warmth.

Wednesday, 18th August

After breakfast we repaired the canoes as best we could and then bartered a haunch of venison for 20 cigarettes. Our paddle 11 miles along the coast to the next stream in calm, sunny weather was uneventful. Here we fished unsuccessfully but once again picked many berries. The sun was setting by 20.30 hours now and, for the first time, it turned really cold after sunset. With one accord we pitched the tent and scrambled in.

Thursday, 19th August

For crossing the fjord we required a calm day and that is exactly what we got. It was also sunny and warm. The shortest crossing was 2 miles to a large high peninsula along the side of which we paddled against the tide to a point where we could cross the very narrow isthmus joining it to the mainland. Here we found considerable driftwood. From the isthmus we paddled north-east in perfect weather towards the narrows leading into Uggsuit the innermost recess of Nordre Strømfjord. We camped 5 miles short of the narrows. From our camp we watched a boat pass up the far side of the fjord.

Friday, 20th August

In the morning we moved off relatively early at 08.40 hours and paddled out of the bay. Across the fjord we saw the boat which was owned by the geological survey but the geologists were away on field work. The skipper, a Faeroes man, made us very welcome. After 30 minutes we were obliged to leave in order to catch the tide race through the narrows. The boat would be following us next day. The weather deteriorated rapidly as we paddled along Uggsuit. For the last few miles to the south-east corner it rained steadily. The stream, from which we had hoped to take fish, was no more than a trickle.

Saturday, 21st August

Fortunately the rain stopped soon after we went to sleep so that our makeshift flysheet consisting of canoe bags didn't have a severe test.

Tuesday, 17th August

Three small lakes and portages took us down to Nordre Strømfjord. On the way we stopped to pick berries at a spot where there were more than at any spot we had passed. In the inlet were two Greenlander fishing boats. As any fish would probably be netted by them this disappointed us. We camped close to the Greenlanders. A cold wind blew off the fjord that evening and we pitched the tent for warmth.

Wednesday, 18th August

After breakfast we repaired the canoes as best we could and then bartered a haunch of venison for 20 cigarettes. Our paddle 11 miles along the coast to the next stream in calm, sunny weather was uneventful. Here we fished unsuccessfully but once again picked many berries. The sun was setting by 20.30 hours now and, for the first time, it turned really cold after sunset. With one accord we pitched the tent and scrambled in.

Thursday, 19th August

For crossing the fjord we required a calm day and that is exactly what we got. It was also sunny and warm. The shortest crossing was 2 miles to a large high peninsula along the side of which we paddled against the tide to a point where we could cross the very narrow isthmus joining it to the mainland. Here we found considerable driftwood. From the isthmus we paddled north-east in perfect weather towards the narrows leading into Uggsuit the innermost recess of Nordre Strømfjord. We camped 5 miles short of the narrows. From our camp we watched a boat pass up the far side of the fjord.

Friday, 20th August

In the morning we moved off relatively early at 08.40 hours and paddled out of the bay. Across the fjord we saw the boat which was owned by the geological survey but the geologists were away on field work. The skipper, a Faeroes man, made us very welcome. After 30 minutes we were obliged to leave in order to catch the tide race through the narrows. The boat would be following us next day. The weather deteriorated rapidly as we paddled along Uggsuit. For the last few miles to the south-east corner it rained steadily. The stream, from which we had hoped to take fish, was no more than a trickle.

Saturday, 21st August

Fortunately the rain stopped soon after we went to sleep so that our makeshift flysheet consisting of canoe bags didn't have a severe test. The mists lifted rapidly as we paddled away from the shore and revealed

the geologists boat two miles ahead. We spent 4 hours with them. Our next objective was a 200 yard neck of land between Arfersiorfik, the next big fjord system to the north, and our present Nordre Strømfjord. This was 10 miles away. We covered the distance in 3 hours.

Sunday, 22nd August

Our aim had been to reach the salmon river, marked Eqalugarssuit on the map, but it started raining at 03.00 hours and continued until noon. Hugh, who had been sleeping out, crawled under a canoe which protected him from the rain. In the afternoon we crossed the neck of land, found some mussels on the shore which we collected for our evening meal, and paddled out into Arfersiorfik. Before reaching the fjord proper we passed a turf hut on the north side which was not marked on the map. To our right we had a good view of the Usugdlop Glacier. That night we camped at the side of a stream flowing from a large lake known as Akinaq.

