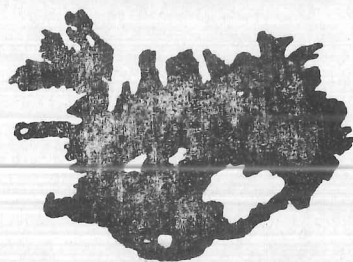


Thorpe St. Andrew School

Iceland



**Expedition
1978**

(*35):91(08)
[1978]

Shelf (* 35): 91 (08) C 1978
Hant.] ✓

f) Slopes and Surfaces

Method of Slope Analysis

For this study we chose several different types of slope and compared them with each other. The main part of the survey was a slope profile; for this we divided the slope into five metre sections starting from the top. We then measured the angle from the horizontal of each section from both top and bottom. The average of these measurements was taken and recorded as the angle of that particular five metre section of the slope. These readings were later plotted graphically on axes of vertical distance against horizontal distance, to give a profile of the slope in question.

A secondary part of the survey was to take a count of the number of soil particles per unit area, and also to note the vegetation on the slope. This information was used to find out if there was any correlation between the angle of the slope and the soil size and plant cover at any given point.

We used totally improvised equipment for this survey. It consisted of two ice axes, one large wooden protractor, one safety rope, one lock-knife and one small mess tin.

The ice axes were used as ranging poles from which we took the angle readings. The safety rope was marked at one metre intervals with pieces of sellotape; this we used to measure distances on the ground and to divide the slope into sections. We made a clinometer from the protractor by hanging the knife, as a weight, on a tiny piece of string tied around a pin in the centre of the protractor. The mess tin was used to define an area for the soil particle count and to ensure a standard area for each count.

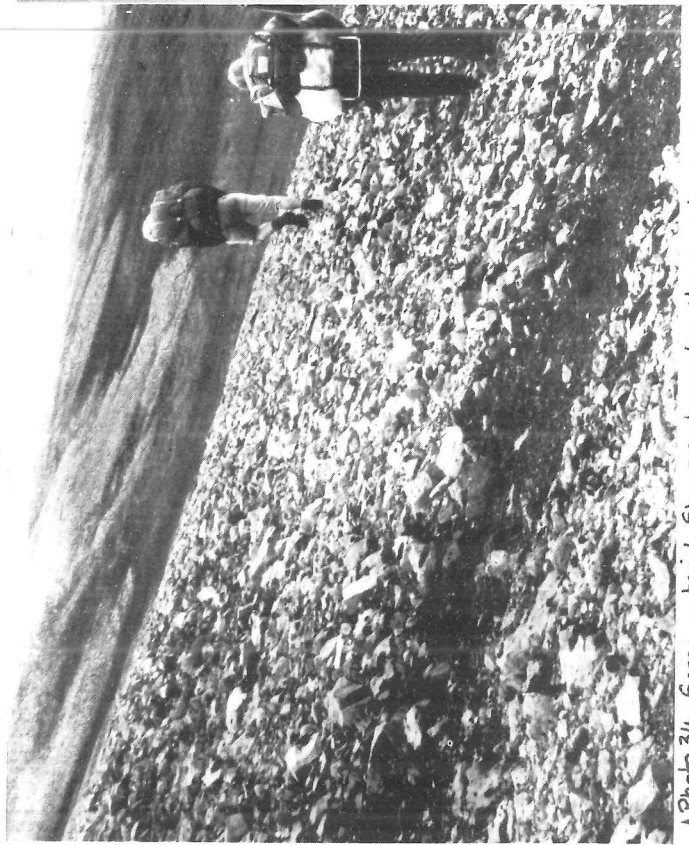
The procedure was to place one ice axe at the top of a slope, measure five metres with the safety rope, and place



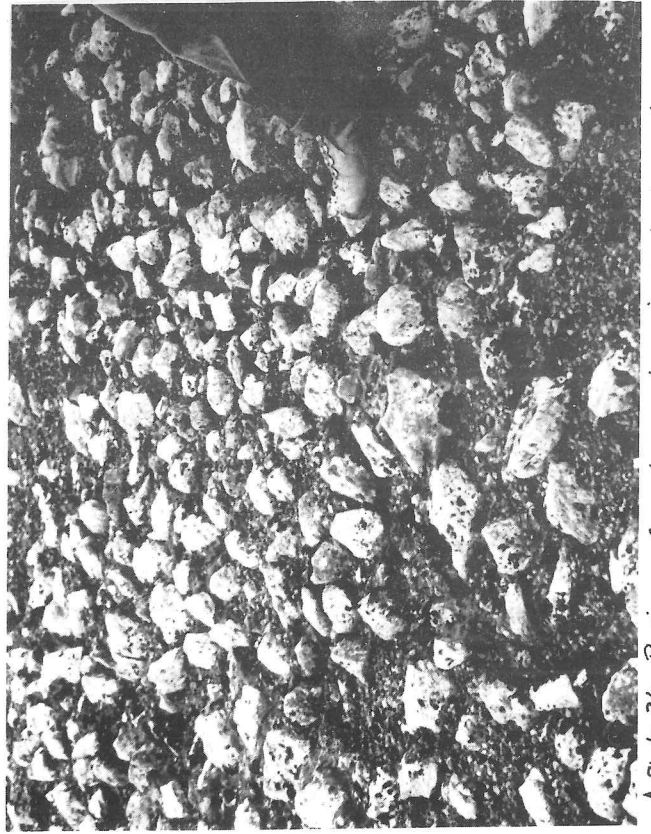


↑ Photo 33. Broken rock surface.

↑ Photo 35.
Cobble
pavement



↑ Photo 34. Scree material. Sharp and angular. Near watershed.



↑ Photo 36. Pumice surface. Very rough - ruins boots. Near crater.

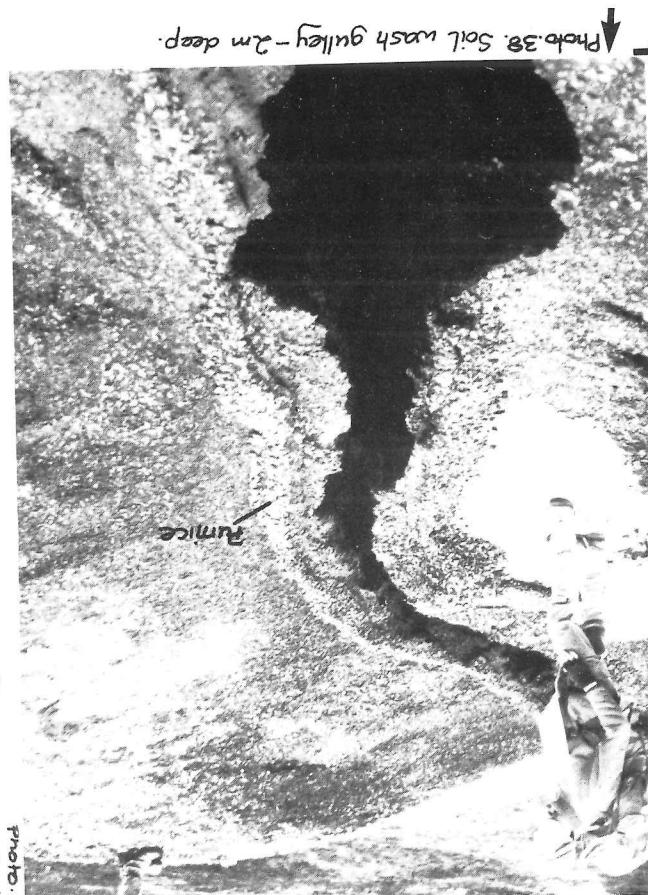


Photo 38. Soil wash gully - 2m deep.

Photo 40. Soil wash near retreating ice.

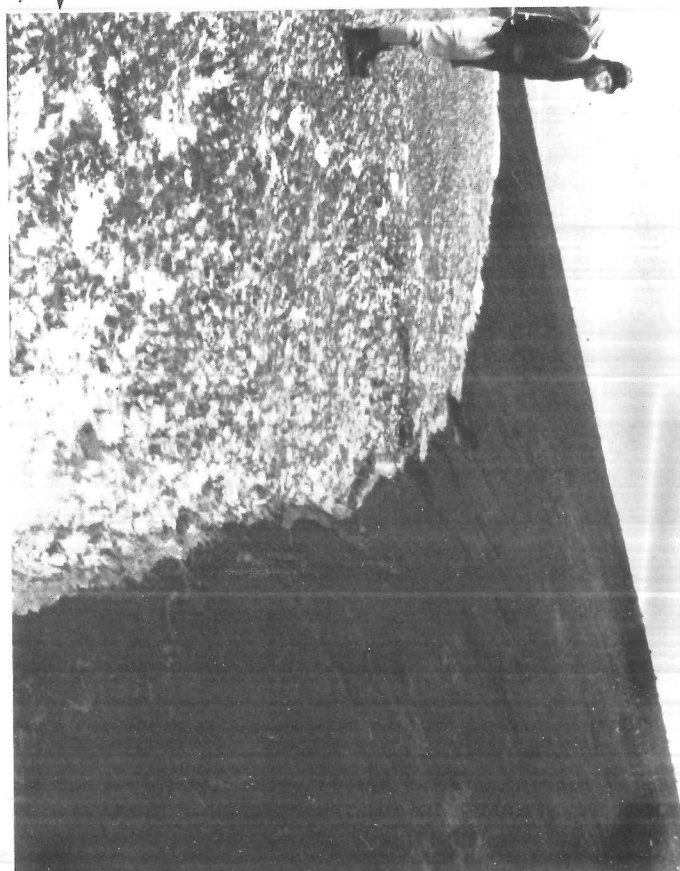
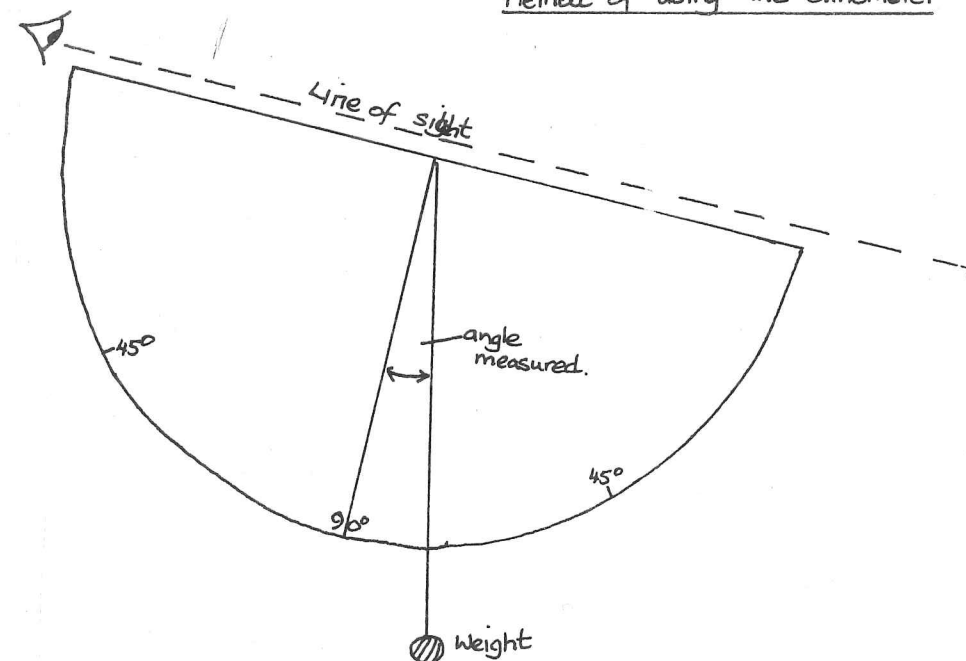


Photo 37. Volcanic Ash Surface. Buck in colour.

Photo 39. Mud surface near hot springs light brown in colour.



Diagram 6.
Method of using the Clinometer



If at any point the slope was discontinuous due to a free face or something similar we would measure up to the top edge from the last ranging point, take the entire discontinuity as one section, and then start from the bottom of it with a fresh five metre section.

At several points on each slope we took photographs to illustrate the type of soil and vegetation, where it differed from any part of the slope previously covered.

Measured length	Dist. m.	Angle -	Angle +	Av.
1	4.9	7.5	7.5	7.5
2	4.9	26.5	25.5	26.0
3	4.9	28.0	27.0	27.5
4	4.9	27.0	25.5	26.25
5	4.9	27.5	26.0	26.75
6	4.9	25.0	24.5	24.75
7	4.9	26.0	26.5	26.25
8	4.9	31.0	30.0	30.5
9	4.9	7.5	7.5	7.5

Slope 3.

Slope 1.

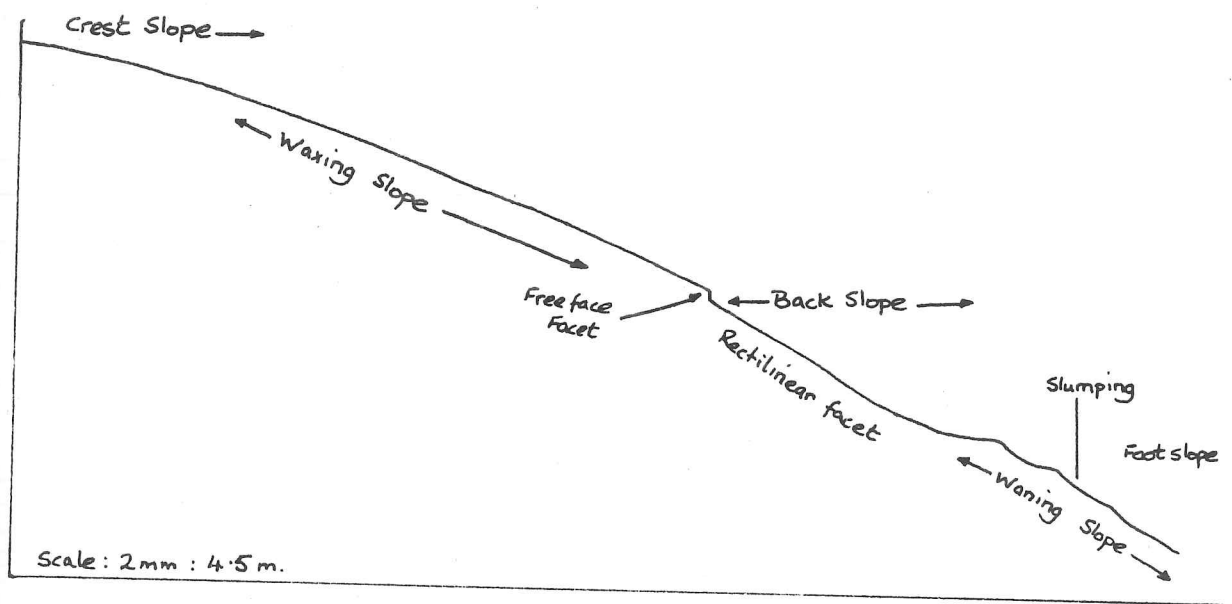
1. Slope length = 165 m.
2. Altitude = 820 m.
3. Soil = volcanic ash.
4. Mean angle of waning slope = 25°
5. % age of waning slope = 6.7%
6. % age of rectilinear slope = 22%

Slope 2.

1. Slope length = 135.6 m.
2. Altitude = 775 m.
3. Soil = volcanic ash
4. Mean angle of waning slope = 24.4°
5. % age of waning slope = 26%
6. % age of rectilinear slope = 36%

Slope 3.

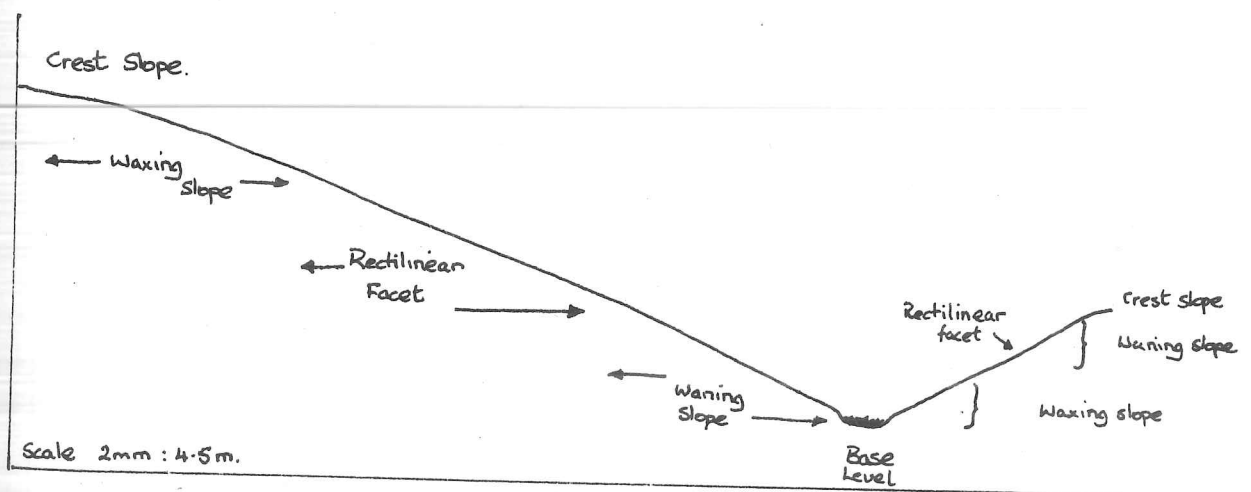
1. Slope length = 38m.
2. Altitude = 775 m.
3. Soil = ash
4. Mean angle of waning slope = 21°
5. % age of waning slope = 15%
6. % age of rectilinear slope = 35%



Slope Profile Survey 1

GR 812918 South facing, 820m above sea level

Total slope length : 165 m.



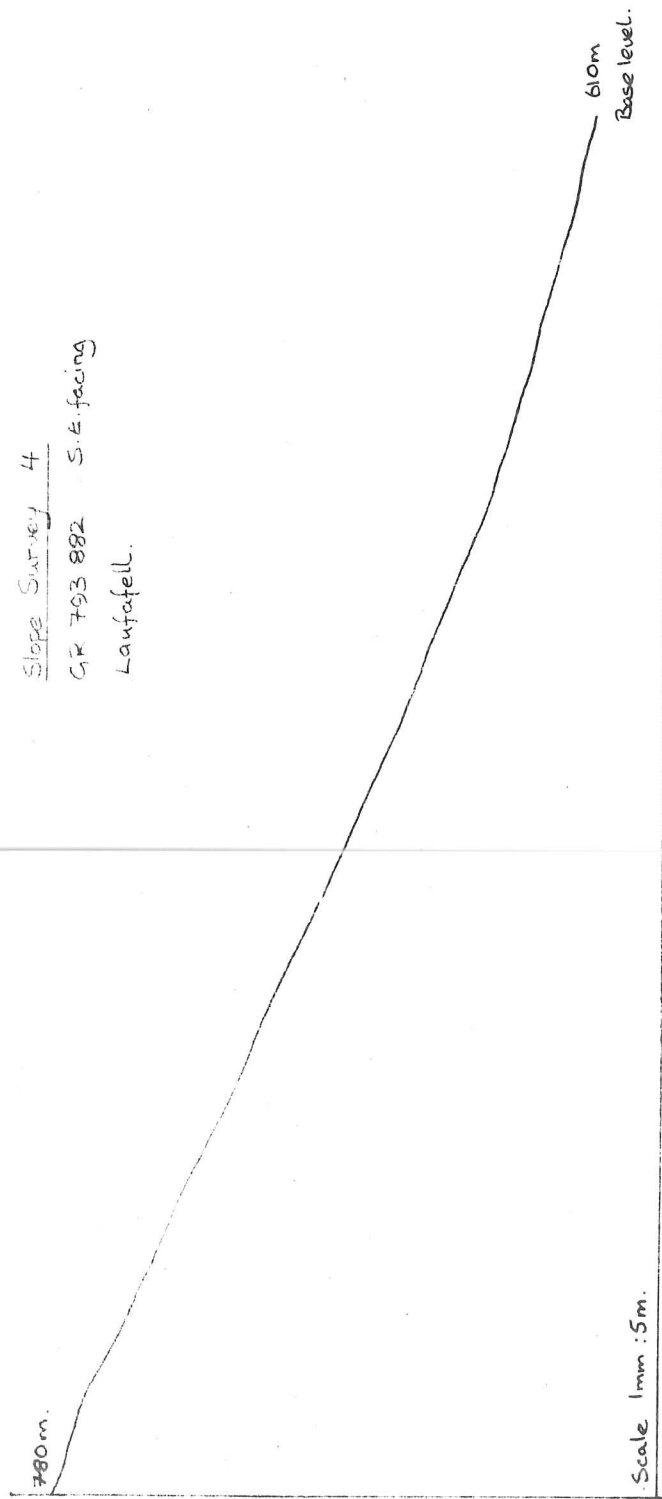
Slope Profile Survey 2

GR 809919 South facing

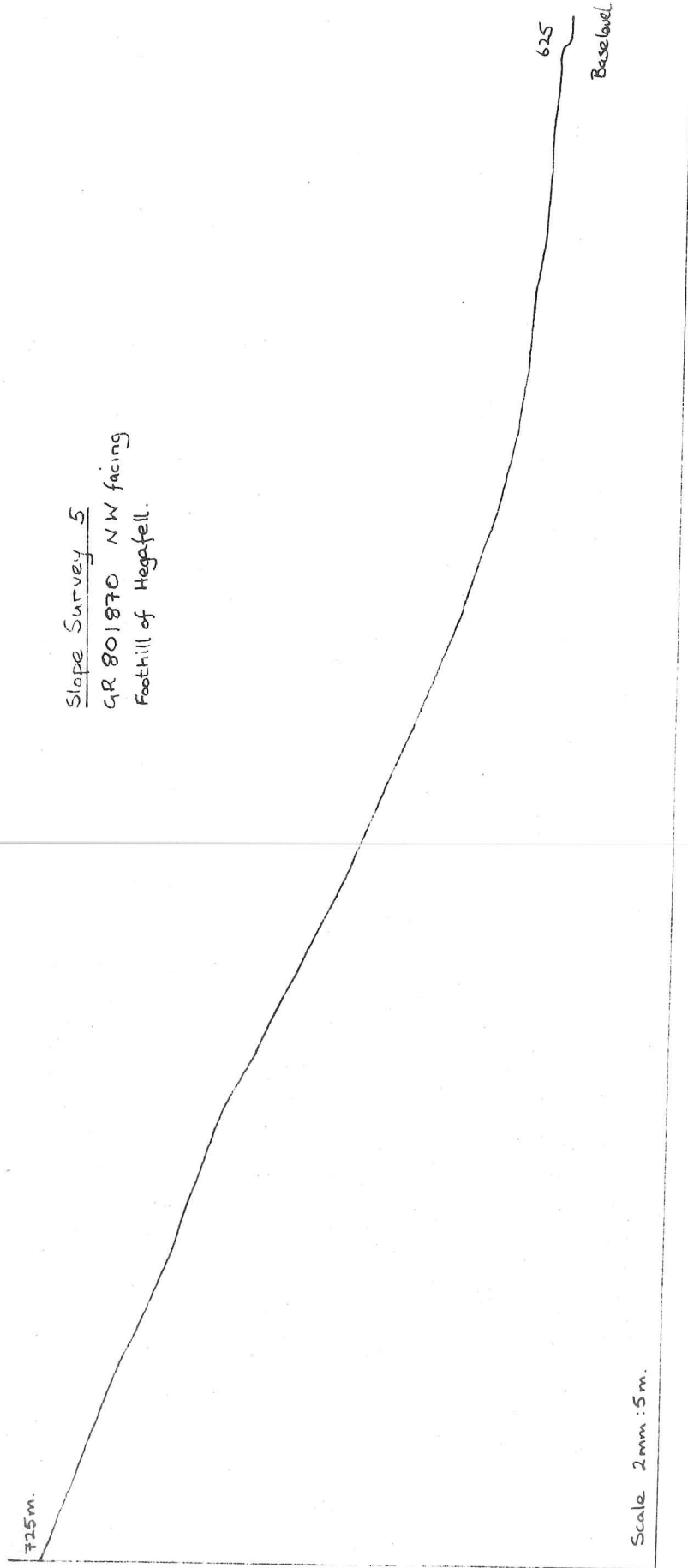
Slope Profile Survey 3

G.R. 809917 North facing.

