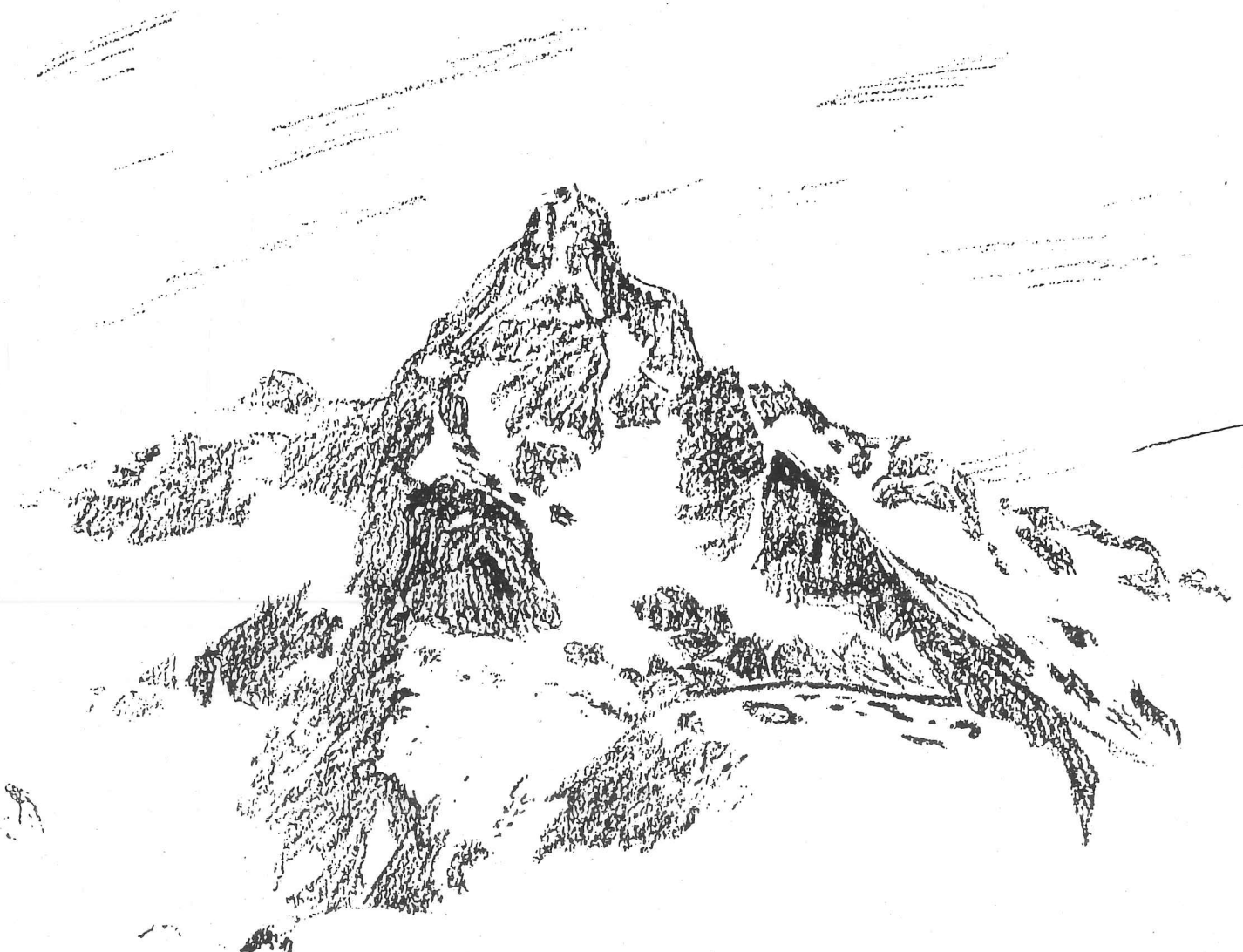


BRITISH TASILAQ EXPEDITION EAST GREENLAND 1987

FINAL REPORT



Patrons

Sir Vivian Fuchs FRS
Sir Ranulph Fiennes

(*38) : 91(08)
[1987]

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EAST GREENLAND 1987

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Graham Poole
August 1990.

INTRODUCTION

EXPEDITION AREA & OBJECTIVES :

The original idea behind the expedition was for a small group of four to spend 8-9 weeks in the field in E. Greenland working unsupported from a basecamp at the head of Tasilaq Fjord 50 kms north-east of Angmagssalik, the major east coast settlement, to achieve a number goals. These included an attempt on the first British ascent of Lauper Bjerg (2580m) by a new route as the climax to a month long ski-tour, and the completion of geological and glaciological projects in the area surrounding basecamp (refer to maps).

EXPEDITION MEMBERS :

GRAHAM POOLE	-leader -glaciologist
ANTHONY DAY	-photographer
STUART RAE BURN	-geologist
NIGEL TOPPING	-medical officer