Monday, 23rd August

The wind, from the north-west, grew stronger during the night. Our next objective, Eqalugarssuit involved crossing the fjord but there were white horses out in the middle making a crossing out of the question. Along the shore we had seen many stone traps which we assumed were used by the Greenlanders in winter for trapping foxes. This was confirmed when Roger found a live fox in one.

Tuesday, 24th August

The wind had abated by the early hours of the morning so we set off at 03.30 hours up our own side of the fjord for  $3\frac{1}{2}$  miles then headed straight across for the other side two miles away in seas which became steadily rougher. At Eqalugarssuit we fished the stream and the fjord off its mouth, but caught nothing. We could see the fish as grey shapes in the turbulent pools so Hugh stalked them with the landing net and caught several. We also found an old Greenlander fish trap which we placed in the stream.

Wednesday, 25th August

We stayed at the river until 11.00 hours as most fish came up the river at high tide which was 10.30 hours. In all we caught 34 arctic char and had 7 small ones each for breakfast. The weather was once again excellent and good progress was made passing with the tide, through the narrows at Sarfarssuk into Alangordleq. Our mileage for the day was 20 and we camped at Igutsait, an exposed and not very pleasant camp site with considerable grey glacier silt along the shore and a poor wood supply.

Thursday, 26th August

It was most important that we should catch the tide in the narrows

at Sarfarssuaq but despite this it was late when we started. Cooking three potfulls of arctic char was time consuming. We did catch the tide - a very strong current - but only just. Paddling against it would have been impossible. We were now opposite Nordenskiold's Glacier which was thoroughly photographed before proceeding to an inlet close to Sofia's Havn. Here we again encountered grey glacier mud but this time there was an abundance of wood.

#### Friday, 27th August

We were up by 06.30 hours. As the tide was out and the mud too deep we relayed the canoes and gear to the rocks at the mouth of the inlet where there was deep water. Our route lay north-east to the head of Tasiussarssup *qinua* where we camped beside a stream well hidden by willow scrub. There were several families of foxes here and an abundance of mussels. Bill took a light load up the steep 700 foot hillside behind the camp to work out the best route for the morning.

#### Saturday, 28th August

It was overcast during the night but the clouds swiftly dispersed encouraging us to wash. The portage went easily but the weather deteriorated rapidly. The sky became overcast and a cold wind blew from the Inland Ice. We canoed through a small lake and portaged down to the glacial lake Ilulialik. The glacier was much more active than the Nordenskiold with large lumps of ice calving at regular intervals. Most of the ice had gathered at the north end of the lake close to the outlet. We camped on a bleak site close by. The dullness of the day was relieved by a magnificent sunset.

#### Sunday, 29th August

In the morning it was still overcast but the wind was almost non-existent. We worked our way through a maze of grounded bergs into the river down which we paddled for  $1\frac{1}{2}$  miles to the start of a big bend where it dropped to sea level in a series of cataracts. We portaged our gear north across the inside of the bend to near the mouth of the river. From here we canoed 9 miles down Orpigsoq to the coast of Disko Bay south of Christianshaab. Here we found wood in large quantities on the storm beach and had a good fire.

#### Monday, 30th August

It was arranged that as an insurance against Roger and Hugh being delayed by heavy seas at Nuk, Bill would cross the hills to Christianshaab on foot and see what travelling arrangements back to Søndre Strømfjord could be made. The wind rose in the morning so there seemed little possibility that they would reach Christianshaab. Bill reached the

settlement by 13.00 hours and was offered a boat to collect Hugh and Roger. However, the wind was already dropping and only at 19.00 hours did the Trading Company boat leave to look for them. We found them only two miles out canoeing in a heavy swell. As they naturally preferred to finish the journey in the canoes we went ahead to join the throng who were waiting to welcome them at the pier.