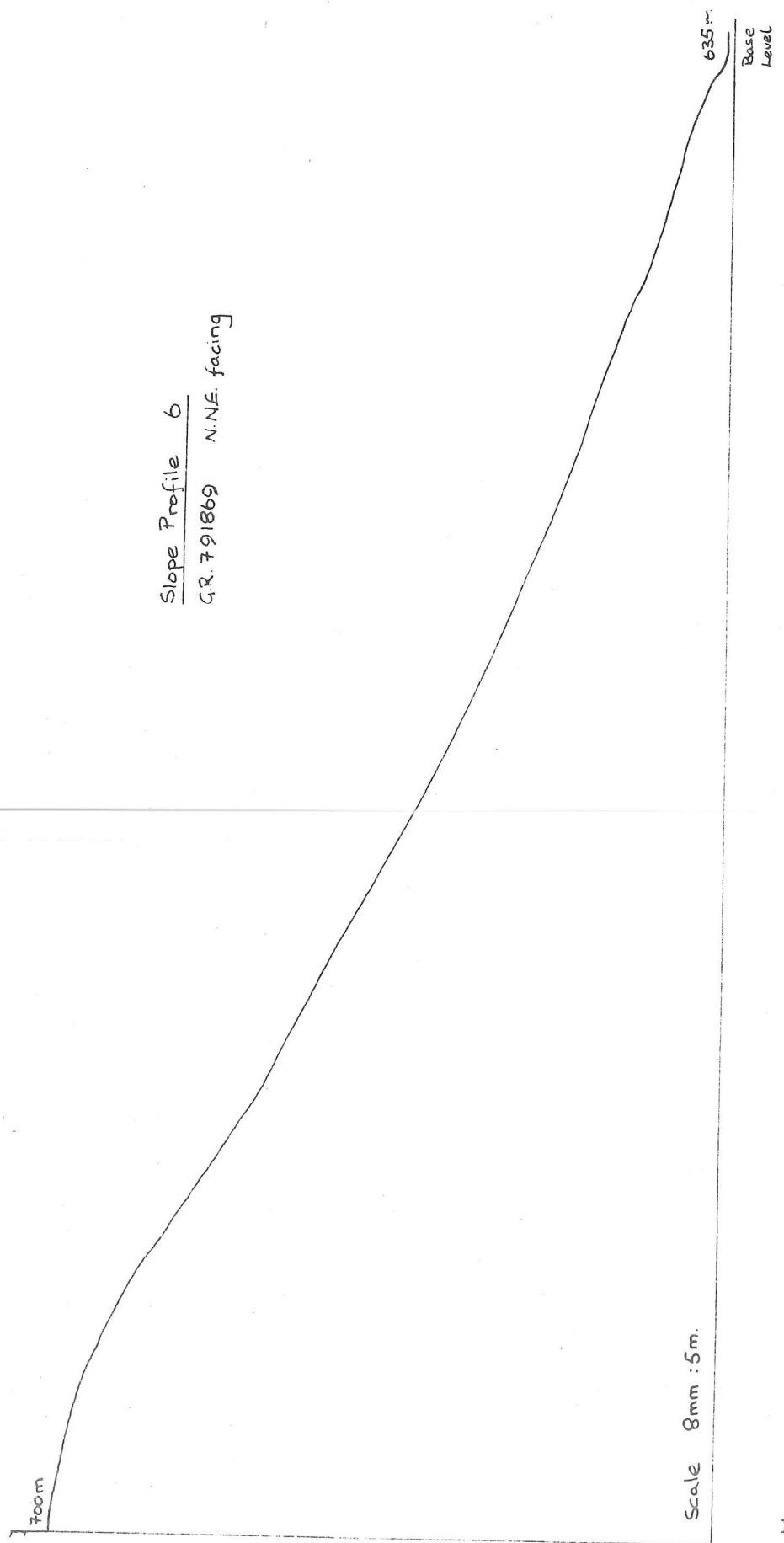
Slope Survey 4
GR 793 882 S.E. facing
Lautafell.



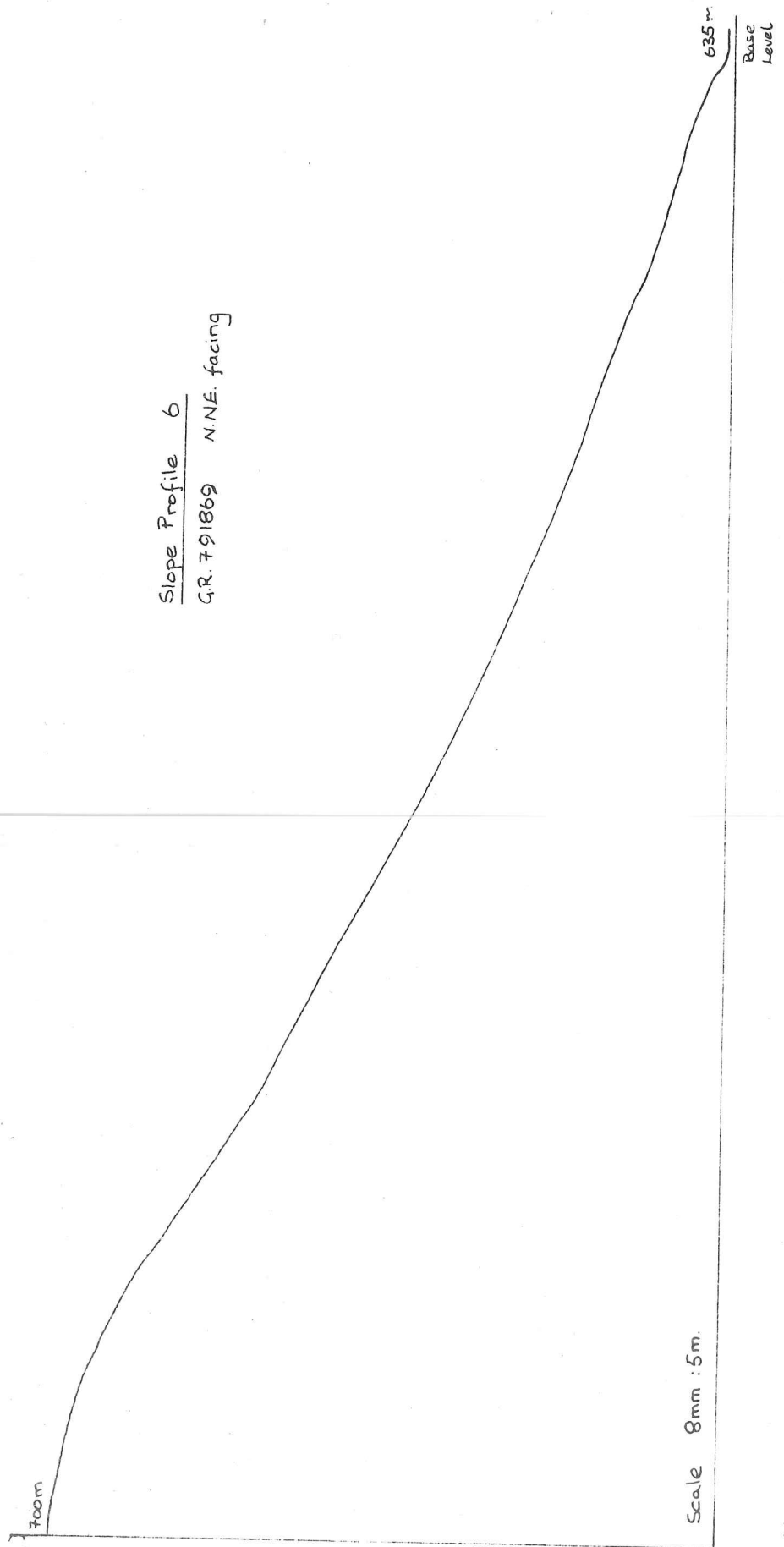
Slope Survey 5
GR 801870 NW facing
Foothill of Hegafell.



Slope Profile 6
G.R. 791869 N.N.E. facing



Slope Profile 6
G.R. 791869 N.N.E. facing



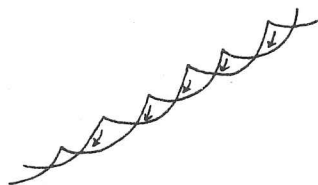
Mass Movement on Slopes.

We observed both rapid and slow types of mass movement on slopes in the area.

1. Slow flowage movements.

a) Soil Creep.

This was observed in many areas and the most common feature associated with this type of movement was terracettes.



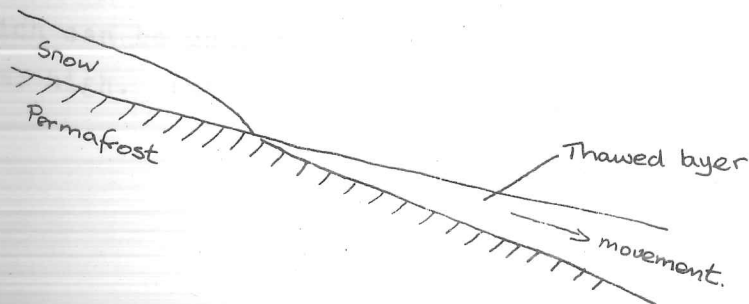
Soil creep & terracettes.

b) Soil Wash.

In areas where there was no vegetation, soil wash produced very rapid gulleying (see photo 38, p. 99). The gulleys were usually very deep (up to 2m.), with sheer sides. Material carried out by this process was then deposited lower down the slope. The material did not move a great distance as it was very porous and enabled the water to escape very quickly.

c) Solifluction.

Near the edge of melting snow the subsurface layer was frozen (Permafrost) and the surface waterlogged due to melt-water. This enabled the surface layer to move slowly downhill.



Solifluction.

2. Rapid flowage movements.

These were observed in one area of pumice during a heavy downpour. The rate of movement was about 2m. per minute. Pumice, being light, can be moved very easily. With run off it floated until a small dam had built up, and when water pressure became high enough the dam would burst and material would be carried away very rapidly until another dam formed. A large ammount of material was washed away by this process.

a) Debris Avalanche.

One avalanche was actually observed on the sides of Laufafell, and a number were heard. Boulders and stones dislodged by water from thawing snow rolled down the steep slopes some 75-100m.

Screees were abundant in the area but no movement was observed.

Surfaces

In this area we noted on our walks at least 50 different types of surface, varying from glass to mud. Some of the different types are listed below.

1. Class lava.

Consisted mainly of broken, jagged pieces of obsidian with ash in between. Blocks of glass varied in size from 2cms. to 0.5 metre. generally, but some very large 2 metre blocks were noted.

2. Block lava.

Encountered in two areas, Hrafninnahraun and Namshraun. Extremely difficult to find a route through and full of holes which can be dangerous. Blocks varied from 0.5m. high to 10m. high. (see photo. 23 , p. 45)

3. Pumice.

Area between the watershed and Camp III ~~was~~ mainly pumice. Formed a gullied landscape making walking very difficult. From the crater to Camp III very coarse pumice tore boots to shreds. (see photo. 36 , p. 98).

4. Ash.

Formed very smooth surface but on slopes water had produced very deep gullies. (see photo. 37 , p. 99). Near melting snow the surface layer had thawed and was able to slide over the permafrost layer beneath.

5. Mud.

This surface was found in the main hydrothermal area. The mud is formed from the breakdown of the volcanic rocks, by chemical weathering. The mud was generally pale brown, but changed near the hot springs to blue. (see photo. 39 , p. 99).

6. Cobble Pavements.

Some extremely good examples of these pavements were observed near the watershed. Formed when the lighter material is blown away, the heavier material left. (see photo. 35, p.98).

7. Scree.

Frost shattering is a common agent of weathering in this area and many examples were noted. The collected material, scree, is made up of angular fragments arranged with smaller pieces upslope and larger pieces downslope.

Various combinations of these types of surface produced a remarkable variety of surfaces, each with it's own characteristics and types of erosion.



Photo 43. Stone polygons and stripes near Landmannalaugar

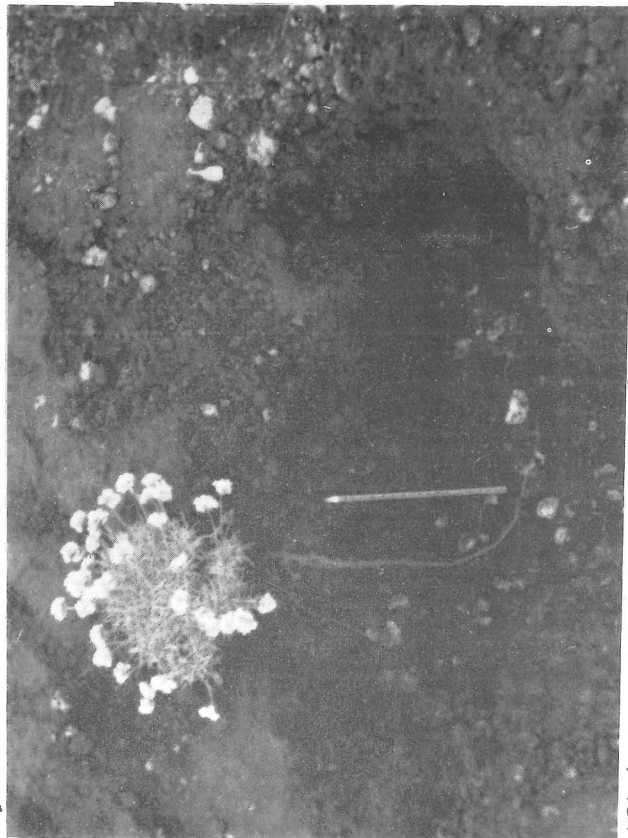


Photo 44. Thrift showing root system.

Photo 41. Headward erosion. One of many examples

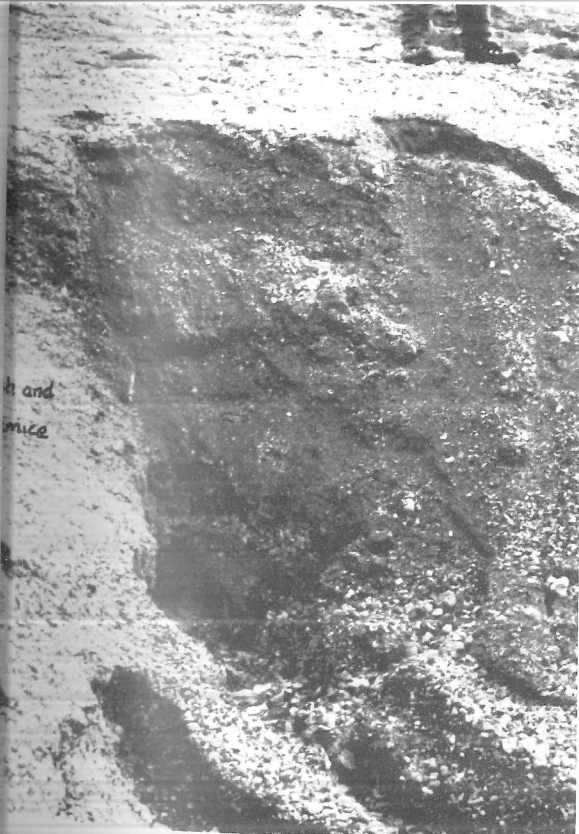


Photo 42
Bog cotton
at Camp
IV

Photo 46. Moss Campion

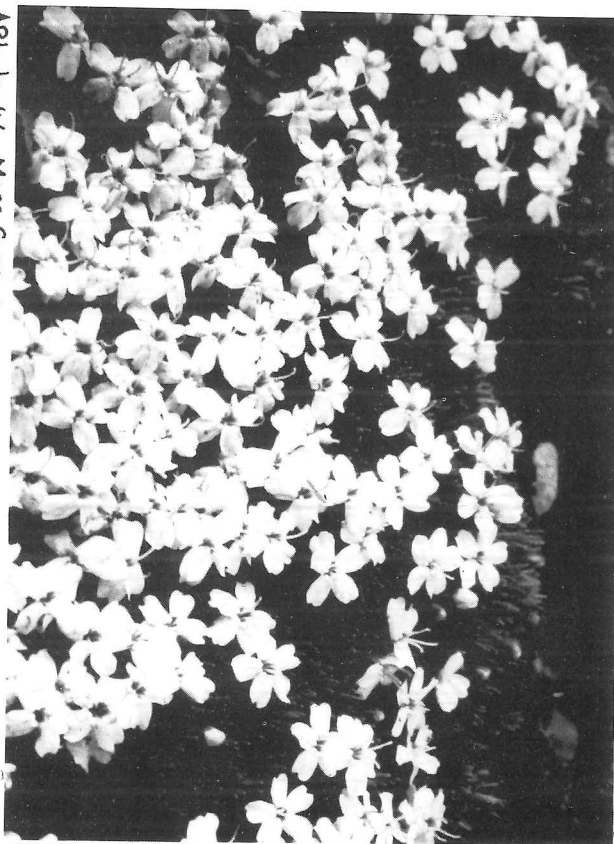


Photo 45. Young Thrift



Photo 48. Thrift

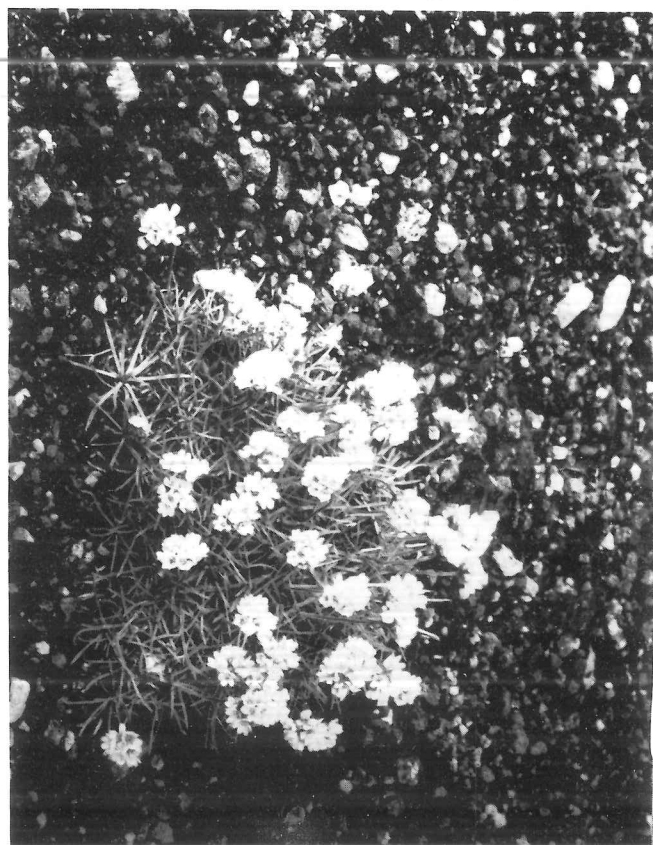
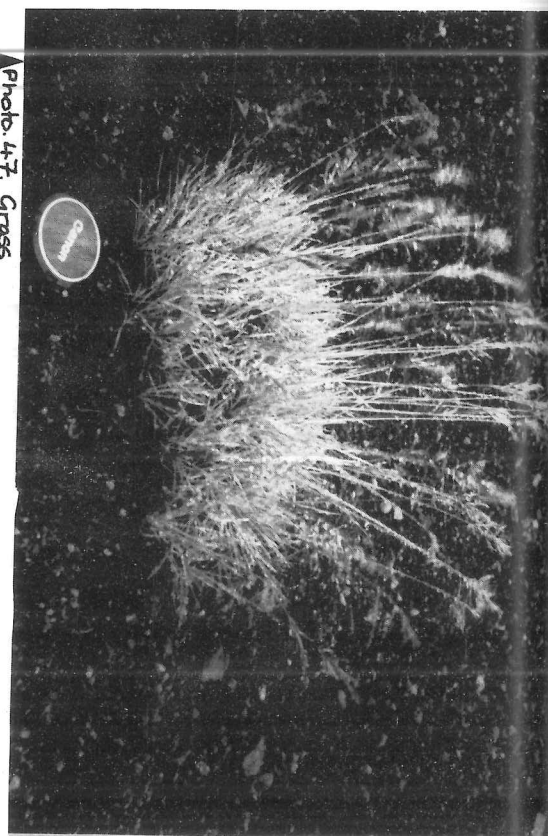


Photo 47. Grass



g) Rivers.