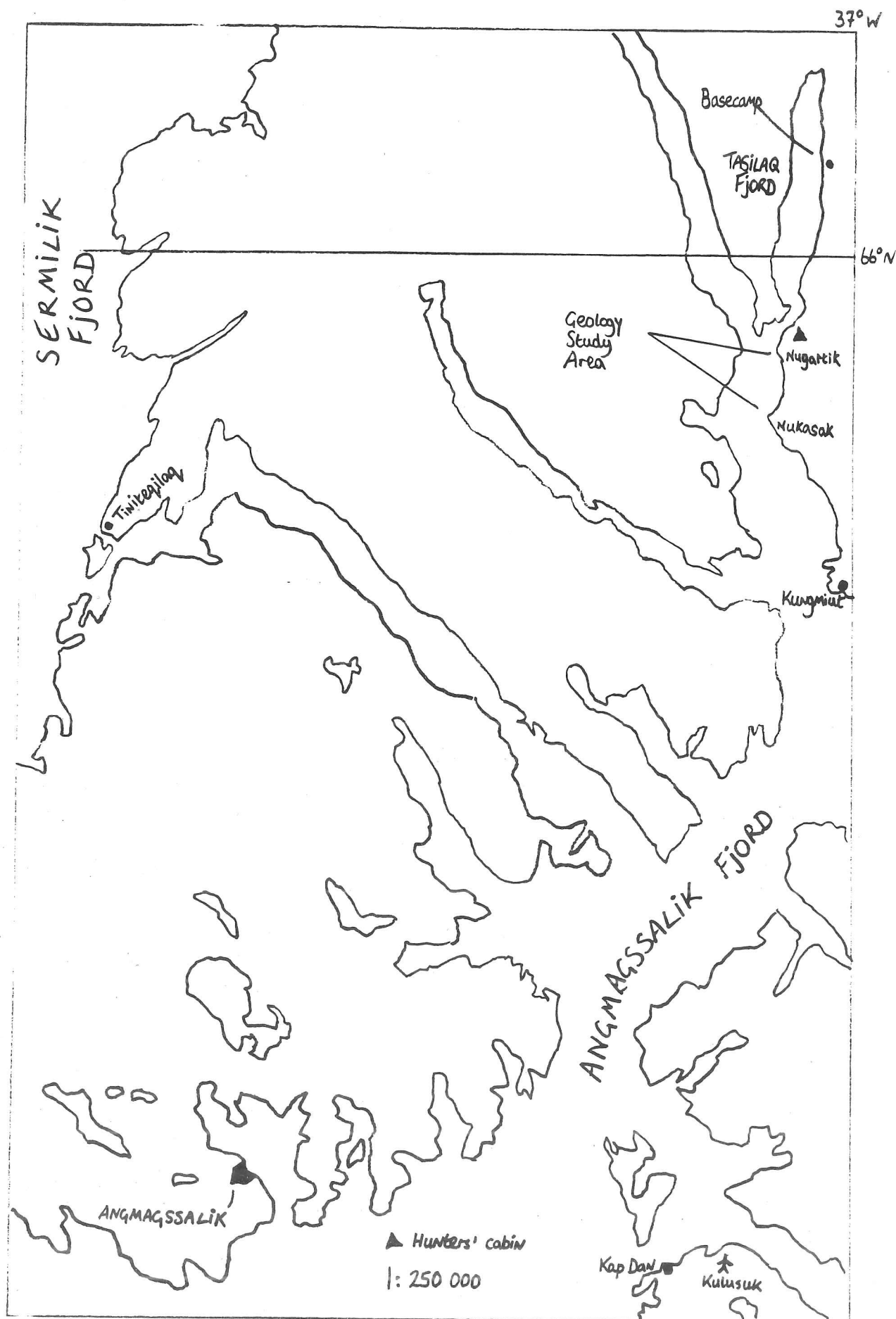
Unfortunately, Anthony Day was forced to leave the expedition early on due to personal problems back in the UK. This represented a serious loss to the expedition, not least because of the months of hard work Anthony had put into the expedition prior to our departure. Nevertheless, the expedition had to continue, and so, after a sad farewell, our plans were resumed.

EXPEDITION DIARY :

29/06/87	Expedition leaves the UK for Iceland
30/06/87	Expedition leaves Iceland and arrives in Greenland
04/07/87	Basecamp at Tasilaq Fjord established
08/07/87	Anthony Day leaves the expedition
11/07/87 - 04/08/87	Ski-tour
05/08/87 - 27/08/87	Science phase
03/09/87	Nigel Topping leaves Greenland for the UK
08/09/87	Graham Poole and Stuart Raeburn leave Greenland for the UK

Our original plan was to set up basecamp and then spend two weeks working on the scientific projects before leaving for the ski-tour. This would leave 2 weeks in the field at the end of the expedition to finish off the projects. However, after speaking to locals about weather conditions as the summer progressed, it was decided to leave for the ski-tour as soon as possible to avoid the Autumn storms when at our most committed.

BASECAMP / GEOLOGY STUDY AREA



GEOLOGY REPORT : MAPPING OF AREA FROM NUGARTIK TO NUKASAK

Introduction

A three week period was spent examining rock exposures on an outcrop level in an area of approximately 25 km² on the eastern side of Angmagssalik Fjord, a few hundred metres south of the bifurcation into Qingertivaq and Tasilaq.

This region has been mapped in limited detail by the 1970 Birmingham East Greenland expedition (Wright et al, 1973) and was further investigated by Chadwick (pers comm, 1987) in 1986 as part of a larger scale by the Geological Survey of Greenland (GGU). In addition, Bridgwater (1979, 1985, 1987a, 1987b) refers to the Tasilaq region as being part of the Nagsugtoqidian mobile belt of S.E. Greenland.

The objectives of the work were :

1. To examine the relationships between "basement" grey gneisses and supracrustal brown gneisses.
2. To investigate Proterozoic pegmatites and dykes to aid resolution of deformation events within the gneisses during the Proterozoic.
3. To determine the extent of preservation of the original Archaean granulite facies rocks.

Advisors for the above project were Prof. D. Bridgwater of the Geological Museum of the University of Copenhagen, and Dr. B. Chadwick, Dept. of Geology, Exeter University.

Methodology

The area was covered by one person in a period of 17 days and involved collection of a large amount of detailed structural data and extensive lithological description. A number of photographs (35mm transparencies) were taken of important exposures and a limited number of samples were taken. These samples have been cut for thin section analysis and that information will appear in a further report being written by the author. Unfortunately, the expedition's post was not forwarded from Angmagssalik to Kungmiut while we were in the field, so Prof. Bridgwater's valuable background information, aerial photographs and precise instructions were unavailable at the time the fieldwork was being completed. As a result the scope of the investigation was less than it could have been. Sadly the geochemical follow up work on isotopic systematics, invaluable to study in polymetamorphic terrains, is unavailable to small-scale expeditions so many of the conclusions suffer from a paucity of evidence. Two minor tasks which could be performed, however, were the measurement of the altitude of glacier snouts (and hence recession rates) and the mapping of previously undisclosed lakes onto the 1:50 000 topographic maps available for the area.

