



## SCOTTISH ARCTIC CLUB

*To Encourage Adventurous Endeavour and Interest in the Science, Culture and Protection of the Arctic*

### Newsletter - February 2022

*President: Stella Spratley*

*Vice Presidents: Susie Ranford, Noel Williams*

*Secretary: Iain Allison, Treasurer: Chris Calver,*

*Committee members: David Broadhead, Chris Gilmore, Fraser Melville, Jennifer Newall, David Stone, Aythya Young*

[www.scottisharcticclub.org.uk](http://www.scottisharcticclub.org.uk)

*New members are welcome: the Club is for people of all ages and nationalities who have an interest in the Arctic, particularly if they have already been, or are planning to travel there. See the web site for an application form.*

### From the President

It was fantastic to see so many people at the Gathering in November, in real life, face to face. So many good chats. It was also good to see such a superb array of talks, all from within our membership. Many thanks to all. Hopefully we have an Attadale meet, solstice meet and a Greenland trip to look forward to. Fingers crossed.

And now to some urgent business. WE NEED A NEW SECRETARY. Please save Iain! He has done way more than enough. Please get in touch. We plan to divide the role up as much as possible. We have already separated the newsletter from the secretarial role. We also plan to make the organisation of the Gathering a separate role. I am sure that Iain will be happy to discuss the role with anyone interested.

Hope everyone is fit and well,

Stella

### From the Editor

This is another bumper issue. For such a small club, we are wonderfully prolific in print.

In this issue we have an article by Bryan Alexander on the last nomads of the Chukota Peninsula with some stunning photographs.

During COP26 the New York Times described Myrtle Simpson as possibly the 'coolest person on the planet'. I disagree – I think she is **the** coolest person on the planet. She gives an atmospheric account of her involvement.

Then something different: Hugh Mackay has produced the report of an Edinburgh University East Greenland Expedition in 1982 in electronic form. It's long but of great interest, and since the newsletter is sent out almost exclusively by e-mail it was thought that it would be a good idea to include it.

This sets a precedent – would other members like to submit old expedition reports? The newsletter could be a useful archive medium.

I am always looking for contributions, so please send them to me at [chris.gilmore@glasgow.ac.uk](mailto:chris.gilmore@glasgow.ac.uk).

## Gathering & Supper 2022

Date: Saturday 5<sup>th</sup> November 2022

Venue: Carrbridge Hotel, Main Street, Carrbridge PH23 3AB

contact details: web - <https://www.carrbridgehotel.com>

telephone - 01479 841202

email - [enquiries@carrbridgehotel.com](mailto:enquiries@carrbridgehotel.com)

Costs: Bed & breakfast - £44.50 per person per night sharing a double/twin room  
£49.50 per person per night sharing a double/twin room  
Dinner - £25.50

As usual, a number of members will gather for dinner on the Saturday evening. We anticipate the event to proceed as for the past few years with the Gathering at 2.00 pm followed by the brief AGM at about 5.30 and the Supper at 7.30.

For now, please book your accommodation with the hotel.

We anticipate returning to the Ben Nevis Hotel for November 2023.

Iain Allison

## Not the Sunday Walk



Although the committee has decided to discontinue the Sunday walk after the Gathering, nevertheless, members took advantage of the good weather to do some local sight-seeing on their way home. This photograph of Loch Arkaig is from Elizabeth and John Hay.

## Scottish Arctic Club

### Annual General Meeting 2021 (DRAFT, not yet approved)

**Minutes of the AGM** held on Saturday 20<sup>th</sup> November 2021 at 5.26 pm with Stella Spratley, President, in the chair and 39 members present.

Apologies for absence were received from: Siggí Adalsteinsson, Anne Bartle, Chris Bartle, Ashley Buchan, David Broadhead, Helena Dejak, Brigitte Grossmann, Hans-Peter Grossmann, Edda Loesch, Frank Loesch, Peter Mackay, Fraser Melville, Barbara Nelson, Peter Nelson, Jenny Newall, Chris Ravey, John Thorogood, Evelyne Wells, John Wells, Angela Wolle, Heiko Wolle.

The president began by welcoming members to this AGM held in person after the restrictions of the past two years.

1. **Minutes of the virtual AGM of 14<sup>th</sup> November 2020**, which had previously been circulated, were proposed as an accurate record by Chris Calver.

2. **Matters arising.**

There were no matters arising not already on this year's agenda.

3. **The President's Annual Report**

In her brief report, the President highlighted the Attadale Meet which went ahead but in the autumn rather than the spring as the only activity in 2021, since the Solstice meet had been cancelled. The Anniversary Expedition to Tasiilaq will now go ahead in July 2022. She extended the Club's very grateful thanks to Chris Gilmore for producing the 50<sup>th</sup> Anniversary Journal which was very well received by members. Her report is appended to these Minutes

4. **Membership Report**

The secretary reported that the membership was fairly stable from year to year and stood at just over 170. A report is appended to these Minutes.

5. **Treasurer's Report**

Chris Calver stated that he had transferred £600 to the Expedition Fund being the sum, rounded up, of donations received with the annual subscription and the excess income from the Attadale meet. In 2020-21 expenses had been greater due to the production of the Journal. However, with a bank balance approaching £5000 he saw no need to increase either the subscription nor the Gathering fee. He was pleased to see that many payments were being made by 'Faster Payment/BACS'.

6. **Scottish Arctic Expedition Fund (SAEF)**

The President asked the chair of the trustees of the SAEF to comment on this item. Kathleen Cartwright reported that the fund stood at about £15,000. Donations this year had been boosted

by a grant of £5,000 from the Wallace Trust (Bill Wallace was one of the founder members of the Club) and from Myrtle Simpson's suggestion that donations in memory of Hugh Simpson be sent to the Expedition Fund. This February, four grants were awarded for a total of £3000 and all were postponed to 2022. Three of the grant recipients for 2020 have also postponed their expeditions to 2022. The SAEF accounts are attached to these Minutes.

### **7. SAC website and social media**

Susie Ranford continues to maintain the Club's website which requires little intervention. The Club has a presence on both Facebook and Twitter and Susie asked for a show of hands of those who use social media; a minority of members present! If anyone has any ideas on how we can increase our reach with social media they should contact Susie.

### **8. Election of new Committee members**

Hans-Peter Grossmann is the only committee member demitting office this year. As we brought the newsletter editor onto the committee we consider that the committee is large enough. The Treasurer, Chris Calver, is elected annually and is willing to stand for one more year. At the next AGM he will have served for 10 years and feels that it is appropriate that he stands down then. The search for a new secretary is making some progress with a volunteer thinking about it. Iain Allison is willing to continue in the meantime especially with the Anniversary Expedition still in progress but wishes to give up at the next AGM. The committee is looking at the distribution of roles covered by the secretary. The production of the newsletter has been taken over by Chris Gilmore and we hope that membership matters can be dealt with by someone other than the secretary. Volunteers are sought!

### **9. Spring Meet**

The President noted, in her earlier introduction, that when attendance at the Solstice Meet dwindled and it was discontinued, it was Kathleen Cartwright who started organising a Spring Meet, initially at Inchnadamph Lodge. The President thanked Kathleen Cartwright for organising these for so long and invited her to comment on the current situation. Kathleen reported that this year the meet was moved from May to September and was fully booked in the three cottages at Attadale. They have a provisional booking for the week of 30 April-7 May 2022.

### **10. Summer Solstice Meet**

The Summer Solstice Meet had to be cancelled. Myrtle Simpson did, however, invite a few friends who gathered that weekend for the usual barbecue and marshmallows toasted round the log fire. As the weekend was so close to the actual solstice, which was on the Monday, Myrtle had organised a visit to the local stone circle where the local landowner, Jamie Williamson, outlined what is known about the archaeology of the site. She is looking forward to hosting the Solstice Meet in 2022 at Farleiter on 24/25/26 June. This weekend offers opportunities for walking, canoeing and swimming as well as excellent gastronomy.

### **11. Annual Gathering and Supper 2021**

The committee has suggested that the Ben Nevis Hotel be booked for 2023 and that the Club looks

for a different venue for next year. We will attempt to hold the Gathering & Supper on the first or second weekend in November and a number of potential hotels have been suggested.

## **12. Any other business**

1. The President thanked Chris Calver for making a Solander box for the 18<sup>th</sup> century, first edition in English, book by Hans Egede on Greenland, presented by an anonymous donor.
2. A bottle of Shackleton whisky was donated by Louise Hollinrake?? The President suggested it be auctioned and asked for sealed bids to be handed to her.
3. The trustees of the Expedition Fund and the committee have decided that there will be a special award for self-supported expeditions to the Arctic to be named the Myrtle and Hugh Simpson Award. It will be a grant up to £3000 and will only be awarded if the more stringent criteria are met.
4. Insurance for activities in polar regions has been discussed recently among members going on the Anniversary Expedition. Some members, of a certain age, have found difficulty in obtaining insurance. A number of organisations were mentioned but we seek members' information on potential companies.

The AGM closed at 5.52

Iain Allison 25 November 2021

## **President's Report for session 2020-2021**

Before writing this I looked back at the report I wrote last year. It mentioned the postponement of our 50th anniversary trip to Greenland. Well, we've done it again . . . Hopefully we will finally get to Greenland in 2022. Third time lucky. The solstice meet also had to be cancelled this year, though a few of us did meet up. But the Attadale meet did take place, having been postponed until September. Hooray! As I write this I am looking forward to seeing people face to face again at this year's Gathering. Everyone will have received their copy of our 50th anniversary journal (a fine publication, many thanks to Chris and all involved) and finally we'll be able to mark our anniversary by gathering to hear tales from across the years. Thanks to all club members who have kindly agreed to speak.

And finally thanks to all committee members. It will be good to see them in person rather than via zoom.

Most importantly, I hope that everyone is fit and well after another strange year.

Stella

## **SAC Membership Report**

### **Membership at 31 August 2020**

Number of members: 173

Number of new members: 5

Number who resigned: 2

Number of deceased members: 3

### **New members**

Simon Fraser

Eve MacCallum  
Remco Schellingerhout  
Simon Tietjen  
Amanda Vestergaard

**Deceased member**

David Talbot, March 2020  
Evelyn McNicol, April 2020  
Hugh Simpson, November 2020  
(Peter Roberts, December 2019)

**Resigned members**

Colin & Jay Whimster

Iain Allison, Secretary 23 October 2021

**Scottish Arctic Expedition Fund (SAEF)**

**SC046857**

**Treasurer's Report: 1 September 2020 to 31 August 2021**

**Balance at bank 01/09/2020 £8853.83**

**Balance at bank 31/08/2021 £15174.27**

**INCOME**

Gift Aid	£533.76	
Donations, auctions, in memoriam	£3763.00	
Amazon Smile Europe Care	£23.68	
Bequest	£5,000.00	
		<b>TOTAL £9320.44</b>

**EXPENDITURE**

Expedition grants awarded (all deferred until 2022):		
Stephanie Carol (SAC Greenland)	£500	
Lucy Hart (SAC Greenland)	£500	
Fraser Melville	£500	
Mark Agnew (Northwest Passage row)	£1500	
	<b>TOTAL</b>	<b>£3,000.00</b>
	<b>BALANCE</b>	<b>£6320.44</b>

**Awards**

Liam Tracy £1,000 Solo 600 km ski expedition in Finnmark  
Tom Litchfield, Hannah Mortlock £500 each  
St Andrews University Mountaineering Club, to join SAC anniversary expedition  
Yvonne Findlay £400 University of Glasgow field trip to Iceland  
Hamish Rodger £700 SAMS/UNIS Glacier fieldwork and skiing, Svalbard  
Flordespina Dodds £600 Whale Wise. Research on humpback whales, Westfjords, Iceland

SCW Fenton, Treasurer, SAEF 3 September 2021 and February 13 2022

## Scottish Arctic Club Committee Meeting 2021 (DRAFT – not yet approved)

**Minutes of the Committee Meeting** held on Saturday 20<sup>th</sup> November 2021 at 10.00 am with Stella Spratley President, in the chair and Iain Allison, Chris Calver, Chris Gilmore, Susan Ranford, David Stone and Noel Williams present.

**1 Apologies** for absence were received from David Broadhead, Hans-Peter Grossmann, Fraser Melville and Jenny Newall.

**2 Minutes of the previous committee meeting on Zoom of 2<sup>nd</sup> November 2020**

2.1 The minutes were deemed accurate and were approved

2.2 Although we had agreed a year ago to invite Holly Gillibrand, a local climate activist, to our meeting, we had not done so and no longer consider it appropriate.