This small study, undertaken on the section of the river Markarfljot adjacent to base camp, was completed when the majority of the party was studying on the other side of Laufafell.

The measurements taken in the course of this study were only comparatively accurate, due to the lack of equipment. However, all the readings were taken under the same conditions, and were, therefore, accurate in relationship to each other.

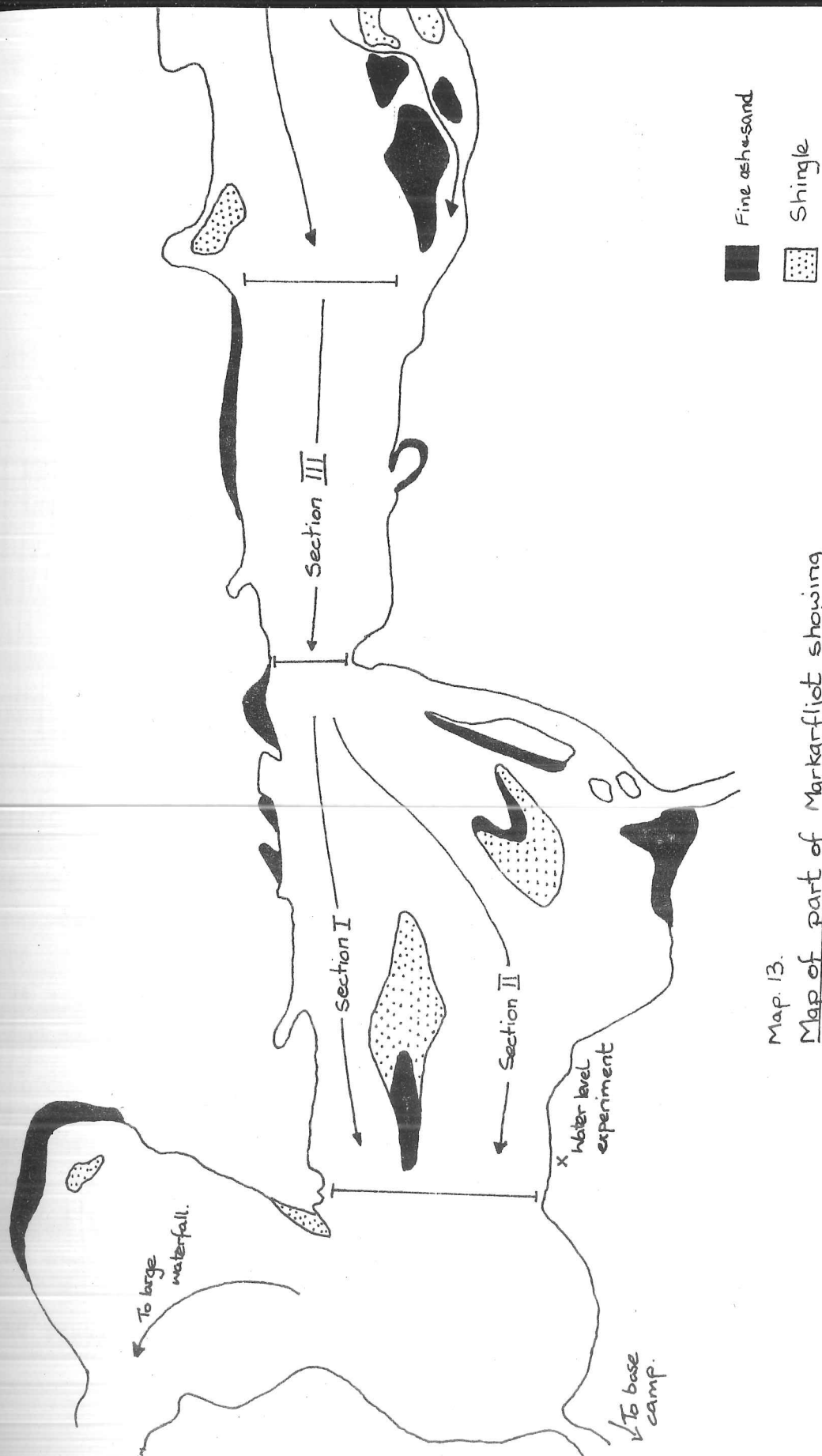
This study resulted from an interest in the velocities in the different channels of the Markarfljot next to base camp and in the relationship of the composition of the river bed to these velocities.

The velocities were recorded in three different sections of the river, each of which is marked in on the diagram on page 112. Each section was approximately 75m. in length. Each length had to be paced out since the tape measures had been left in England. Sections I and II were immediately downstream of the small waterfall, and section III was immediately upstream of the waterfall.

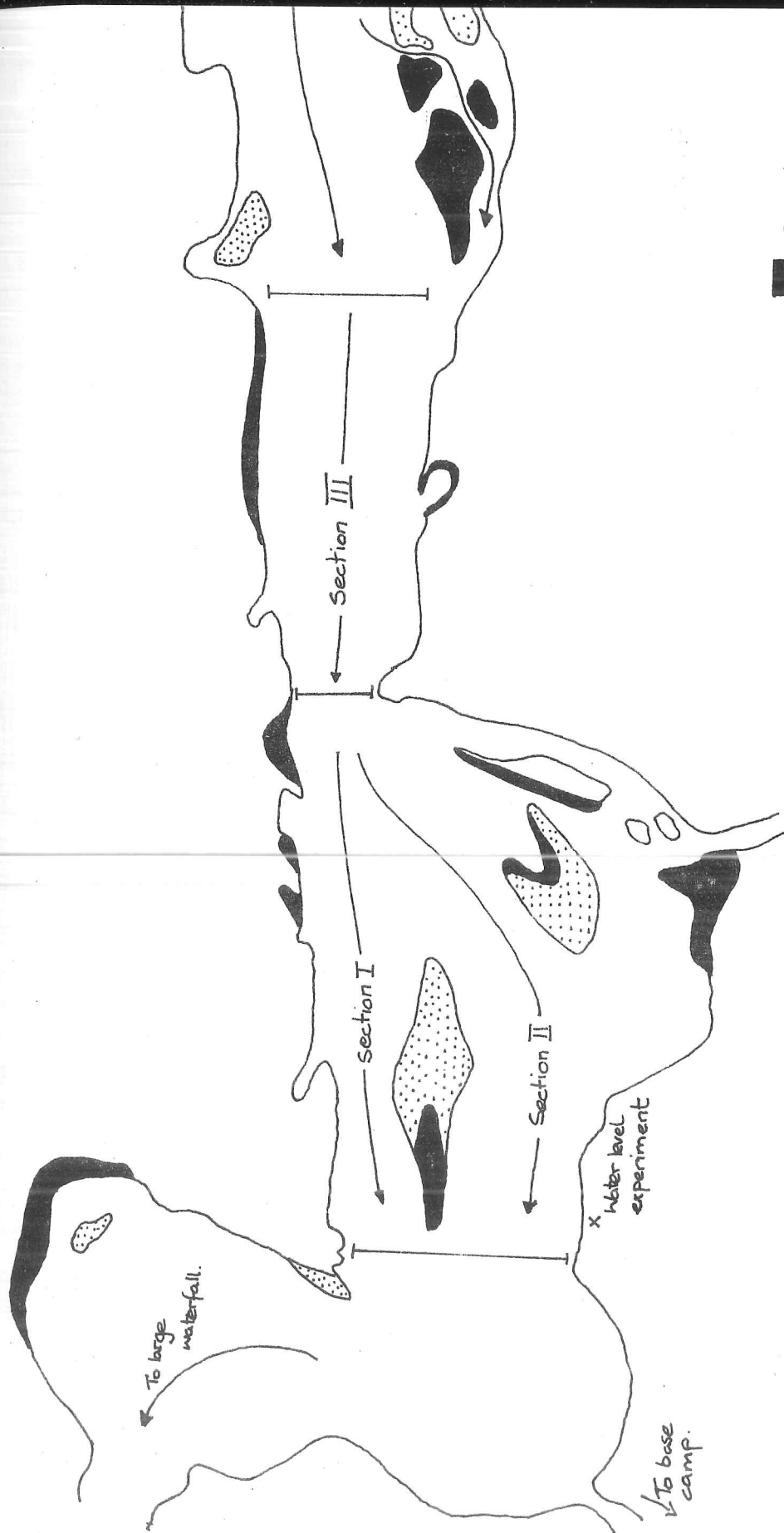
Having measured the sections over which the velocities were to be recorded, the problem of actually finding a means to record these measurements with some degree of accuracy arose. To this purpose pieces of pumice weighing on average 80gms. were collected. The velocities of the water in the three sections could then be measured by throwing the pieces of pumice into the river and measuring the time each piece took to travel down each section of the river.

The timing itself also caused problems, since an ordinary watch had to be used instead of a stopwatch. This limited the accuracy of the readings.

Once the method of measuring the water velocities in the three sections had been sorted out, readings were taken over two days at four different times - 1300, 1600 and 1900 on 9.8.78 and at 1000 on 10.8.78. These readings are rec-



Map. 13.
Map of part of Markarfljot showing
survey sites.



■ Fine ash sand
 ■ Shingle

Map. 13.
 Map of part of Markarfljot showing
 survey sites.

orded below.

Time	Section I	Section II	Section III
1300	75 secs	113 secs	31 secs
1600	92	117	32
1900	84	144	30
1000	97	124	32
	per 75 metre section		
1300	3.6 km/ hr.	2.3 km/ hr	8.7 km/ hr
1600	2.9	2.3	8.4
1900	3.2	1.8	9.0
1000	2.7	2.1	8.4
	km per hour		

From this table it can be seen that section III had the most constant velocity. The other two sections, downstream of the waterfall, show distinct variations in velocity at the recorded intervals. The reading taken at 1900 hours in section II is markedly different from the others in that section because the peice of pumice being used got caught up in some rocks in a shallow part of the channel.

Once the readings had been taken, the composition of the river bed in each section was taken into consideration. The velocities in section III were probably more constant than those recorded in the other sections, because the river bed was made up of large rock slabs where the water had worn away the volcanic intrusion in that area so that the water was forced into a narrow channel carved in more resistant rocks than those in sections I and II. The water being forced into this channel before the waterfall accounts for the high constant velocities recorded in that section.

Sections I and II had beds composed of much smaller and finer materials. Section II's channel bed was mainly

made up of fine deposits and gravel, whereas section I had larger stones and rocks making up the bed.

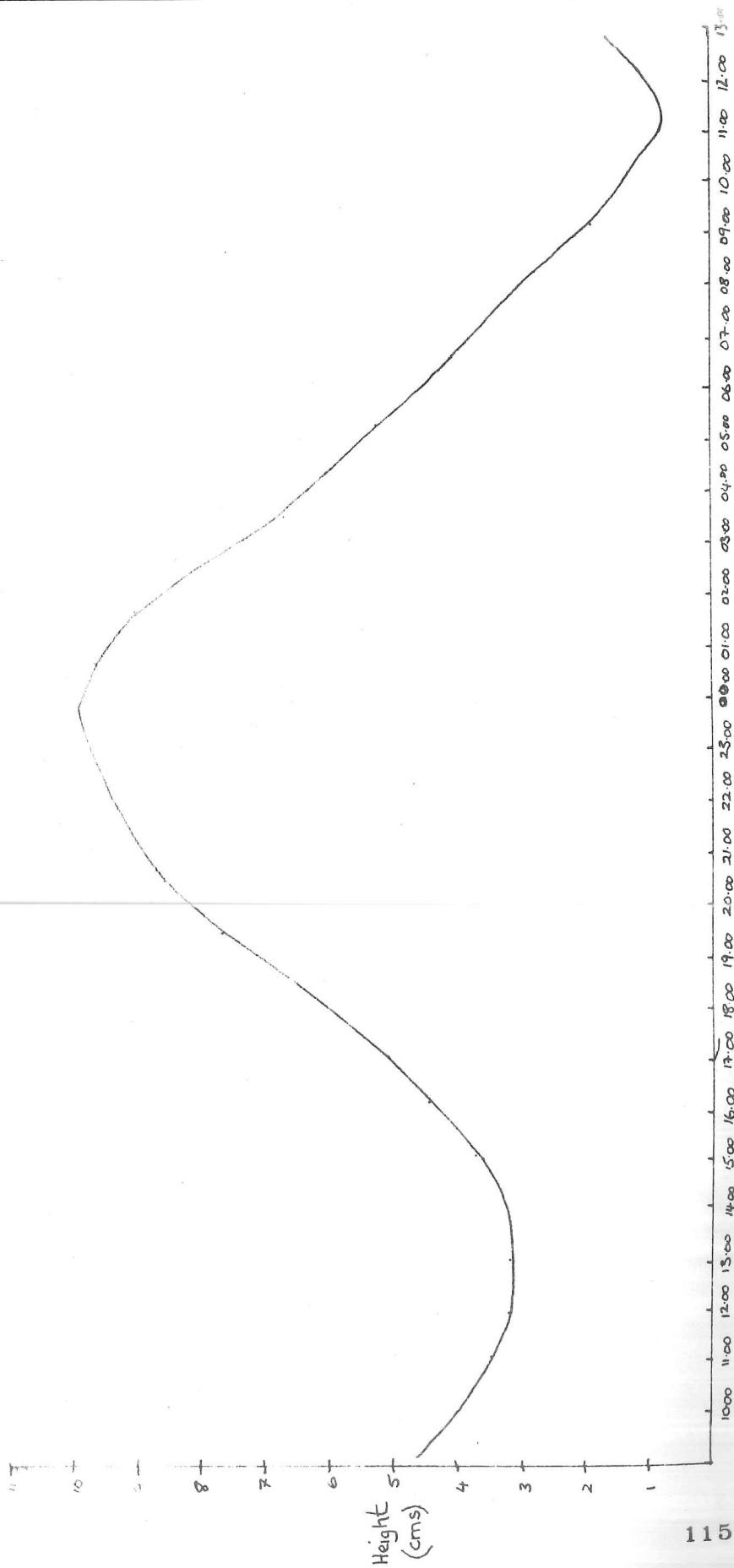
The depths of each section also varied considerably section III having the deepest channel and section II the shallowest. The shallowness of the channel in section II combined with the composition of the bed gave rise to the slower velocities recorded there.

The composition of the channel beds would seem then to have a bearing on the water velocities in the different channels.

One further survey was carried out. This involved measuring the depth of the river each hour over a period of 24 hours. A calm area of water was chosen for this and a length of wood marked off in intervals was pushed into the bed of the river. Recordings could then be made and a graph was produced of the results. (See page 115).

It is interesting to compare the results of this survey with those of the snow retreat survey. It appears that the greatest depth of water occurs some 6-8 hours after the greatest rate of retreat of the snow.

Markerflyot
 Variation in height with time.
 28 hour survey.



9.8.78

Time (hours)

8.8.78

h) Weather

Abbreviations: str - stratus; cu - cumulus or cumulo-; a - alto;
n - nimbus or nimbo-; ci - cirrus or cirro-;
SO - sky obscured; ltr - later; LR - light rain;
OLR - occasional light rain; R - rain; HR - heavy
rain; HI - hail; g - gusting; var - variable;
phps - perhaps.

Date/ Time	temp./ °C	max. min. °C	wind speed/direction (Beaufort scale)	cloud/ oktas	precipitation
26.7.78 21.00	6½		3-4 E	8 n-str	LR
27.7.78 03.30			5g7 E	8	
12.00	9½	8½/-	3 E	8 low str	nil
18.00	8½		2-3 E	8 str	OLR
21.00	9	11/8	0	7½ a-c, str cu-n	nil
28.7.78 09.30	7		2-3 W	7 a-cu, cu	nil
12.00	warm!		3 WNW	4 cu	nil
17.30	9		3 WSW	6 str, cu-n	nil
21.00	9½	11/6½	2 WSW	4 str, cu-n	nil
29.7.78 09.30	9½		3-4 S	5 ci, ci-cu	OLR
12.00			3-4 SSE	8 str, cu-n	OLR (ltr HR)
16.00			3 SE	5 ci, ci-cu cu-n	nil
21.00	7½	12/3	2-3 S	7 str, cu-n	nil
30.7.78 09.30	11	-/5	2 S	7	nil
19.25			2 SW	4	nil
31.7.78 10.25	7½		3 S	8 str, cu-n	nil
Overcast, little wind, cool most of day; warm, sunny evening, wind freshening.					

Date/ Time	Temp./ °C	Max.Min °C	Wind speed/direction (Beaufort Scale)		Cloud Okats.	Precip
<u>1.8.78</u> 10.00 19.15	9 $\frac{1}{2}$ 7	12 $\frac{1}{2}$ /5 $\frac{1}{2}$	4 4	SF NNE	5 a-cu 8 str	nil OLR
<u>2.8.78</u> 10.50 19.40	8 7 $\frac{1}{2}$	12 $\frac{1}{2}$ /5	5 5-6	SE SE	SO 8 str cu-n	mist OLR
<u>3.8.78</u> 10.00 12.30 23.30	11 $\frac{1}{2}$ warm		4-5 4 0	SE S S	5 str, cu 2! cu	nil nil mist
<u>4.8.78</u> 12.30 20.30	warm Rain all afternoon		1-2 1-2	N W	8 cu-n 8 str	OR nil
<u>5.8.78</u> 10.00 18.00 22.10	warm 8 $\frac{1}{2}$		1 2	E S S	8 cu-n 8 str SO	nil HR mist
<u>6.8.78</u> 10.35 22.00	9 5 $\frac{1}{2}$	-/6	2 3	S W	8 str 8 str	R nil
<u>7.8.78</u> 08.00 19.00 21.30	7 8 $\frac{1}{2}$ 8	10 $\frac{1}{2}$ /4	0 2-3 2-3	W NW	8 cu-n 8 cu-n 8 str	nil OLR nil
<u>8.8.78</u> 11.15 Overcast 20.10	cool all day, cool	cool, low stratus,	2* no precipitation. 0		8 str 3 cu	nil nil
<u>9.8.78</u> 06.20 10.00 13.00 20.00	relatively warm relatively hot! relatively very warm relatively warm		0 1 3 1	N NW NW	2ci-cu 1 ci-str 4 ci 7 str	nil nil nil nil
<u>10.8.78</u> Windy since 05.00 15.30 21.00 Max-min	8 6 thermometer lost when loo blew over.	Cloud fairly thin 14/1 $\frac{1}{2}$	3-5 3-5	SE SE	8 str 8 str	nil R
<u>11.8.78</u> Windy all night	with some rain.					

Date/ time	Temp/ C	Max. Min. C	Wind speed/direction (Beaufort Scale)	Cloud oktas	Precipitation
<u>11.8.78</u> 10.00	bloody cold** Wind abates somewhat, then freshens. Spectacular cloud rising at 1,000ft per minute in the NE.		4g7-8 S	8 str	nil
22.25			3-5 S	8 str	R
<u>12.8.78</u> 05.20			fairly warm warm	3-4 SE	8 str
21.15	2-5 S	5 ci-cu, cu-n		nil	
<u>13.8.78</u> 07.15	warm		2-3 S	4 cu-n	nil
18.30			3-4 S	4 cu-n	nil
22.30			3-4 S	8 str, cu-n	nil
<u>14.8.78</u> 09.00			3-4 S	8 str	nil
19.00			1-2 S	SO	mist
<u>15.8.78</u> 09.00	very warm warm Two or three light hail showers.		2 SE	1 cu	nil
18.00				8 str, cu-n	LR
<u>16.8.78</u> All day				HOT!!	Light airs

* doubtful observation.

** subjective comment registered by Mr. Charig.

The weather report is not as detailed as it should have been due to a number of mishaps with the equipment and the failure to obtain some items before departure.

4. Biological Survey.

Biological Reports.

1. Study of Thrift Productivity.

The aim of this investigation was to carry out a quantitative study of the productivity of one of the more prominent species of plant found in the Austur-Reykjadalir region. This would take the form of a comparison between the productivity of the particular plant in a number of different localities. After obtaining results, some suggestions could then be made as to the ecological factors accounting for these results. The plant chosen for this investigation was Thrift (Armeria vulgaris).

The Austur-Reykjadalir region is of particular botanical interest at present, as it has recently seen recolonization of vegetation although the diversity of species is poor. As recently as 1970, the nearby volcano Hekla erupted and covered the area with a layer of volcanic ash, so destroying the existing vegetation at the time. This means that seven or eight years ago Austur-Reykjadalir was botanically barren. The species of plant found growing in the region in the summer of 1978 are those which have managed to establish themselves during the intervening years.

Plants colonizing this austere area of Iceland have to be extremely hardy and adaptable. The substrate is largely composed of volcanic ash and regolith which has the disadvantages of not only providing an arid environment, but also a relatively unstable one where rootin is concerned. One of the most notable features of Armeria vulgaris is its remarkably sturdy, lengthy and repeatedly diverging root system. This allows the plant to anchor itself firmly and to obtain sufficient moisture. Other environmental factors to be tolerated by successful colonizers include attitude, exposure, temperature and snow-cover for many months each year. The nature and

degree of these factors will influence the ammount of plant tissue that is produced in any given growing season. It is this which is measured as the productivity of the plant.

Armeria vulgaris belongs to the Plumbaginaceae plant family. It is closely related to the four subspecies of Thrift found in Britain, the most common and similar being the Sea Pink (Armeria maritima) which, as it's name suggests, is found on the coast. However the Icelandic subspecies is found well inland, as is the subspecies which grows in the Scottish Highlands.

The plants we found in the Austur-Reykjadalir area, were rarely more than 6cms. high from top to bottom of the stem. The leaves are bright green, narrow, linear and single veined. The flowers are varying shades of pink (almost white on some plants), and arranged in inflorescences. The British species flower from March to September, but the Icelandic species flowering period is probably shorter as snow and ice are still predominant in March-possibly from June to September.