Geological description

The field area lies within the Nagsugtoqidian belt and contains Archaean tonalitic and granodiorite gneiss as well as meta-sedimentary and basic meta-igneous dyke rocks that have been affected by a series of tectonic and metamorphic events of approximately 1300 Ma. The tonalitic and granodiorite gneisses show a variety of textures from coarse grained well banded varieties to more homogeneous fine grained types. There is also evidence of migmatisation, particularly at the boundaries with the meta-sedimentary brown gneiss. In fact no contacts between these two units were observed which had escaped later overprinting by deformation. The tectonised nature of the boundaries was further complicated by the movements of chemical species through the zone surrounding the migmatised contacts. As a result the exact relationship between basement grey gneiss and supracrustal brown gneiss is unclear.

However, the fact that the boundary acted as a focus for deformation associated fluxing of volatile rich fluids (presumably essentially hydrous ones) supports a tectonic interpretation for the original juxtaposition and not an intrusive one as has sometimes been suggested.

The Proterozoic pegmatites are normally intimately associated with amphibolites forming characteristic network-type exposures. Within the pegmatites, feldspars dominate, and can at times become very large. The pegmatites cross-cut most lithologies with the exception of one or two basic dykes which accords well with a Proterozoic age for their formation. The basic dykes are hard to distinguish from other basic bands within the original gneisses since they have often been deformed so that they now have a trend similar to the last foliation imposed on the gneisses. There is evidence, however, of stresses acting normal to dyke trend and as boudins occur in a few places the field evidence suggests that dyking was a process that occurred more than once during the polyphase metamorphic development of the region. Some appear to be nearly part of the last event in the area and are therefore undeformed while others are cross-cut by pegmatites and have suffered extensive deformation.

One of the biggest problems encountered when examining the lithologies in the area is the effect of regression. Rocks at one stage in granulite facies conditions have passed through amphibolite facies as pressure and temperature have dropped. In addition, these events have occurred more than once and the whole area is very much a polymetamorphic one. I found no evidence where I was working for preservation of original granulite facies rocks - all the mineralogy I saw suggested retrogression. Further north rocks have been subject to less severe deformation and may therefore still display original granulite facies textures and mineralogies. Unfortunately, time and transport was unavailable to verify this opinion.

The dominant trend of structures within the area is E-W. Foliation is usually close to vertical, hence the parallelism of it with the dykes. Pegmatites tend to trend E-W too but at plunges of 70 degrees or so to the East. There are also nearly horizontal pegmatites trending N-S but these are rarer. Fold patterns within the gneisses are complex, though there are some examples of fairly simple superimposed conical folds.

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Acknowledgements : thanks are due to Prof. D. Bridgwater for his valuable advice and help. Also to Dr. B. Chadwick for basemaps and likewise, Dr A. Wright. Finally, thanks to Mr. M. Unsworth for the loan of a hammer.

Stuart Raeburn.

GLACIOLOGY REPORT

The aim of the glaciology project was to study debris strata within the ice at the margin of one or more glaciers in Tasilap Kua, the valley at the head of Tasilaq Fjord, and also at the head of Midgardgletscher which calves into Ningerte Fjord north of Tasilaq Fjord. It was hoped to use results obtained to make a comparative study between glaciers in this part of East Greenland and those of West Greenland, where the terrain is much less "alpine" and the climate different, using work completed by Peter Knight (see below) and others in West Greenland. Peter Knight of Aberdeen University advised the expedition on this project.

Despite strenuous efforts - covering approximately 150 kms over particularly rough and dangerous ground with loads of 65-75 lbs - the author and Nigel Topping failed to reach Midgardgletscher which has receded over 15 kms in the last 50 years. To compound this disappointment, and despite being able to locate the base of glaciers on a number of occasions (e.g. at 16th September Gletscher), no suitable series of debris strata within the ice was found to study. One possible explanation for this is that what it was hoped to find was hidden by moraine.

The present position of the snout of Midgardgletscher was ascertained approximately using cross-bearings and a sighting compass (see map). A far-point of the southern side of the snout of 16th September Gletscher was reached via Tasilap Kua and the southern shore of Ningerte Fjord (crossing one glacier snout en route). The whole area offers considerable opportunities for peri-glaciological studies by groups more experienced than ours, it being difficult, but not impossible, to establish a base anywhere up to the the furthest point reached. Spot heights given for cols etc. in Tasilap Kua by the 1:250 000 maps available proved somewhat less than accurate and opportunities for surveying might exist. It is not possible to cross 16th September Gletscher and Ningerte Fjord is impassable due to it being choked by ice.

Acknowledgements : thanks are due to Peter Knight of Aberdeen University for his valuable advice and support in the planning stages of the expedition and to Kent Industrial Measurements Ltd. for the loan of a conductivity meter.

Graham Poole.

SKI-TOUR REPORT

Having initially decided to bring the start of the ski-tour forward because of an apparently settled spell of good weather and local advice that conditions would worsen as Autumn progressed, gathering clouds and swarms of mosquitoes accompanied our eventual departure.

As we trekked, heavily laden, along the moraine leading up to the glacial system for the third and final time, we were disappointed to rise into warm, wet cloud but relieved to leave the irritating insects well behind. Such unsettled weather was to cause us many problems as we often had to sit out frustrating periods of precipitation and whiteout, taking our chances to make ground whenever a break in the conditions allowed.