Tuesday, 31st August to Monday, 6th September

Our original intention had been to travel to Søndre Strømfjord from Egedesminde by helicopter but, as the canoe journey had not taken as long as expected, we decided to return by boat down the coast to Holsteinsborg. For two days we thankfully accepted the hospitality of the Trading Company then left for the 24 hour journey to Holsteinsborg. Here we hired a small motor boat to take us eastwards to the head of Ikertoq Fjord near Sarqardlit. A portage took us to a long lake, Taserssuaq, from where we had a long portage over a 1000 foot ridge to the steep drop down to Søndre Strømfjord. We took our first loads down then on the return journey were chased by a lone bull muskox. This gave us some anxious moments and we only escaped by jumping into a canoe and paddling out into a small lake.

The following morning Hugh paddled across the fjord to join his family at Robinson River, 11 miles away, while Roger and Bill paddled up the fjord for 30 miles to the harbour.

## CANOE JOURNEY - DAILY CAMPS AND MILEAGES W. Wallace

STAGE	DATE	POSITION	MILEAGES				TOTAL MILEAGE
			PORTAGE	LAKE	RIVER	FJORD SEA	
Nordre Stromfjord Isortoq River	8:8:65	No name	1.5	2.0			3.5
	9:8:65	Near Qordlortoq	3.0	4.0			7.0
	10:8:65	Near Aussivigssuit	0.5	8.0			8.5
	11:8:65	Isortoq River Bend	2.0	0.5			2.5
Stage 1 - Subtotal			7.0	14.5			21.5
Descent of Isortoq River	12:8:65	Isortoqelven			5.5		5.5
	13:8:65	Isortoqelven			19.5		19.5
	14:8:65	Aussivit			10.5		10.5
Stage 2 - Subtotal					35.5		35.5
Isortoq River - Nordre Stromfjord	14:8:65	No name	1.5				1.5
	15:8:65	Aussiviil	1.0	6.5			7.5
	16:8:65	Ernivik	0.5	10.5			11.0
	17:8:65	Sersinilik	2.0	1.5			3.5
Stage 3 - Subtotal			5.0	18.5			23.5
Nordre Stromfjord  and Arfersiorfik	18:8:65	Near Naujagdlit				11.0	11.0
	19:8:65	Amerssuaq				19.0	19.0
	20:8:65	S.E. Ugssuit				17.0	17.0
	21:8:65	Itivdliarsuk				10.0	10.0
	22:8:65	Near Akinaq	0.5			8.5	9.0
	23:8:65	Near Akinaq					
	24:8:65	Egalugarssuit				11.5	11.5
	25:8:65	Igutsait				21.0	21.0
	26:8:65	Sofias Havn				13.0	13.0
27:8:65	N.E. End Tasiussarssup Qingua				16.5	16.5	
Stage 4 - Subtotal			0.5			127.5	128.0
Stages 1 - 4 Carry Forward			12.5	33.0	35.3	127.5	208.5

CANCEL JOURNEY - SONDRE STROMFJORD TO CHRISTIANSHAAB

STAGE	DATE	POSITION	MILEAGES					TOTAL MILEAGE
			PORTAGE	LAKE	RIVER	FJORD	SEA	
Stages 1 - 4 Brought Forward			12.5	33.0	35.5	127.5		208.5
Arfersiorfik	28:8:65	Aria	2.0	8.5				10.5
- Orpigsoq	29:8:65	S. End Orpigsoq	1.5	1.5				3.0
Stage 5 - Subtotal			3.5	10.0				13.5
Orpigsoq -	29:8:65	Igblorssuatsiait			1.0	8.0	3.0	12.0
Christianshaab	30:8:65	Christianshaab					15.0	15.0
Stage 6 - Subtotal					1.0	8.0	18.0	27.0
TOTAL			16.0	43.0	36.5	135.5	18.0	249.0

SUMMARY	
TOTAL DISTANCE	249
AVERAGE MILEAGE	11/day
DAYS TAKEN	23
LIE UP DAYS	1
BEST DAY	21 miles

CANOE JOURNEYEQUIPMENTCanoes:

Two 17' 3" Tynne 2-seater canoes were sent in by ship to Søndre Strømfjord and we picked these up on arrival. Three of us alternated each day between the one used as a "single" with the provisions and the other used in the normal way. The canoes had a rubberised canvas hull - which was very satisfactory - and spray sheets. Both had foot controlled rudders; these were considered to be almost essential.