The long, thick, woody and much-branched rootstock is a very important characteristic. In some cases the roots were 2-3 metres long. The apex or lower part of the root is very fine, and the upper part may divide into two, three and more, to form what at first may look like several different plants in one clump, until the roots are unearthed.

From the thick, upper part of the root grow the leaves. These generally lie flat and form a confused circle about 3 or 4cms. long at the most. From the centre of the lower leaves rise the smooth, softly hairy flower stems, numbering from one to four or five from each root division. There may be about twenty stems on one plant, depending on how many root divisions are formed. The flowers are grouped in a half-round bunch, the inflorescence. The calyx is funnel shaped with five lobes, the corolla being five-clawed petals. The five anthers are

yellow, and the ovary bears five long, threadlike stigmas.

Hence the floral formula is $K_5 C_5 A_5 G_5$ where:-

K=calyx, C=corolla, A=androecium (male part or anthers),

G=gynaecium (female part or ovaries).

The flower is radially symmetrical or actinomorphic.

Study Areas

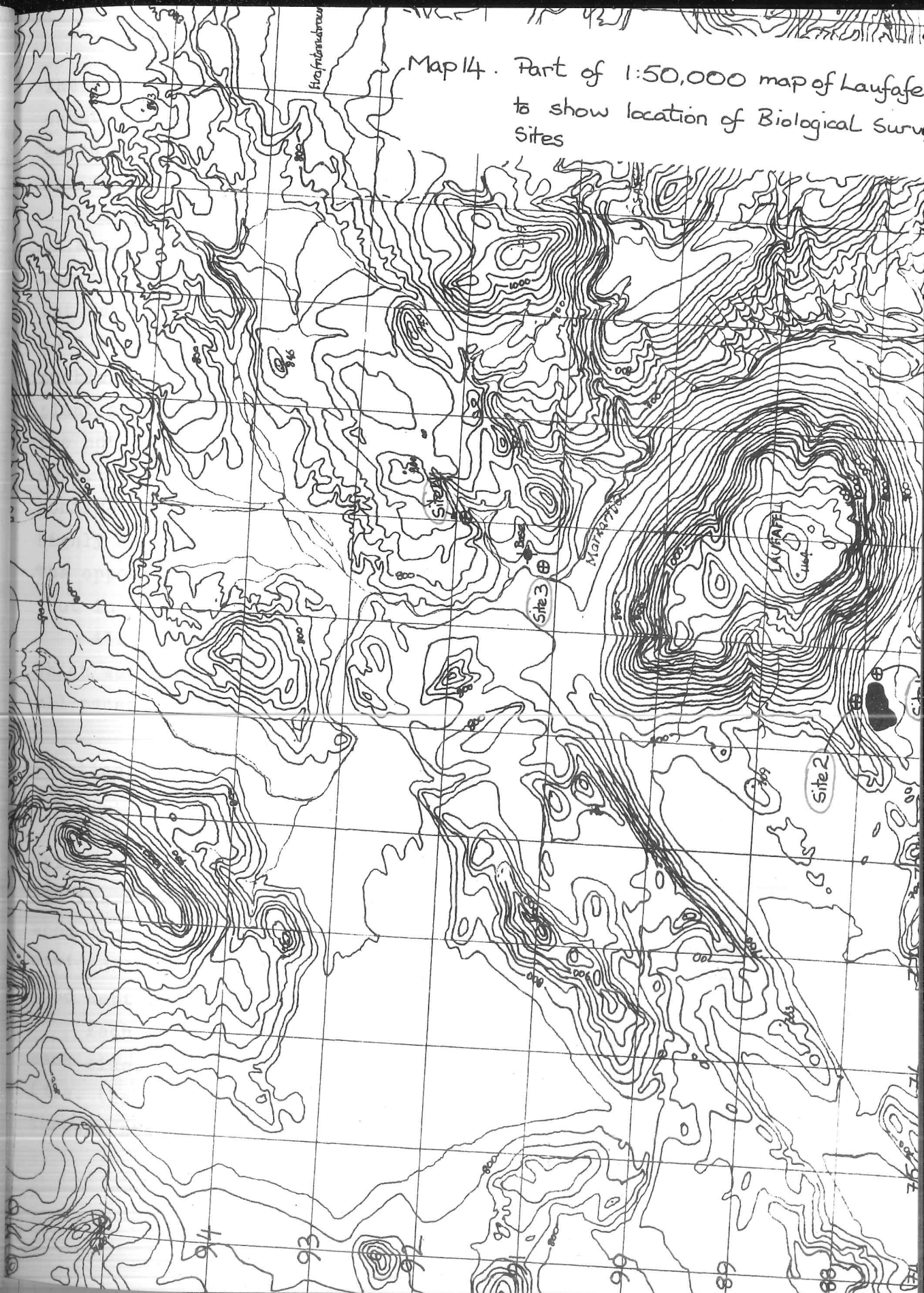
For map to positions of Study Sites see p.

There were four sites in all. Site 1. was about a hundred metres from a small lake (see map) near the fourth camp on the south side of Laufafell. The altitude was approximately 700 metres, on a flat plain surrounded on all sides except the south-east by steep slopes. It was therefore partially protected from the fullest extent of the strong winds. Also present were large mounds of block lava looming out of the generally flat plain. The substrate consisted of volcanic ash about three inches thick, and then a brown-black earth, damp and sandy in consistency. The area lay near an Icelandic road (i.e. track), which only sees traffic in the summer at weekends, a few vehicles each day. Many vehicle tracks were found at Site 1. showing human visitation (probably campers). The area was heavily moss-covered, and harboured a number of other plant species, about 15.

Site 2. was very close to Site 1. on the north side of the lake, and on the south-facing slopes of Laufafell. the slope was steep, about 50° , and was practically devoid of vegetation. The substrate was volcanic ash, with no apparent soil for some depth. The ash was very unstable and easily moved.

Site 3. was further north, bounded by the river Markafljot on one side, and by a stream which flowed into it on another side. The third side gradually sloped away upwards, while the fourth side continued generally flat with the occasional gulley (easily eroded by melt-water) beside the Markafljot.

Map 14. Part of 1:50,000 map of Laufafe
to show location of Biological Survey
Sites



The site was very gently sloping down towards the river. The substrate was very similar to that of Site 1. though the lower earth was browner. The site was exposed fully to the elements and was devoid of vegetation apart from Thrift.

Site 4. was approximately one kilometre away from Site 3., on a slope of about 23° , above a small hot spring. The slope was south-east facing and quite sheltered on the lower parts, but very much exposed on top. Soil was much more prevalent, held together by roots of abundant moss, so keeping the soil stable for other plants to colonize. As many as twenty two plant species were found. The lower edge of the site ran along the hot spring stream where the temperature changed from around 90°C . at the hot spring to 40°C . where the stream came to a confluence with a melt-water stream. The hot spring water was highly sulphurous and enabled algae colonization in the stream. The opposite slope was entirely of volcanic ash, at least a foot in depth, and supported almost no vegetation.

All sites were at 700 metres altitude, except Site 4. which was at 800 metres. They were all one hundred paces square, all paces being about 0.75m.

Practical Work

The main problem encountered in this part of the study was the lack of good equipment, due to the weight limit for luggage and the extra cost. A makeshift quadrat was constructed from wood from the crates. It measured one metre square and was divided into 25 smaller squares by lengths of string, which also kept the quadrat shape constant!

Each site was measured by pacing out a square, 100 paces each side. In each site, 20 quadrats were thrown at random, (i.e. the quadrat was thrown 20 times). This involved the thrower standing in a central position, covering his eyes and

turning around a number of times, so as not to know which direction he was facing, and then throwing. The quadrat was also thrown from the edge inwards.

Each square metre where the quadrat landed was cleared of all Thrift material and collected in a polythene bag (a separate bag for each site). This included as much of the root system as possible, which proved to be difficult as the roots were frequently a metre long and a foot in depth. Excavating wide-spread root systems from volcanic ash and black soil was far from easy using a trowel and geological hammer! Never-the-less the bulk of every plant was collected.

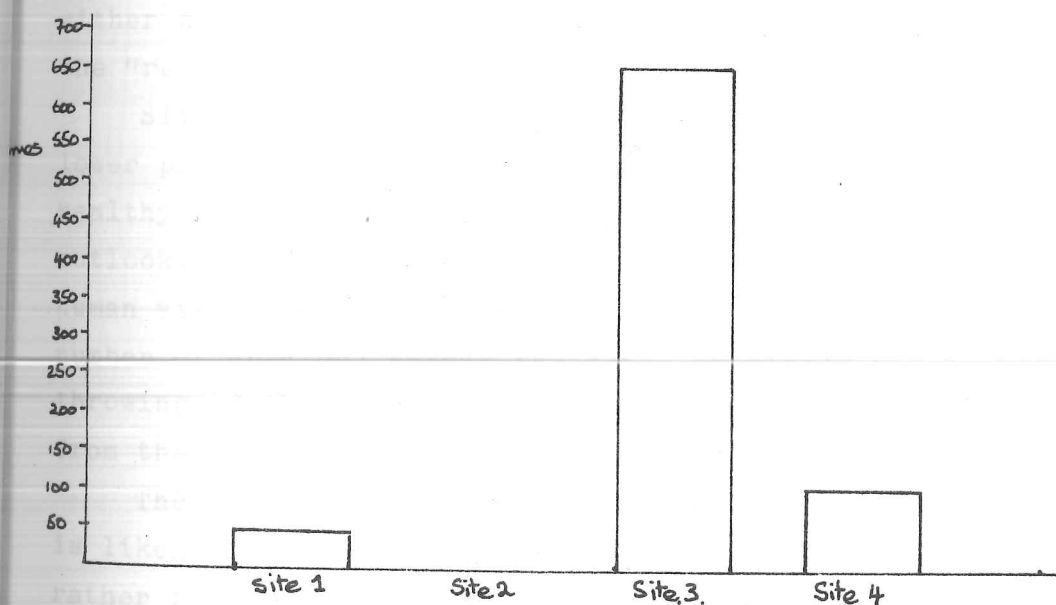
Unfortunately, only very insensitive scales had been brought, hence the plants were transported home. Here they were cleared of any soil that still remained around the roots, air-dried for a considerable time, and finally weighed with more accurate and sensitive scales. Thus the total biomass of thrift for each site was estimated.

Another part of the biological study may be of some relevance to this part. It involved taking quadrats down one side of the hot spring valley and up the other; quadrats were 5 metres apart. A straight line was drawn across the valley on a map on which the quadrats were to be made, to form a transect of the valley. All species of plant were noted and identified, including thrift, to give a picture of the vegetation in the area, and to investigate variations in species number with changing ecological factors, tolerance of certain environments and presence of other plants.

Results of Thrift Surveys:- Tabulated on following page.

Site	Total Biomass of Thrift In 20m ² (20 x 1m ² Quadrats)		Average Height/ centimetres.
	lbs. oz.	grammes	
1.	0 1.5	45.5	5
2.	0 0	0	0
3.	1 7	652.0	4
4.	0 4	113.4	2

Bar chart showing a comparison of the total biomass of thrift in four localities.



Site 3. was the most productive area by far with 652 grammes of air-dried plant material, and an average stem height of 4cms. Site 4., beside the hot spring, with 113.4 grammes was next; the average stem height being only 2cms. Site 1. had the highest stem height average of 5cms., but only a biomass of 45.5 grammes. This was possibly due to chance of random quadrat throwing, as thrift occurred with the same frequency for Site 1. as for

Site 4. The quadrat seemed to miss many of the plants during the random throwing in Site 1.

Conclusions.

It would seem that thrift grows best on fairly level ground, and not so well on slopes. This is partly shown by the results for Site 3. and Site 4. In Site 3. there is a high productivity of thrift, with healthy, flourishing plants, despite the exposure to the elements. Firm anchorage is provided by the lengthy roots, whose huge total surface area allows much water to be absorbed from the rainfall, which quickly soaks through the loosely packed volcanic ash and lower soil. Apart from the many large clumps of thrift there were few other plants in either number, or species. Little competition was apparent for the "resources" of the area.

Site 1., although on level ground, showed considerably lower productivity, despite very healthy looking plants. This healthy appearance and height may have been due to the sheltered outlook. The poor productivity could well have been due to human visitation, competition from other plants (there were a number of species) around the lake, or simply bad luck in the throwing of the quadrat. The soil seemed little different from that at Site 3. but was slightly sandier.

The reason for the total absence of thrift from Site 2. is likely to be due to the rather steep slope. The soil, or rather the volcanic ash, as soil was not apparent for a foot or so, was very unstable and easily moved. This would cause plants great difficulty in establishing themselves, particularly as thrift, a perennial, requires time to establish itself, and would soon be eradicated by substrate movement. Only moss campion and small amounts of moss were discovered here.

At Site 4. the productivity was fairly low. The thrift plants were generally small with few or no flowers. This could

be due to the considerable competition from other plants able to colonize the slopes helped by the quantities of moss (which proved to be one of the most versatile of plants) binding the soil and forming small terracettes or steps from which the plants could develop. The temperature of the immediate locality was higher than that of surrounding areas because of the warming influence of the hot spring and warm stream below. However, this did not seem to encourage the thrift plants.

Another disadvantage for plants attempting to grow on slopes, with considerable amounts of loose volcanic ash as in Site 2. is the fact that rain water will drain less through the substrate, moving instead downhill over the slope, in which case the long roots of thrift would be of less avail.

Basically, the thrift plant would appear to thrive best on fairly level ground (and stable) with little competition from other plant species.

2. Flora.

By far the most obvious of the flora was the flowering plants. These are the easiest to identify. However, the most common plant group was the mosses, but since we had no facility to identify them we could not include them. Of the remaining unincorporated flora, the horsetails and lichens (being identified by the Natural History Museum) predominated. The key is most applicable for the area around Laufafell. The Austur Reykjadalir region yielded more species but we did not include these since we do not think we explored the region thoroughly enough.

Method of Identification of Flora.

1. Are the flowers : pink-go on to question 2.

white- 8

yellow- 14

part or totally purple-17.

blue- 20

growing on a leafless spike

(with very small flowers)-21

2. How many petals do they have : if four-see question 3.

if five- 6.

If the flower is bell shaped then it is a *vaccinium* hybrid between bilberry and cowberry.

3. Are the single flowers incorporated into a large moss-like mat with one communal root : if yes, it is moss campion.

if no-go on to 4.

4. Is it a low creeper, hairless, with runners above ground, leaves little-toothed, long sepals which are dark red, pink flowers 4-5m.m. : if yes-it is Alpine willow herb.
if no-go on to 5.

5. If the stem is of medium height, hairless leaves forming a rosette, stem leaves dissimilar, usually consisting of seven and nine leaflets : it is River beauty.

6. If low, hairless, with kidney shaped leaves, flower 10-15mm. and pale pink veined with purple : it is Marsh violet.

if no-go on to 7.

7. If flowers in roundish head with brown tints : it is Thrift.

8. Are there distinct petals : if yes-go on to 9.

if no-if bell-shaped with deep pink sepals which are long stalked and drooping, above prostrate foliage it is Cassiope.

9. Are there four petals : if yes-if the flowers are 7-10mm., on a stem with few leaves, above a rosette of root leaves, it is Cardamine bellidifolia.

if no-go on to 10.

10. Are the petals cleft and notched : if yes-go on to 11.

if no-go on to 12.

11. Are the petals twice as long as the sepals, indented once and fairly prominent : if yes-it could be Cerastium sp. but identification wasn't totally positive.

if no-if the leaves are greyish and lanceolate with flowers in umbel-like heads, ragged petals, it is Umbellate chickweed.

12. Do the thick, irregularly toothed leaves form only a rosette around the base of the flowering stem : if yes-it is Saxifraga tenuis.

if no-go on to 13.

13. Are the leaves three lobed and packed at the end of runners, with few on the flowering stem, petals have a greenish tint on the underside : if yes-it is Tufted saxifrage.

if no- if the leaves are divided into five lobes, on stalks; petals small and off white, it is Highland saxifrage.

14. Is the flower a composite : if yes-go on to 15.

if no-go on to 16.

15. Is the flower stem reddish, also some of the outer florets and hollow; rosette of leaves round base deeply indented :

if yes-it is Red veined dandelion.

if no-if the leaves are narrow, red florets hidden by brown bracts, with flower in spiky cluster not overtopped by leaves, it is Dwarf Cudweed.

16. Are the leaflets three toothed and rose-like with flowers 5mm. and petals shorter than the sepals : if yes-it is Sibbaldia.

17. Is the flower completely purple : if yes-go on to 18.

if no-go on to 19.

18. Is the flower two lipped : if yes-it is Self Heal.

if no-if the stems are many and prostrate, leaves many, flower rose-purple and solitary, it is Purple saxifrage.

19. Is the stem creeping, leaves ovate, glabrous; spike erect, flower white flecked with purple 5-6mm. : if yes, it is Thyme leaved speedwell.

20. The only blue flower encountered was the Alpine speedwell, the distinguishing mark was the white eye in the flower.

21. Are the stems prostrate, leaves oblong and lanceolate with silky hairs, catkin scales brown at tip : if yes-it is Creeping willow.

if no-go on to 22.

22. Are the leaves sagittate (arrow shaped) : if yes-it is Buckwheat.

if no-go on to 23.

23. Are the leaves lanceolate, tapering at base, flowers pale pink to white : if yes-it is Alpine bistort.

if no-if leaves are kidney shaped then it is Mountain sorrel.

Index of species in the key.

<u>Botanical Names</u>	<u>Common Names</u>	<u>Key Number</u>
<i>Ameria maritima</i>	Thrift	7
<i>Cardamine bellidifolia</i>		9
<i>Cassiope hypnoides</i>	Cassiope	8
<i>Cerastrium</i> sp.	Mouse ears	11
<i>Epilobium anagallidifolium</i>	Alpine willowherb	4
<i>Epilobium latifolium</i>	River beaty	5
<i>Fagopyrum esculentum</i>	Buckwheat	22
<i>Gnaphalum supinum</i>	Dwarf cudweed	15
<i>Holosteum umbellatum</i>	Umbellate chickweed	11
<i>Oxyria digyna</i>	Mountain sorrel	23
<i>Polygonum viviparum</i>	Alpine bistort	23
<i>Prunella vulgaris</i>	Self heal	18
<i>Salix repens</i>	Creeping willow	21
<i>Saxifraga cespitosa</i>	Tufted saxifrage	13
<i>Saxifraga oppositifolia</i>	Purple saxifrage	18
<i>Saxifraga rivularis</i>	Highland saxifrage	13
<i>Saxifraga tenuis</i>		12
<i>Sibbaldia procumbens</i>	Sibbaldia	16
<i>Silene otites</i>	Moss campion	3
<i>Taraxacum specabillia</i>	Red veined dandelion	15
<i>Vaccinium</i> sp.		2
<i>Veronica Alpina</i>	Alpine speedwell	20
<i>Veronica serpyllifolia</i>	Thyme leaved speedwell	11
<i>Viola palustris</i>	Water violet	6

3. Biological Analysis of Hot Spring Slopes.

Since one of the major studies attempted was based on slope surveys it was considered plausible to make botanical transects of the same slope. This would be revealing in that plants are major stabilizers in soil movement and erosion. Therefore an environment of complete coverage would indicate an area of some maturity. The substrate on which the foliage was growing can be obtained from the geographical section.

To this end quadrats were laid at the same interval as the ranging poles used for the slope sections. The transect square was divided into $\frac{1}{2}$ s by the incredible Mr. King so that the frequency of flora could be gauged by the following criteria:

1. 1 - 10% rare (r)
2. 10 - 40% occasional (o)
3. 40 - 70% frequent (f)
4. 70 - 100% abundant (a)

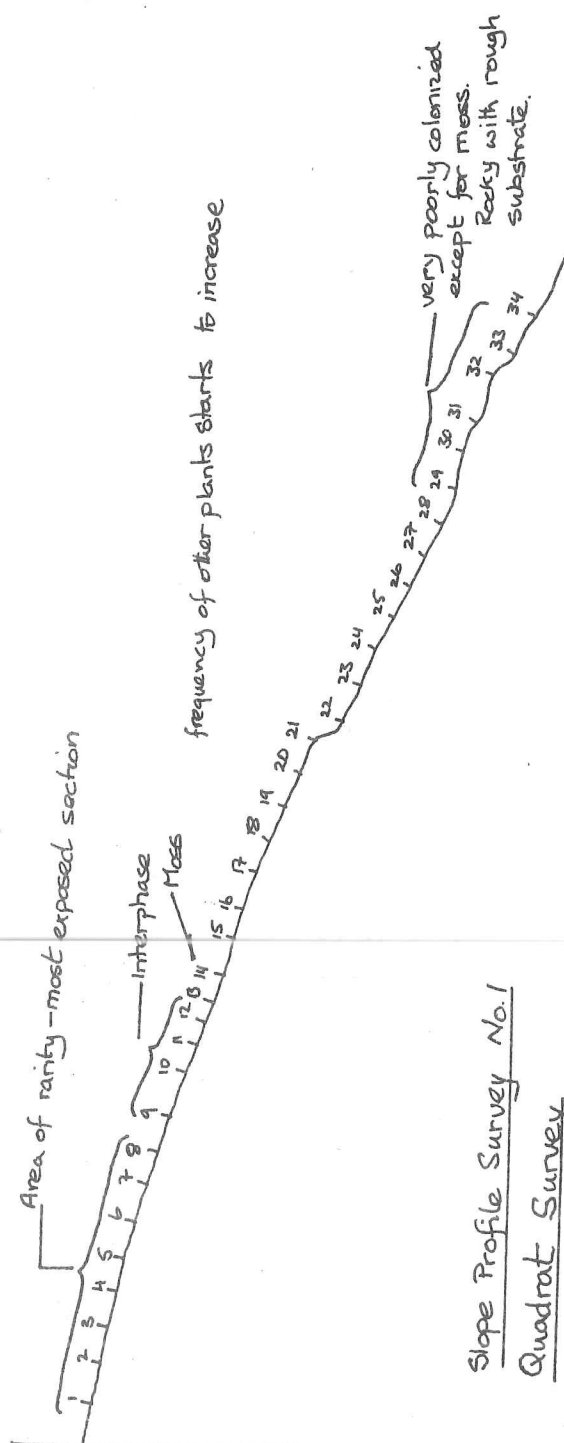
The results are tabulated on the following pages.