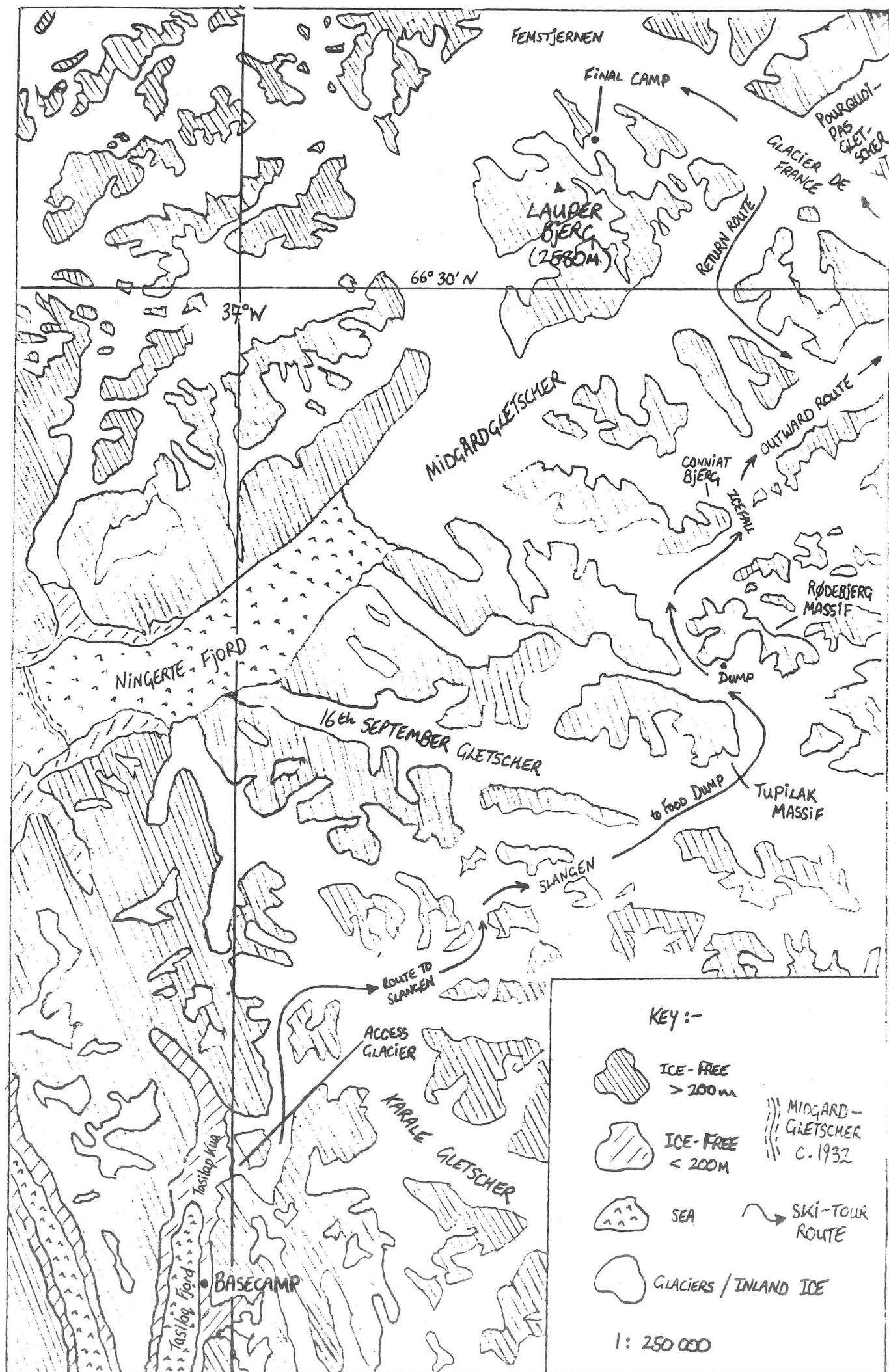
This pattern was established early as two days at the camp above the access moraine were followed by four hours of very hard work pulling up a slight gradient in soft, slushy snow to a campsite above Karale Gletscher. A further wait, and at last some clear blue skies offered the prospect of a good day's skiing. Skis and pulks clattered over a hard surface as we descended to the glacier. Skiing downhill with an 80kg pulk driving you can take some getting used to. I took an early tumble but recovered and began to feel I was really getting the hang of it when Graham turned and pointed my attention to a lonely pulk some 200m behind me where it had become unattached in my fall. A lesson learned !

Some glorious sweeping traverses linked with tentative snowploughs brought us onto Karale Gletscher itself. The way across was clear but to the south a huge bank of cloud was rolling over a snow-covered dome and descending ominously towards us. We took a quick bearing on our target and were soon navigating in whiteout. Having crossed the glacier, and with visibility down to a few feet, there was little point in trying to continue. Graham knew, from first hand experience of this part of our route, that it would have been easy to have missed our way. So, after another frustrating half-day, we made camp.

Night having no meaning in this land of the midnight sun, the lure of clear skies pulled us out of our comfortable lair after only a brief sleep to finally put in a hard day's work. With skins on all the way, we made good progress up the valley past many promising looking cols to the one we knew would provide a gateway to the north. There followed 7 hours of struggling with the pulks and eventually ferrying loads up the final steep section to camp in yet more appalling weather at the top of an ice-fall surrounded by crevasses. Another day sitting out storms added to our impatience - would we ever get there? We dared not continue in whiteout for, in addition to the nearby crevasses, lay ahead some tricky navigation across a featureless icy plateau. Moreover, our 1:250,000 maps were somewhat less than accurate due to the rapid retreat of the ice in the 55 years that had passed since the last survey. Our wait was rewarded the next day, however, with perfect conditions and a rapid ski to the site used by many previous expeditions. This was a glorious campsite with panoramic views of vast glaciers stretching away to majestic snow-capped peaks. We planned some ski ascents for our return journey and wondered at the fantastic rock formation, a contorted volcanic dyke, which gives this place its name, Slangen - The Snake.

A rewarding uphill ski with skins through a narrow gully and past the wriggling snake was followed by an exhilarating downhill section, turbo powered by the rattling pulks. Skating technique then enabled us to make rapid progress across the vast expanse of 16th September Gletscher and at last round the corner of the sinisterly impressive Tupilak. This is an awe inspiring mountain with a jagged skyline ridge and contorted summit silhouette named after the evil spirits the Inuit believe to live in the mountains and carve in ivory.

The dark presence of Tupilak reminds us of the stories about spirits a local hunter and good friend for many years, Peter Winther, had told us - like those of Qevitoq, mysterious half-men/half-spirits who live alone in the mountains far from any settlement but come at night to steal food and hunting implements. We made camp between Tupilak and the more cheery Rødebjerg. The Red Mountain was living up to its name as it caught the evening



sun on its broad flank and after a slap-up meal of veggie burgers and pasta we slept well under its comforting gaze.

At this campsite we left a dump of food and fuel for the return journey and the fine weather prompted me to bivouac outside, away from the claustrophobic confines of the tent. This plan backfired however, as the onset of rain forced me to hop like mad for the tent's now welcome cover. Again our start was delayed by whiteout and bad weather. Meantime, I discovered a new pastime - trimming my growing beard with the scissors on my Swiss Army Knife - very absorbing!