**3 Minutes of the virtual, climate-change meeting of 9<sup>th</sup> November 2020**

3.1 The minutes were approved

3.2 There were no matters arising

**4 Minutes of the virtual AGM of 14<sup>th</sup> November 2020**

4.1 The minutes were approved

4.2 There were no matters arising

**5 Annual reports to 2021 AGM**

5.1 The President's brief report is appended to the Minutes, below.

5.2 The Secretary's report on membership is also appended.

**6 Annual Accounts**

6.1 The Treasurer's report is attached to these Minutes

6.2 The treasurer reported that the balance was close to £5000 and considered that there was need to increase either the subscription or the fee for the Gathering. As the balance is so high, it was suggested that we could pay for an invited speaker for a future Gathering.

**7 Expedition Fund**

The committee noted the accounts of the Scottish Arctic Expedition Fund (SAEF) and that there is currently a high balance of about £15,000 due to exceptional donations in 2020-2021. The grants awarded in February 2021 total £3000 and it is hoped to maintain this figure and this high balance will be used to even out the variable donations from year to year.

The book, a first edition in English of Has Egede's account of Greenland, donated in 2019 by a member, who wished to remain anonymous, has had a new Solander box made for it by Chris Calver which was admired by all. As the proceeds from the sale or auction of this item are to be credited to the SAEF, we left consideration of the best way to proceed to the trustees of the SAEF.

**8 Committee members**

8.1 The secretary's position is up for re-election every year. Chris Gilmore hinted that he was considering it; however, he has now been doing the Newsletter for a number of years and would prefer that someone else take it over. He considers that, with the software system that he uses, the time taken to put it together is just a few hours and if a replacement as newsletter editor is found, he would be more inclined to take over the secretary's role. It was further suggested that a membership secretary could be appointed to take on such matters from the secretary. The discussion continued regarding the period of service for the office bearers and a consensus was that the president, secretary and treasurer should

be in office for 5 years, with no extension, to provide some continuity. The procedures of two other charities were noted with a maximum of 2 years, renewable once, or 5 years also renewable once. There is a need to revisit the Club's constitution. As the secretary had reported the membership numbers, some discussion centred on how best to publicise the Club to attract new members.

8.2 The treasurer is elected annually and Chris Calver indicated his willingness to continue for one further year.

8.3 The President thanked Hans-Peter Grossmann for his service to the Club over these past years. It was noted that, as we had brought the newsletter editor onto the committee, there was no need for a further committee member.

## **9 Spring and Solstice meets in 2021**

9.1 The President noted that the Spring meet at Attadale had been postponed from May to September and had taken place with 16 members. The cottages at Attadale have been booked for 2022, 30<sup>th</sup> April to 7<sup>th</sup> May

9.2 The President noted that the Solstice meet, hosted by Myrtle Simpson did not take place; however a small number of members did enjoy a fire and barbecue hosted by Myrtle and a Sunday visit to a local stone circle where the land-owner, Jamie Williamson, outlined what is known archaeologically about the site. For 2022 the dates are: 24/25/26 June.

## **10 Annual Gathering & Supper 2022**

10.1 For 2022, it was decided to look for a hotel that could accommodate us on either the first or second weekend in November. Carrbridge Hotel, and Duke of Gordon, in Grantown, were suggested and the President has checked the Highlander in Newtonmore.

10.2 For 2023, it was decided to book the Ben Nevis Hotel again.

## **11 Next committee meeting**

It was suggested that the committee meet using Zoom at some point prior to the next Gathering as well as having a meeting at the Gathering.

## **12 Any other business**

12.1 A member suggested that the Club hold a lunchtime meeting for members who preferred to stay overnight. It was noted that the geographical spread of our membership meant that any such meeting would attract few members. It was considered that we could adjust the current annual Gathering to accommodate a lunchtime event as well as the evening Supper and the committee will give this further consideration.

12.2 Insurance for expeditions to the Arctic, specifically Greenland, was raised. This will be mentioned at the AGM to seek out information from members

12.3 The website was mentioned by Susie Ranford, who currently maintains it. She has renewed the annual hosting fee and is about to renew the 5-year domain name subscription. There is no tracking available on the site so we have no idea how often it is visited nor who is visiting. We should get a feel for who uses social media at the AGM.

Iain Allison, 23 Nov. 2021



**Scottish Arctic Club**  
**Treasurer's Report: September 1st 2020 - August 31st 2021.**

Balance at bank 1/9/20 £4,808.95  
 Balance at bank 31/8/21 £4,209.12  
 Reduction in balance for year £599.83  
 At Aug 31 2021 Total money available £4,209.12

**Income**

Subscriptions on Gathering forms/cash	n/a
Subscriptions other dates (BACS and via Secretary)	770.00
Journal sales (inc, postage)	60.00
Gathering fees	n/a
Donations (other dates transfers/cash)	28.00
Attadale Meet 2021	3234.00
Heiko Donation ( SAEF)	100.00
Total	<u>£4192.00</u>

**Expenditure**

Office/Committee (inc. journal postage)	504.97
Journal Printing costs (inc. extra copies)	1093.00
Attadale Meet 2021 (total rent for cottages )	2950.00
Heiko Donation SAEF (16/11/20)	100.00
Website	£143.86
Total	<u>£4791.83</u>

Reduction in balance is £4791.83 - £4192.00 = £599.83

**Notes:**

Website The 2020/21 registration was paid in November 2020.  
 The office expenses include the 50yr Anniversary Journal + post and packaging.  
 Production and distribution of the most fascinating and excellent Journal was approximately 50% covered by income, hence the minor reduction in our balance, which is picking up with subscription income.  
 The SAC received donations totalling £28 during the year.  
 Due to Covid there was no Gathering, supper or Attadale meet in 2020.  
 Attadale 2021 took place in September. A surplus of £472.08, will be transferred to the SAEF, and will appear in the 2021/22 figures.  
 More faster payments and standing orders are now in place. 'Faster Payments' usually imply using cards at bank branches or over the internet.  
 The SAC has sufficient funds to cover its normal activities during the remainder of 2021 and for 2022.  
 As a final note: **Balance at Bank at 15/09/2020 £ 4712.12**

Chris Calver, SAC Treasurer 22/10/2021

## Myrtle Simpson: My Cop26

The phone rang. 'David de Rothschild speaking'. Oh, I said, 'I've heard that name somewhere before'. 'I'm the heir' he said 'speaking for Cop26'

He explained that the Arctic was to be a prime issue. A special Hub had been set up, to tell the World that we had to move. We are very nearly too late. The high Arctic is getting too hot. The resulting thaw will cause disaster.

He and his team were looking for a Nansen, Amundsen, a Wally Herbert. But they were all dead. They wanted someone who had travelled on the ice at a high latitude. My name came up as Hugh. Roger Tuft and I had reached 84°N on our attempt to reach the North Pole.

David urged me to come down to Glasgow to tell COP26 the facts. To show slides of our journey and the reality of Global Warming.

When I made difficulties he solved all problems and suggested I bring a pal. So Rory, [youngest son], came as my Sherpa.

The organisation was incredible. The thousands of Protesters corralled in the street. The World Delegates whizzed to destinations. Friendly police, all with Irish or Welsh accents, directing Rory and me to our Hub. My large label round my neck marked 'Speaker' opened all doors, cups of coffee and smiley faces. The area of westend Glasgow turned into a cultivated site.

Everyone we met was Someone. As we waited my turn to speak, I noticed a Greenland face. A young guy showed pictures of his family, dog sledge, kids playing in the snow, 'All gone' he gestured. the tide had come in, the sea risen and their way of life destroyed.

We all listened to each other: we wanted the same thing. Everyone searching for answers and intrigued by ideas.

A guy showed a video of himself swimming for 5 consecutive days across the Pole. An elderly American woman who dived deep under the ice told us all the reefs were dead. Scientists, from Geologists to Botanists to marine Biologists proved what we were doing to destroy the Northern World.

But there was light beyond all this. We could all work together AND save THE world. The atmosphere was optimistic. No one was arguing. No feeling of self-rightfulness. Or doom and gloom.

As I climbed back into my covid free bubble in the Gorms, I felt so privileged to have been at COP26. Incidentally, thy loved my slides. I do feel I kept the flag flying for the SAC!



## **The 1902-04 Scottish National Antarctic Expedition of William Speirs Bruce and its Geological Collection.**

**Iain Allison**

The centenary of the death of William Speirs Bruce occurred on the 28<sup>th</sup> October 2021. Regrettably the Club did not record this anniversary in any way so perhaps this note will partially make up for it. I came across his name earlier this year in an article in the Scottish Journal of Geology by Silvia Carrasquero, curator of the Museo de La Plata, in Argentina. An earlier, 2017, article in the Scottish Journal of Geology discussed the geological work of the Scottish National Antarctic Expedition (SNAE). This article was written by Philip Stone of the British Geological Survey in Edinburgh and details the notebooks and specimens from the SNAE now in the care of the National Museum of Scotland. Subsequently, there followed correspondence between Carrasquero and Stone who encouraged her to write about the geological collection in the Museo de La Plata. This collection of rocks from Laurie Island, South Orkney Islands, was donated by Bruce to Francisco Moreno, the director of the Museo de La Plata, to whom Bruce had written requesting assistance in his negotiations with the Argentinian government about their taking over his meteorological station on Laurie Island. That small collection initiated the museum's Antarctic collection. Bruce's observatory was called Omond House, after Robert Traill Omond, the first superintendent of the weather station at the summit of Ben Nevis where Bruce worked for almost a year in 1895/96. The Argentine government did, indeed, take over the running of the station Bruce had established and the Orcadas Antarctic Station continues to operate to this day.

Silvia Carrasquero's article appeared in the first issue of the Scottish Journal of Geology for 2021 and a short discussion of it by Philip Stone was published in the second issue shortly after Bruce's anniversary. Following publication of Dr Carrasquero's paper, I wrote to her to say that within the Club, his name and reputation had not been forgotten and I mentioned Iain Smart's donation of his Polar Medal to the RSGS in Bruce's memory. I then had an email exchange with Philip Stone following the publication of his note. He mentioned that a few geologists did get together on the centenary to remember his contributions to science. One of their number was Ian Dalziel who was the geology leader on the cruise I took to South Georgia and the Antarctic Peninsula in early 2013 under the auspices of the Geological Society of America, marking the start of their 125<sup>th</sup> anniversary celebrations. The itinerary did include the South Orkney Islands, however the ice conditions prohibited us visiting there, but instead we visited Elephant Island where, over a decade after the SNAE, Shackleton's crew survived for over 4 months at the end of the Endurance expedition.

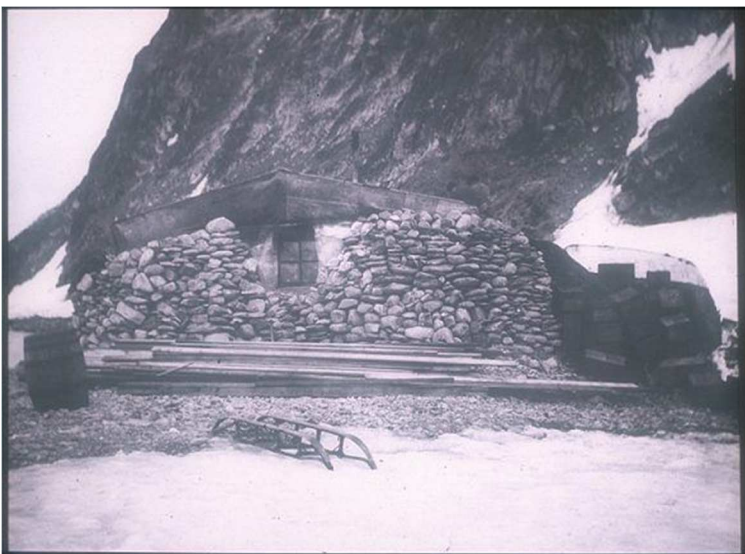
In Stone's note, he outlines more of Bruce's Arctic geological research especially in Svalbard where, on his third Arctic voyage in 1898, he noted deposits of gypsum and coal. In 1908 Bruce formed the Scottish Spitsbergen Syndicate and later was able to recruit experienced geologists, such as James Wordie and Henry Cadell, for the exploratory field work. He visited Spitsbergen 6 times between 1909 and 1920 and exploration continued after Bruce's death till 1928. Although much scientific work was done and his company had filed claims over an area much larger than any other company, no commercial deposits were exploited. At the time there was no sovereign nation in control of the Svalbard archipelago and Bruce sought for the British government to re-assert its rights to the control of Svalbard. The Svalbard treaty was eventually signed in 1920 and Norway became the sovereign power in 1925.



Omond House at present. Photograph by Heiner Kubny.



Argentinian Orcadas Base, Laurie Island, South Orkney Islands.



Omond House at the time of the Scottish National Antarctic Expedition 1902-04.