Conclusion.

In general it can be seen that there is an increase in frequency of species and diversification from the top of the slope to the bottom of the slope. However, on the lower transects the conditions alter so that more specialised or hardy plants come into their own. The greatest reason for this must be shelter from the almost incessant wind which would erode soil from the roots. This concentration of colonization would lead to stability in the slope. It is justifiable to assume that moss is the first major colonizer, and this stabilizes the substrate. In almost every transect moss was the commonest plant and in many cases other plants were growing through it (polygonum), on it (lichen) or in gaps between large clumps (saxifraga).

The major weakness in our experimental method is the narrowness of the transect which means that the results could not be as accurate as we could have hoped for. In fact trends

Quadrat
Number:



Slope Profile Survey No. 1

Quadrat Survey

GR 812 918 South facing 820m a.s.l.

Total slope length: 165 m

Scale: 2mm : 4 1/2 m.

line transect on volcanic ash and regolith, down south facing slope above

hot spring. Altitude 800m. G.R. 811918

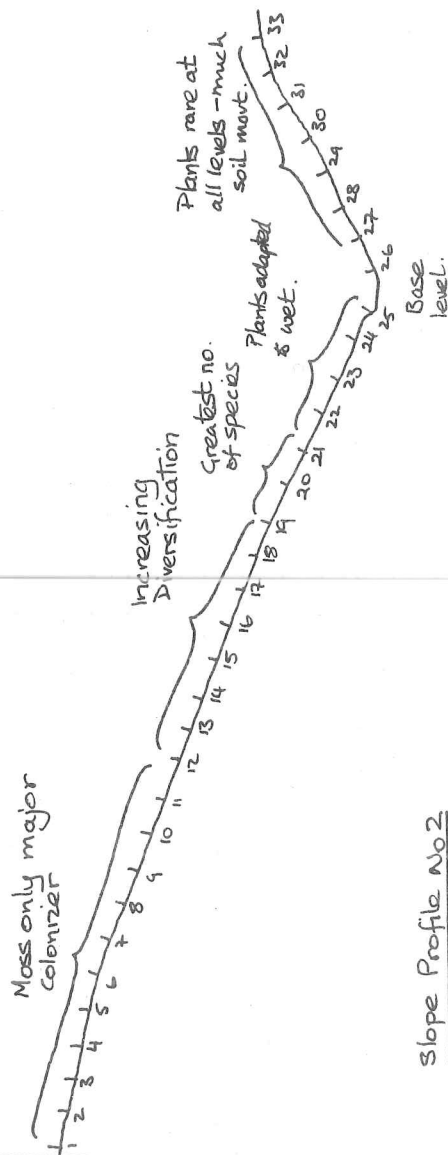
Quadrat: 50 cm²
5m between stations

Key: R = rare
O = occasional
F = frequent
A = abundant

below 10%
10-40%
40-70%
70-100% } % age cover.

Species

|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|



Slope Profile No 2

GR 809919

South-facing

Slope profile No 3

GR 809917

North-facing

Quadrat Survey

Quadrat: 50cm², 5m between stations

Key: R = rare
O = occasional
F = frequent
A = abundant

below 10%
10-40%
40-70%
70-100%
% age
cover

Line transect on Volcanic Ash & Regolith across valley downstream from glacial melt tributary to hot spring. G.R. 310917.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	3
Sibbaldia																																	
purple saxifrage																																	
Saxifraga oppositifolia																																	
Fungus sp.																																	
Mass saxifrage																																	
Saxifraga hypnoides																																	
Alpine willow herb																																	
Epilobium angustifolium																																	
Red veined dracopis																																	
Taraxacum set: spectabilis																																	
Prunella vulgaris (Self Heal)																																	
Holcus umbellatus																																	
Oxiria digyna (Mountain Sorrel)																																	
Graphium supinum																																	
Veronica alpina (Alpine Speedwell)																																	
Cerastium alpinum (Alpine mosses)																																	
Equisetum palustre (marsh horsetail)																																	
Silene acaulis (Cass campion)																																	
Sedum sp. (Stonecrop sp)																																	
Ameria maritima (Thrift)																																	
Grass spp.																																	
Polygonum viviparum																																	
Vaccinium sp. (Bilberry)																																	
Lichen spp.																																	
Racomitrium moss																																	

that would have been found may have been obscured by very local features (i.e. a large rock that had rolled down the slope and lay in the transect quadrat).

Another objection could be raised about the arbitrary way in which we judged frequency. However, the quadrat was divided into specific values and the value given is the consensus. The major limiting factor was time, this was even more limited by the rain which did not seem to have a limit!

4. Bryophytes and Lichens

These were collected during the expedition for analysis back in England. Unfortunately in the damp atmosphere we were unable to properly dry the bryophytes and these had to be left behind.

The lichens we collected were brought back to England and were sent to the British Museum (Natural History) for identification by chromatography techniques. The results of this analysis are not yet available.

The lichens were collected in various areas of the volcanic landscape but predominantly in the block lava flow of Hrafninnahraun.

Part 2.

Organization:

- 1) Finance.
- 2) Travel and Route.
- 3) Food.
- 4) Shipping.
- 5) Equipment.
- 6) Planning.
- 7) Safety.
- 8) Hygiene.

Part 2.

Organization:

- 1) Finance.
- 2) Travel and Route.
- 3) Food.
- 4) Shipping.
- 5) Equipment.
- 6) Planning.
- 7) Safety.
- 8) Hygiene.

Part Two. Administration and Organization.

1) Finance

Expeditions such as this offer extremely good value for money. One hundred and seventy pounds for four weeks in Iceland, all inclusive, is really inexpensive, although it sounds like a lot of money. Each person was asked to contribute that amount towards the total cost of nearly three thousand five hundred pounds. The balance was covered by grants, fund raising and donations. Owen also received a Churchill Travelling Fellowship which paid all of his own expenses and also helped to purchase equipment for the expedition, and a further ten members of the group received awards from the Reckitt and Colman Trust.

Income

Personal Contributions	2440-00
Prince's Trust	180-00
Scott Polar Research Institute	50-00
Young Explorers Trust	150-00
Donations	225-00
Fund Raising	417-67
Interest on Deposit Account	30-71
	<u>3493-38</u>

Expenditure

Travel

Bus Charter	251-00
Air fares Heathrow-Keflavik return	1312-00
Airport tax at Keflavik	96-00
Return transfer Keflavik-Reykjavik	41-80
Norwich-Heathrow return	50-00
	<u>1750-80</u>

Accommodation

Campsites Reykjavik and Landmannalaugar	81-00
Accommodation in school two nights	<u>62-30</u>
	<u>143-30</u>

Equipment

Including hire, purchase of equipment and construction of crates plus 55 litres of paraffin	<u>304-99</u>
---	---------------

Food

Bulk purchases	<u>561-16</u>
----------------	---------------

Shipping

Felixstowe to Reykjavik + insurance	145-15
Dock Fees	67-20
Return of equipment + insurance	92-00
Dock Fees and Customs at Felixstowe	19-21
Van hire and petrol	29-00
	<u>352-56</u>

Insurance

Medical and Equipment	<u>62-10</u>
-----------------------	--------------

Maps

1:50,000 Austur Reykjadalir	1-00
Geology map	2-82
Other maps of varying scales	9-67
Printing of maps (80 copies)	<u>10-00</u>
	<u>26-32</u>

Administration

Y.E.T. Membership	5-00
Iceland Unit information	3-15
Interviews	14-95
Film	45-00
Guy Hawkins (petrol to bring up equipment)	10-00
Passport	11-00
Case	7-95
Paper and Envelopes	11-25
Stamps	13-09
Typing of Report	25-00
Photographs for Report	32-00
Printing of photographs	
Printing of the report	113-76

292-15

Total Expenditure: £3493-38.

b) Travel and Route.

We travelled to Heathrow on the school bus leaving Thorpe at 13.00 and arriving at Heathrow at 17.30. Our flight from there to Iceland was arranged by Mr. N.M.P.Lander of Icelandair, London. Provisionally booked in November 1977. Mr. Lander also arranged for us to pay for our Keflavik-Reykjavik-Keflavik transfer, airport tax and accommodation in Reykjavik at the end of the trip, all in one go. For this we were most grateful as it saved carrying cash in Iceland for these items.

We had a weight allowance of 20kgs. per person on both flights. Before leaving school we weighed all rucksacks and extra equipment to be taken on the flight and made out a list showing each persons baggage weight. This proved to be a great help at the check in and we were through in ten minutes! Weights in kilos and not in pounds.

The flight took 3hrs. 40mins. and we arrived at Keflavik at 01.10. Our bus transfer took us direct to the campsite where we arrived at 04.30.

The area of Austur Reykjadalir is situated 50kms. from the town of Hella, and from the 1970 expedition we knew that the road marked on the map was in fact a track occasionally marked by cairns. This part of the journey was the most difficult to arrange and we are most grateful to Dick Phillips for chartering our bus.

We had arranged for the bus to pick us up at the Campsite and take us direct to Laufafell. The bus which arrived was the scheduled bus to Hella where we had to change. It carried all our ten crates, 16 rucksacks and a 55 litre drum of paraffin.

The road out of Reykjavik was good and was tarmaced. After Sellfoss this deteriorated into an ash road which has to be wetted to keep the dust down. We didn't in fact change buses at Hella but at Storolfshvoll- to a desert going bus! From here the road reverted, after a few kilometres, into a track.

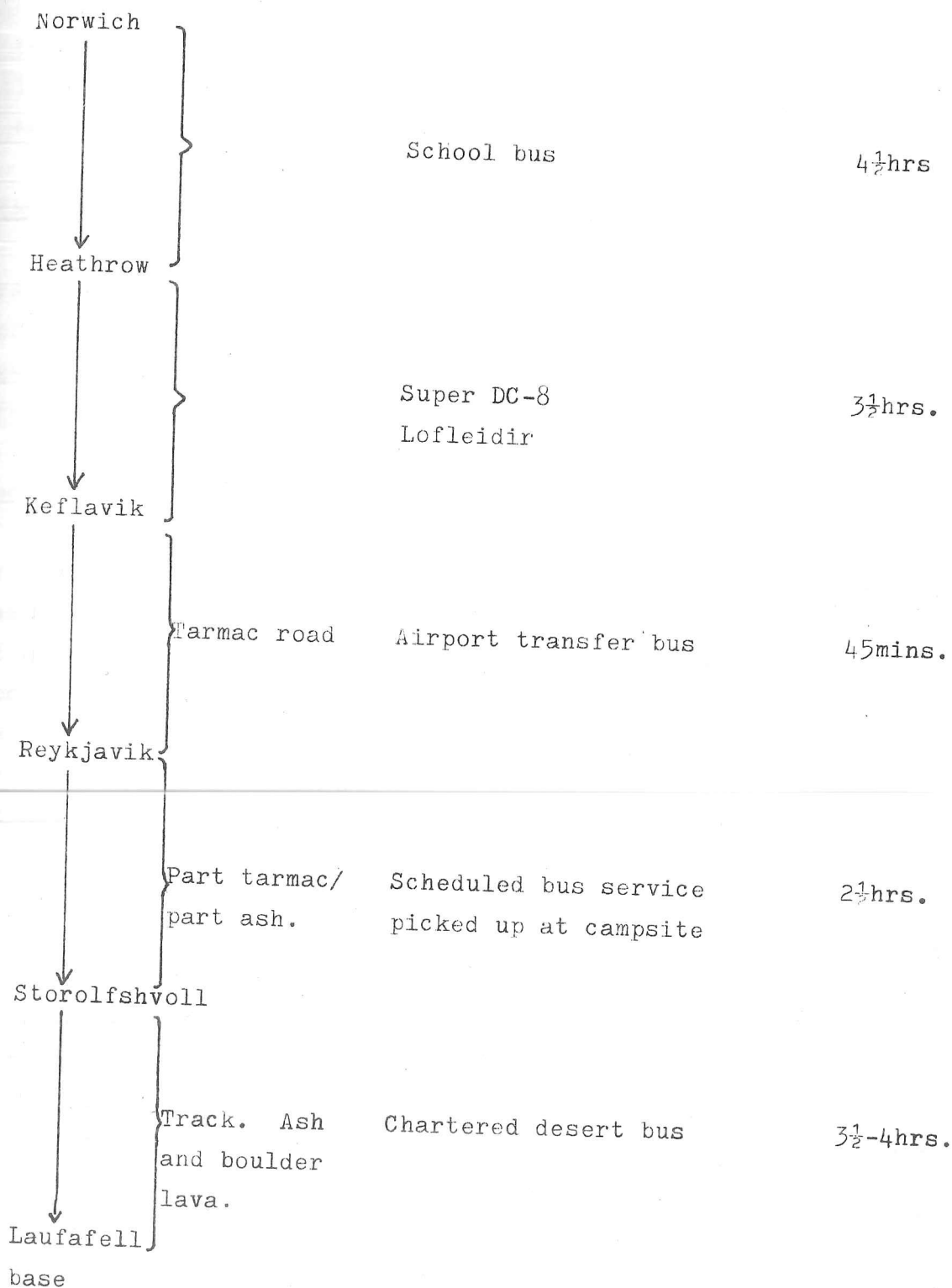
However, the track has been much improved in the last eight years and it had been recently bulldozed. The track passes south of Laufafell and we left it at grid reference 776883 topass round the north of Laufafell to our base camp. Between the track and the camp there is no definite path, only a number of confused tracks. Knowing your route makes a great deal of difference and we reached the Markarfljot some 3 $\frac{1}{2}$ hrs. after leaving Storolfshvoll. A great improvement on the 24hrs. of eight years ago. The crossing point on the river is at grid reference 805913 and is passable by range rover sized vehicles. A track does go further into the area but suitable sites for pitching tents are rare as there is almost no grass and the ground is mainly volcanic ash.

On the 15th August we were picked up for the return to Reykjavik. The bus arrived 2 $\frac{1}{2}$ hrs. late (the driver had taken the wrong track!). Journey uneventful. We did have a slight problem with our transfer bus. Only a 40 seater arrived at the school instead of a 50 seater. The bus was booked for the Yorkshire School's Exploring Society but they very kindly allowed us to share it with them.

We spent two hours in the airport prior to departure, a worthwhile two hours as there is plenty to look at in the Duty Free Shop, especially woolen goods. We left Keflavik on time in a Boeing 727 for a very comfortable flight back to London.

At Heathrow our bus was waiting and Steve Blyton managed to return us to school by 01.30 on the 18th. Our grateful thanks to Steve who also took us down to London, an excellent drive both ways.

Travel and route.



c) Food

We required food for 28 days to give us a safety margin of four days. As all the food had to be shipped out to Iceland weight was an important factor. Bearing this in mind we tried to make the menu as varied as possible.

Breakfast

Total quantity taken

Porage Oats	30lbs.
Alpen	30lbs.
Sugar	60kgs.
Syrup	24lbs.

Lunch

Sardines	112 tins
Cheese spread	30 pkts.
Packet soups	240 pkts.
Chocolate	400 bars
Peanuts	30lbs.
Rolo	250 pkts.
Kit-Kat	250 bars

Dinner

Curry and rice	40 pkts.
Pasta and vegetable Bolognese	48 pkts.
Savoury Risotto	48 pkts.
Vegetable Stew	48 pkts.
Rice	30lbs.
Instant Potato	56lbs.

SundriesTotal quantity taken

Marmite	2 large jars
Coffee	5lb tin
Tea	200 tea bags
Flour for bread making	36kgs.
Textured Vegetable Protein	10lbs.
Dried Yeast	2 tins
Margarine	14lbs.
Oxo cubes	10 dozen
Jam	7lbs.
Honey spread	1 dozen tubs
Honey	1 dozen $\frac{1}{2}$ lb jars
Peanut butter	2 dozen jars
Digestive biscuits	144 pkts.
Raisins	1 case
Salt	5 lbs.
Pepper	3 pkts.
Mustard	2 dozen tubes
Banga style soya	8 pkts.
Burga style soya	8 pkts.
Curry style soya	8 pkts.
Luncheon meat	24 tins
Stewed steak	12 tins
Rice pudding	48 tins
Milk (long life and dried)	486 pints
Baked beans	2 dozen tins
Tinned fruit	2 dozen tins
Chocolate, strawberry, raspberry and blackcurrant sauces.	
Coca-Cola	244 cans

This was our daily diet:-

Breakfast-consisted of porridge or Alpen with milk, sugar or syrup, and coffee or tea.

Lunch-was a snack meal of sardines and biscuits, or cheese spread and bread, a Yorkie, Kit-Kat or Rolo (all three sometimes!), and peanuts and/or raisins.

Evening meal-the main meal of the day was based on soya. Either a Raven meal or, once a week, soya and a Colman's casserole mix. These proved excellent although the curry was not popular with all.

Evening snack-coffee, tea or Oxo and digestive biscuits.

Mistakes were made in the estimation of quantities of some foods. We could have used double the amounts of both tea and coffee, and of yeast. Meat pastes, Rise and Shine, extra tinned fruit, milk pudding mixes e.g. Angel Delight would have been pleasant additions to our diet.

Our total food bill was originally £661 as we bought in bulk. We had a large number of donations which greatly assisted our venture and we sold off the excess of our bulk purchases so that the eventual cost of food to the expedition totalled £355. This is equivalent to £22-18p per person, per month or 79p. per day.

We had a reasonably well balanced diet and the soya provided an excellent substitute for meat, especially the Banga and Burga mixes.

Breadmaking in the "land of Ice and Fire"
(and how to make good use of both).

The Icelanders have for a thousand years baked bread in the hot earth, but to our knowledge no other expedition has attempted it so this was an unusual challenge for the group.

Read Woodrow flour mills were interested in the idea and were kind enough to advise, and to donate a quantity of flour to the expedition.

Chris and Imelda took charge of the experiment and our first rough and ready attempts. Preparation of the dough was done in the field in the shelter of a snow cave (away from windblown volcanic ash). The ingredients roughly estimated were:-

1½lbs. Reads White Bread Flour

1½lbs. Reads Brown Bread Flour

6 oz. Margarine (or one hand scoop)

Pinch of salt

Dried Yeast

Sugar

Warm water (as required)

This makes a rather rich loaf and the bread would be equally palatable with only a small quantity of margarine.

The ingredients were mixed in a washing up bowl, and the dried yeast activated with glacial melt-water warmed in a hot spring to the required temperature. The resultant dough was kneaded and left to prove in a polythene bin liner in the store tent. It was then lightly kneaded again and divided into three parts which were put into tins for baking. Ex catering-size vegetable cans were transported for the purpose after a previous suggestion, the use of clay flowerpots,

had been discarded on the grounds that the pots would be too heavy and easily broken.

The tins containing the Mark I loaves were buried up to the level of their snap-on lids in the hot grey sulphurous mud around base camp hot spring and left for 24hrs. Everyone waited anxiously for the result which was promising but far from perfect. The plastic lids warped with the heat from the mud allowing grit to enter the tins and coat the loaves. The loaves themselves were rather small and, in retrospect, had not been given sufficient time to prove. However, this didn't deter a ravenous group from devouring one hot loaf there and then.

For the next attempt snap-on lids were discarded in favour of black polythene sheets tied round with string and pierced in the centre (cut up refuse sacks courtesy of Broadland District Council). A string handle was attached to each tin to facilitate removal from the hot ground with an ice axe.

Since the texture of the original loaves was rather heavy and sticky the fat content was reduced in subsequent batches and the tins were no longer greased before the dough was put in, (murmurs of plum pudding etc.) Proving time was gradually lengthened to overnight and estimating the amount of yeast became habit. This process would have been simplified by it's prior measurement and wrapping in clingfilm, and storage in a large airtight container.

Each modification improved the end result, but the biggest step forward came during the manufacture of the Mark III loaf. The 'oven' was changed from the grey sulphurous mud to a steam vent in the volcanic ash, and the resulting loaves were quite something! They had a much drier texture and rose well to fill the tins, the ash providing a higher and more constant temperature.

Altogether 33 loaves and 16 rolls (cooked in baked bean tins) were baked and enjoyed. This was the result of a baking session roughly every other day, but had we taken more yeast we could have baked every day and experimented more. Breadmaking is a fairly time consuming operation but fresh baked loaves enlivened our otherwise dehydrated diet and we felt the effort and experience to be well worthwhile.

d) Shipping.

All our food, the store tent and scientific equipment was sent out by sea six weeks before we left. This was in fact far too soon as we had to pay substantial warehouse fees. Three weeks would have been sufficient.

Our stores fitted into ten crates made up as follows:-

- 1 1.25 x 0.62 x 0.6m. crate (also the portable loo), made by Richard Burgess and Trevor Wright, containing food and tent poles.
 - 2 0.7 x 0.3 x 0.6m. crates for climbing equipment and food.
 - 2 0.8 x 0.4 x 0.5m. crates for food.
 - 1 0.4 x 0.3 x 0.5m. crate of scientific equipment.
 - 4 0.6 x 0.3 x 0.5m. tea chests for food.
- Each crate painted a very noticeable colour.

Mr. Stevens of Mann Egerton very kindly arranged a van and driver to take all our crates to Felixstowe on June 13th. A list was made of the volume, weight and contents of each crate plus the total weight, and the list duplicated. The total volume was forgotten-it was needed.

Mc Gregor, Gow and Holland arranged the shipping and we are most grateful to them for their help.

Retrieving the crates in Reykjavik proved much simpler than we had thought possible. It took four hours from the time we arrived at the customs house, to the time we sat down on the crates at the campsite.

The procedure has changed in the past few years. This year we proceeded as follows:-

1. Made our way to the new customs offices and presented our

papers on the second floor. These were then stamped. (15 mins.)

2. Up to the third floor and had papers stamped again-no charge.
(30 mins.)

3. Proceeded to shipping offices of the Eimskip Steamship Co.
Up to the second floor, presented papers and had to pay
warehouse fees. (1 hour)

4. Then to Sundahofn warehouse to collect crates. (30 mins.)

It seems a good idea to start as near 09.00 as possible.

