TECHNICAL PROGRESS REPORT
OF
BIOLOGICAL RESEARCH ON
THE VOLCANIC ISLAND SURTSEY AND ENVIRONMENT
FOR THE YEAR 1972

Submitted to

Division of Biology and Medicine

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The study involves the terrestrial biological research on the volcanic island, Surtsey, off the coast of Iceland, according to Contract No. AT(11-1)-3521.

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MASTER

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The research dealing with the terrestrial biota on the volcanic island of Surtsey off the shore of Iceland and its environs has been financed by the U.S. Atomic Energy Commission.

According to the Research Proposal for the year 1972 the project involves a study of dispersal, colonization and ecological succession of terrestrial plants and animals on Surtsey and its environs.

The research work carried out during the summer of 1972 proceeded along the same general lines as that of previous summers with regular observations during the summer months. Two guards stayed permanently on the island during the summer and took care of the meteorological recordings. Several students of biology made frequent trips to Surtsey and recorded biological events and collected samples. In addition, expeditions to Surtsey and the environs were made for special studies.

The results are every other year published in the "Surtsey Research Progress Report" of which six volumes have been issued. The latest report, Volume VI, was sent last summer. In addition, a number of special articles have appeared in various journals or are in preparation.

In general the research in 1972 was carried out as follows:

MICROBIOLOGY

The following scientists have been connected with various fields of the microbiological study on Surtsey:

Prof. Tomas D. Brock, Department of Microbiology
Indiana University, Bloomington, Indiana, U.S.A.

Prof. Dr. W. Schwartz, Institut für Molekular
Biologie, Biochemie und Biophysik, 3301 Stockheim,
Germany, who has been most interested in autotrophic
bacteria of the soil.

Dr. G.H. Schwabe, Max-Planck Institut für
Limnologie, 232 Plön, Germany, who has studied the micro-
flora of the two main craters on Surtsey.

MOSES AND LICHEN

Mosses have been studied by Mr. Bergthor Johannsson,
M.Sc., of the Icelandic Institute of Natural History,
Reykjavik, Iceland.

The distribution of moss on Surtsey was recorded
by students of biology as well as some of the visitors.
A report on the moss for the year 1972 is given in
Appendix III. The lichen have been studied by Hördur Krist-
insson, Akureyri, Iceland. The lichen flora of Heimaey
has been investigated by one of the biology students in 1972,
Appendix V.

VASCULAR PLANTS

The studies of vascular flora were performed by
Sturla Fridriksson, Ph.D., Agricultural Research Institute,
Reykjavik, as well as by the biology students working
as assistants.

Records were kept of seeds and other plant parts that drifted to Surtsey. (Appendix II).

All higher plants that started growing during the summer of 1972 were counted and staked out. They numbered 199 and most were of the species Minuartia peploides, (Syn. Honckenya peploides) and Cochlearia officinalis and a few were of Elymus arenarius and Stellaria media. (Appendix I).

The vegetations of selected areas on Heimaey and the adjacent mainland have been investigated to compare their climax communities and various successions in habitats which are similar to those found on Surtsey. A vegetation map of Heimaey was completed and the biomass of various communities was measured. On January 23, 1973 a 1.5 km long fissure opened up on the north-eastern part of the island emitting lava and ashes over great part of the island. The ashes cover a part of the town as well as the vegetated areas. In the spring of 1973 the volcanic activities are still proceeding.

ENTOMOLOGY

The recording of insects found on Surtsey was continued during the summer 1971 by the guards stationed on the island. The entomological work was directed by Professor Carl H. Lindroth, Zoological Institute, University of Lund, Lund, Sweden.

VERTEBRATES

The ornithological studies were directed by Dr. Finnur Gudmundsson, Head of the Zoological Department, the Icelandic Institute of Natural History, Reykjavik. (Appendix VI).

The opportunity was used for investigating the role played by birds in the dispersal of living diaspores.

METEOROLOGY

The meteorological study was supervised by Hlynur Sigtryggsson, Director of the Icelandic Bureau of Meteorology, Reykjavik. Daily observations were carried out by the guards at the field station.