When at last the weather cleared, we were able to proceed quickly, zig-zagging to avoid large crevasses as we pressed upwards towards our first distant sight of Lauper Bjerg. A perfect surface sped us downhill before an extended slog to the highest point of the ski-tour. It was the coldest point too, ferocious winds channelled up to the col and made progress energy-sapping and created an awkward wind-pressed surface. At the high point exhilarating views of Lauper Bjerg and the rest of our route to the north made up for the days of frustration and stop-start travel. So, tired but excited, we began the descent of a large ice-fall.

This had been a long day of hard, tense work and the frayed tempers of the 3-4 hours of descent were to become typical of the underlying moods within our small group over the next few weeks. Rarely did they surface and, although I felt it was to our credit at the time, with hindsight it is clear that suppressing these thoughts served only to magnify the depth of emotion. It would have been far more constructive to air criticisms soon after they arose. At no stage did we have a discussion about how we were getting on as a group and I am sure much could have been gained from the occasional civilised chat in the warmth of the tent over a hot mug of soup.

The three of us pulled only two pulks, giving each skier one hour in three to lead with little hindrance. The advantages were clear - he could help either of his sledge-laden colleagues in difficulty over rough ground and ski on ahead to choose our route carefully and break trail. Contouring becomes an invaluable skill when towing a heavy pulk, even small local undulations are avoided, being both time consuming and tiring.

Stuart was not as confident a skier as Graham or I and would often fall behind. Doubtless this must have annoyed him but equally annoying to us was his tendency to lead with little of the aforementioned consideration for the pulk-bearers. Both shortcomings were evident on this descent as Stuart struggled to control his pulk as we picked our way through ominously gaping crevasses. Despite being my turn to lead after 2 hours of uphill grind, I took the pulk from Stuart to speed our progress. He happily agreed but proceeded to anger Graham and myself by ignoring the difficulties of turning with three meters of traces and pulk in tow and choosing his route with abandon despite our concerns about slender snowbridges.

As the gradient lessened and we left most of the worst slots behind, we relaxed and made good speed for an hour before embarking on the now familiar routine of digging a level platform in the snow to pitch our tent.

The following day, Thursday 23rd July, we made good progress all the way down to Glacier De France. At this stage we had in fact made a route-finding error although it proved to be beneficial. The planned route cut a corner by skiing over a col which showed little height to be gained on the map. However, as mentioned before, many of the ice levels have changed dramatically since Gino Watkins' 1932 British Arctic Air Route Expedition first surveyed the area. None of the cols we passed showed the expected height difference and we were soon on Glacier De France without immediately realising it.

Here, a new and interesting obstacle appeared. Going further north and inland, the glaciers were becoming drier and here we encountered our first meltwater stream cut two metres below the surface of the glacier and with a two metre wide stream rushing between its icy banks. Rather than ski a long way upstream and off course to where we might be able to jump the stream, we decided to tackle it there and then, cutting steps into the bank before leaping

across, hoping that my twin ice-axed lunge would hold me and prevent me from suffering an unpleasant immersion. The successful jump also provided a lesson as to the hardness of frozen water as I cut open the palm of my hand in the course of landing but after scrambling up the far bank we were able to manhandle the pulks across.

After a day's sleep at a beautiful campsite in the middle of Glacier De France (we had reversed our life-cycle in order to take advantage of the better skiing conditions at night), the following night found us becoming proficient at leaping meltwater streams and making sure we kept up enough momentum to carry the pulks across rather than have them drag us back into the freezing water. We also learned to consider all options as far as traction was concerned. Boots, crampons, skis or skins? With a light covering of snow on crystals of ice, we were much better off without the encumbrance of either skis or crampons, especially when it came to taking running jumps at those streams.

This was followed by a couple of miserable half days involving carrying the pulks over a huge lateral moraine across our path and moving one campsite in a hurry as snow turned to sleet and rain and the surface of the glacier around us into a river! At last, and travelling in whiteout, we reached the corner of the Lauper Bjerg massif. Despite this, morale was low with Graham in particular being grumpy and my naive efforts to jolly him out of it only making matters worse.

However, as if to herald our entrance to the north facing horseshoe that was our gateway to the mountain, wonderful crisp weather greeted us the next morning and was to stay with us for most of the remaining part of the expedition. We rapidly rounded the corner for our first close-up views of our goal and the route by which we hoped to attain it - a subsidiary ridge towards the eastern side of the mountain linked to the actual summit massif itself and its east ridge by a col. Having decided upon a change in our planned route because of some unpleasant looking avalanche chutes and near vertical ice-bulges, we skied onward to the foot of the mountain and our final campsite. Eager and fresh after a couple of days' light work, we sorted out our climbing equipment and prepared for the climb, allowing time for the mountain to come into better condition after the recent poor weather.

The following evening we skied to the foot of our chosen route - a subsidiary ridge further to the north-east leading to the col from where either a route onto the east ridge could be taken or a ridge round to the north could be tackled directly - and spent some time in wonder at the sun setting over the myriad mountains of Schweizerland, playing brilliant tricks of shadow and golden red light on the crevasse-riddled hub of Femstjernen, the "five-star" in Danish, a tortured turmoil of momentous icy forces where three glaciers enter the arena and two grind their way onwards towards the coast.

As we started to climb, three on a rope over easy mixed ground, our view of this most impressive glacial feature improved as did our glimpse of routes to the north, the snow-capped dome of Mount Forel and the inland ice-cap fuelling dreams of adventures to come after the climb on Lauper Bjerg.

The top of the subsidiary ridge was reached without event but after traversing its spectacular knife-edge and realising that the descent to the col was to be quite involved, Graham magnanimously decided to return to leave Stuart and I to complete the climb faster, and therefore safer, as a rope of two. Somewhat ambivalent about him returning to the camp alone and with mumbled comments about when to let off our emergency distress beacon should things go awry, Stuart and I abseiled to the tiny col separating the subsidiary ridge from the summit massif, on one side a rapid descent to the narrow glacier coming out of the heart of the mountain, on the other a shear drop to the violently scarred beauty of Midgard Gletscher leaving Femstjernen behind.