On our return we sent back five crates of samples,
equipment and excess food which we collected from Felixstowe
a week later in a hired van from Harber Hire. (all our costs
are tabled in the Finance section.)

e) Equipment

Our equipment was very satisfactory and we are most grateful to Leisure and Camping for their advice and help, and to Guy Hawkins for his assistance.

Equipment per pair

- 1 two man tent-Black's Oregon, Alaskan or Typhoon.
- 1 primus stove (paraffin)
- 1 bivouac bag

Equipment per person

- | | |
|---|-------------------|
| 1 sleeping bag | 1 anorak/duvet |
| 1 pr. boots | 1 set waterproofs |
| 4 prs. socks | 1 compass |
| 2 prs. underwear | 1 map case |
| 2 prs. trousers | 2 note books |
| 2 pullovers | pencils, pens |
| 2 shirts (woolen) | 1 Karrimat |
| 1 pr. training shoes | 1 camera |
| 1 hat | 1 ice axe |
| 1 pr. gloves | washing equipment |
| 1 pr. alpine gaiters (optional, but turned out to be essential) | |
| 1 set mess tins | 1 pr. sunglasses |
| 1 K.F.S. | 1 mug |
| 1 rucksack and hip belt | 1 water bottle |
| 1 novel | |

General Equipment

- 1 Icelandic tent (for Stores)
- 1 12 x 15 sheet of polythene for flysheet for store tent
- 1 Bucket
- 1 Washing up bowl
- 1 Measuring jug

1 Funnel
1 Double burner primus
6 Climbing helmets
3 Safety ropes
4 Climbing ropes
25 Karabiners
6 Safety belts
10 Slings
3 Full sets of crampons
4 Prs. instep crampons
1 Tent repair kit
1 Large medical kit
3 Small medical kits
50 Toilet rolls
1 Large box washing powder
Meta fuel
Geological hammer
1 String bag for washing clothes

Scientific Equipment

Theodolite
Thermometers
Six's thermometer
1 Microscope
1 Quadrant
1 Sample net
60 Specimen tubes
40 agar plates
1 Clinometer
2 Tape measures

Useful additions to equipment list

Paraffin lamp	Handcream
More Snappie bags	Lipsalve

More matches

Detailed personal kit list

Thin bore hose for paraffin

Ridged funnel

Beer kit

2 Kites

Football

Tea towels

Fluorosine dye

Ranging poles.

Paint and paint brush

Fire extinguisher

Entrenching tool

Base plates for store tent poles

String

Cord

Sticky tape

Check all instruments

before leaving

The Damart Thermawear gloves and underwear proved excellent for the climatic conditions. In fact one person had to be persuaded to remove his after two weeks, he washed them and they went straight back on for the next two weeks!

f) Planning

March 1977

Idea of Expedition broached to Dr. Scott, Mr Ball and Mr Belchambers. Given the go-ahead.

May 1977

Expedition announced to 5th years staying on in the sixth form and the Lower VI.

Letters handed out.

Meeting with parents of students interested in the expedition.

June 1977

Interviews held.

537 letters written to firms asking for sponsorship.

Sept. 1977

Members chosen. Interest in the expedition beginning to grow.

Bus charter booked, flight provisionally booked.

Nov. 1977

Application for grants sent off. Booklet produced. Guy Hawkins invited to join expedition.

Feb. 1978

Food began to come in and to be purchased.

Passport applications sent off. Maps traced and printed.

May 1978

All food purchased. Crates made and bought.

June 1978

Crates packed and taken to Felixstowe for shipment to Iceland. Check of all equipment.

July 1978

Practise putting tents up. Final check of equipment.

20th July



Expedition

17th August

g) Safety

On an expedition such as this accidents, and the possibility of getting lost are a source of constant worry to the leaders.

Therefore before any walking was done the whole group was instructed in the use of compasses, what to do in case of an accident, day sacks and the use of ropes. Each member of the party was given the opportunity to lead on more than one occasion which made most of them realise the difficulties involved.

Each pair took with them on a walk a day sack containing; sleeping bag, bivi bag, stove, mess tins, emergency rations, dry clothing and a days food.

In addition to this the leader took a safety rope and comprehensive first-aid kit. A number of the party had first-aid certificates. No party went out with less than four people and more often six.

Each person had a map of the area 1:50,000 which had been traced (a total of $49\frac{1}{2}$ hours work) and then printed.

h) Hygiene.

With a mixed party one of the main concerns was toilet facilities in the Laufafell area. This problem was solved with a flash of inspiration.

Our largest packing crate measured 1.25x0.62x0.6m and proved to be perfect for a portable loo!

Before shipping out the equipment the crate was modified to take a detachable seat. This was a plywood board with a hole cut in it. The hole was rather large. (see photo.64 p.180).

Once at base camp the crate was emptied and up-ended down by the river. The seat was put in place and a bucket placed beneath the hole. This meant that the necessities of life could be carried out in relative comfort, in the dry and in privacy. The view across the river was quite superb!

The bucket was emptied and cleaned after use by each person.

At camp IV the facilities were a little more primitive since the crate could not be transported that distance. The seat from the crate was carried to camp IV and set into a snow bank and a recess made for the bucket below. This worked extremely well although rather chilly and it did begin to melt after two days.

Since a great deal of our food was packaged we had to store all the waste paper until the end of the expedition. We had been given 200 dustbin bags by Broadland District Council and these we used for our rubbish. The bags had to be tightly sealed to prevent litter blowing over the countryside.

At the end of the expedition we burnt all the rubbish and the remaining tins and solid waste was then placed in more bags and taken back to Reykjavik for disposal. We left no rubbish or buried waste at any of the campsites we used.

Part 3.

Diary .

Diary

6th June 1978

Crates packed and taken to Felixstowe. Sent to Iceland on board M.S. Dettifoss.

19th July Wednesday

In school practising putting up tents and packing rucksacks. Weighed rucksacks and made list of weights for airport check in.

20th July Thursday

Left school at 13.15 after having picture taken by Eastern Evening News. Quite a crowd to say goodbye. Big Guy arrived on time with biscuits and other equipment at Heathrow. At 20.00 we checked in. Weight list very useful. We were through within 15 minutes.

Slight hitch with metal detectors. Graham failed it four times!

An hours wait on the plane while they tried to fit all the rucksacks on. A very hot wait.

22.30 took off from Heathrow. A new experience for most.

21st July Friday

Flying north at 31,000 feet with the northern horizon glowing red and golden, a fantantastic sight.

A dinner of smoked herring in cream sauce, chicken and salad, mousse and coffee was served. Delicious.

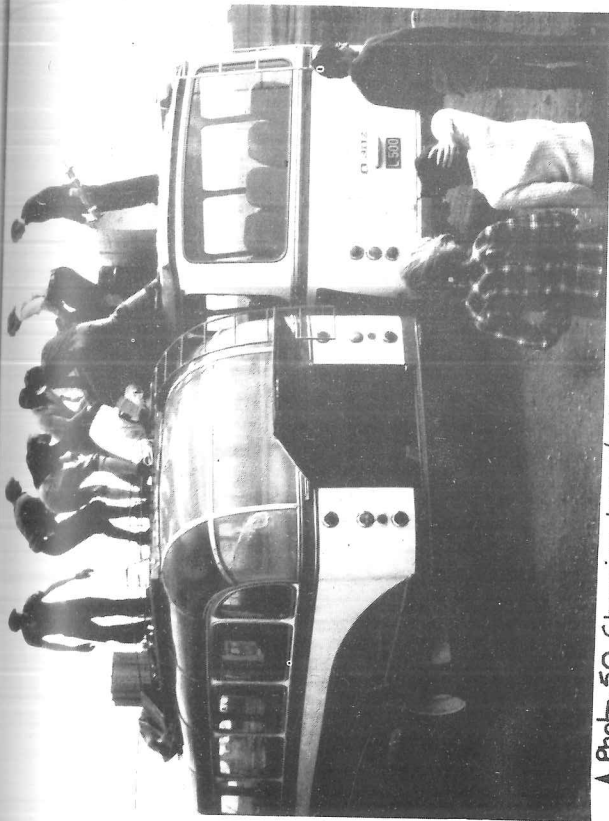
0100 first glimpse of Icelandic coast beneath the clouds. Rest of time spent looking out of windows.

00.30 (Icelandic Time) we landed at Keflavik and after a long wait found our luggage and transfer bus.

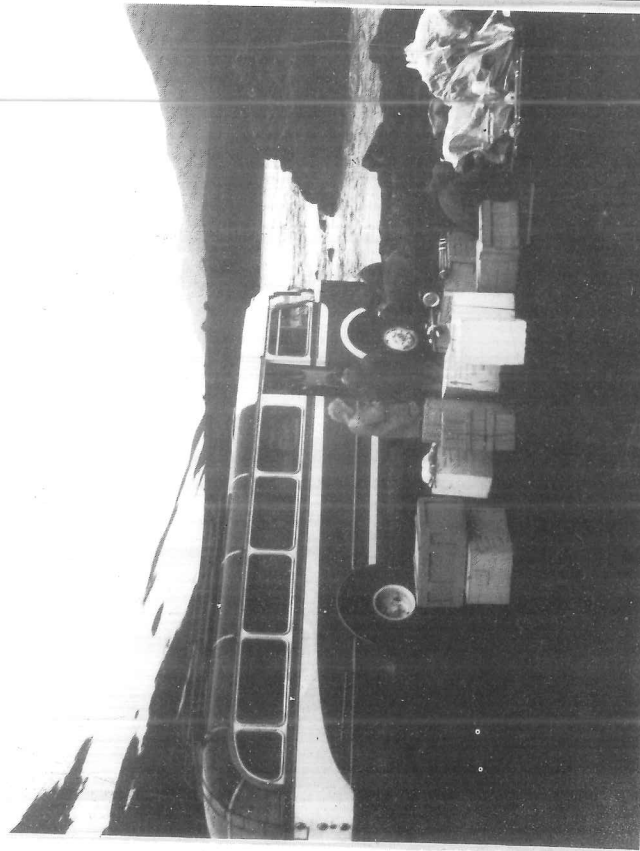
Arrived Reykjavik campsite at 0300 and pitched tents in daylight.



▲ Photo. 49. Reykjavik Campsite. 21.7.78



▲ Photo. 50. Changing bus at Stordfsvöll.

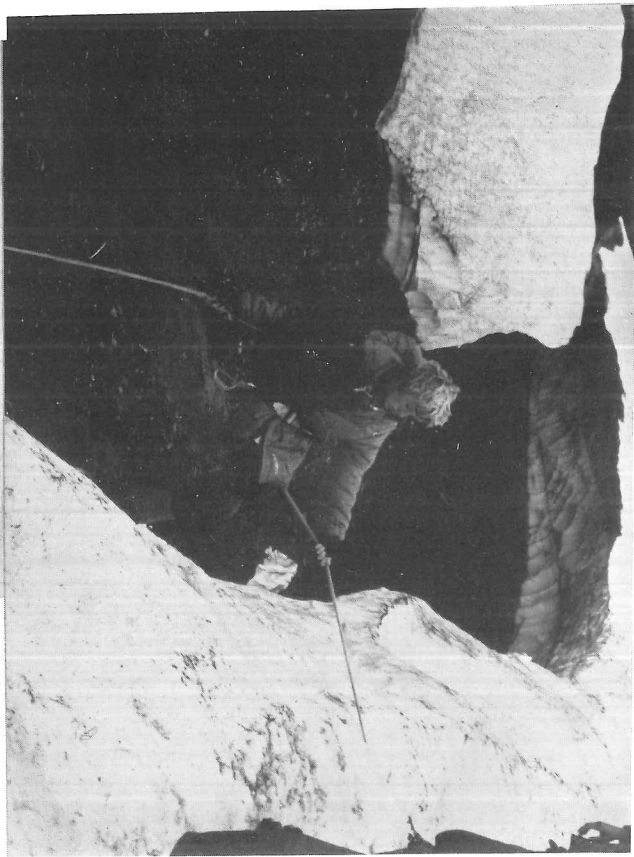


▲ Photo. 51. Arrival at Base Camp - Laufafell. 20.00 on 22.7.78



Photo 52 Half way across Markarfljót.

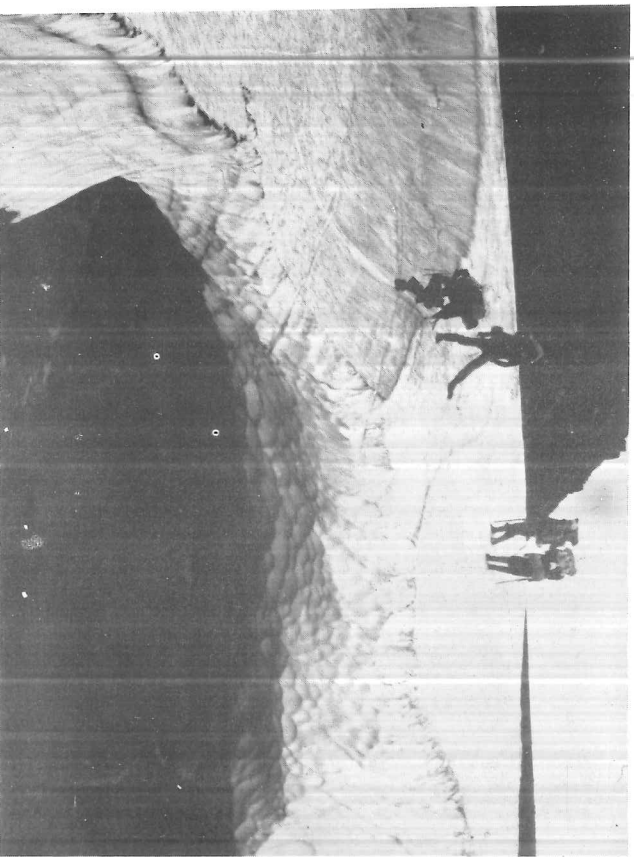
↑ Photo 54 Abseiling - the nursery slopes



↑ Photo 53. Setting up Base Camp



↑ Photo 56. Crossing Harkerfjot by snow bridge.



↑ Photo 55. Base Camp. Lauafjell in background.



Big Guy and Owen up at 0600 and gave out jobs to others. They then went into Reykjavik to sort out paperwork and find crates. Nick and Peter (Cod) went off to find some paraffin and the two Kates went to post letters. Chris and Imelda went to the British Embassy. Big Guy and Owen finished with customs and shipping line by 10.45, lighter in pounds sterling and pounds weight!

Collected crates at 1300 and returned with them to campsite by 1330. Afternoon spent sightseeing. Nick and Cod returned with paraffin and a van (free of charge).

Evening spent writing postcards and putting stamps on 50 envelopes.

22nd July Saturday.

Owen and Guy first up at 0600. After breakfast explored the swimming pool (geothermally heated of course). Soaked for a couple of hours.

At the campsite Dick Phillips' agent was waiting to inform us that we were to catch the scheduled bus to Hella. We were to load equipment onto a truck which would take us to the bus terminal where we would transfer to the bus and thence to a mountain bus at Hella. After being shown the mountain of equipment he agreed that this would be difficult and left.

At 1220 the scheduled bus arrived at the campsite having taken a small detour. 745 kgs. of crates, 660 kgs. of rucksacks and a 55 litre drum of paraffin were loaded on in 25 mins. A quick stop at the bus station for passengers and then off to Storolfshvoll, not Hella after all!

Arrived Storolfshvoll 1545. High winds and dust. Mountain bus drew up alongside after an hour and a half, crates were lifted from the top of one bus to the other. All loaded and ready to go-some anxious looking faces-"What was it we were told about river crossings?" One bag of raisins handed out,

went very quickly.

After a few kilometres the road deteriorated to a volcanic ash track-some worried looks now-bus tilting at alarming angles. Crossed a small river-nothing to it. The driver wanted to go south of Laufafell but Owen and Big Guy eventually persuaded him to go north. We left the road and hit really rough terrain and after one wrong turn arrived at the bank of the Markarfljot at 1950. Now there were some worried looks-Markarfljot is a real river. The driver waded in and agreed to cross it. Blank amazement on faces as we drove straight in and cheers as we drove out the other side. We had arrived at base camp.

Owen and Big Guy did a quick recce and found their old base camp too small. Selected another site in a small valley. Off loaded the bus and watched it depart with mixed feelings. Erected tents, unpacked crates, a meal and bed. Owen and Big Guy went to recce the following days walk.

23rd July Sunday.

Owen and Guy up at 0600. Began sorting out store tent, located places for glissading and abseiling. Chris and Imelda took group to visit the hot spring and waterfall, store tent tidier by the time they returned. Wind blown dust getting into everything. First attempt at cooking on a hot spring. Graham constructed a quadrat from string and packing crate using an ice axe as an adze, an ingenious feat! Owen and Guy out at 2300 for another recce, arriving back 0300.

24th July Monday.

Up at 0700 and left camp at 1100 to practise ice axe use, glissading, knots and abseiling. Chris and Imelda off to hot spring to bake bread. Lunch at the hot spring and then made snow belays until 1600.

Returned to base for supper and then out for a walk to the watershed. Superb view of Myrdalsjokull.

Kate P. grazed back of hands while glissading.

25th July Tuesday.

Up at 0800 and set off in drizzle at 1030 for walk round northern part of area. Saw volcanic plugs and a hydrothermal area. It was there discovered that Owen's feet were twice the size of Imelda's!

Lunch by the river where Owen tried to take a group photo. First time he forgot to wind on. Second time he was showered with pumice when he tried to get into the photograph. Came across a 50 metre cliff on our route and had to climb a snow bank.

Stopped on the way back for a brew up at the hot spring and then practised glissading. Cod decided to jump off the top to get a faster slide. Big Guy and Owen then started skiing on their boots-big feet help-Owen managed to ski down from the top but failed to stop and ended up in the stream.

Back to base for supper. Glorious leader made a big blunder over Nick's birthday. His birthday was August 25th not July. Nick was given an un-birthday of a tin of salmon (supplied by Big Guy), a bar of soap and a tub of honey spread. It all disappeared very rapidly.

Quote from a log (the person shall remain anonymous):
".....washing socks and myself in freezing cold water....tried to brush hair, usually clean teeth, had wash most days, tried to keep tent clean. All this true I swear and I might change my shirt next week(when it's really stiff....)"

26th July Wednesday.

Up at 0807 $\frac{1}{2}$ (time negotiated by Stephen). First study day at base camp hot spring. Carried out slope analysis-cold work. Graham and Nick had problems with the theodolite. The thread on the locking screw stripped and had to be fixed with elastoplast-not very successful.

Cooked soup in water bottles dropped into the hot pool. Slope analysts returned to base and drew up results-excellent.

First loaves of bread baked by Chris and Imelda. A bit heavy and tasted like plum pudding! Second batch in today. This time in the volcanic ash.

Evening spent talking and flying kite in ever increasing wind and rain. All turned in by midnight.

27th July Thursday.

0030 Owen up to check tents as the wind had increased and was now gusting force 6-7. Tent pegs began to fly. Store tent flysheet tore. Nick got up and we spent 45 minutes repairing the damage. Big Guy got up next to put his flysheet back on. More pegs lifting out. Owen heard Marcus talking with Graham.....Graham: "I take my hat off to him getting up in this weather".....Marcus; "I would expect it of him, after all he is the leader".

The toilet then blew over and had to be weighted down with rocks. A brew up and back to bed at 0430.

Owen and Big Guy up at 0800, others slept on after a disturbed night.

Left camp at 1230 and went to the hot spring to finish our studies there. Bread turned out very well and disappeared rapidly.

Big Guy and Owen left at 1425 to recce route to the crater of Hrafninnahraun. Crossed Markafljot by snow bridge and briefly explored the east side of the river. Set off back to base at 1725, arriving back at 1900.

Chris and Imelda made more bread.

Some people suffering but Diocalm works wonders. Quote from Cod about Owen's feet "If your toes grow much longer you could eat bananas with them".

28th July Friday

Left camp at 1015 carrying two days food. Crossed snowfield using crampons arriving at Camp III at 1200. Dumped food and had lunch. Chris and Imelda then took the group up over the edge of the crater to make a preliminary survey. Weather very good. Even quite warm and not damp.

Owen and Big Guy set off to recce Camp IV and the hydrothermal area. Group returned to base at 1530. Practised glissading by hot spring. Some people experimented with a mixture of margarine and sugar to keep them going-apparently pretty good but turns you a bit after threequarters of a cupfull.

Bread risen very well and devoured very rapidly. Coffee and TWO biscuits in the evening!

29th July Saturday

Owen and Big Guy up at 0630. Set off from base at 1030 and reached the crater by 1200. Down to camp III and cached more food. All the group a bit miserable due to excessive damp. Tedious. All returned to the crater for lunch in the pouring rain. The rain stopped, the sun came out, afternoon spent sketching, photographing and collecting samples(lichens for the British Museum).

On our return to base some of the party climbed a snow bank for a 100 metre glissade. Owen sommersaulted and cut his nose, the rest got down safely.

Back at base we were able to give some letters to a party of Icelanders on their way home after a weekends camping.

Andy decided to wash in the cold stream....performance not repeated (in the cold stream that is).

Quote of the day from Nick; "It's like a monastery here. Once you're in it's difficult to get out."

30th July Sunday

Owen and Big Guy up at 0630. Robin being up next took great pleasure in waking the rest. Tents down and ready to move by 0945. Going was slow as we had heavy packs-tents plus another two days food. Some rucksacks had more strapped to the outside than was inside them.

Lunch at Camp III, superb bread. The group were given directions to locate a suitable camp 2kms. up a stream from the Markarfljot. Owen and Guy observed their progress from a distance. Eventually, somewhat disgruntled, after a wet river crossing the group arrived and set up camp. The Kates, Nick, Stephen, Mark G. started making stepping stones across the river to the hydrothermal area. We had to cook on this area during our stay at Camp IV due to a paraffin shortage at base.

Andy and Robin returned to Camp III to pick up remaining equipment and Owen and Big Guy returned to base to bring up more food the following day.

According to Stephen Camp IV was 'damp'.