SOIL

Further investigation on the substrate were carried out. Such as the consolidation and palagonitization of the tephra which is being studied by Sveinn Jakobsson.

CONFERENCES

Dr. Sturla Fridriksson attended an International Geobotanical Congress at Rinteln Germany. He reported on the Surtsey study and showed a color movie on Surtsey.

APPENDIX I.

Vegetation Studies on Surtsey in 1972.

by

Sturla Fridriksson, Skúli Magnússon
and Ragnar Jónsson.

Introduction:

The first biological excursion to the island in 1972 lasted from June 6 to June 12. The time was employed to look for plants that had over-wintered. Of higher plants 45 individuals had survived the winter and in addition 12 new individuals were observed, including a plant of Mertensia maritima and one Trip-leurospermum maritimum. Around plant nr. 38 which was a Cochlearia officinalis and which matured in 1971. 95 new seedlings were observed that obviously were the descendants of the same plant. Some of these seedlings had even started growth in the fall of 1971. As in previous summers the individual plants were marked with a stake and numbered. The surviving plants from 1971 and earlier kept their old stake number where this was possible. Their numbers in the tables can thus be compared with that of previous years.

The second excursion to Surtsey was from 3. to 9. of July. In this trip four additional surviving plants were recorded as well as 27 new individuals. Most of the new seedlings were discovered on the northern ness in the debris at the high tide mark.

Among these plants were 13 individuals of Mertensia maritima which has not previously been so abundant on the island. The rest of the plants found during this excursion were of the species Honkenya peploides and one new Cochlearia officinalis

which was in the vicinity of plant 38.

The third excursion lasted from 25. July to 3. August. During this trip 19 new vascular plants were observed. Among these were some species that had not previously been discovered on Surtsey. The new members were Angelica archangelica one plant, Puccinellia sp, one plant, one unidentified dicotyledonous plant and an other grass species which is very likely not an Elymus. In addition an individual of Cakile edentula was discovered and a plant of Stellaria media which apparently has grown from a seed produced by plant nr. 74 from 1971. The Cochlearia officinalis plant nr. 36 had already matured seed and the dehiscence seed had started to germinate.

During this excursion the moss was investigated. Its distribution was measured and mapped. The barren lava is gradually being invaded by the moss. For the first time moss was f.ex. observed growing in the quadrat H 13.

The fourth and the last excursion lasted from 12. to 29. August. During this time the moss flora was mainly investigated. Among the new species discovered were: Psilophilum laevigatum, Polytrichum piliferum, Aulacomnium palustre, Dicranoweisia erispula, Plagiomnium euspidatum as well as a few liverworts, species of the genera Solenostoma, Scapania and Cephaloziella. These species were only discovered at one location each.

In regards to the vascular plants 13 new individuals were discovered during this period. The

total number of vascular plants discovered on Surtsey thus became 199 individuals during the summer 1972, which is the greatest number hitherto found growing on the island. Among the 13 new individuals that were recorded during this excursion there was one Angelica archangelica one Puccinellia sp. one Stellaria media and three plants of Cystopteris fragilis. The previously mentioned dicotyledon plant was washed out by the waves and lost during a heavy storm in August and could thus not be identified. The Honckenya plants that were first to flower had matured seed. And its dehiscence had started at the end of August. In table 1 the individual plants found on Surtsey in 1972 are listed.

The vascular species on Surtsey in 1972.

Cochlearia officinalis

This species was most abundant in 1972 with 98 individuals whereas the plants were only 21 in 1971. In table 1 there is only listed one plant as no 37 where there actually were 50 plants. These were all seedlings, the descendants of plant no 38, which matured seed in 1971. Some of these seedlings had already started growth in 1971 (Sveinbjörnsson et al. 1971) but others started growth in the following spring. All these 50 plants occupy an area within a 50 cm distance from the mother plant. There were more than 80 seeds that germinated. But at least 10 seedlings failed to mature due to crowding and various other reasons. In the quadrat S14 there are seven other plants of the same species which are very likely also the descendants of the same mother plant and have only dispersed farther away.