## **Last Nomads of the Chukotka Peninsula**

**Bryan Alexander**

On a cold day in early March, Vasya brought his snowmobile to a halt on a hilltop. We had been travelling for almost four hours and I welcomed the opportunity to get off the sled and walk around. The snow had been packed hard by winter storms and the sastrugi and rough ice jarred my spine. We were heading to the winter camp of one of the last groups of nomadic Chukchi reindeer herders on the Chukotka Peninsula. I had first heard about these people many years ago on an earlier trip to Chukotka. I was told that they lived far away in the north and still followed a very traditional lifestyle. Although I was interested in visiting them, the difficulties involved in travelling to this nomadic group who live in a vast (50,000 sq km) and remote area, I felt made it unviable.

In 2009, Gennady, a Chukchi friend of mine, mentioned how he had been travelling in the north of the Chukotka Peninsula the previous winter and had come across these herders. He had been astonished by how traditional they were. I reasoned that if Gennady, a Chukchi himself, was that impressed by these people, maybe I should try to visit them after all.

In early February 2010 I flew to Chukotka, and then following Gennady's advice, set out to try and visit these reindeer herders. A combination of, bad weather, fuel shortages, and a lack of transport delayed us, but after four weeks of frustration and delays, we were finally close to our destination.

After further 40 minutes Vasya stopped his snowmobile again on another hilltop. The view was spectacular and in the valley below I could see three Yarangas (Chukchi tents). We set off down the steep snow covered hillside and ten minutes later Vasya brought his snowmobile to a stop outside one of the Yarangas. I got off the sled and followed him inside where we were greeted by Natasha Nomoro and her partner, Grisha Rahtyn.

The Inside of the Yaranga was much larger than I expected, there was no heat and the reindeer skin walls were covered in frost. Natasha led us to the back of the Yaranga, where there was a polog, an inner tent. This box shaped structure with reindeer skin walls was the only part of the Yaranga that was heated, and it was where she and Grisha ate and slept. I lifted up the reindeer skin at the entrance and crawled in. It seemed small and quite dark inside. The only light came from a couple of oil lamps and it took a while for my eyes to get used to it. We sat on reindeer skins as Natasha made tea and served us raw frozen reindeer meat which we ate with pieces of seal fat. The Polog was surprisingly snug, the warmth coming from the just two oil lamps and the heat of our bodies. As I sat there gradually thawing out after the cold journey, I felt a bit like I had gone back in time to the Arctic of 100 years ago. Natasha and Grisha were both dressed in traditional Chukchi reindeer skin clothing and the only items of modernity that I could see were a thermos, an alarm clock and a wind-up radio.

Later that evening after a meal of boiled reindeer meat we chatted and I began to learn more about Natasha and Grisha's life on the tundra. He was 40 and she was 46 and they were the oldest of the nine adults in this herding group. Together they looked after about 2,500 reindeer. In a week or two they would begin their migration north to the coast where they would spend the summer with their reindeer. There they have good pastures and the cool winds off the Chukchi Sea help to keep the mosquitoes at bay. The couple had only got together quite recently after both Natasha's husband

and Grisha's wife had died. As the average life expectancy for native people in Chukotka is only 45 years, they were considered the old people of the camp.

Grisha told me they were keeping a 24 hour watch over the herd because there was a pack of grey wolves in the area. There were a few polar wolves too in the area, but they are solitary. Grisha explained that the polar wolves were not a problem and he was happy to let one kill a reindeer every month or two. "They need to eat too, and they always select a reindeer from the outside of the herd. They don't chase the whole herd and split them up like the packs of grey wolves do."

We turned in early that evening as Grisha had to leave at first light for his shift, keeping watch over the herd. I was expecting it to be cold at night in the Polog but I was pleasantly surprised by just how warm it was. I had a reindeer skin sleeping bag, but it was too warm to use. I just stretched out on a reindeer skin fully clothed with my parka over me. Later in the night, I became so hot that I ended up stripping down to just my shirt and long johns. At 4 am I woke to find Grisha and Natasha already up sitting and drinking tea. They poured me a mug of tea and I joined them. Later, we ate a meal of frozen small pieces of raw fresh and fermented reindeer meat which were seasoned with willow leaves.

After our early morning meal, Grisha began to dress and prepared to go to the herd. What surprised me was that he wore no modern clothes at all, from his socks and long underwear to his boots and Kukhlyanka (outer coat) all his clothes were made of reindeer skin.

By six it was getting light and Grisha left on foot. The temperature was -32°C and he had a 10-15 km walk ahead of him to reach the herd. That was before he even started his day's work of rounding up stray animals and keeping a watch out for wolves. I was surprised and impressed that this group still herded their reindeer in the traditional Chukchi way: on foot and without using herding dogs. Unlike most reindeer herders in other parts of the Arctic, they had no snowmobiles or any other form of motorised transport.

Soon after Grisha left, Natasha began her chores around camp collecting ice, hanging their fur clothing out on a line to dry, before climbing up onto the roof of the Yaranga to beat the snow off it. She told me that this Yaranga had originally been made by her great, great, grandmother. Over the years it had been repaired and patched with new skins numerous times as it was passed down from one generation to the next.

As the first rays of morning sunshine touched the surrounding hills I was able to appreciate just what a beautiful setting the camp was in, with rolling hills all around. The place is known as Tenimvaam. It lay close to a river where hot springs keep the ice thin even in the coldest of winters so the herders can fish for Arctic char and grayling. Also important, the surrounding hills offered shelter from the winter storms. "It can be windy all around," Natasha told me, "But here it's usually calm."

Vitta and Yashka, two young men who had been keeping watch over the herd during the night had slept most of the morning but came to our Yaranga later. Vitta is Grisha's 15 year old nephew. Natasha gave the boys a meal of boiled reindeer and a mug of hot tea. She seemed to keep busy the whole day doing chores around the camp and sewing. In the late afternoon, Grisha returned from the herd looking tired. He took off his Kukhlyanka (coat) and hung it up to dry before we settled down to a hot meal of stewed reindeer.

A few days later, Natasha told me that if the weather was good the following day, Grisha would put

up his own Yaranga and she would move in with him. She would leave hers for her son and daughter-in-law, passing the Yaranga on to yet another generation.

The next day, the weather was perfect, cold, clear and sunny. During the morning Grisha began the task of putting up his Yaranga. He erected the frame in the traditional way, so that the entrance faced east towards the rising sun. The frame was lashed securely together with rope. It took him several hours to complete. In the afternoon when the other men came back from the herd, they helped him pull the cover over the frame. Grisha seemed pleased told me that the next day they would probably have a 'celebration.'

I was curious about what type of celebration he was planning. It turned out to be a traditional ritual to celebrate him and Natasha moving in to his Yaranga for the first time. Both coastal and inland Chukchi traditionally have animistic beliefs, with each family having their own idols. The ritual that Grisha was to perform involved feeding his idols with reindeer fat and asking the spirits for help in looking after the herders' families and reindeer.

Before the ritual began, the young men were sent out to gather the reindeer and bring them close to the camp. After the reindeer had arrived, Grisha placed a child's sled and an adult's sled close to his Yaranga, putting idols and other sacred objects on them, and positioning two idols in the snow in front of each sled. Afterwards he went inside the Yaranga.

The young men watched in silence as Grisha began the process of making fire by friction using a bow drill to light small pieces of willow. The wood didn't light easily, "It's wet," Grisha muttered as he worked the bow drill back and forth. It took about 20 minutes before the wood began smouldering and by then Grisha had beads of frozen sweat on his brow. He placed the smouldering wood on a shovel and gently blew on it coaxing the fire into life and adding more small twigs of willow. Finally he carried the burning wood outside placing it on the ground by the sleds, where he gradually built up the fire. After the fire making, dried meat was offered to the spirits of the different areas of pasture they used throughout the year. We all sat and ate some of the dried meat before the young men gathered the herd and lassoed a reindeer for the sacrifice.

The reindeer was led close to Grisha's Yaranga, positioned so that its head faced to the east and then stabbed quickly through the heart. It fell to the ground and was dead within seconds. As part of the ritual, Grisha dipped his hand in blood and walked quickly around his Yaranga touching the cover with his bloodied fingers and continuing on to finally touch the two sleds where the sacred objects were. Later Grisha 'fed' his idols with reindeer fat and the day ended with everyone gathering in the Yaranga for a meal of boiled reindeer meat. It seems remarkable that these traditional Chukchi religious beliefs and rituals survived the communist era, when religions were banned and Shamans were persecuted, and still exist in the 21<sup>st</sup> Century.

The name 'Chukchi' is a Russian adaption of the word 'Chauchu' meaning 'rich in reindeer,' but these people are anything but rich. Although some of the reindeer were privately owned most of the herd is owned by the municipality which pays each herder a wage of around £120 a month. From that sum the cost of food & fuel is deducted. After these deductions, one of the herder's salaries in January ended up being only £10 for the month. Apart from tea, sugar and some macaroni, there was no food, other than reindeer meat, in the camp. The herders didn't even have flour to make bannock or bread, and while I was with them, we ate only reindeer meat and seal fat three or four times a day.

The traditional life of these reindeer herders out on the tundra contrasts greatly with the life of the Chukchi who live in Chukotka's villages and small towns. Natasha told me that compared to many people in the villages, she felt that they were better off: "We have our reindeer, fish and food from the tundra."

I left the Camp at Tenimvaam with an impression of the Chukchi, as a very hospitable and hard working people, who live in harsh environment under difficult circumstances. I was impressed that they had managed to retain so many of their cultural traditions. A Chukchi woman I had spoken to before my trip had described these herders as: "one of the last fragments of Chukchi culture." I think she was right.

*Text and photographs © Bryan Alexander*



Grisha Rabysa dressing in reindeer skin clothing inside his Yaranga (tent)



Yashka, a Chukchi reindeer herder outside a Yaranga.



Natasha Nomro removing frost from the inside of her Yaranga



Natasha Nomro, scraping snow from the top of her reindeer skin Yaranga after a storm



Grisha Rabysa, a Chukchi reindeer herder





Griha Rahyn, a Chukchi reindeer herder, leading two of his draught animals



Griha Rahyn, with one of his draught reindeer



Ihik and other traditional sacred objects used by Griha Rahyn in rituals to protect his family & reindeer.



Griha Rahyn, erecting the frame of his Yuranga (tent)



Chukchi reindeer herders putting the cover on a Yuranga (tent)



Yashka a young Chukchi reindeer herder, dragging firewood back to camp on his sled



Griha Rahyn, a Chukchi reindeer herder, stands by a fire he has made with a 'low fill' for a traditional ritual



Two sleds have dried reindeer moose and sacred objects placed on them during a traditional Chukchi ritual; two idols have been placed at the front of the sled on the right



Griha Rahyn, a Chukchi reindeer herder, using a bow drill to make fire during a traditional ritual



Griha Rahyn, preparing to make fire with a bow drill & traditional fire making during a ritual



Natasha Nomro & Griha Rahyn, Chukchi reindeer herders, at their winter camp



A reindeer herd at a Chukchi herders' winter camp on the tundra



Vicra Natergeev, a young Chukchi reindeer herder, eating a morning meal of raw frozen reindeer meat inside a Yaxanga (tent)



Chukchi men rounding up a herd of reindeer at their winter pastures on the Chukotka Peninsula



At mealtime in their Yaxanga, Chukchi reindeer herders, Griha Rahyn & Natasha Nomro, share a bowl of hot reindeer stew

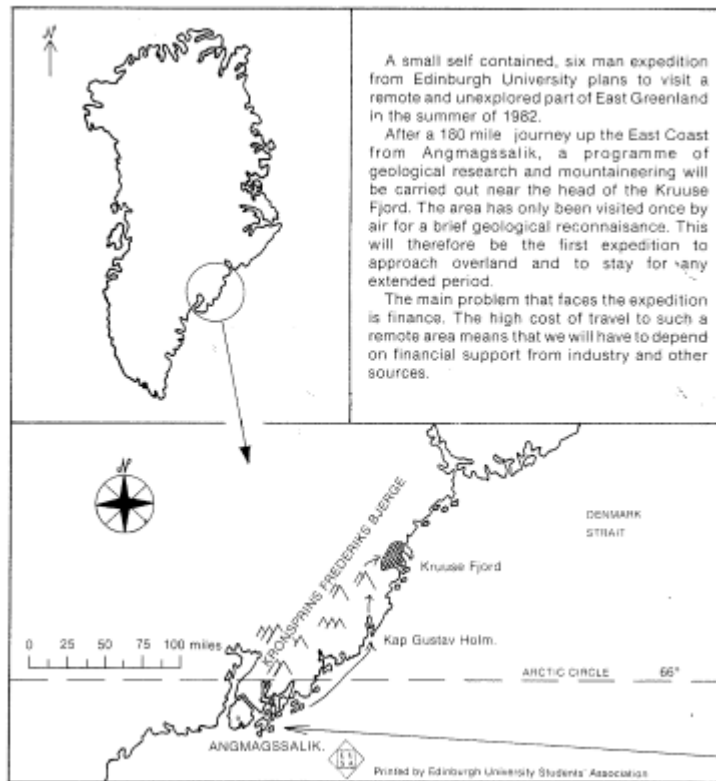


A herd of reindeer at their winter pastures on the Chukotka Peninsula

# Hugh Mackay: Edinburgh University East Greenland Expedition 1982

## PROSPECTUS

PATRON: The Hon. Lord Birsay KT, LLB



Edinburgh University  
EAST GREENLAND  
EXPEDITION 1982  
DANCE  
in aid of funds  
DISCO & LATE BAR  
LIVE CEILIDH BAND  
Minto Hotel, Minto St.  
Wednesday 3<sup>rd</sup> March  
£1 *per person* 8pm-1am



DEDICATED WITH GRATITUDE AND  
AFFECTION TO THE MEMORY OF  
HARALD LESLEY,  
THE LATE LORD BIRSA Y KT  
WHO WAS PATRON OF THE EXPEDITION

EDINBURGH UNIVERSITY EAST GREENLAND EXPEDITION 1982

Patron: The late Lord Birsay K T

Nick Rose (Geologists; Leader)  
Hugh Mackay (Geologist; Equipment)  
Dave Thomson (Geologist; Research)  
Pete Brownsort (Chemist; Food)  
Simon Durkin (Engineer; Treasurer)  
Charles Morton (Medical Student; M.O.)