Camping:

In the prevailing dry summer conditions of our route area, there was considerable debate about the necessity of a tent. In the end we took a light two man one. Many nights were spent in the open but during one spell of rain and in the late August night frosts this protection was useful.

Clothing:

The absolute minimum was taken mainly ventile trousers and anoraks. Light climbing boots and gym shoes were used as footwear. No spare clothing was taken except a nylon waterproof anorak (cagoul). Life-jackets were taken.

Navigation:

A magnetic compass was hardly used. The 1:250,000 Danish maps were excellent.

CANOE JOURNEY - FOOD

journey was planned to last 28 days but only 40 man days of food (the contents of two boxes, exactly the same as those for the 'Inland Ice'). The actual duration was 23 days. It was to live off the land as much as possible and this worked out well except that such items as butter, porage, and sugar cannot be obtained in uninhabited country. Also the markings of streams, which on the map would have been considerable trout streams, was misleading. In reality they were mere trickles and only one stream produced a total catch of 100 lb. of cod. Trailing the spinner behind the canoe did not entice any more cod. It may be that they feed at deeper levels since they are abundant in the fjords and are caught by the occasional Greenlander party.

The lack of fish was partly alleviated by meeting a Greenlander party with whom we bartered venison for cigarettes. During the week there was a profusion of berries, similar to blueberries, but by the end of the week the cranberries were ripening rapidly. Several mushrooms were found and eaten including a number of horse mushrooms up to 7" across. At several places in the fjords the berries supplemented our diet.

CANOE JOURNEY - FOOD

The canoe journey was planned to last 28 days but only 40 man days of food was carried (the contents of two boxes, exactly the same as those for the crossing of the 'Inland Ice'). The actual duration was 23 days. It was planned to live off the land as much as possible and this worked out reasonably well except that such items as butter, porage, and sugar cannot be procured in uninhabited country. Also the markings of streams, which on Scottish maps would have been considerable trout streams, was misleading. Frequently they were mere trickles and only one stream produced a total of 3½ arctic char. Trailing the spinner behind the canoe did not entice a single fjord cod. It may be that they feed at deeper levels since they are undoubtedly in the fjords and are caught by the occasional Greenlander hunting/fishing party.

The lack of fish was partly alleviated by meeting a Greenlander hunting party with whom we bartered venison for cigarettes. During the first two weeks there was a profusion of berries, similar to blueberries, and in the last week the cranberries were ripening rapidly. Several varieties of mushroom were found and eaten including a number of horse mushrooms measuring up to 7" across. At several places in the fjords mussels supplemented our diet.

EXPEDITION ACCOUNTSGeneral Comments

When plans were formulated it was hoped that the geographical ambitions and scientific aims the expedition would enjoy enthusiastic support from the Royal Geographical Society and the Mount Everest Foundation. The latter had supported us previously in a generous manner on comparatively minor projects. Unfortunately no financial support was forthcoming from the R.G.S. and the M.E.F. only felt able to give £200 - though this was very welcome. As so often happens, however, when expeditions are on the point of being cancelled for lack of funds, money was raised from an unusual source - the Medical Research Funds of the Secretary of State for Scotland. This £750 made the expedition feasible and was especially welcome since it made the project an almost completely Scottish venture. The remainder of the money (£1,350) was raised individually by obtaining overdrafts and we now endeavouring to eliminate these by writing and broadcasting.

There can be no doubt that the expedition cost was almost as low as it could possibly have been to complete our aims.

EXHIBITION ACCOUNTSGeneral Comments

When plans were formulated it was hoped that the geographical ambitions and scientific aims the expedition would enjoy enthusiastic support from the Royal Geographical Society and the Mount Everest Foundation. The latter had supported us previously in a generous manner on comparatively minor projects. Unfortunately no financial support was forthcoming from the R.G.S. and the M.E.F. only felt able to give £200 - though this was very welcome. As so often happens, however, when expeditions are on the point of being cancelled for lack of funds, money was raised from an unusual source - the Medical Research Funds of the Secretary of State for Scotland. This £750 made the expedition feasible and was especially welcome since it made the project an almost completely Scottish venture. The remainder of the money (£1,350) was raised individually by obtaining overdrafts and we now endeavouring to eliminate these by writing and broadcasting.