Little Guy developed a rash due to the sulphurous water.

31st July Monday

Owen and Big Guy arrived back at Camp IV at 1000 with heavy packs of food and equipment. Group split into two for the hot spring study. Robin led one group with Little Guy, Stephen, Mark H., Marcus, Chris and Imelda...Looked at the lowland area. Andy led the other group with Kate M., Kate P., Nick, Graham, Mark G., Cod,...Looked at the highland area.

Owen and Big Guy went to recce the Ice Hole and the glass lava flow and returned to Camp IV laden with 50lbs each of volcanic glass.

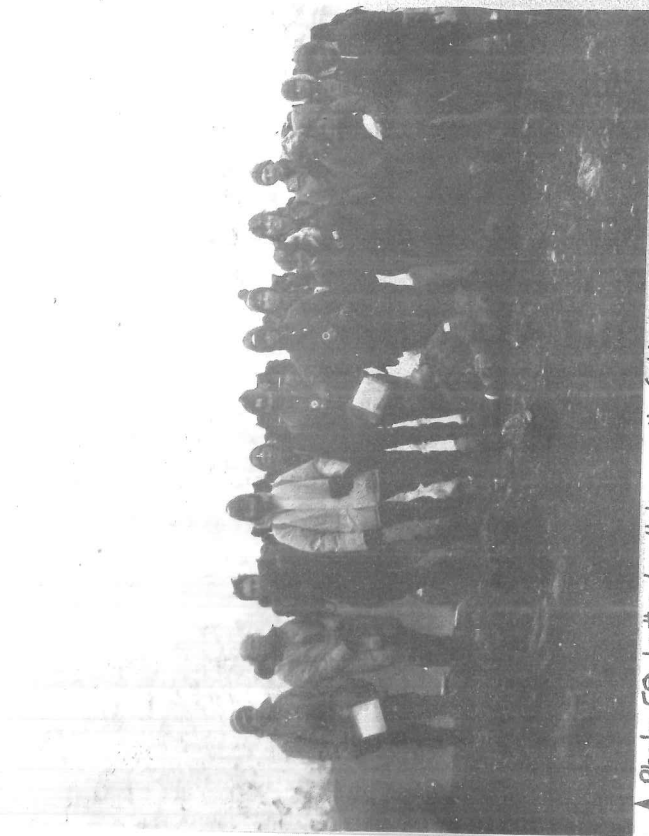
Set up snow belay and most abseiled off the 15 metre ice cliff.



↑ Photo 57. Nearing camp IV.



↑ Photo 59. Making Coffee in a convenient hot spring.



↑ Photo 58. In the Ice Hole on Hrafninnusker



↑ Photo 60. Volcanic Flugs. Camp IV to Landmannalaugar

Photo 63. The Storm Cloud north of Base Camp

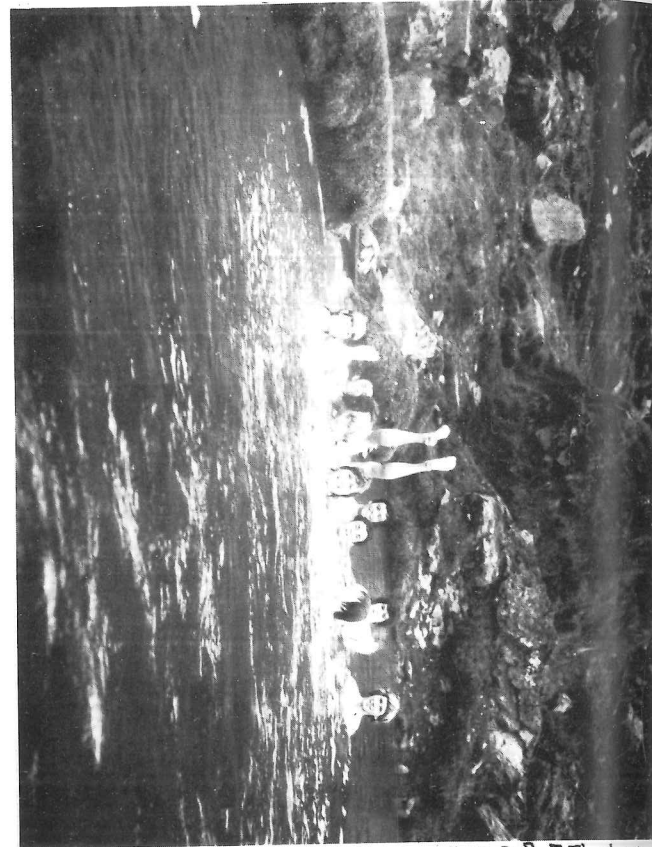
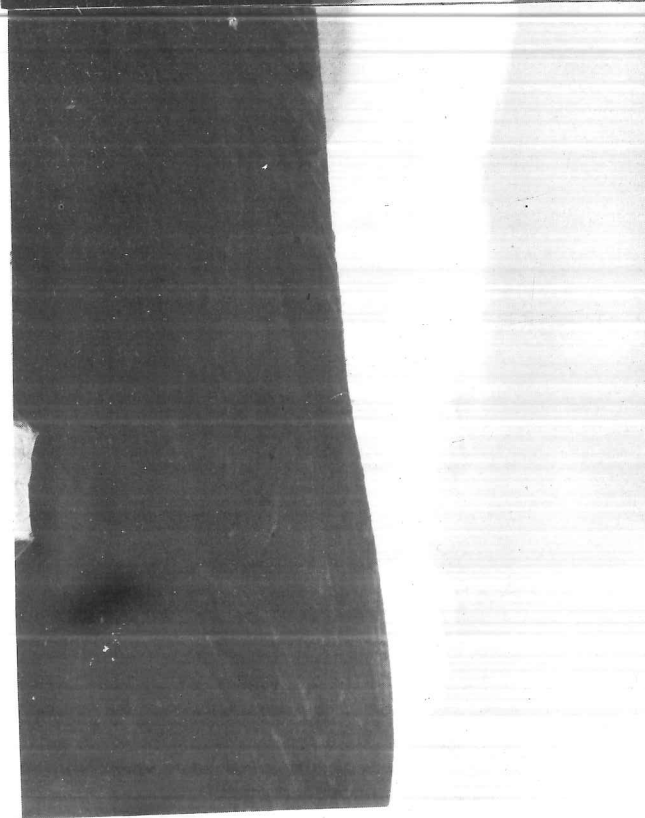
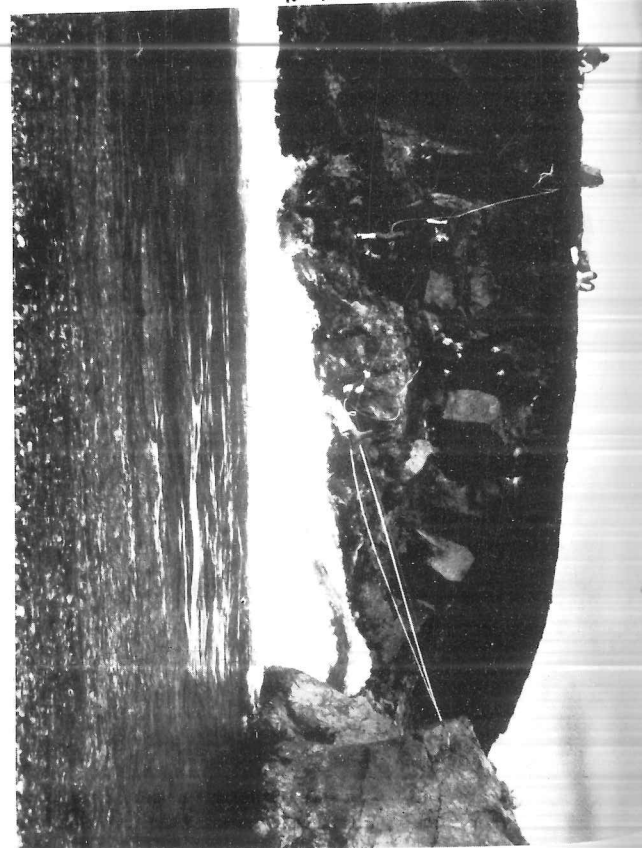


Photo 61
The hot
pool at
Landmann-
alaugur.
First bath
for two
weeks
Photo 62
The rope
bridge



Andy, Robin, Owen and Big Guy then returned to base for more food.

Nick cut his finger badly on volcanic glass.

Robin and Andy made pigs of themselves on the remains of some rice pudding.

1st August Tuesday

Robin, Andy, Big Guy, Owen arrived at Camp IV with yet more items of equipment and food from base camp.

Nick slipped and hurt his back while crossing the river and had to lie down for the day. Mark Hill with bad blisters.

The two groups swapped areas for the hot spring survey - a tiring day.

Big Guy and Owen set off to recce the north side of Hrafninnusker and found their biggest hot spring (in 1970) had now turned into a geyser. They collected another 180lbs of glass lava and carried the lot back to base.

Nick still flat on his back and being looked after by the Kates. Robin's tent becoming the centre of nightlife in Austur Reykjadalir, if you like cards.

2nd August Wednesday

Camp IV misty and damp. All crowded under Robin's flysheet. Nick still flat on his back, Mark H. still suffering with blisters. Owen and Big Guy arrived in shirt sleeves and required help to remove their packs (90lbs each).

Group walk to the north of Hrafninnusker. Stopped for lunch at geyser. All becoming expert at cooking on hot springs. Walked towards the Ice Hole in thick mist collecting samples of bubble glass. Stopped in massive Ice Hole and had photograph taken. Then went to the glass lava so that the group could collect samples.

Stopped by a large steam vent and the group then went onto the high glass lava. Owen and Big Guy left to find a bath otherwise they would collect more samples. Very misty and wind increasing in strength. They found a hot waterfall and proceeded to strip off and have a wash. In the middle of this along come the group and start taking photographs-embarrassing.

Group returned to Camp IV and started moving their tents around so the wind didn't blow in the entrances.

Owen returned to base to check the store tent. Wind getting very strong. Arrived at 2100, store tent still there!

Experimental cooking at Camp IV now reaching it's height-most peoples meals free of mud!

3rd August Thursday

Camp IV basking in the sun at 1000 when Owen and Big Guy arrived. Packed up tents for walk to Landmannalaugar. Nick, Mark H., Chris and Imelda stayed at Camp IV.

Stopped for lunch by the geyser and left there at 1330. Robin leading. A tough walk up very steep hills and on to a snow field in mist. Owen wanted a group photo again and got snowballed for his efforts. Cod took his revenge and Robin got caught with his trousers down-well almost.

We eventually reached the edge of the block lava of Namshraun. Spectacular sight. Arrived Landmannalaugar at 1750, put up tents and then into the hot pools to soak for two hours. Stephen actually removed his longjohns!

4th August Friday

A lazy day. Cod soaked himself for five hours and actually looked clean. Arranged for letters to be posted and did some overdue washing. Kate M. down with a cold. Andy helped clean out the hut (just to keep in the warm and dry).

At Camp IV Nick still in pain. Chris and Imelda making

bread. Visitation from some Icelanders who gave Nick and Mark H. some real food! Smoked lamb and malt loaf.

5th August Saturday

Up at 0600 and packed up camp. Large numbers of people here including a man from Norwich!

Left Landmannalaugar at 0930 and were through Namshraun by 1000. Forty minutes of very hard climbing and we had reached the lava plug. Andy leading. Warm and sunny. Stopped for lunch at a very large steam vent where we cooked our soup. Mark G. took an hour to eat a Yorkie!

We were then led through a bog and onto another glass lava flow. Certain members of the group had to be persuaded that they already had enough samples. We then had to cross a torrent-no-one got wet. Kate P. almost went in-saved by Stephen. Arrived back at Camp IV at 1600.

Owen bet group that they couldn't consume 7lbs of rice by the following morning. Then left with Big Guy for base camp as Chris and Imelda arrived with fresh bread.

Nick feeling better today and Mark H. had done a survey on the snow. Some now suffering from split fingers due to the acid water. Evening meal-.....rice followed by rice pudding.

Base camp becoming like Picadilly Circus. Four cars arrived and people set up camp.

6th August Sunday

Robin woke up Camp IV at 0800. Breakfasted on rice and rice pudding-still 4lbs left. Owen and Big Guy arrived while they were striking camp-almost empty packs. Nick, Cod, the Kates and Mark H. had left early for a slow walk back to base.

Left Camp IV with full packs and reached base at 1330. Tents up and then we did a recce of the east bank for a suitable site for a rope bridge.

Evening spent in store tent with a barber shop trio!

7th August Monday

Left base at 0815 to construct a rope bridge.

Big Guy and Owen waded Markafljot with a safety rope and hauled across equipment for a bridge.

Owen went across first, being the heaviest, and as the rope was not taut enough ended up in the waterfall soaked. Went to change. Some alterations made and then it was dry river crossings. Most went across and then returned for lunch at base. On the return across, Robin, at Big Guy's suggestion, stops Owen in mid-waterfall and starts bouncing the rope. Owen soaked again. All returned to base for lunch, Owen now wearing borrowed gear.

1315 group set off for walk on west side of river to look at stratified lava. Samples of pyroclastics collected. Cod rolling rocks again.

Owen stayed at base and had a visitation from some Icelanders. Running short of cigarettes-everyone enjoying watching him suffer.

8th August Tuesday

Robin and Andy each took one group for a three day expedition on their own to the other side of Laufafell. Nick and the Kates stayed behind to do their river study.

Andy, Stephen, Mark G., Little Guy, and Graham went round to the south of Laufafell to the lake. Robin, Marcus, Mark H., and Cod went round the north of Laufafell to the lake. A hard walk contouring. Set up camp at 1230 and then attempted to recce three lakes further west. Turned back-very tired. Robin set up snow study in his socks back at lakeside camp!

9th August Wednesday

A superb day. Clear skies and hot sun. Owen and Big Guy

off to Camp IV in swimming trunks. They climbed to the top of a small volcano 1079metres, where they could see ten ice sheets, some as far as 100kms. away. Cleaned up Camp IV site, collected more samples, had a bath and returned to base. Nick and the Kates slept most of the day after their all night stint on the river study.

At lakeside camp all up by 1000. Cod and Marcus set out in swimming trunks to do plant studies. Robin, Mark H., and Graham doing a snow study. Stephen, Mark G., and Little Guy studying slopes.(Stephen in his Longjohns!)

Robin lost his Yorkie-very upset. Cod broke geological hammer-typical.

A tiring day despite lovely weather.

10th August Thursday

Morning at base spent waiting for groups to return. Sorted food.

Lakeside camp up at 0800. Wind increasing. Robin got impatient with his primus. Mark H. continued with snow survey. Robins group set off for base at 1035, Andy's at 1130. Arrived as one group at 1230. Weather deteriorating.

Evening spent talking and singing in the store tent. Communal brew-up with the last of the tea. Someone suggested reheating the tea leaves so everyone swilled out their mugs in the kettle for re-use....revolting!

Wind increasing in strength, gusting 5-6.

11th August Friday

Owen up at 0030 to check the tents. Nick emerged to help. Back to bed at 0300 and up again at 0400. Some flysheets lifting off. Bed again at 0445 after securing toilet crate. Up at 0700. Wind increasing in force, now about 7. A massive pressure cloud beginning to build up over

mountain to the north of base camp. Estimated rise of air currents about 1000 feet per minute.

Disaster-bucket missing from toilet....great consternation in camp....Mark H., Robin, Owen and Big Guy went in search and found it 50 metres from the large waterfall.

Robin's tent flattened and one ridge pole snapped. Morning spent storm lashing store tent with 120ft. of No. 4 Nylon rope and all other tents with the safety ropes. Emergency rations handed out and rucksacks packed with essentials for survival in the open.

1420 Big Guy took six out for a walk on the other side of the river. Store tent beginning to tear along the ridge-repaired by Andy and the Kates.

River rising so rope bridge is now a damp crossing. 1930 started to rain. Early night for most. Everything packed in poly. bags and tied down.

12th August Saturday

Owen up at 0400 checking tents. Wind still very strong. store tent guys shredded along one side. Polythene flysheet still holding up.

After lunch we went to the mountain hut to collect crates for Dick Phillips. Wind strong enough to lean against. Returned to base at 1530.

A large mountain bus turned up and Owen managed to acquire a packet of cigarettes!

13th August Sunday

Up at 0600 and all up to Camp IV for a bath. Mist, wind and very damp. The female members of the party had their own shower while the lads crowded under the large hot waterfall. Looked like something from Dante's Inferno-naked bodies, steam and snow! (girls took twice as long as the rest). All very tired.

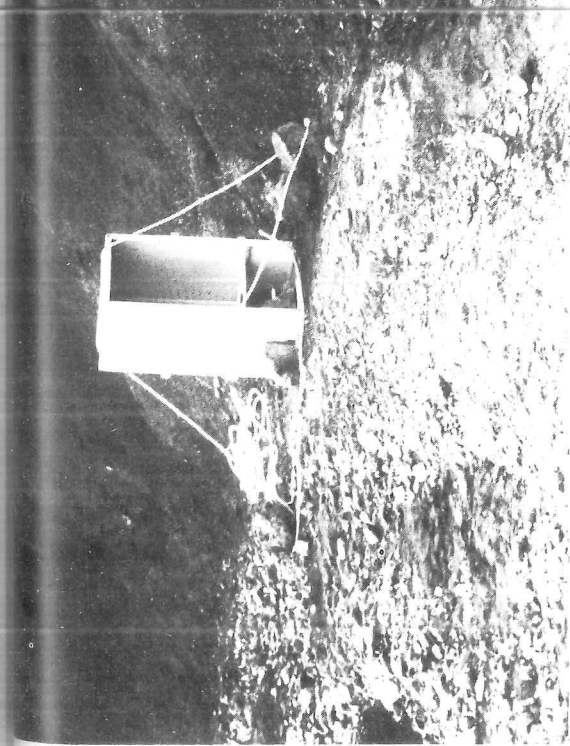


Photo. 66. Camp IV LooL Chilly but a superb view



Photo. 64. Base Camp Loo - stormblasted.

Photo. 65. Members of the Expedition - base camp hot spring.

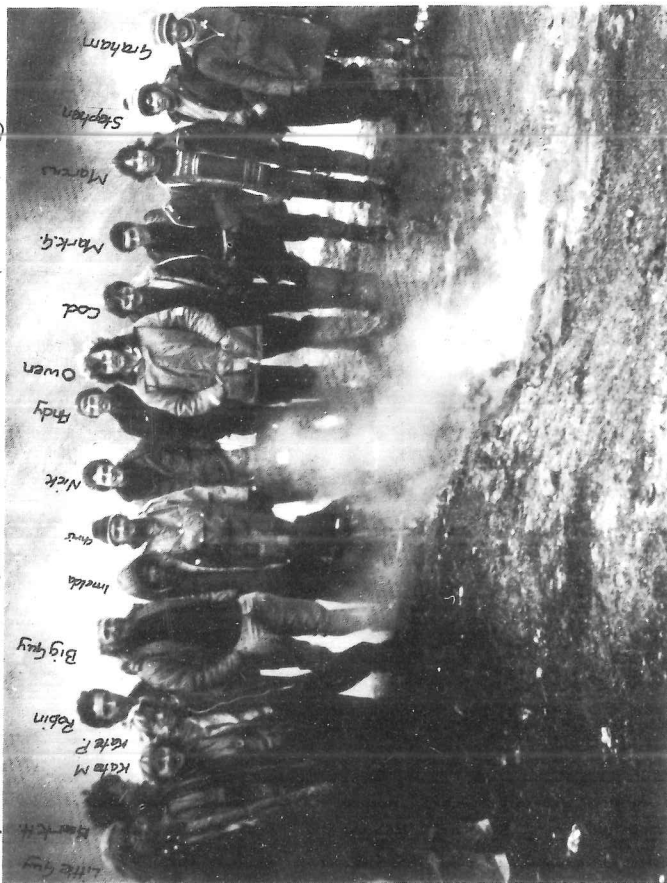
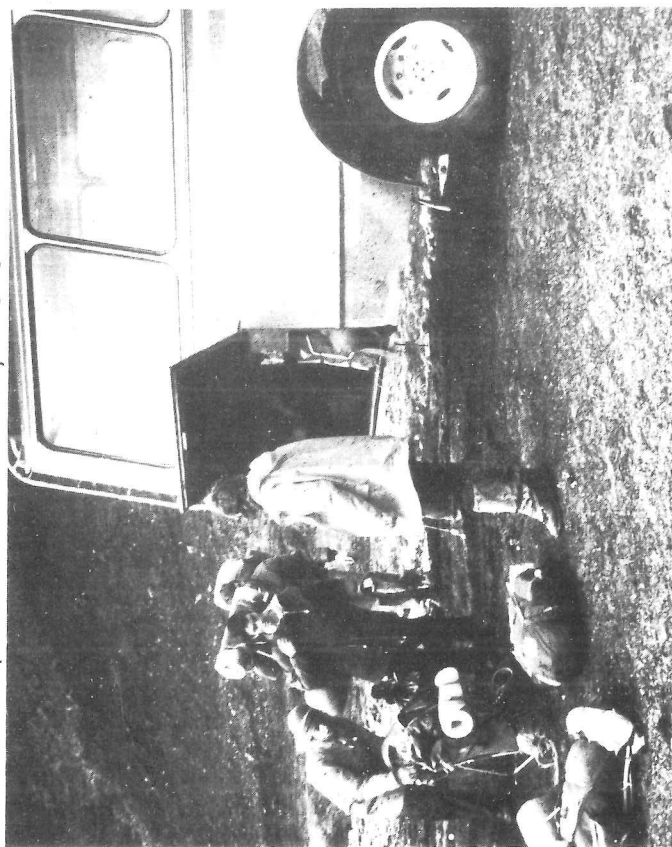


Photo. 67. Departure from Base Camp 15.8.78



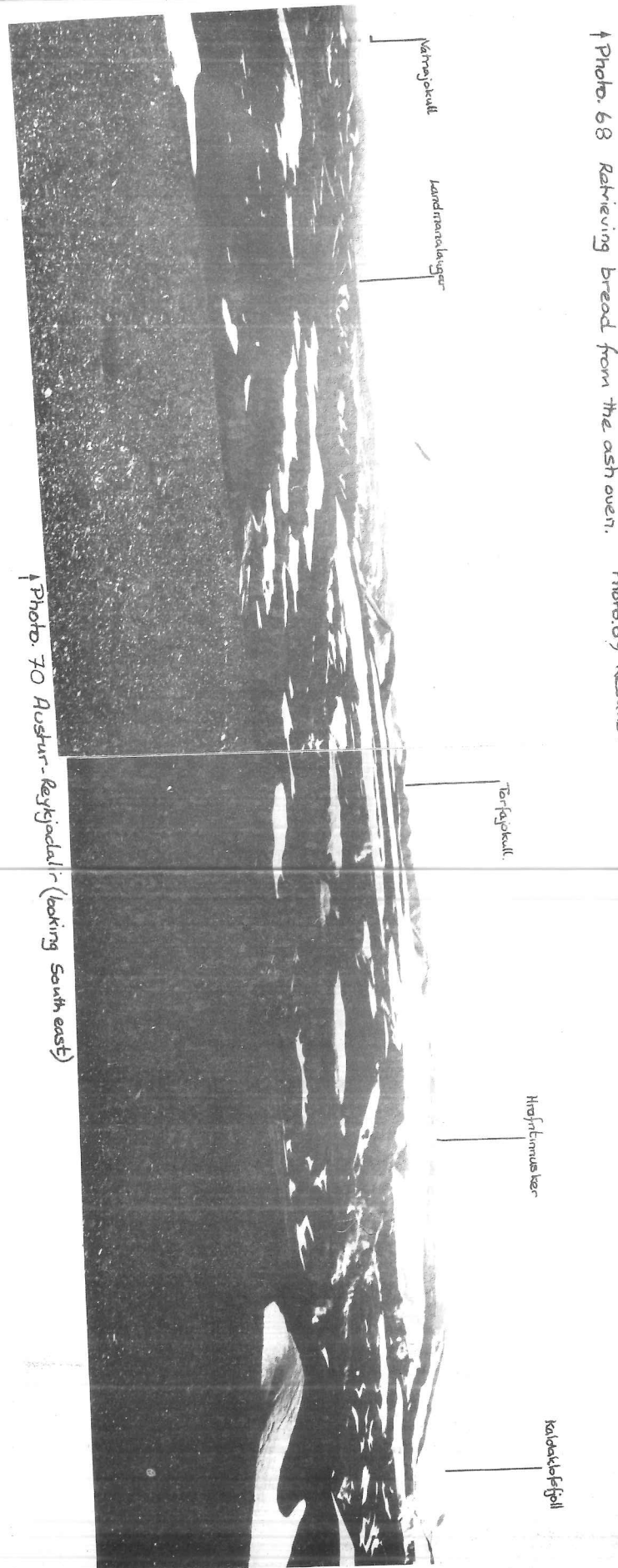


Photo. 68 Retrieving bread from the ash oven.