A report of the Activities and findings of the expedition,  
which visited the Kruuse Fjord region of East Greenland  
in July and August 1982.

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4

Having arrived at base camp we dug our tents into pits for shelter and erected radio masts. The first five days at base camp coincided with the finest weather of the whole expedition and we took this opportunity to do a number of routes on the surrounding peaks as well as undertaking a geological reconnaissance. In all six new routes were done on five peaks. The climbing, nowhere difficult, was nevertheless an exhilarating exercise and for most of us our first experience of new routing.

The 1st of August was the day that we received our airdrop of supplies. The previously agreed landing site was marked out with orange bivouac bags and we sat around with smoke flares at the ready. The helicopter was heard in the distance but seemed unwilling to come any closer, we later discovered that the pilot was having map reading difficulties. However we eventually received our food and were given a good display of aerobatics on takeoff.

Shortly after this bad weather returned with a vengeance and we found ourselves confined to tents for five days, by this time the great endurance test of the expedition would appear to have been the ability to fester while maintaining one's sanity!

This stint of bad weather effectively brought any chance of more activity at the Kruse Fjord to a halt. There were still a number of routes which we wanted to complete, most of which were picked for their geological interest. In particular we wanted to survey one of the long ridges that radiated from Beinn Birsay or Point John since they gave a good cross section of the layered gabbros that we had come to study. However we decided to leave base camp on the 10th of August in order to make use of good weather. We set off but were again brought to a halt by another storm after only three days travelling. This developed into a severe blizzard which deposited around 4 to 5 feet of snow over a 60 hour period. We lay in our tents and watched the snow level rising until it reached the ridge poles and airshafts had to be excavated.

6

I hope this section has given an overall view of how the expedition progressed. Return to normal life was a slight culture shock for all of us, which shows, how, even over a short period one can become intensely involved with the peculiar realities of expedition living. Most of us, given the chance, would be keen to return to Greenland at some time in the future, and perhaps one day the Kruse Fjord will reveal some more of its secrets to those willing to persevere and reach it.



*Sledging on the Pourquoi Pas Glacier*

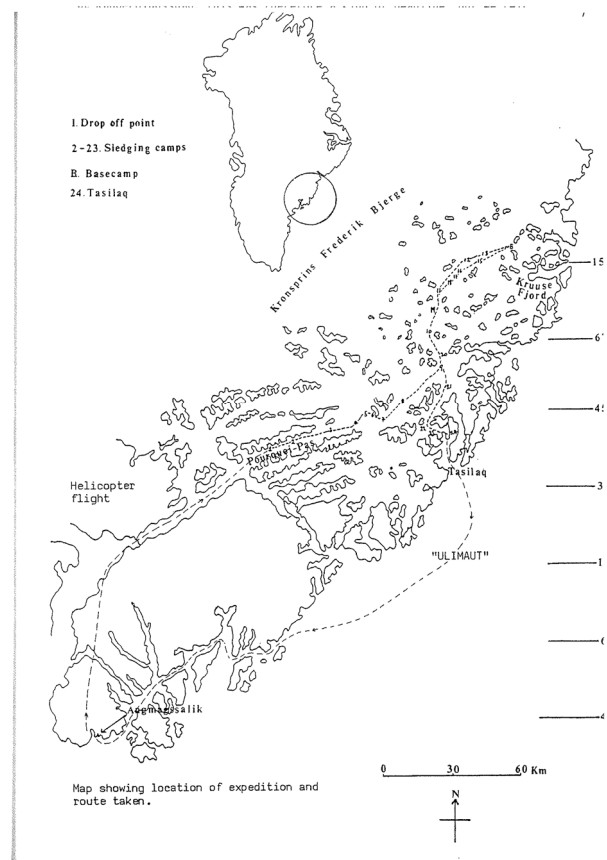
We dug ourselves out and took stock of the situation which didn't look all that hopeful. We sank up to our knees even with skis on and it was impossible to pull even half lashed to pull even half laden sledges. Wind conditions caused the fresh snow to drift and compaction seemed non-existent. Our chances of reaching Tasilaq Fjord on time to meet the Ulimaut seemed to be diminishing, and it was felt that even Pete's generous food allowance would not last through the winter. We came to the inevitable conclusion that we would have to dump everything that wasn't absolutely essential and make a forced march to get us within safe distance of Tasilaq.

We piled all our climbing gear and spare clothing into tea chests which soon became buried in drifts, other items were burnt, our saddest loss was two boxes full of rock samples that we had collected - the whole point of the expedition!

Having reduced our loads we were able to make quite good progress. Keeping up a fairly hard pace and exhausting ourselves as a result we managed to get within striking distance of Tasilaq. We had expected to have to sit out at least one more stint of bad weather, however this did not materialise and consequently we arrived with a day to spare. The last two days consisted of backpacking our gear down a small icefall and the final moraine strewn glacier to the Tasilaq campsite.

Arrival at Tasilaq was not the end of our problems. The Ulimaut had a desperate struggle reaching us due to the severity of the pack ice. However it suddenly appeared through the mist on the morning of the 26th August. We made ourselves at home in the converted fish hold where we sat out the long periods spent stuck between iceflows. These lasted up to 20 hours and resulted in a five day round trip which should, in a normal year, have taken only a day and a half.

We finally arrived back in town and lapped up local hospitality for a few days before setting off across the channel to the Kap Dan airstrip. Various American geologists unloaded their excess food on us so we pigged out in style during our two day wait for the flight.



## EXPEDITION DIARY

27 June 1982 Fly from London to Iceland  
 28 June Fly from Reykjavik to Kulusuk  
 29 June Fly by helicopter from Kulusuk to Angmagssalik  
 8 July Helicopter flight to Pourquoi-Pas Glacier cancelled due to bad weather  
 10 July Helicopter flight to Pourquoi-Pas Glacier; begin sledge journey  
 13 - 19 July held up by crevasses and bad weather at head of K.I.V. Steenstrups Nordre Brae  
 19 - 26 July Continue sledging to base camp at Kruuse Fjord  
 27 July - 2 August Carry out geological fieldwork and mountaineering from base camp  
 3 - 8 August Another storm brings activity to a halt  
 10 August Start return journey  
 13 - 15 August Blizzard buries tents  
 16 August Abandon unessential equipment and continue sledging  
 22 August Arrive at Tasilaq  
 26 August Boat arrives - having been stuck in pack ice  
 29 August Arrive back in Angmagssalik after numerous delays in pack ice  
 31 August Boat journey to Kulusuk  
 2 September Fly to Reykjavik  
 3 September Fly from Iceland to London

## GEOLOGICAL OBSERVATIONS

Dave Thompson

## 1. REGIONAL GEOLOGY BETWEEN THE POURQUOI-PAS GLACIER/TASILAQ AND THE KRUISE FJORD

During the journey to and from the Kruuse Fjord, the Expedition sledged across glacier terrain which was, for the most part, surrounded by Archaean Gneisses. Several opportunities arose to study them at closer quarters, which allowed us to distinguish five main lithologies.

## (a) Archaean quartzo - feldspathic and amphibolite/pyroxene gneisses:

These were by far the most common rock types observed and consisted of repetitive units of quartz-rich/poor feldspathic gneisses, interbedded with darker more homogeneous amphibole/pyroxene rich gneisses in huge sheet-like bodies. The degree of banding and the thickness of each unit varied considerably, being fairly intense and well defined along the northern side of the Pourquoi-Pas Glacier, but much more uniform further north.

Large scale structural deformation of these rocks appears to be absent, the layers being concordant and gently dipping, the dip increasing towards the coast. However on a small localised scale polyphase folding was commonly noted.

In some areas, especially on the southern side of the Pourquoi-Pas Glacier, bedding appeared to be absent, giving the rock the appearance of a large Granite Intrusion.

At 34° 36'W, 67° 2'N an outcrop of the country rock was examined. It was found to consist of two feldspars, quartz and a pyroxene and was an excellent example of a granite gneiss. It had a granular texture with no schistosity, but was found to contain xenoliths of a schistose mafic material.

(b) Basic Sheet/Dyke Intrusions within the Archaean gneisses

A series of basic intrusions striking southwest to northeast were found throughout the region. They were mainly concordant to semi-concordant with the foliation of the country rocks, suggesting some structural control on their emplacement.

The most impressive of these layers was a steeply dipping sheet (approx. 50°/130° at 35° 50'W, 66° 41'N) on the northern edge of the Pourquoi-Pas Glacier. On closer study it was found to be a medium to coarse grained melanogabbro with augite (60%), feldspar and olivine (commonly iddingsitised). Weathered under-surfaces contained disseminated deposits of a metallic mineral (possibly arsenopyrite). This particular sheet was commonly up to 60m thick, although it frequently became broken up and interleaved with the surrounding country rock.

A similar sheet was observed from the helicopter, on our way to the drop-off point, along the northern side of the Midgardgletscher. It is possible that this is a continuation of the Pourquoi-Pas sheet, which would imply a length of at least 70km.

A similar sheet to the one just described was seen to the west of Tasilaq Col at 34° 45'W, 66° 48'N (approx. 30-50m thick) and thin dykes observed at Pt. 1700m (34° 35'W, 66° 56'N) which were cut and offset by later faulting were assumed to belong to the same group.

These dykes and sheets probably belong to the suite intruded before and during the early Proterozoic deformation, that affect the Nagssugtoquidian Mobile Belt area (Bridgwater 1976 - Geology of Greenland).

(c) Nagssugtoquidian Deformation

A region made up of a distinct rock type and tectonic style was found at the northwest end of the K.I.V. Steenstrups Brae, at 35° 5'W, 66° 47'N.

The structure consists of upright moderate to tight folds giving steeply dipping to vertically bedded rocks, folded around axes which trend in a roughly east-west direction. The folding is accompanied by a group of sparse and randomly spaced dykes parallel to the axial direction.

The most common lithology is a well foliated Amphibolite Gneiss, made up of an amphibole-quartz-feldspar rock with a good cleavage parallel to the axial direction of the folding. Darker amphibole rich bands are interspersed with the quartzo-feldspathic bands.

Another rock type found near the campsite on the Col at 35° 10'W, 66° 46'N consisted of a quartz-feldspar matrix with large alkali feldspar augens and flames of amphibole-rich material.

The whole area is criss-crossed by pegmatite veins/acid dykes containing: orthoclase, microcline, biotite, quartz and a green amphibole, which certainly post date the main phase of deformation.

- 1. Drop off point
- 2-23 Sledging camps
- B. Basecamp
- 24. Tasilaq

Figure 1. Features observed on journey to Kruse Fjord, described in Section 1.