Then followed a most enjoyable period of mixed climbing with Stuart and I moving quickly up a broad ridge. We had to continue thus to the summit itself, but precarious overhanging ice-bulges persuaded us to cross the summit snowfield and finish off the route via the easy

latter stages of the east ridge.

Some 20m from a rocky stance on the east ridge and safety, disaster struck as a soft crunch and a hiss of sliding tons of snow almost nonchalantly noted the start of a ferocious avalanche which was to snatch us brutally from the mountain within sight of our goal. I don't know how long we fell but it seemed an age and encompassed a kaleidoscope of emotions. The terrible realisation that death was imminent, guilt at leaving loved ones thus, exhilaration at flying free-fall, desperation as I tried to force all my weight onto my axe as it scraped and bounced uselessly over a mountainside of solid ice as I fell and fell.

At last, with a soft thud, I knew it was all over and that, for now at least, I was safe. I was in a large crevasse filled with what must have been debris from previous avalanches and, as the dregs of our white conqueror fell ignominiously on my head, I maniacally scrabbled out of its grasp and slithered down with a wince of pain as I twisted my injured knee.

Quickly trying to compose myself, I thought of Stuart and, looking up, saw only his hammer, obviously ripped off the back of his sack, sticking like a tombstone in the snow. Hauling my way up the rope between us past a deep cut that had almost severed our umbilical cord, I reached a snowy bank of densely packed avalanche debris and started digging, throwing the snow behind me and dreading what I might find. Muffled groans allayed my worst fears as I uncovered his face, lips and nose blue through lack of oxygen. At last Stuart could breathe but he kept on chanting, "chest, chest, chest....". I asked if anything was broken : "chest, chest, chest....". He was in a state but would be alright. I got him right out and together we slithered down. A DF118 to kill the pain in his chest made Stuart feel so sick that we decided to stop treatment and after five hours huddled together to keep warm and recuperate, we set about our slow descent.

Proceeding very slowly, we belayed each other gradually away from the further avalanche danger which was probably more imagined than real. I was forced to abseil a couple of icy sections as my crampons had been broken in the fall.

Several hours later we came to a point a couple of abseils above a rocky gorge leading to the glacier and a long but safe plod back to Graham. We had been forced to cut and tie the rope where it had frayed in the avalanche and on the first abseil this knot got stuck and we simply could not pull the rope free. Undoubtedly I had survived the avalanche better than Stuart but we were both exhausted so I was greatly relieved, not to mention humbled, when he selflessly offered to prussik up to resolve the situation. This episode over, we abseiled again and picked our way through characteristically crumbly rocks to the glacier below.

Ahead lay a long snow plod and although our main concern was to prevent Graham letting off the "Locat" safety beacon, 36 hours struggling with the mountain had taken its toll and it took us much longer than we expected. Eventually, though, my shrill whistle blasts were answered and, after a couple of false alarms, we spotted the tent and redoubled our efforts to reach the comfort and safety which it represented.

Graham skied out to meet us some 50 yards from the tent and we greeted him like long lost relatives, almost overcome with the emotion and fear of the last 48 hours. At first I had thought we had been quite brave but later I realised that we had been lucky to survive and had simply done what we had to whilst Graham had gone through hell as he contemplated our fate and his responsibilities as leader should the worst have happened.

Thankfully, this was behind us now but dreams of skiing further north were out of the question as we planned to rest for two days before returning to basecamp. Graham nursed Stuart and me with food, drink and loving care while I tended painful burns on my arms sustained during my attempts at self arrest.

At last, on July 31st, we headed for home. Curiously, it was on this day that we saw our very first star of the expedition - a welcome sign indeed as friends and family at home could see it too. Venus had arrived to guide us back and she certainly lifted our spirits. But, for two days,

I was miserably low. My arms hurt incessantly, and just when I was getting into a skiing rhythm, an awkward wave of sastrugi would jar my knee painfully. We had failed to achieve our major objective and were now simply retracing our steps. I got down and got annoyed with myself for getting down. During this time, Graham was a tower of strength, declining his turn to rest from pulk-pulling and gradually cajoling me out of my gloom so that on the third day I began to enjoy the skiing again.

We retraced our two weeks fitful outward journey in just six days, finally returning to a green fjord-side resplendent with colour and sound to bombard our deprived senses. It also held the promise of vast quantities of chocolate in our well hidden stores but the mosquitoes were out to greet us and we were soon planning our next trip!

A couple of days' rest before we trekked to Kungmiut in the hope (forlorn though it was to be) of mail and thence to scientific work gave us time for quiet reflection as the dust settled on the events of the past four weeks. The marriage of near success with near disaster taught many lessons that a quick ski-tour and easy, untroubled ascent would have failed to do. So, despite the disappointment of failing to achieve our stated goal, we had returned to the newly verdant Tasilaq valley enriched by the experience and far wiser, the apprehension and temporary dulling of ambition which inevitably accompany accidents giving way to a still keener desire to seek adventure again.

Nigel Topping.

APPENDICES

A. Medical report

The job of medical officer was not a taxing one as expedition members maintained good health throughout our time in Greenland. The problems that did arise were easily dealt with thanks to the excellent First Aid Kit put together with the help of the Department of Community Medicine at Cambridge University to whom we are most grateful.

The few problems that did arise and their treatment are listed below :

Mosquitoes

Apart from confinement to the tent, retreat to high glaciers, heavy clothing and running around were all successful measures. The "Jungle Formula" insect repellent also worked well.

Blisters

Long days skiing almost inevitably took their toll and we used the tried and tested method of piercing and applying Iodine paint immediately and then twice daily thereafter. Though temporarily (and excruciatingly) painful and certainly not recommended by any first aid book ever seen by the author, this was completely and rapidly effective.

Sun

We used Nivea Sun Block (factor 15) rather than expensive "glacier creams" which are actually not as strong (factor 7-8). Lip-salve helped prevent chapped lips.

"Nappy rash"

Sweating whilst skiing and walking caused occasional tenderness between the buttocks. We treated this with the only powder we had - fungicidal foot powder - and this worked very well.