Plant no 30 from 1971 also matured seed during that same summer but none of these developed as no new plants of Cochlearia were found in the same quadrat (K-18) in 1972.

The only Cochlearea to flower during the summer 1972 was plant no 36. It matured seed in August and shortly after the seed dispersed and started to germinate. In the autumn of 1972 a few seedlings were seen growing beside the mother plant. Nine of the Cochlearea plants found this summer have survived in Surtsey since the year before.

Honckenya peploides.

This species has been the most common vascular plant in Surtsey. From the time it first colonized in 1967 50-90% of all the plants have comprized of this species. It was only first outnumbered by Cochlearia officinalis in 1972 and count only 36% of the total number of vascular plants in 1972.

In 1972 there were 71 plants of Honckenya in Surtsey. The year before there had been 52 individuals of the same species, and 38 of these plants overwintered. Twelve of these plants flowered compared to 5 the year before. Seven of which matured fruits whereas only one plant (no 17) matured seed in 1971. Although this plant dehiscd the seed it is not known whether some of the new plants found in the same quadrat (J 18) in 1972 descend from it.

One of the Honckenya plants (no 63) is the largest plant found growing in Surtsey. It developed mostly in July and August and is by now quite conspicuous. The two species Honckenia peploides and

Cochlearia officinalis are by far the most stable colonists of the vascular plants.

Mertensia maritima.

This species was first observed in Surtsey in 1967 although it never matured at that time. Again in 1968 four plants were found on the island but did not survive or become permanent. The summer 1972 there were recorded 15 plants of this species in the high tide line on the northern ness, but none of these matured.

All the Mertensia plants that so far have started growth on the island have been located on the flat sandy shore which is overflooded during winter storms. It is thus no wonder that the species has not become permanent on Surtsey.

As all the plants are situated in the debris at the high tide line they apparently have developed from seed that has drifted ashore from the sea.

Cystopteris fragilis.

During the summer 1971 three ferns were discovered in the lava which were considered to be of this species. One of these plants survived the winter being well protected under the protruding lava. In addition to this plant three new ferns were found during 1972. Two of these were found in shallow lava hollows in quadrat 0 13 i.e. no 117 and 118. The third plant (no 118) was discovered in the lava crater in quadrat I 8. The conditions were the most favourable for this individual as it grew in the bottom of a crack in the lava, where it was shaded and enjoyed both heat and moisture from hot vapour emitting through the fissure. The development of this plant was accordingly better than that of the three other members of the species

found on Surtsey in 1972.

Cakile edentula (syn. Cakile maritima).

The first vascular plant on Surtsey was of this species (Fridriksson 1966). Since then it has been observed now and then but the species has never been a permanent settler. During the years 1968, 70 and '71 no plants of this species grew on the island.

In 1972 one individual of this species was found growing on Surtsey a plant no 95 in quadrat A 13. It was a small plant, and situated on the northern ness in such a way that it has little chance to survive the winter:

Stellaria media.

This species was first discovered on Surtsey in 1970 and has grown on the island the following years. It has not increased in numbers, as four plants were found the first year and only two in 1972 i.e. plants no 107 and 115. These plants were both growing in cracks of the lava and apparently developed from seed brought in by birds in a similar way as the plants of the same species found in 1970. (Fridriksson et.al 1970).

Angelica archangelica.

Two plants of this species were discovered on the north-eastern shore of Surtsey. This is the first time members of this species colonize the island although its seed have previously been found on the shores of Surtsey. These two plants were only small seedlings with cotyledons and the

seedwall. They were found growing at the hightide mark which indicates that the plants developed from seed which has drifted to Surtsey by the ocean. One of the plants no 120 died already during the summer 1972.

Carex maritima.

A small plant has been growing in quadrat M 11 for the last two years i.e. no 39. It was first recorded in 1970 as a seedling of Elymus arenarius but has now definately been identified as Carex maritima. The plant has not produced any flower stalks but has developed stolons and increased in number vegetatively so that three new individuals have now developed beside the mother plant.

Puccinellia sp.

Two small palnts no 90 in quadrat R 14 and no 110 in quadrat k 17 were identified as of the genus Puccinellia. They were both growing near the sites where there had been water containers frequently visited by birds. It is thus very likely that these plants developed from seed dispersed to this area by the birds.