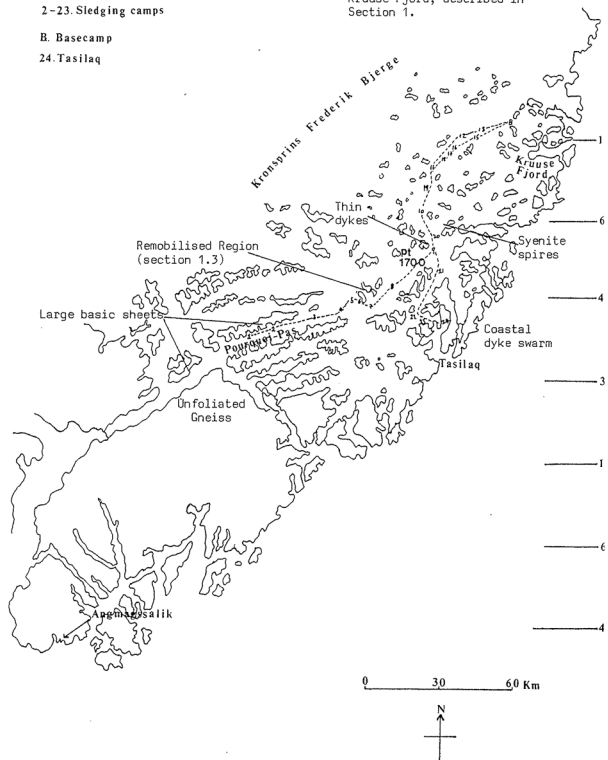


FIG. 1

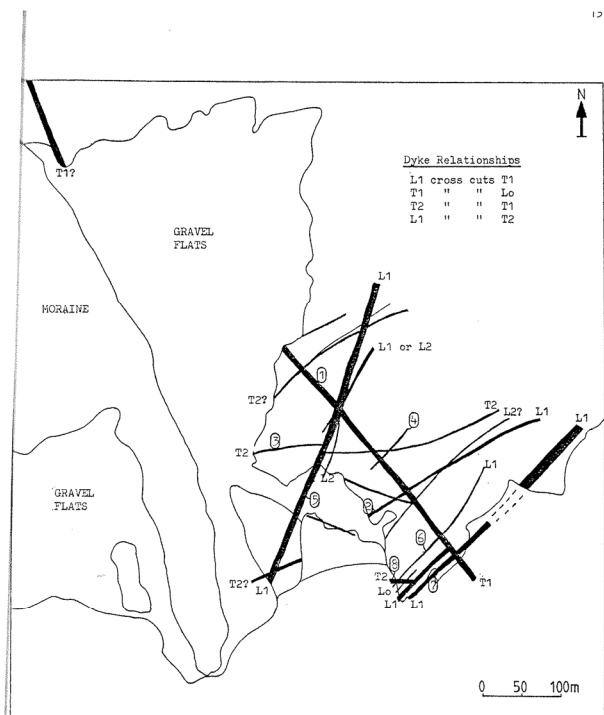


FIG.2:- Sketch map of the area around the Tasilaq campsite showing the local Tertiary coastal dyke swarm.  
 Specimens:- 1) T1-Main dyke  
 2) T2-or Linterm.  
 3) T2  
 4) L2-pyroxene rich  
 5) L1  
 6) L1-flow banded  
 7) L1  
 8) T2-pyroxene ?  
 9) Big feldspar dyke  
 10) Augen gneiss  
 Order of intrusives:- L0,  
 T1,  
 T2,  
 L1,  
 L2?,  
 L2 probably occurs after L1,  
 or could be contemporaneous  
 with it.

This region probably corresponds to the area of Nagssugtoquidian remobilisation described by Myers (1979) giving it a time range of around 2700 - 1700 Ma, and representing an isolated block of the main Nagssugtoquidian Mobile Belt which outcrops further to the south.

- (d) An extremely impressive pair of spires showing a markedly different weathering pattern to the surrounding country rocks were spotted to the southeast of the glacier which runs northwest from Pt. 1700 at 34° 25'W, 66° 59'N. Two compass bearings put their location at approximately 34° 24'W, 66° 59'N. This pale unfoliated rock was assumed to represent the western margin of the Laubas Gletscher Syenite Intrusion.

(e) Coastal Dyke Swarm at Tasilaq:

After being unable to study the costal dyke swarm at the Kruuse Fjord which is known to be present there, we had an opportunity to have a look at a similar phenomenon on our return journey. This study was carried out at Tasilaq Fjord (see fig. 2) mainly to try to determine the age relationships between the dense local Tertiary intrusives.

2. THE KRUISE FJORD INTRUSION (Fig. 3)

2.1 Introduction:

The accompanying map shows the inferred extent of the intrusion. No direct contacts were found within the area studied, however contacts were observed through binoculars to the east and south.

The intrusion is 21km long and 13km wide at the widest axes. The highest point is 1930 metres (Beinn Birsay), the gabbro itself probably first becomes exposed at around 500 metres above sea level giving a rough vertical exposure of approximately 1500 metres for the layered series. If the layering was horizontal then this would also define the extent of the layered sequence that is exposed. However, most of the layered rocks dip at angles of around 45° so that the actual extent of the layered sequence is exposed is considerably more than this (around 2,150 metres).

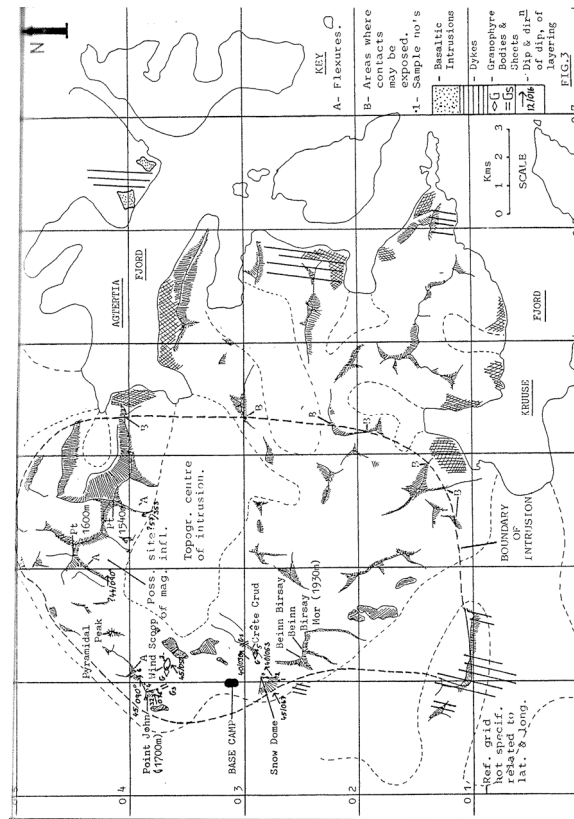
2.2 Distribution of Lithologies

Only two major rock types were distinguished, the first being a variable iron-rich gabbro, usually with a cumulate texture developed but having considerable variations in the modal abundances of the main cumulus minerals (olivine, pyroxene and feldspar). The total exposed sequence studied the second major lithology that was found was a granophyre of which sample number 5 is a good representation. Granophyre was found at a number of localities in the area, at all of these it contained an abundant suite of xenoliths, some of which reached considerable sizes (up to 0.75 metres) and probably originated by the stopping effect of the upwelling granophyre.

Some unusual and varied rock types, possibly hybrid gabbros and gabbro breccias, were found along the ridge (Crete Crud) to the southeast of basecamp.

2.3 The Layered Series - Overall Structure:

Layered gabbro made up the bulk of the exposed rocks in the area studied and distant viewing of the whole area through binoculars indicated that virtually all the exposed rocks were



layered, one possible exception being a large ( 50m high) body at the base of the Snow Dome, which probably lies at the base of the layered sequence. From above it appeared to be fairly homogeneous with no lateral and vertical variations.

The direction and angles of dip of the layers are shown in Fig. 3. On the western and southern margins where direct measurements were obtained, the layers were all found to dip inward towards the centre of the intrusion so that traced laterally they would form concentric rings. Therefore it would seem reasonable to suppose that the deponent lay within the poorly exposed area containing a seaward flowing glacier that lay in the topographical centre of the intrusion. However, observations of an outcrop to the north suggested some northward dipping layers away from the centre. Thus one may postulate that there are several deponents in operation and that the floor of the magma chamber may have contained hummocks (Fig. 4).

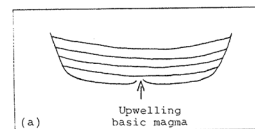


Fig. 4: (a) Sketch showing the proposed model for a flat floored magma chamber.

(b) Sketch showing the proposed model for the Kruuse Fjord, with a hummocked magma chamber floor.

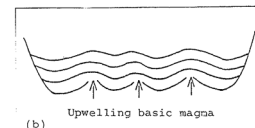
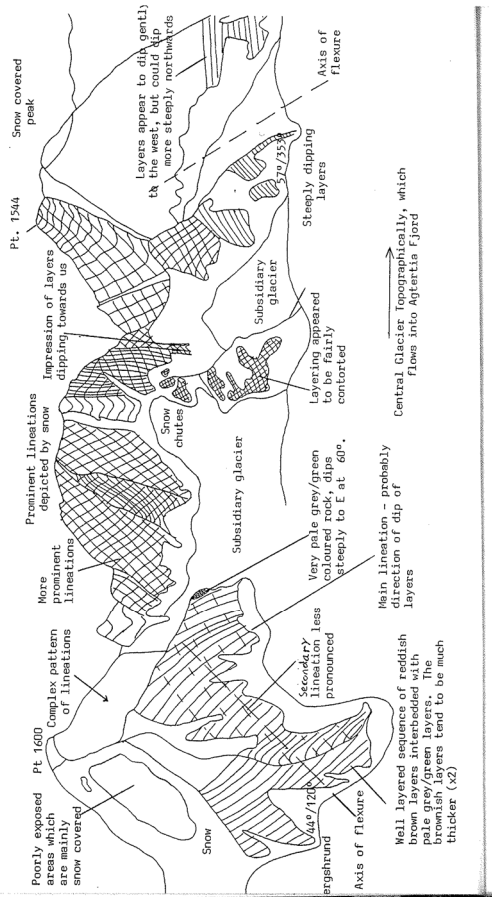




Fig. 5. A sketch looking approximately NE of the layering in Pt. 1544m and the surrounding ridges. Taken from GR. 01300315 (See fig. 3)



The dip of the layers ranged from 30° to 60° with 45° being a good average figure. This would seem to be high and widespread throughout the intrusion except possibly in the east, where dips appear to become shallower (Fig. 5). This could imply that the intrusion is tilted slightly towards the east. However, one must be careful since these are two dimensional observations and the layers could be dipping towards or away from us. The steep dips found in the west are comparable in steepness to those attained in the border group of the Skaergaard intrusion.

Another feature that is worthy of note is the occurrence of a large scale flexuring within the layering as shown in Figs. 4 and 5. This type of flexuring was observed at three localities, marked on the map (Fig. 3), and causes the layers to become more steeply dipping towards the centre of the intrusion. These flexures could be attributed to the formation of drag folds formed by gravitational collapse of layers in the centre of the magma chamber while still in a semi-liquid state.

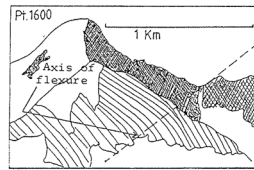


Fig. 6: Sketch of Pt. 1600m and neighbouring ridges showing the well defined flexure.

#### 2.4 Layered Series - Small Scale Structures:

Some of the small scale structural features of the layering are shown in Figs. 7, 8, 9 and 10. Spectacular trough bands of the type found at Skaergaard were absent. Slump structures were seen at a number of localities, ranging from highly convolute forms to the more regular folds as shown in Fig. 7.

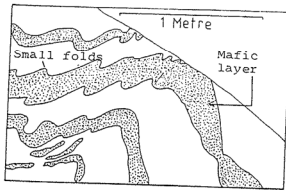


Fig. 7: Small scale folding of the layering which was reasonably common within the more finely layered units.

These are recumbent folds, the folds being defined by a melanocratic layer with smaller parasitic folds on the hinges.

Figs. 8 and 9 show channel scouring structures found on the south and east sides of the Snow Dome peak.

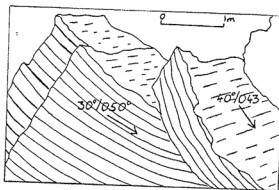


Fig. 8: Channel scouring feature in feldspathic gneisses to the east of the Snow Dome.

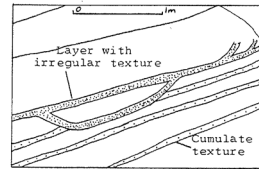


Fig. 9: Structure found on slabs on southwest face of Snow Dome

These structures consist of layers that appear to scour out and truncate the layers below, the two layers having different microtextures and mineralogy. Syndepositional faulting (Fig.10) which may be consistent with the high angle of the layering, was observed in several localities.

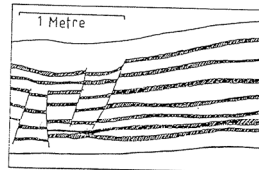


Fig.10: Syndepositional faulting of the layering as observed at the Wind Scoop.

Wavy layering and lenticular structures were well developed, particularly on the south faces of Point John, and Bein Birsay (Fig. 11).

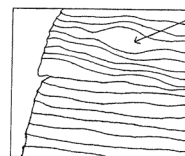


Fig. 11: Type of layering observed on the south face of Point John.