Photo. 69 Results.



14th August Monday

Pack and stack day. Up to hot spring for photographs and final bake of bread. Cleared out store tent and fixed up table and chairs (crates) for sixteen.

Cod constructed a new toilet in a snow bank—a luxury version—was intended as a snow hole but he decided not to sleep in it and did a conversion job.

Marcus and Stephen went off to finish quadrat survey. Picked up all the litter in camp and Mark H. prepared a bonfire. Andy and Owen made 70 beefburgers and 22 sausage burgers. 1905 party begins.

MENU Beefburgers
Sausageburgers
Mixed vegetables
Mashed potato
Rolls
Tinned fruit
Coffee and Coke

Nine primuses lit and the store tent became unbearable. Food vanished very rapidly. Robin and Andy gassed all evening and the barber shop trio in full voice.

2315 bonfire and candles lit (ash soaked in paraffin in tin cans).

15th August Tuesday

Most turned in about midnight. Kate M., Mark H., Robin, Andy, Little Guy, Big Guy and Owen continued the party in the store tent with high spirits until 0315 when we all went up to the hot spring for a brew —up joined by Kate P.

Back to base and a couple of hours sleep. Everything packed and ready to leave by 1200. Sun and hail showers.

1400 Bus due—no bus.

1500 no bus

1600 no bus

1630 Big Guy says he is going to get Sod's Law to operate by unpacking his rucksack, which he begins to do-

1635 "Bus"

Equipment loaded on, group seated, departure 1700. Arrive in Reykjavik at 2100. Settle into school accommodation, supper and bed.

16th August Wednesday

Owen and Big Guy went to arrange shipping of stores. Others sightseeing, buying presents and swimming.

Sendibil arrived at school and took crates. Big Guy, Kate P., Robin and Cod to Sundahofn warehouse-container waiting for our crates-being shipped out immediately.

Robin, Andy, Big Guy and Owen took Kate P. to the cinema for her birthday.

17th August Thursday

At exactly midnight in the middle of Reykjavik Kate P. was given the bumps-very strange looks from passers by. Back at school we gave her a scarf as a present.

Owen went to the British Embassy with Andy to phone Steve Blyton-3 hour delay on calls to the U.K. The British Embassy said they would phone for us.

Cleaned up school and waited for the bus. 1300 only one bus turned up, a 36 seater, not really big enough for Yorkshire Schools and ourselves but we managed to squash in and arrived at Keflavik at 1400. Two hours in the duty free shop.

Boarded plane at 1600 and after a superb meal and flight landed at Heathrow to be met by Steve and the bus. Big Guy left after being given a bottle of Malt Whiskey and Mark H. was met by his parents. The rest of us got on the bus and after a brief pub stop arrived at school at 0030 on the 18th.

Acknowledgements.

We wish to thank the following bodies for the generous grants they made towards the cost of the expedition:

The Prince's Trust, The Winston Churchill Memorial Trust, The Young Explorers Trust, and the Scott Polar Research Institute.

Also the following firms for their generous assistance:

Ambrosia Creameries, Anglia Television, Arkady Soya Mills, Bayliss Wright & Co., Beecham Proprieties, British Home Stores, British Petroleum, British Sugar Corporation, Broadland District Council, Charrington Breweries, Coca Cola Southern Bottlers Ltd., Colman Foods, CompAir Ltd., Norwich Co-op, Dairy Crest, Damart Thermawear Ltd., Dixons, Freight Bonallack, Gillette Industries, Kodak Ltd., Leisure and Camping (Norwich) Ltd., Linnells Value Centre, Mann Egerton, Marks and Spencer, Norwich Brewery, Norvic Shoes, Quaker Oats Ltd., Raven Foods, Read Woodrow Ltd., RHM Foods Ltd., Rowntree Mackintosh Ltd., Schweppes, Tate & Lyle, Walls, Weetabix Ltd., Whitworth Holdings, Norwich Injection Moulders.

And our grateful thanks to the following individuals for their assistance in the organization of the expedition which helped to make it such a success:

Godfrey Arnison, Miss H.D. Artis, Mr. F. Ball, John Balls, Gill Beasley, Mr. C.M. Belchambers, Mr. G.H. Battye, Una Bartram, Steve Blyton, Mr. G.W. Bolton, Mr. A.E. Breed, John Bruhn, Dave Buckingham, Mr. B.D. Burnett, Mr. J.J. Cousins, Peggy Cullingford, Len Davies, Alan Davison, Tony Escritt (Iceland Unit) Mr. G.D. Fallas, Ann Gaskell, Chris Gaunt, Mr. H.D. Gell, Mr. Grayling, Capt. J.H. Gross, Mr. G. Hadfield, Miss J. Hill, Mr. Howath, Helen Hoyte, Rosemary Hunt (typing and patience) Mrs B. Jackson, Mr. P. James, Dr. Brian John, Francis Kapherr, George Kime, Nigel M.P. Lander (Icelandair), John Larkin, Dave Hipperson (printing), Major General H.A. Lascelles, Mr. C. Lawrence, Mr. J.A. Mack, Miss Elizabeth Manson-Bahr (Y.E.T.) Barbara Meazey, Ken Meazey, Mrs. B. Morrison, G.M., Mr. D.M. Nelson, Mrs Peart, Dick Phillips, Mr. A.L. Pitman, Capt. T. Quare, Mr. H. Reynolds, Pam Rising, Dr. G. de Q. Robin, Mr. J.F.M. Roualle, Anne and John Rowson, Anne Salwey, Mr. C.F. Schwab, Dr. C.J. Scott, Capt Sheepshanks, Peter Smith, Miss S. Smith, Pete Staniland, Dina Smithdale, Mr. R.A. Stevens, Joy Steward, Mr. R.A. Stewart, Mr. A.E. Stott, Gavin Sumner, Bill Sutton, Mr. H.L. Tuck, Mr. A.N. Wilson, Mr. J. Woodrow, Trevor Wright Ian and Alison Sinclair, Margaret Hardingham.

And finally our thanks to all those members of staff who helped the expedition by filling in for our lessons and for putting up with so much disruption!

Conclusion.

Conclusion.

The first Norfolk State School Expedition was undoubtedly a success. It proved that a venture such as this will work and that the benefits to the members of the expedition were wellworth the effort and time involved in planning the trip.

The success of the trip was due to a number of factors. The assistance provided by the Iceland Unit of the Young Explorers Trust proved to be invaluable in the planning stages of the expedition. In fact in all our travel arrangements we only had one minor mishap which was sorted out in 15 minutes.

Another factor was the help and encouragement we received from so many individuals, trusts and firms.

Perhaps the most important factor was the group itself. Most had had little previous experience of the type of terrain that we found in Austur-Reykjadalir. Some had not camped or flown before. To most the whole experience was totally new. At times tempers did become frayed but everyone pulled together and most of the success was due to the efforts of the individuals.

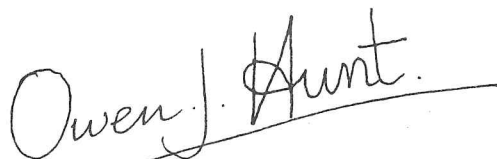
However, the major failing of the expedition, in my opinion, was the scientific programme. This was rather an ambitious programme and we grossly overestimated our work rate and underestimated the amount of time we would spend getting from one place to another, drying clothes and simply surviving. Also our scientific equipment was poor in quality and quantity and we had to make many improvisations - a very useful exercise in retrospect. Much more thought would be needed in this section for a future expedition.

What of the future? Another expedition is being planned for the summer of 1980 to the same area in Iceland to further the study of this remote and fascinating area and it is hoped that students from other schools in Norfolk will be able to

participate.

Although we spent a fair amount of money on equipment for the expedition most of this went on hiring tents, rucksacks etc. and one of the aims for the future is to purchase the proper equipment so that we can build up a stock.

Finally, I would like to thank all those who helped with our plans and the members of the expedition who made this venture such a success. I am sure the group would also like to include a special word of thanks to Guy Hawkins whose knowledge and experience of mountaineering and survival proved invaluable to the expedition.

A handwritten signature in cursive script that reads "Owen J. Hunt." The signature is written in dark ink and is positioned above a horizontal line.

Owen J. Hunt.

Expedition Leader.

24.1.79.

Appendices

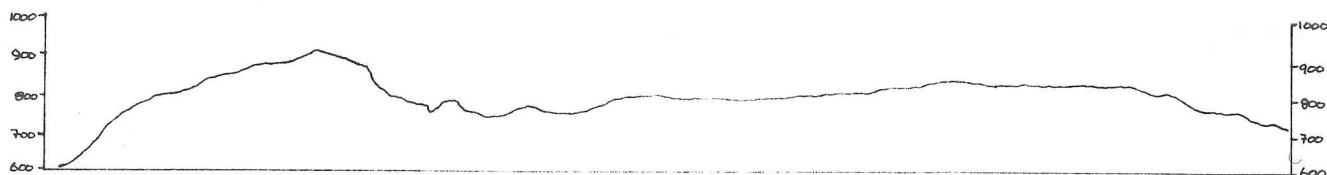
Appendix I.

Cross-sections.

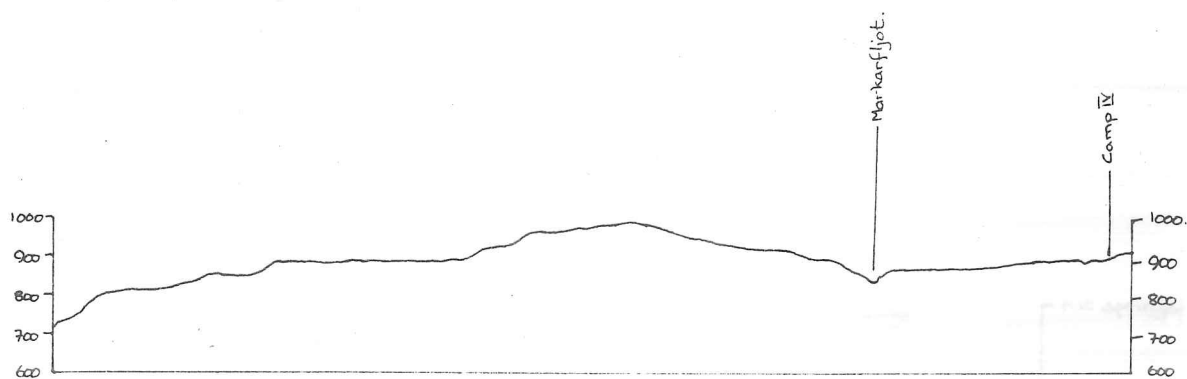
In this section we have included a number of cross-sections to give some idea of the terrain. Each cross-section shows one of the walks the group made in the area of Austur-Reykjadalir.

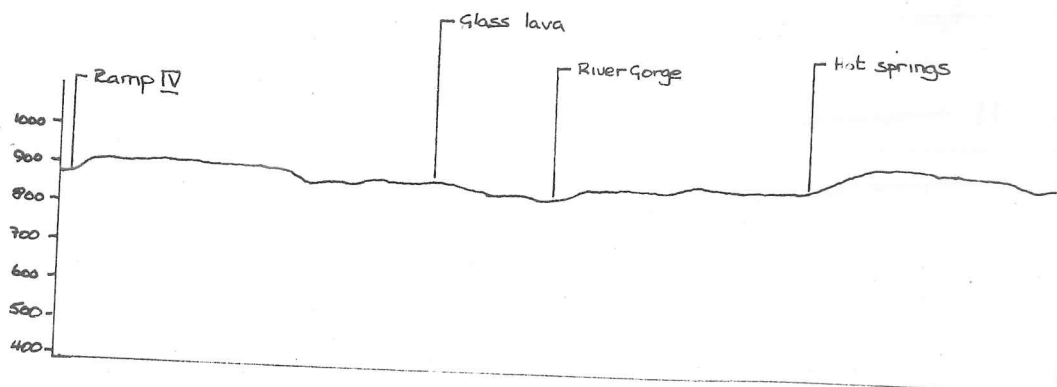
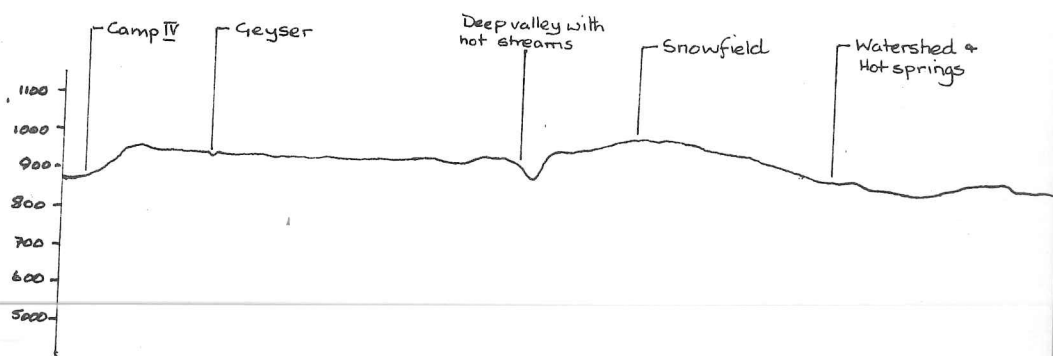
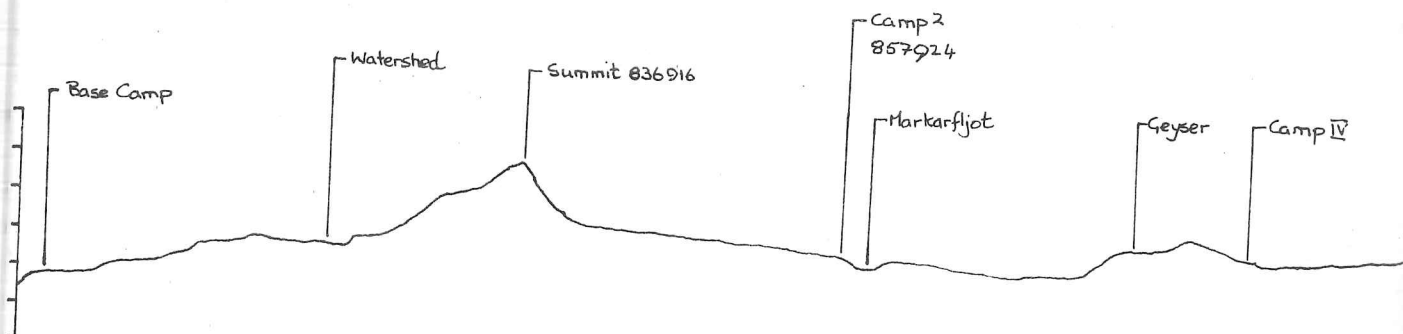
Although not very high most of the walks included many trecks up hill and then down only to have to climb up again. This proved to be very tiring.

Cross Section 1: Circular Walk. North of Base Camp.



Cross Section 2: Base Camp to Camp IV

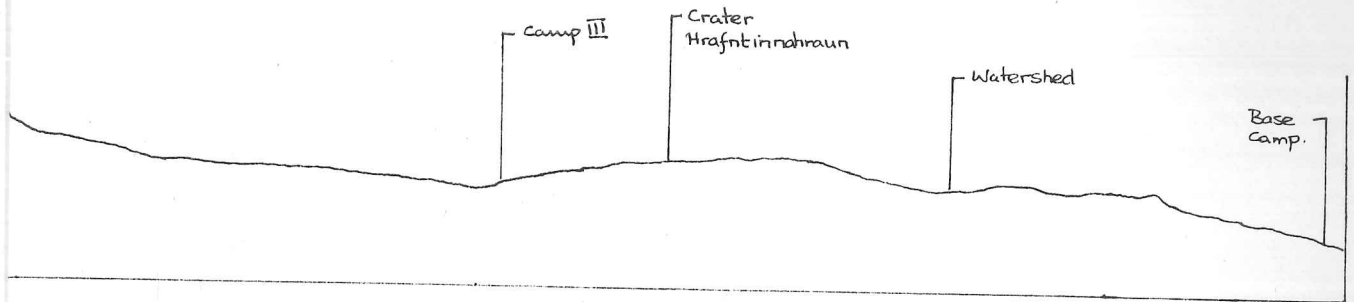




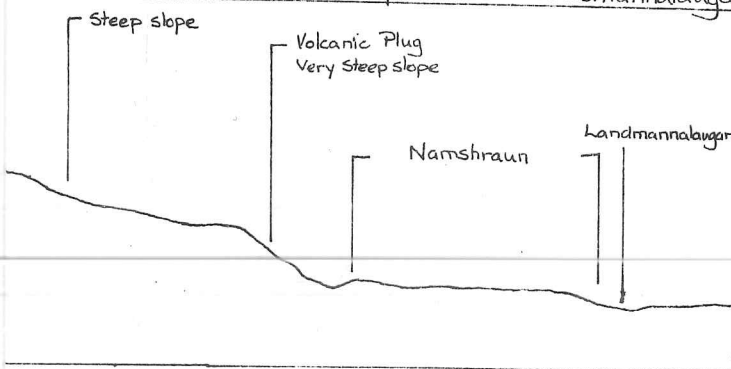
Cross Section 3: Base Camp to Glass Lava (Hrafninnusker) via

"Three Sisters" + Geyser

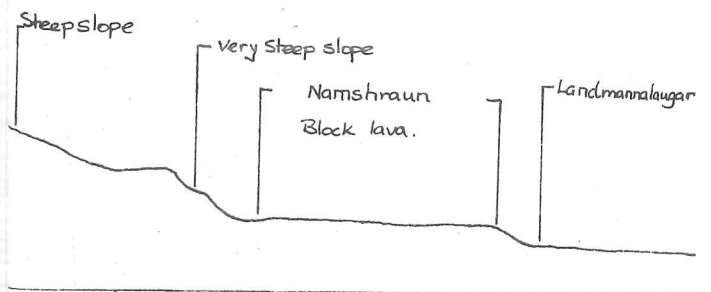
flow on
usker
Summit 873897



Cross Section 4: Camp IV to Landmannalaugar:



Cross Section 5: Landmannalaugar to Camp IV.



Appendix II.

Route cards.

Below are some examples of the route cards made out before each and every walk.

1. 24.7.78. Leave 0900. Time: $4\frac{1}{2}$ hours.

Bearing 45° Grid to 814925 $2\frac{1}{4}$ kms.

Bearing 0° Grid to 813933 $\frac{3}{4}$ kms.

Bearing 60° Grid to 819936 $\frac{1}{2}$ kms.

Bearing 20° Grid to 821940 $\frac{1}{2}$ kms.

Bearing 90° Grid to 830941 1 kms.

Bearing 60° Grid to 834942 $\frac{1}{4}$ kms.

Bearing 137° Grid to 837936 $\frac{3}{4}$ kms.

Bearing 240° Grid to 818924 $2\frac{1}{4}$ km.

Bearing 231 Grid to hot spring at 811916.

Return to base camp via hot spring valley.

2. 27.7.78

Start 1300 Hot Spring.

Grid 79° to 833923 spur $2\frac{1}{4}$ kms.

Grid 90° to 842923 crater 1 km.

Grid 119° to 848920 edge of block lava $\frac{3}{4}$ km.

Grid 67° to 854922 camp III $\frac{3}{4}$ km.

Retrace route to watershed and then to base.

Time 5 hours.