Pain killers

After the avalanche Stuart was in great pain during breathing. This was probably due to muscular damage caused by a blow to the chest during the fall and was treated with one DF118 tablet. This did reduce the pain but the nauseous side-effect was so pronounced that we decided against continuing this course of treatment.

Antibiotics

During the avalanche Nigel sustained burns/grazes to three large areas on his forearms and elbows. These soon became badly infected so courses of flucloxacillin and ampicillin were taken. This was extremely effective. Within one week, the wounds had very healthy scabs on them.

B. Food

Of most interest to future expeditions may be our sledging rations :

<u>Item</u>	<u>Net weight per man day (g)</u>	<u>Kcal per man day</u>
18 sugar cubes	70	275
Porridge oats	63	250
Dried milk	40	170
Chocolate	80	580
Granola bar	110	400
Mixed fruit & nuts	75	350
Soup	20	-
Pasta / rice	70	250
Dehy' / dried egg	75	360/420
Margarine	107	800
3 digestive biscuits	50	240
1 fruit bar / half tin sardines	50/80	188/240
TOTAL (min / max)	810/840	3863/3975

Notes :

1. "Dehy" consisted of a number of brands ranging from flavoured and textured soya to "veggie" bangers and burgers. To the latter were added three spoonfuls of dried egg.
2. Taking different brands and types of chocolate, granola bars, mixed fruit and nuts, biscuits etc. added considerable interest to our diet. We were unable to buy the required quantity of ships biscuits ("skibskiks" in Danish) on arrival in Angmagssalik but this is not normally a problem.
3. Tea, coffee and instant horlicks were also taken - the latter proving particularly popular.
4. A wide range of condiments, spices, herbs and dried vegetables made main meals considerably more varied and palatable than often seems to be the case with expedition cuisine; in the case of the soya they were judged to be high on essential.
5. Discounting the egg, the expedition was vegan, albeit unintentionally, but still ate well.

On reflection, a number of small changes to our diet were considered :

+ 43g margarine	:	+320 kcal per man day	
+ 30g biscuits	:	+160	" "
+ 40g chocolate	:	+290	" "
+100g misc. sweets	:	+400	" "
- 50g fruit bar / 80g sardines	:	-188/240	" "
- 30g mixed fruit & nuts	:	-175	" "
+133/103g	:	+807/755	" "

Amongst the comments made regarding our diet were :

1. Instant dried mash could have been taken to provide greater variety, 70g providing approximately 225 kcal compared to 250 kcal for rice or pasta.
2. Sugar cubes were by far easier to use away from basecamp.

3. Cinnamon in the porridge would have helped at times.
4. Empty dried milk bottles are by far the best solution to the problem of inertia in tents during bad weather although their capacity might be called into question!
5. Sweets and perhaps the occasional luxury would have made a big difference morale-wise.

Particular thanks are due to Anthony Day who put in a lot of work in devising our rations and whose imaginative ideas made eating at basecamp quite an experience - the highlight was jelly made using a billy placed in a stream feeding off a glacier as our fridge! It was a pity Anthony, long nicknamed "Antoine" due to his creative flair, missed out.

C. Fuel & stoves

Optimus 111T Hiker Stoves were used throughout the expedition due to their reliability. Wooden bases were made for the stoves since their bases can get extremely hot. It seems that priming tablets are no longer available for purchase in Angmagssalik and the alternative, paste, is often in short supply in the settlement's KNI store if it can be found at all.

Paraffin was used for fuel. It is readily available at the petrol station in Angmagssalik (and the other settlements in the area). Suitable fuel containers for large volumes were found in the KNI store. We used litre sigg bottles and sturdy squash bottles for the sledging trip.

D. Packing and basecamp arrangements

For shipping to Angmagssalik in Greenland via Harwich and Aalborg in Denmark, food and kit was packed in cardboard boxes and plastic building aggregate bags before being put into six tea-chests. The contents of the tea-chests were mixed so as to reduce the risk, for example, of losing all of the sledging rations should one chest go astray. For customs and insurance purposes, contents lists for the chests had to be given to the carrier. This information was needed for our own purposes anyway.

Sledging rations were packed into 4 man day bags and then double-bagged into plastic building aggregate bags. Anthony Day's departure obviously caused a few problems but the weekend spent packing in the UK was most definitely not wasted.

Whilst not wishing to make generalisations about the local population amongst whom we have several very good friends, expeditions even remotely near settlements must take every precaution against having their supplies and equipment stolen or eaten by arctic foxes if they are to leave the basecamp area for any length of time. Previous expeditions based at Tasilaq Fjord (e.g. in one particular British expedition in 1986) have had their supplies stolen - the time we spent burying the tea-chests etc. under moraine and in a different cache a few hundred meters away was well spent as subsequent to the ski-tour we learnt that there had been a number of "interested visitors" to our basecamp.

E. Logistics

No two expeditions are the same but a few points regarding our experiences might be made :

1. Shipping : the task of arranging the shipment of a few hundred kgs of supplies and equipment from London to Angmagssalik, E.Greenland, (via Esbjerg and Aalborg in Denmark) seemed quite daunting at first. It was made comparatively simple, however, by contacting an experienced carrier - United Baltic Corporation Ltd. - who arranged everything and paid for the cost of shipment from London to Aalborg. The outward freighting route was as follows :

London-Harwich-Esbjerg-Aalborg (Grønlandshavnen, DK 9220 Aalborg Ø.)-Angmagssalik

United Baltic Corporation Ltd. arranged for the shipping of our freight to Aalborg by DFDS Ltd.. From Aalborg, it was transported to Greenland by Kalallit Niuerfiat (Greenland Trade). Freight is held at the harbour until freight charges are paid. Return freight charges can be paid for at the harbour office in Angmagssalik.

Freight rates and sailing schedules can be obtained from :

The Greenland Trade Department (Grønlands Handel), Kalallit Niuerfiat (KNI) , Shipping Department, Grønlandshavnen, DK 9220 Aalborg Øst, Denmark.

It should be emphasised that the arrival of freight in Angmagssalik can be delayed by adverse ice conditions. The first ship does not reach Angmagssalik much before the last week in June.