## 2.5 Lithological and Textural Variations in the Layered Series:

This study brought home to us the great variety of layering to be found in an intrusion of this type and showed it is false to assume that layered rocks are all going to be similar to the text book examples of endlessly repeated rhythmic units. During our study the following variations were found:

- Layers without well-defined cumulate laminations suggesting that crystal settling was of little importance.
- Uniform layers of mainly feldspathic mesocumulate giving monotonous uniform beds of up to 1.5 metres in thickness. Well developed at the southern end of the ridge running northwest from Point John and traceable to outcrops near the Windscoop.
- Rhythmic layers with typical sequences of alternating light and dark bands usually with a base of mafic minerals grading up into more feldspathic material. On a scale of up to 25cms per layer well seen on the south face of Point John.
- Pegmatitic layering, consisting of much coarser grained gabbro. Seen on the ridge to the northwest of Point John and at the Wind Scoop. A section of this ridge is illustrated below (Fig. 12).

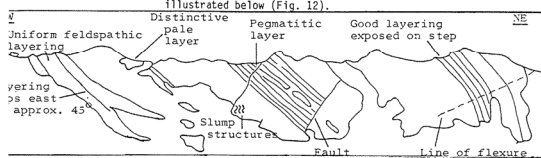


Fig. 12: Sketch of the ridge which runs northeast from Point John (G.R.0090-0385), showing the layering and the flexuring of the layering.

## 2.8 Eastern edge of Snow Dome:

Not only was veining a fairly common feature, but small scale fracturing (1cm across) cross-cut many of the units looked at. This was particularly apparent on the eastern edge of the Snow Dome (G.R. 01100285) where three sets of fracture patterns were observed:

- 80°/224;
  - 40°/186;
  - 6°/324
- All of which had considerable spatial variations. The layering (1/4 - 3m thick) dipped at 41°/036°, and consisted of medium-coarse grained gabbros with varying abundances of the primary phenocryst phases (olivine, feldspar and pyroxene). No evidence could be found to show whether or not the fractures offset the layers).

It was at this locality that one of the few basaltic intrusions were found, it being a 4-10cm thick dyke cross-cutting the layering and dipping at 30°/305°.

## 2.9 Crete Crud:

This section (Fig. 13) consists of an illustration along a section of the ridge that runs northwest from the Snow Dome. It seemed to contain a complicated series of hybrid gabbro breccias. A strong fracture trending parallel to the ridge (040°-220°) was seen to transcend all units.

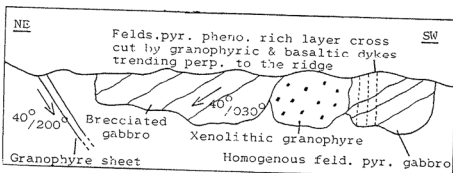


Fig. 13: Sketch of Crete Crud from Base Camp showing the cross cutting nature of the granophyre bodies.

- Layering due to subtle changes in the abundances of certain minerals, essentially a type of rhythmic layering where no dominant cumulus phase can be identified. This type of layering was found to be very common.
- At the northern edge of the ridge running northwest from Point John an interesting texture was observed, consisting of rafts of olivine crystals dispersed in a more feldspathic matrix.
- Repetitive units, up to two metres in thickness, separated by weathering surfaces and containing smaller scale internal rhythmic layers. These presumably represent separate pulses of magma that have then undergone crystal settling, i.e. megacycles.

It is also possible to distinguish large scale variations in the character of the gabbro; careful mapping and logging along ridges would allow one to piece together a well-defined vertical stratigraphy which might then be correlated throughout the intrusion. Unfortunately time prevented us from doing this. However, it was observed that certain conspicuous large scale variations were present. For instance the south face of the Snow Dome had a break at 1/3 height, the darker layers below possibly being far more Fe-rich than the overlying lighter coloured ones.

## 2.7 Amphibole and Pegmatite Veins:

These were quite common, the best localities being shown on the map. Possibly two broad types may be defined - those that are clearly discordant with the layering and those that are possibly concordant with it and have simply brought about the replacement of the original mineralogy with late stage hydrothermal vein minerals, mainly amphiboles and feldspars. To the south of Point John some slabs were found which consisted of a heavily altered gabbro criss-crossed by leucocratic and hornblende veins, one of which was collected and contained a fibrous amphibole.

Granophyres, containing rich xenolith assemblages, were found throughout the area studied. It occurred either in sheet form, sometimes semi-concordant with the layering, or as larger plug type bodies, truncating the layering. In the latter case the shape is obscured by the ice and it may be possible that the separate granophyre bodies link up into one mass.

## 2.10 Wind Scoop:

Some excellent examples of large xenoliths up to 0.75 metres across were found (Fig. 14) at this locality (G.R. 01150365).

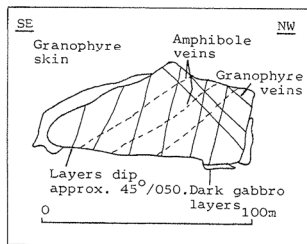


Fig. 14: Sketch of the outcrop exposed at the Wind Scoop (G.R.01150368) showing the relationships between the various vein systems.

A granophyre plug on the eastern edge of this locality was found to be quite inhomogeneous, ranging from pure white to dark grey in colour and possibly becoming hybridised with the surrounding gabbro at the outer margins. As well as containing the large nodules described above it also hosted a variety of smaller xenoliths up to 20cm long

## 2.11 Basaltic Intrusions and Dykes:

Basaltic dykes cutting the layered series were very rare, at least in the western part of the intrusion. Coast parallel dykes become progressively denser to the east but their age relationship to the intrusion is uncertain. Very large

irregular shaped plugs were seen exposed on the coast on the northern side of Agtertia Fjord.

A series of dykes striking northeast to southwest were found to the south of the Snow Dome and these were back veined and had caused baking of the country rock.

A dense dyke swarm was also seen to cut the peak at G.R. 0100 0105, especially on the western face.

#### 2.12 Sample Collections

Only seven samples were retrieved from the Kruuse Fjord out of the hundred or so that were originally collected.

- (1) A sample from the dark band on the south face of the Snow Dome;  
This prominent dark band appears to be concordant with the layering; it was roughly 2.5 metres thick and dipped towards the northeast (Fig. 15). On a small scale it was found to cut the layers beneath it as shown in the diagram below. It contained flow aligned feldspars and hand specimens were heavy, possibly due to magnetite. The surface had a peacock purple weathering sheen, a type of weathering that was fairly widespread throughout the intrusion. Major element analysis is given in Table 1 (KFC 3).

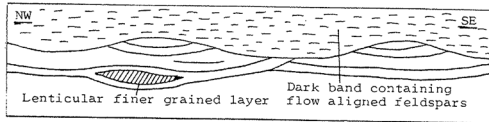


Fig. 15: Diagram to show the contact relations at the base of the dark band on the Snow Dome.

Table 1: Major element analyses of three Kruuse Fjord samples.

	Gabbro (from Wind Scoop KFC1)	Granophyre KFC2	Meta-gabbro (from Dark Band) KFC3
SiO <sub>2</sub>	43.72	67.13	32.22
Al <sub>2</sub> O <sub>3</sub>	12.13	14.85	7.05
Fe <sub>2</sub> O <sub>3</sub>	20.30	4.73	33.51
MgO	5.46	0.86	15.05
CaO	10.49	1.99	6.67
Na <sub>2</sub> O	2.92	4.99	0.87
K <sub>2</sub> O	0.44	3.93	0.04
TiO <sub>2</sub>	3.65	0.86	4.60
MnO	0.27	0.11	0.28
P <sub>2</sub> O <sub>5</sub>	0.03	0.15	0.02
Total	99.66	99.59	100.32

#### Bibliography

Myers, Bridgwater and Gill, G.G.U. Progress Report 1979-80.

Myers, (1979) - Earth Planet Sci. Lett, 46, p407-418.

Escher and Watt (Eds) - Geology of Greenland - especially Chapters 2, 3, 5 and 15.



Inward leg sledging camp

- (2) Small gabbro chip from the Snow Dome;
- (3) Leucocratic gabbro from the Wind Scoop; Major element analysis given in Table 1 (KFC 1);
- (4) Some granules of leucocratic gabbro from the southern end of the ridge that runs northwest from Point John.
- (5) Granophyre containing nodules of gabbro and basaltic material. Major element analyses given in Table 1 (KFC 2).
- (6) Gabbro sample (medium grained) from the ridge to Point John;
- (7) Granophyre from Snow Dome.

We also collected some samples of amphibole veins from the Windscoop and elsewhere, one of which contained an excellent example of a fibrous hornblende up to half a cm in length.

It is hoped eventually to have our few remaining samples analysed, after which a more comprehensive and hopefully conclusive report will be produced.



Nick Rose

#### MOUNTAINEERING REPORT

Simon Durkin

#### Introduction

One of the main objectives of the expedition was to investigate the mountaineering possibilities in the Kruuse Fjord area. It was felt that this would be inevitably linked with the geological objective on account of the terrain.

In our first four days at base camp we climbed some of the obvious routes in the immediate vicinity. We climbed a total of five new peaks by six routes and although none were of great length or technical difficulty they provided some very enjoyable climbing. From these summits we were able to confirm, at least visually, the feasibility of access routes into other parts of the range. Also we sketched out routes for more challenging mountaineering objectives. Unfortunately, due to the onset of bad weather these objectives had to be shelved.

Brief descriptions of the routes we climbed and a discussion of the potentials of the region now follow.

#### Traverse of Point John (1700m) from West to East

The finest peak visible from base camp was Point John, an elegant pyramid lying about two miles to the north. On 28th July, our first day at base camp, four of us set out to climb it. Charlie and Hugh took the straightforward looking East Ridge while Pete and I chose an approach from the west.

From the corrie to the south of the peak we avoided the large bergschrund by climbing a steep snow pyramid. This led to an obvious snow shoulder which was followed by a fifty foot rock step where we roped up. The rock step (Grade II) led to a very steep snow pitch which Pete led. This took us onto the West Ridge which swept up

steeply from the main glacier. The ridge was followed on steep ice for about 450 feet to the summit (3 hours).

We were joined on the summit by Charlie and Hugh who had arrived by the East Ridge. We all descended by this route which was straight-forward snow although steep at the top.

The time for the traverse was 4 hours, the grade about AD-. The peak was named Point John after my brother who was killed in a road accident in 1978.

#### Traverse of the Crete de Crud

To the southeast of base camp an obvious ridge rose up from the central basin of the range and led southwest to drop down the outer edge of the range. The ridge was important from an access point of view as it barred a direct approach to the high plateau around Beinn Birsay (Point 1930m), the highest peak in the range. Also its northern end seemed the most reasonable route for a descent into the central basin.

On 28th July Nick and Dave investigated this ridge. They traversed onto it at its northern end and first descended a few hundred feet. The descent was not difficult although the snow was steep and the slope still convex when they turned around without getting a clear view to the bottom. The climb to the summit was first on steep loose slabs with some interesting geology, then on steep ice. The summit, at about 1500m, was a pleasant roof-top of snow. Descending first on snow they came to the last section, a horizontal ridge of very broken rocks which gave the whole ridge its name. Finally a descent was made to the col at the southern end.

#### Ascent of the Pyramid Peak (c.1500m)

On 29th July Pete, Hugh, Dave and I explored to the northeast of base camp to look at access routes and to climb a prominent peak that has become known as the Pyramid Peak.

as they rose towards Point John so they left the ridge and traversed the east face of Point John to reach its east ridge. The traverse was awkward and time consuming on steep and slushy afternoon ice.

The ridge was over 1000m long and the whole route took 16 hours, it was graded at AD.

#### Ascent of Beinn Birsay (1930m)

The highest peak in the range lay southeast of base camp beyond the Crete de Crud. It had a very spectacular Southwest Face and a fine, long South Ridge in which we were particularly interested.

On 31st July Dave, Hugh, Pete and I set off for the col at the southern end of the Crete de Crud. We traversed the Crete northwards to reach its summit in under two hours. We then headed southeast, first descending 50m to reach the northeast flanks of Beinn Birsay which we climbed easily on gentle angled snow. Apart from one deviation to avoid a bergschrund we kept to the heavily corniced ridge and reached the twin summits in another hour. There was no cornice at the summits and we could peer over and down the huge Southwest Face. The South Ridge rose over 1000m up from the glacier directly to the main summit. It was mainly rock which looked sound, particularly where it steepened towards the top. The only major obstacle on the ridge appeared to be a deep notch one third of the way up. We descended a few hundred feet to the southeast of the summit to get a profile view of the ridge and to look at the peaks and passes in the southern corner of the range, many of these looked quite reasonable.

We returned to base camp by the same route; the round trip took 7 hours and the grade was F. We named the peak Beinn Birsay in honour of our patron, Lord Birsay.

On 3rd August Nick, Charlie, Pete and I set off to climb the South Ridge of Beinn Birsay, prepared for a long day. But we abandoned the attempt before reaching the foot of the ridge in the face of an imminent storm. The storm lasted for five days and effectively put paid to our plans for further routes.

We climbed through a wind scoop around a tooth of rock about a mile north of base camp to reach the hanging glacier beyond. We crossed this to reach the col at the end of a long ridge running northeast from point John. From here we had hoped to turn the northern end of the Pyramid Peak to reach the glaciers and peaks on the northern edge of the range. However a steep icefall plunged down to the northwest from the col and did not provide a route. Instead we climbed the peak itself, 500 feet of steep snow took us to a rock ridge which we scrambled up to the summit.