There can be no doubt that the expedition cost was almost as low as it could possibly have been to complete our aims.

EXPENDITUREW. Wallace

(1) Freight and carriage on equipment	£ 79:15:0
(2) Travelling and accommodation	1,231: 6:6
(3) Sledging equipment	389:15:8
(4) Clothing	84:10:6
(5) Food	133: 3:6
(6) Canoeing equipment	83:17:9
(7) Sundry purchases	41:15:2
(8) Sundry expenses	39: 4:9
(9) Photographic equipment	223:12:2
	<hr/>
	£2,307: 2:0
	<hr/>

EXPENDITURE DETAILS(1) Freight and Carriage on Equipment

Leith to Reykjavik	£14:13: 0
Leith to Copenhagen	13: 0: 0
Onwarding in Copenhagen (out)	9:11: 0
Søndre Strømfjord to Copenhagen	8: 0: 6
Copenhagen to Glasgow	30: 5: 0
Onwarding in Copenhagen (return)	4: 7: 6

£79:15: 0(2) Travelling and Accommodation(a) Before departure

Visit to Greenland Ministry, Copenhagen	£50:15: 6
Visit to Mount Everest Foundation, London	12: 0: 0
Visit to Scottish Home & Health Depart- ment, Edinburgh.	10: 6
Equipment trials in Cairngorms - Hugh & Myrtle 300 miles at 8d.	£10: 0: 0
Bill 300 miles at 8d.	10: 0: 0
	20: 0: 0
Expedition meeting at Coylumbridge Hugh and Myrtle 300 miles at 8d.	10: 0: 0
Bill 300 miles at 8d.	10: 0: 0
Roger 600 miles at 8d.	20: 0: 0
	40: 0: 0
Visit to Messrs. Black, Greenock 45 miles at 8d.	1:10: 8
Packing week-ends - Hugh & Myrtle (3) 180 miles at 8d.	6: 0: 0
Roger (1)	4: 0: 0
	10: 0: 0
Visit to Glasgow - Bill 60 miles at 8d.	2: 0: 0
Various car journeys in Glasgow 45 miles at 8d.	1:10: 0

Sub-total £138: 6: 8(b) During Expedition

Fares - Renfrew to Reykjavik (4) by air	£100:16: 0
Charter flight - Reykjavik to Kulusuk	474: 0: 0
Fares - Christianshaab to Holsteinsborg by sea	8: 8: 0
Hire of boat - Holsteinsborg to Sar ardlit	7:12: 6
Fares - Søndre Strømfjord to U.K. by air	314:17: 6
Fares - Copenhagen to Leith by sea	£37: 8: 0
Deduct: Refund on cancellation	<u>36:13: 0</u> 15: 0
Food and accommodation in Greenland	183:10:10

Sub-total £1,089:19:10(c) Since Return

Journeys to Giffnock 30 miles at 8d.	£1: 0: 0
Visit to Glasgow 60 miles at 8d.	2: 0: 0

Sub-total £3: 0: 0TOTAL £1,231: 6: 6

(3) Sledging Equipment

British Antarctic Survey pyramid tent	£88:17: 0
Waterproof tent bag	5: 8: 0
Nansen sledge - second hand	60: 0: 0
- new	67:10: 0
Sledge wheel and light weight wheel substituted	15: 4: 6
Radio direction finder	18: 5: 0
Wrist watch	28:12: 6
Stop watch	8:15: 0
2 Sleeping bags (others provided by members)	10:17: 6
Sleeping bag covers	5: 2: 0
Tea chests and food boxes	21:16: 0
Bubble sextant and sun compass	16: 0: 0
Primus stove and spares	8:15: 4
4 pairs wooden skis	41: 0: 0
Sledge harness	3:12: 0
Flares	8:16: 0
4 Karabines	2:19: 0
2 Avalanche shovels	3:11: 9
Plastic jerricans	3:19: 6
12 Nylon food bags	8:14: 0
6 Nylon kit bags	3:18: 0
Cotton covers for kampanats	5: 0: 0
Sail for sledge	1:18: 6
4 pairs ski sticks	8:12: 6
Aneroid	5: 0: 0
Kampanats	7: 5: 4
Ropes, blocks, prussikers, spring balances, etc.	29: 7: 3
	<u>£488:16: 8</u>
Deduct: Equipment taken over by Expedition members	99: 0: 0
	<u>£389:16: 8</u>