Import regulations can be obtained from :

The Greenland Trade Department (Grønlands Handel), Kalallit Niuerfiat (KNI) , Head Office, P.O. Box 130, DK 3900, Nuuk, Greenland.

Useful addresses :

United Baltic Corporation Ltd., Baltic Exchange Buildings, 21 Bury Street, London.

2. Flights : the expedition flew to Greenland on scheduled flights via Iceland. Problems regarding excess baggage charges Heathrow - Keflavik were sorted out with the help of Geoff Sammons, Twickenham Travel. Geoff also negotiated with Icelandair to lift the one-month restriction on APEX tickets. The expedition transferred by bus from Keflavik to Reykjavik and took a regular flight on Odin Air to Kulusuk in E.Greenland. Excess baggage will be charged on this stage of the journey. Relevant addresses are found in literature available from the Expedition Advisory Centre.
3. Kulusuk - Angmagssalik : if weight is a problem, chartering a boat from the nearby settlement of Kap Dan may be the best solution (boats can tie up at a quay near the airport buildings) but taking the helicopter will be quicker, easier and, quite probably, cheaper.
4. Transport to basecamp : it is quite easy to charter boats from hunters in Angmagssalik, particularly if someone is able to speak Danish or Greenlandic, but it should be noted that this can be very expensive due to local regulations. Fortunately, our expedition had prior contacts. If an expedition is to be based in the region of one of the smaller settlements, it is possible to ship equipment, supplies and personnel to these settlements on KNI ships, and then charter a smaller boat from there. Whilst this method of transport is obviously less flexible, it might prove cheaper and is perhaps the most reliable way of travel back to Angmagssalik late in the season (information on prices etc. available from the KNI office in Angmagssalik).

F. Equipment

The expedition took normal climbing and mountain ski-touring gear in addition to three fibre-glass pulks. Two pieces of equipment, however, were designed and made especially :

1. Sledging harnesses : as a result of previous experience it was decided to use our rucsacs as harnesses. The method we used to attach the former to the pulk traces was simple - a belt 1200mm long and 25mm wide made out of tubular sling tape was passed around each rucsac just above the hipbelt and tightened. Two attachment points (also made out of tape) were sewn onto the belts. The pulk traces were either clipped into these attachment points using lightweight karabiners, or by means of short loops of prusik cord passing through the belt attachment points. These methods become clearer on reference to the diagram below which shows the design of the pulk traces. Although we had no problems, it should be noted that

using our rucsacs as harnesses imposed greater wear and tear on them, necessitating occasional maintenance. Care had to be taken to ensure that the belts did not slip down towards our rucsac hipbelts, thus running the risk of the latter being cut into. The expedition would like to thank Roger Withers at Wild Country / Wintergear for his help in designing the belts and for arranging for them to be made.

2. Pulk traces : folding traces can be bought from Fjellpulken (Norway) or Highland Guides (Aviemore), but being made of fibreglass, these snap very easily. Since we were to have to negotiate a number of crevasse fields, ice-falls and melt-water streams, it was decided to build our own one-piece traces out of angled pressed mild steel. Aluminium alloy would have been better but is considerably more expensive. Precise design of traces will depend upon the chosen method of attachment to the skier, length limitations imposed by the method of transport of equipment to the expedition area and so on. Our design, with due regard to towing efficiency, was as follows :

NB. Welded joints and mild steel may become brittle at low temperatures. This was not a problem for us given the time of year we were travelling at. Since the expedition, Snowsled (Workshop 4, Street Farm Workshops, Doughton, Tetbury, Gloucs, tel. 0666- 504002) have started marketing high quality and extremely durable pulks, harnesses and traces. The only problem is their expense.

A particular debt of gratitude is owed to Simon Williamson who made the traces in his own free time. The traces coped admirably with the extreme demands placed upon them - the problems we had were of our own making!

G Safety precautions and insurance

A Locat Safety Beacon was taken (by hire agreement with Emtrad Ltd. - see below) on the expedition in case of an emergency which demanded rescue by air. A number of flares were taken for signalling purposes if the need arose. Although it was extremely unlikely that we would encounter any polar bears given the time of year and location of the expedition operating area, a firearm was obtained locally. The flares served a second possible purpose, along with the thunderflashes that were also taken, i.e. that of scaring bears away. The flares etc. were supplied by Pains-Wessex Schermuly.

After leaving the expedition area and arriving back in Angmagssalik, the expedition heard of an expedition that had headed further inland and had had to be rescued. This expedition had also taken a Locat Safety Beacon but by taking the beacon into a snow-cave, had apparently made precise location by the rescue party difficult.

The Danish and Greenlandic authorities require all expeditions to take out insurance policies covering the cost of possible search and rescue. Our insurance was arranged through M.J.V. Housley Ltd. (see below)

Useful addresses :

Michael Housley Ltd., Barclays Bank Chambers, 99-101 Commercial Street, London.
Pains-Wessex Schermuly, High Post, Salisbury, SP4 6AS.
Emtrad Ltd., William Wright Dock, Hull, HU3 4PG.

H. Budget

INCOME :	£
SPONSORSHIP & PERSONAL GRANTS	2705
PERSONAL CONTRIBUTIONS	2279
TOTAL	4984

EXPENDITURE :	£
TRANSPORT	2835
FREIGHT	215
FOOD	228
EQUIPMENT	905
INSURANCE	390
MEDICAL	42
FUEL	19
ADMIN. incl. FINAL REPORT (est.)	350
TOTAL	4984

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Allcord Ltd.
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Dalgety Spillers Food Ltd.
Davenport Vernon Holdings Ltd.
The Donald Robertson Travel Fund
The Douglas Heath Eves Charitable Trust
Equity and Law
Europa Sport
Garrick Foods
The Gilchrist Educational Trust

Modern Health Products Ltd.
David Mordaunt
The Mount Everest Foundation
Ove Arup Partnership
Pains Wessex Schermuly
Pam and Gerald Parham
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The Realeat Company
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Revlan Group
Robinson College Travel Fund
Rowntree Mackintosh Plc.
Rowntree Sun-Pat
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Swindon Rotary Club

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Kent Industrial Measurements Ltd.
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Lyon Mountaineering Equipment
Mainair Sports Ltd.

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Dr. A. Wright

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