From the summit we could see the northern end of the Crete de Crud where it dropped into the central basin. It looked steep but was free of major crevasses and clear of any serac debris from the icefalls on either side. It appeared to be the only reasonable route through the icefalls on the southern slopes of the basin. The headwall of the basin looked a definite no-go area with steep rock overhung by seracs and confused icefalls. However, the icefalls flowing south from the northern peaks looked more approachable, although still awkward and we could sketch out plausible routes for some of them. In particular, the long snow ridge running southeast from Point 1600m, a very impressive peak, looked like a promising route.

We descended by the same route and skied back to base camp. The grade was about PD.

#### Traverse of the Wanda-John Ridge

On 30th July Nick and Charlie set off to traverse the long ridge running northeast from Point John. The ridge had a central peak of around 1600m and several minor peaks and appeared to be of geological significance.

They started from the far, northeastern end where they climbed up a small snowy col by mixed ground on the left. There was not enough time to climb a small snow peak further northeast so they turned southwest towards the main ridge. Passing through a gap between a huge cornice on the left and an overhanging serac face on the right they reached the central summit by 6.30am. This was followed by a long rock arete with occasional steps and snow sections. The rock petered

#### Conclusions

In the limited time available we had climbed all of the major peaks easily accessible from our base camp except for one: the Snow Dome (ca. 1800m) immediately to the south. However, the five peaks we climbed were but needles in a haystack and the Kruuse Fjord area offers many more fine peaks. Most of these would involve access via the central basin or via a traverse of Beinn Birsay to reach the southeasterly basins. They would therefore require a least one and probably two bivouacs.

Given more good weather we could certainly have accomplished some of these routes. But the routes we did accomplish were very satisfying and leave us with many happy memories. For me, the ascent of Point John by the West Ridge will always stand out as one of the most enjoyable mountain days I have experienced.



*L-R: Thompson, Brownsort, Durkin and Rose*

## Further Mountaineering Notes

### Character of Climbing in the Kruuse Fjord Area and Potential Further Afield

Pete Brownsort

If the peaks we climbed were as needles to the haystack of the Kruuse Fjord range they were as grains of sand on a beach compared to the peaks we flew over, sledged through or saw in the long views northwards towards the Watkins Bjerge.

That being said, the Kruuse Fjord mountains are very distinctive in several ways some of which are attributable to their geology. It was this distinction, the geology and the unexplored nature of the area that tempted us there in the first place.

To the north and west of the range are vast, low-lying glaciers while to the south is an area of complex turbulent glaciers and small peaks. While peak heights gradually increase with distance inland there is not a peak to match Beinn Birsay in height at a similar distance from the coast for thirty miles north or south. When viewed from inland the range presents its largest and steepest faces, a consequence of its invariably dipping layered rocks and the scouring action of the more powerful glaciers fed from the ice-cap. The peaks have simple but bold features and often a degree of symmetry. The enormous rock walls and ice faces of the range are absent from the mountains of the surrounding country which tend more towards pinnacles, ribs and covoilrs. The rock itself when seen from a distance has a different tone being blue-black as opposed to the warmer, brown tones of the country rock.

Proximity to the sea, relative height and a direct exposure to the cold winds from the ice-cap may be factors that have combined to allow a greater build up of ice in the range than elsewhere in the coastal mountains. This contributed much to the character of our climbing as

Less easily accessible but as far as I know all unclimbed are the peaks around the head of the Laubes Glescher to the north of Tassilaq. These range from 1600m to 2000m and include some impressive rock spires and walls. It would take perhaps ten days to set up a base camp in this area after being dropped by boat at Tassilaq beach. There are also fine mountains all around Tassilaq Fjord which have been explored by several previous expeditions.

Towards the edge of the ice-cap, perhaps forty miles from the coast, there are a number of snow peaks 200m to 3000m high which we saw from our sledging route. These appeared to offer fairly straightforward climbs but their height and remoteness would give an exciting challenge perhaps to a strong ski-mountaineering party.

In addition to these more serious areas our return journey by boat showed us the limitless possibilities for climbing holidays among the beautiful islands and fjords all along the coast for sixty miles north east of Angmagssalik.

In considering climbing in areas as remote as those mentioned above one must always bear in mind that the journey to a peak will often be a greater challenge than the ascent of that peak. This certainly proved to be the case on this expedition.



*Peter Brownsort and Simon Durkin*

the easiest routes on the peaks were climbed were mainly on snow and ice. On north-facing slopes the snow often lay extremely steeply and was generally hard green ice within about six inches of the surface. This gave excellent and exciting climbing well protected by good ice-screws. Snow and ice features such as cornices, bergschrunds and crevasses were of an impressive scale and the ice-falls above the head-walls of the central basin were continuously active. We avoided all these objective dangers.

We did little rock climbing and the rock, though inherently sound, was generally pretty loose as would be expected with such an active freeze-thaw cycle. Although there was much stonefall, there was none of an anthropogenic nature from above as is common in the Alps. But the sport of Boulder Trundling was often practised - a very satisfying and perfectly safe activity when you know exactly where everyone is within a fifty mile radius! The unhidden dangers particular to French belay ledges were thankfully absent.

Avalanches were not unknown - contrary to some information we had received. We saw evidence of wind-slab avalanches and there were continuous fresh snow avalanches off the steeper faces after the five-day storm.

One of our stated objectives was to open up the area for future expeditions. While we have fairly conclusively demonstrated that one cannot wholly rely even on overland transport in areas as remote as this (let alone air or sea transport) it is worth commenting from a climbing point of view on the more interesting areas we passed through.

A mere eighteen hundred pounds will take you by helicopter in fifty minutes from Angmagssalik to the Pourquoi-Pas Glacier. Here there are many fine peaks of 2000m to 2400m but it is likely that some have been climbed - after all you could almost do a route in a weekend from London, so what can you expect. But the routes all looked excellent, and spread over a range of standards

## PHYSIOLOGY

Charles Morton

### Background

It is well documented that various periodic or cyclical parameters of human behaviour may be manipulated by environmental factors. Aschoff(1) showed that human volunteers living in isolation with no reference to time, or access to environmental clues such as the day/night cycle ie: under constant illumination exhibit a drift away from the normal 24 hour sleep/wake cycle and diurnal rhythm of renal function. The period reported in one experiment was one of 26 hours. Further, he demonstrated that the 'natural' period could itself be altered by varying the intensity of constant illumination. Mills(2) reported that a male subject living in isolation underground for 105 days likewise exhibited this drift of diurnal rhythms, the period being 24.5 hours. This was in spite of being in possession of an accurate watch, and thus being aware of 'real' time.

### Objectives of the E.U.E.G.E.

On this expedition we were to experience continuous daylight. Owing to our relatively low latitude (67° 20'N) there would inevitably be a variation in the intensity of light. Reports indicated that even at the darkest moments there would be sufficient light for full activity. This indeed was the case for the time of the experiment. In addition we planned to travel at 'night' when the snow was in its best condition, in other words we would be 12 hours out of phase.

It was decided to study the sleep patterns of all six members of the expedition in relation to:

1. A possible drift away from the 24 hour cycle. This might occur in a similar way to that reported by Mills above in spite of possession of watches and clocks.

2. The difficulty or otherwise of adjusting to the "out of phase" routine. This is known to be of relevance to industrial shift working and presumably also of importance in planning similar schedules on polar expeditions.

#### Methods

For the six weeks prior to departure all members kept a record of their sleep patterns to act as a control. On the expedition records of all members' sleep patterns were kept on charts.

Observations on the physical rigours of each day were made, and the difficulties of adapting to new routines recorded.

#### Results

When the results have been fully considered in the light of available literature they will be submitted to a suitable journal for publication. In the meantime further information may be obtained from the address below.

#### References

1. Aschoff, J. "Circadian Rhythms in Man" Science: 1965 : 148, pp 1427 -1432.
2. Mills, J.N. "Three Months Underground" J. Physiology: 1964 : 174, p217.

Further information regarding the medical or physiological aspects of the expedition may be obtained from:

Charles Morton  
Woodcroft  
The Avenue  
March  
CAMBRIDGE PE15 9PR

These contents were packed in polythene boxes 7" by 4.4" by 2.5" and weighed 12oz. Instructions for use of the various items were included.

The larger box contained some stock of the above items, some antibiotics, some plaster of paris sufficient to manufacture a backslab and a suturing kit. In addition my own first aid kit contained Cyclimorph 15mg x 5 and a No. 2 plastic airway.

During the expedition medical problems were luckily negligible. A number of cases of diarrhoea occurred in storm bound camps doubtless due to poor personal hygiene. Codeine Phosphate was an effective treatment. There was one case of contact dermatitis from paraffin, our only fuel. This was effectively controlled with Clobetasone Butyrate ointment. Most of us found sleeping difficult on the return journey in spite of a state of increasing physical exhaustion; waking after 4-5 hours sleep and being unable to fall asleep again was the common problem. Temezapan 30mg proved to be ineffective and a longer lasting benzodiazepine would have been more appropriate.

As a general comment the small first aid kits were always far more accessible than the larger box. For instance on the one occasion when the suture kit would have been useful the medical box was buried under four feet of fresh snow! Steristrips in the small kits might be a more sensible alternative.

#### Further Reading

Illingworth R. "Medical Equipment on Expeditions B.M.J. 1981, 282, p202.

## MEDICAL REPORT

Charles Morton

There are many reports by doctors on the planning and provision of medical aspects of the expeditions in which they have taken part. Medical planning for this particular expedition was much facilitated by these and by personal advice from other expedition doctors. The essence of such planning must be anticipation of events and their management, including the possible evacuation of casualties.

The medical equipment consisted of three small first aid kits (one for each climbing/sledging/camping pair) and one larger box.

The small kits contained:

Aspirin 300mg	10
Paracetamol 500mg	10
Codeine Phosphate 30mg	12
Sennakot tablets	5
Metaclopramide	5
Chloramphenicol "Minims"	2
Pentazocine 50mg	6
Pentazocine 30mg/ml. inj. 2ml	3
2 ml syringe with needle	3
Triangular bandage	1
Crepe bandage roll	1
Elastoplast 12cm x 3.8cm	
Melonin dressing - large	1
Melonin dressing - small	1
Roll of micropore tape	1
<Gauze swabs - pkt of 5	1
Mediswabs	3

## FOOD REPORT

Pete Brownsort

I was originally chosen to be food officer on account of my notoriously large appetite. Nick thought this would be the best way of ensuring ample food supplies and preventing me from complaining if there were insufficient.

Rather than get bogged in complicated food energy value calculations I decided to rely on my natural instincts in designing the rations. As a starting point I took the type of ration I normally take on winter climbing trips in Scotland and while these are usually supplemented with quantities of chips and beer they proved to be an adequate framework.

The resulting diet was based around simple carbohydrates: oats, biscuits, sugar, pasta and sweets as opposed to the more traditional pemmican, margarine, dried fish and dog of the Watkins era. We kept to some traditions, however, and commemorated the anniversary of Watkins' death by dropping to half rations as our food ran out at Tassilaq.

There were three major constraints to be considered in designing the rations. Firstly, and most importantly, weight; we originally intended moving everything ourselves overland. Plans for an R.A.F airdrop and the various luxuries that would allow came and went. Eventually we had to carry five weeks' supplies ourselves and two more were delivered by the helicopter on its visit. My original target weight was set at about one kilo per man day, I managed to get pretty close to this figure (c. 1.2kg) even including packaging.

The second major constraint was the ease of preparation of the meals. I felt that particularly on the sledging journeys, the quickest and easiest meals would be best. This led to the design of two types of supper menu; one for sledging rations using tinned meats and another for base camp rations using dried meat which would require

longer cooking and larger amounts of water, but whi-  
lighter.

Certain team members soon became fed up with large numbers of 'Cheddars' although some of us liked them. However, the oatcakes were perhaps the most sought-after commodity during the expedition. They became a kind of currency and were used for various exchanges and as payment for tasks performed.

While St Ivel 'Five-Pints' dried milk is itself very good, the uses to which the empty bottles were put made it an essential item. These uses ranged from milk mixing, storage and measuring of other foods and water, replacements for broken mugs and other culinary uses to the less obvious uses as paraffin bottle and the extreme use as a pee-bottle for use when stormbound; clear labelling was essential!

#### Packaging

All the food was sorted and packed in Edinburgh in May 1982. Many items were weighed out into portions and heat-sealed into polythene bags. When each box was packed it was numbered and also heat-sealed into a large, tough polythene bag.