(4) Clothing

Each member had one waterproof lightweight nylon anarak	
one ventile anarak	
one pair windproof overtrousers	
In some cases members provided an item of windproof clothing	
The cost of those items purchases was	£71:14: 8
Mukluks (canvas boots - Government surplus) and felt inners	5: 7: 6
Windproof mitts	1:19: 7
Woollen combinations	5: 8: 9
	<u>£84:10: 6</u>

(5) Food

Potato powder	£6: 9: 0
Dried soup, onions and peas	10: 0: 0
Dried milk	3: 1: 3
Rum fudge	6: 0: 3
Chocolate	1: 0: 0
Meat bar	99: 0: 0
Biscuits	7:13: 0

(6) Canoeing Equipment

Repair to "Tyne" double canoe	£44: 1: 3
One new "Tyne" double canoe	59:17: 6
Canoe paddles	6: 9: 0
Adapting canoe trolley	1:10: 0
Canoe trolley	4: 0: 0
Mountain tent	10:10: 0
Binoculars	<u>10: 0: 0</u>
	£136: 7: 9
Deduct: Equipment taken over by Expedition members	<u>52:10: 0</u>
	<u>£83:17: 9</u>

(7) Sundry Purchases

Expedition stamp	£ 5: 0: 0
Charts and maps	11: 2: 3
Aerial photographs	6: 4: 7
Stationery	10: 0
Flowmaster pen set	1: 4: 6
Stereo viewer	1: 1: 0
Books - "Admiralty Pilots" & "Admiralty Radio Signals"	4: 0: 0
- 3 copies "Northern Lights"	4:10: 0
- Gifts for assistance in Greenland	6: 9: 6
Sundry small items	<u>1:13: 4</u>
	<u>£17:15: 2</u>

(8) Sundry Expenses

Telephones and postages	£18: 9: 7
Bank charges and interest	3: 9: 0
Insurance	3:11: 6
Sundries	<u>13:14: 8</u>
	<u>£39: 4: 9</u>

(9) Camera Equipment

Leica camera	£65: 0: 0
Overhaul of Leitz equipment	48: 0: 0
Leica telephoto lens	61:10: 0
Overhaul and repair of Voigtlander camera	11:10: 0
Camera film	93:18:11
Filters and lens hoods	<u>18:13: 3</u>
	£298:12: 2
Deduct: Equipment taken over by Expedition members	<u>75: 0: 0</u>
	<u>£223:12: 2</u>

96

SUMMARY OF INCOME to 30.4.66.

Earned Income

<u>Section 1:</u> From interviews (B.E.C.)	£67:19: 9.
<u>Section 2:</u> From sale of articles and photographs about Expedition (including World Medicine, The Guardian, Politiken, Sunday Express, Australian Press, Lloyd's Magazine, Chicago Tribune, SHE Magazine, Ski Magazine)	£715: 3:10.
<u>Section 3:</u> From lectures on Expedition (including Oxonford School, Paisley Library, H.M.S. Maidstone, Cove Lit. Soc. Fyfe W.R.I.)	£28:10: 0.
<u>Section 4:</u> From sale of franked covers	£46: 4: 0.
Therefore total earned income (provisionally)	<u>£857:17: 7.</u>

Grants to Expedition

<u>Section 1:</u> From Medical Research Fund of Secretary of State for Scotland	£750: 0: 0.
<u>Section 2:</u> From Mount Everest Foundation	£200: 0: 0.
Therefore total grants received	<u>£950: 0: 0.</u>

Therefore provisional estimate of total income  
to 30.4.66. £1,807:17: 0.

These figures must be provisional because sale of articles etc. is continuing and it is hoped to publish an Expedition book - "White Horizons". Also considerable further expenditure will be incurred in publishing the Expedition Report.

# SCOTTISH TRANS-GREENLAND (PHYSIOLOGY) EXPEDITION, 1965