We used three types of boxes. A flattish, tray-like box made of coated cardboard and supplied by Bowaters was used for breakfast boxes and sledging rations. Large cardboard boxes with an outer sleeve of coated cardboard provided by Thames Case were used for the base rations. Plastic boxes with snap-on lids from DRG Plastics were used for some lunches and all the sundries. We had no problems with this packaging, nothing got significantly damp although the stores were often left lying around in snow and rain and were treated roughly while sledging.

The packaging policy for the sledging rations was very convenient. Separate breakfast boxes for each pair were essential as we always had breakfast in bed. The food for the rest of the day was all in a single box so most of the sledge loads could remain undisturbed. The cook of the day preparing the meal then had everything to hand and already measured out.

So with the help of these companies the catering was very successful and in retrospect the job of food officer was very satisfying. The standard of cooking was generally very high, particularly at base camp with its well organised kitchen. The memories of a good meal and comfortable seat (albeit cut from ice) on a warm afternoon surrounded by superb views will be with me for many years; although I suspect that the memories of the few culinary disasters such as the 'Tandoori Potato Soup' and the 'Ham a la Thixofix' might remain as long.



*Brownsort and Durkin on Point John*

#### Acknowledgements

I would like to thank the following companies for their help.

Food - supplied free of charge by:

Alliance Cash and Carry  
Brooke Bond Oxo Ltd  
Colman Foods Ltd  
Grant Brothers (Meat Canners) Ltd  
Keen Cost Cash and Carry  
Lyons Tetley Ltd  
Pattersons Scottish Shortbread Ltd  
Roots Wholefoods  
St Ivel Ltd  
A. & R. Scott  
Spillers Foods Ltd  
Tate & Lyle Refineries  
United Biscuits Ltd  
Van den Berghs & Jurgens Ltd

Supplied - at reduced cost by:

Batchelors Catering Supplies Ltd  
McNabs Groceries Ltd

Packaging - materials supplied free by:

Mackinnon and Hay (polythene bags)  
Bowaters  
DRG Plastics  
Thames Case Ltd

Polythene bag heat-sealer lent by the Botany Department, University of Edinburgh.

#### Equipment Report

Hugh Mackay

None of us had been on a sledging expedition to Greenland before so we chose our equipment on the basis of alpine and Himalayan experience, reports of similar expeditions and discussions amongst ourselves. Having returned we have gained an insight into the type of gear needed to survive and prosper in an arctic summer environment. I hope to highlight some of our successes and failures in this report so that future expeditions may benefit from the experience.

#### Personal Equipment

The expedition took place in July and August during the short arctic summer. The weather would be better described as alpine rather than arctic. Typically the daytime temperatures are high while at night they may fall a few degrees below zero. However storms were fairly frequent and during these virtually all conditions were encountered from persistent fog and drizzle to severe blizzards lasting several days.

Clothing worn on a cold sledging night would typically consist of thermal underwear, a wool shirt, polar jacket and a windproof/waterproof jacket of some description. For the latter thinsulate jackets were found to be ideal since they were robust and remained warm when wet, if necessary they could be combined with goretex or other waterproof cags.

Single alpine boots were quite sufficient for climbing and walking. For much of the time we wore nordic ski boots which can double as a lightweight walking boot. These were found to be cold on occasion.

Other essential items were spare gloves, snow goggles and high factor sunscreen.

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#### Transport

Virtually the whole expedition was spent on travelling across snow covered glaciers. We decided that the best way to travel on this type of terrain was by using skis and man-hauled sledges. For most of the journey this combination worked very well, the skis provided adequate traction and only had to be removed on steep uphill sections with a hard surface.

Before we left we had experimented with various types of ski, including waxed and non waxed nordic skis and mountaineering skis with skins. We finally decided on Trak Telemark non waxed nordic skis. They are light, have steel edges, are easy to put on and the bindings have few moving parts to go wrong. Non skiers found them easy to use and they required no attention. The last thing one wants to do on emerging from a tent at 11pm on a freezing night is to start fiddling with waxes. The only disadvantage of nordic skis is that one must carry two pairs of boots, one for skiing and the other for climbing.

We used three ex Royal Marine Pulka sledges, with two people hauling each sledge. The pulka sledge is essentially a 5' by 2' tray with three 1" wide steel runners screwed directly onto the 1" base. The sledges were inexpensive but were not really the best design for the high and heavy loads that we put on them (around 180kg). As a result they were rather unstable. They were however very strong and held out to the end despite constant use and some spectacular crashes. Some minor repairs were carried out involving rescrawing some of the runners.

Unfortunately there is a great shortage of sledges available for this type of expedition. We tried to obtain Nansen sledges (which would have been ideal) but the cost of these was prohibitive (about £500 each) and it is difficult to find suppliers. Most of the types of stretcher sledge used in mountain rescue are unsuitable and again expensive. The best solution in future might be to build ones sledges basing the design on a modification of the dog sledges commonly found in Angmagssalik and seemingly of simple build.

#### The Blue Tube

One of the main problems of the coastal ice cap environment was the lack of running water. The only two methods of obtaining water were by melting snow on the primuses or by using the heat of the midday sun to melt water for us. For the latter case we developed an efficient method of melting snow using a length of dark blue polythene tubing. About ten metres of tubing was used one end was tied off, and snow shovelled in the other end. Once full, the open end was also tied off so that the snow was completely sealed in. After about three or four hours the tube would contain two to four gallons of water. This method was quite effective even on overcast days and we reckoned that it may have halved our paraffin consumption.

#### Equipment List

**Personal:** Ice axe, ice hammer, crampons, climbing harness, deadman descender, two slings, prussik loops, helmet, boots, gaiters, ski boots, skis, ski sticks, sledging harness, gl dubbin, 3 pairs wool socks, 2 pairs mitts, 2 pairs gloves, 1 set of thermal underwear, 2 pairs Y fronts, 1 wool shirt, 1 Thinsulate jacket, 1 pair overtrousers, karrimat, sleeping bag, scarf, towel, toothbrush, stationary.

**Per Sledge:** Teachest, 10 litre plastic jerry can for paraffin, primus stove, billie set, wooden spoon, meta tablets, first aid kit, geological hammer, rope, bamboo canes, candles, binoculars, 1 smoke flare, 1 pinpoint flare, toilet rolls, food boxes.

**Miscellaneous:** Spare crampons, spare ice axe, spare ice hammer, spare ski sticks, spare ski bindings, spare goggles, tent spares and repair kit, primus spares and repair kits, tool kit, spare primus, spare meta fuel, rifle and cleaning kit, 50 rounds of ammunition, 2 two gallon dixies, 2 snow shovels, ice saw, plastic basin, 2 smoke flares, 2 parachute flares,

#### Radios

We are indebted to Plessey Avionics who lent us all our radio equipment. We could not possibly have afforded to buy our own.

We took the following equipment:

- 2 x Clansman RT 320 Manpacks
- 2 x Hand generators (for recharging batteries)
- 2 x 1 ah batteries
- 2 x Whip antenna
- 2 x Dipole antenna
- 2 x Dipole mast
- 2 x Handset
- 2 x Earth

Two of everything was carried in case one broke down.

Using this equipment and the Dipole antenna we were able, on occasion, to communicate with Angmagssalik, from our base camp at Kruuse Fjord, a distance of some 160 miles. The quality of reception and transmission were dependant on weather conditions; if the weather was bad we could not communicate at all. However during clear conditions reception was extremely good.

As far as radios are concerned one thing became clear, that is except in cases where first class equipment is being used by expert hands they are not to be relied upon. We found that their effectiveness was at best sporadic. The message is simple, an expedition of this sort that relies heavily on radios as a crucial part of its planning is flawed from the start. Although it is still important to carry some means of communication as a safety measure.

3 pinpoint flares, blue water tube, main first aid kit, fishing tackle, heliograph, mapping equipment, geological hammers, collecting bags, drawing paper, ski wax, radio equipment (described elsewhere).

**Climbing Equipment:** We were uncertain as to what to expect in the way of style and difficulty of climbing. Consequently we took more than we actually needed, particularly rock climbing gear.

11 ice pegs, 40 krabs, 14 screw gate krabs, 12 extension slings, 24 pitons, 6 deadmen, 9 assorted chocks, 4 friends, 3 x 9mm and 2 x 11mm ropes, abseil tape, harnesses, helmets, descenders, crampons, ice axes and hammers.

#### Acknowledgements

The following companies supplied equipment to us at reduced rates.

Alpine Sports (Blues) - Edinburgh  
Berghaus  
Clog Climbing and Safety Equipment  
Black and Edgington Sports  
Thermawear Ltd  
Helly Hansen (UK) Ltd  
Karrimor International Ltd  
Kodak Ltd  
Plessey Avionics and Communications Ltd  
Graham Tiso Ltd



*Skis off for final leg on Beinn Birsay*



**Acknowledgements**

We would like to thank the following for their help, given either as advice or as direct assistance:

Sir Harald Lesley - The Late Lord Birsay KT  
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 Dr K R Gill  
 Dr R F Cheeney  
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Dr C K Brooks  
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 Heinrich Nielsen  
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 The Late Mrs Merylees

And Also

Leslie Heaseman, Denise McGuire, Heather Hooker and Margaret Rees for help with typing. Rona Wolfe for giving us the snow shovels, B J Durkin for giving us the snow goggles. Pattie Bell for help with fund raising, Stuart Faulkner and J R Sutcliffe for help with obtaining radio equipment. Faz Faraday for teaching some of us how to belay, the Glenorchy gang for allowing their Living Room to be turned into a warehouse and the Grumpy Controller for allowing a takeover of his waiting room. Lastly our parents for letting us go.

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The accounts shown below give a fairly detailed breakdown of our expenditure, and perhaps illustrate how the bills for what might be thought of as peripheral items rapidly mount up.

<b>Income</b>	
<b>Industry</b>	<b>£</b>
Mobil North Sea Ltd	250.00
Scottish Grain Distillers Ltd	25.00
Charles Openshaw and Sons Ltd	50.00
ABC Chemical Company Ltd	50.00
Bank of Scotland	100.00
RTZ	100.00
BP General Education Charity	100.00
Marconi Space and Defence Systems Ltd	350.00
Reed Stenhouse UK Ltd	100.00
Christian Salvessen Ltd	100.00
<b>Grants</b>	
University of Edinburgh	100.00
Edinburgh Geological Society	200.00
Lothian Regional Council (Countryside Award)	200.00
Gino Watkins Memorial Fund	400.00
Mount Everest Foundation	650.00
Royal Geographical Society	250.00
Scottish Mountaineering Trust	200.00
Edinburgh University Mountaineering Club	75.00
Augustine Courtauld Trust	250.00
Gilchrist Educational Trust	150.00
Scottish Sports Council	200.00
Private Donations	120.00
Members' Contributions (£875 each)	5,250.00
<b>TOTAL</b>	<b>9,270.00</b>

**Expenditure**

**Equipment:**

	<b>£</b>
Climbing equipment	78.00
Sledging harness	50.00
Snow valances	38.00
Flares	19.00
Meta fuel	31.00
Sledges	50.00
Gun and ammunition	262.00
Medical supplies	131.00
Film	86.00

**Administration**

Stationary and stamps	140.00
Maps	55.00
Phone Bills	42.00
Petrol	24.00
Bank charges	33.00
Gun license	25.00

Food	384.00
Crates and cases	133.00
Insurance	648.00

**Travel**

Air fares to Greenland	2,200.00
Freight to Greenland	436.00
Helicopter transport in Greenland	2,000.00
Boat charter in Greenland	2,176.00
Additional expenses	<u>134.00</u>

**TOTAL** 9,182.00

**Some Notes on Expedition Planning**

**1. Permission**

Permission to go ahead with the expedition was sought from the Ministry for Greenland in Copenhagen and the application took the form of a questionnaire. Permission was received in March 1982.

**2. Shipment of Equipment**

Needs to be arranged well in advance, the first boat arrives in Angmagssalik around 1st of July, but if the ice is bad this may be delayed.

**3. Personal Travel**

Several travel agencies are able to offer discount air fares to Greenland which work out cheaper than dealing direct with the airlines themselves. Two companies worth approaching are Twickenham Travel, (Twickenham) and Regent Holidays (Shanklin, I.O.W.).

**4. Internal Travel**

This is very difficult to arrange in advance - there are two methods. Firstly, helicopters - which are very expensive and of dubious reliability. Secondly, there is boat charter, however boats are usually busy during the short summer season and are again fairly expensive, especially if you get stuck in the pack-ice.

Of course the best answer is to have your own independent travel: Canoe/raft/inflatable/110 etc. But we are unable to give any advice on this.

**5. Summary**

The most important advice that can be given about planning an expedition to Greenland is as follows:- Don't believe anything anyone tells you, unless it is first hand knowledge. For instance the helicopter payload and other details were obtained from Greenlandair's Head Office and they turned out to be completely inaccurate.





*Sledging to Tasilaq*



*Crampon trouble*



*Descent to Tasilaq*



*Base Camp at Kruse Fjord*