Tripleurospermum maritimum (syn. Matricaria maritima).

One plant of this species (no 40) grew in quadrat S 14. The habitat is a sand covered lava hollow. And the plant grows there among the C. officinalis individuals that occupy the same hollow.

There is no indication as to how this plant may have been dispersed to this plance, but it could

have been brought in by birds like the C. officinalis plants.

Unidentified species.

Two plants were discovered in 1972 which could not be identified i.e. no 96 in A 12, which was a dicotyledonous plant that grew on the northern ness and was washed out by the sea. The other no 88 in E 13 was a monocotyledonous plant which likely belongs to the Carex family.

Vegetation.

During the summer 1971 there were 83 vascular plants in Surtsey of these 49 individuals survived the winter 1971-72 or 59%. This is the highest percentage of surviving individuals hitherto obtained in Surtsey. The major part of the individuals were this year growing in the rather secure sites of the lava with fewer individuals on the northern ness than in previous years. This latter location is often overflowed during winter storms and is thus quite hazardous for the overwintering of plants. The corresponding percentages of overwintering plants for the previous winters are 70-71 53%, 69-70 35% and 68-69 20%. The following graph shows the number of vascular plants growing on Surtsey during the years 1965 to 1972, as well as the number of overwintering plants for the last four years. It is obvious that there is an increased number of plants each year that survive the winter. This must be due to the more secure location of growth

and a steady increase of the permanent member of plants.

NO. OF PLANTS

The number of species and individuals of vascular plants found in Surtsev 1972 are listed below:

<u>Species</u>	<u>amount of plants</u>
<u>Cochlearia officinalis</u>	98
<u>Honekenya peploides</u>	71
<u>Mertensia maritima</u>	15
<u>Cystopteris fragilis</u>	5

<u>Species</u>	<u>amount of plants</u>
<u>Stellaria media</u>	2
<u>Angelica archangelica</u>	2
<u>Puccinellia sp</u>	2
<u>Cakile edentula</u>	1
<u>Carex maritima</u>	1
<u>Tripleurospermum maritimum</u>	1
<u>Unidentified plants</u>	<u>2</u>
Total vascular plants	199

During the previous years Honckenya peploides was the most abundant plant in Surtsey, but in the summer 1972 the individuals of Cochlearia officinalis outnumbered the others. This is mostly due to the fertility of plant nr. 38 which produced a number of offsprings in 1972.

The distribution of plants has increased somewhat since the year before. In 1972 the 199 individuals were discovered in 41 quadrats of the 234 quadrats covering the dryland on Surtsey. Five more quadrats were occupied by plants in 1972 than in the year before.

The increased distribution of vascular plants on Surtsey can be shown by the number of quadrats the plants have occupied in the various years. The following graph shows that there is a steady increase of occupied quadrats during the last four years.

Number of quadrats occupied by vascular plants.

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

- 1 ANGELICA ARCHANGELICA
- c CAKILE EDENTULA
- 2 CAREX MARITIMA
- x COCHLEARIA OFFICINALIS
- 8 CYSTOPTERIS FRAGILIS
- Δ HONCKENYA PEPLOIDES
- o MERTENSIA MARITIMA
- f PUCCINELLIA SP.
- Δ STELLARIA MEDIA
- W TRIPLEUROSPERMUM MARITIMUM
- u UNIDENTIFIED SP.
- ⊙ BRYOPHYTA

A
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SURTSEY

1972

The main location of the vascular plants during the summer 1972 was in general the same as in previous years, east of Eystri-Bunki in quadrats J 17 and 18, near the hut in quadrats E 12 and 13 and in Svartagil quadrats F 13 and G 13. The fourth location was on the northern ness. This place was occupied by 40 plants which all were new colonizers.

The fifth location is Lýsuhóll (S 14) on the southern part of the lava where 91 plants were found occupying an area of 80-100 sqm.

In the following table there is a list of species of vascular plants found on Surtsey during the past eight years. It is noticeable that the first colonist Cakile edentula has not become a permanent member. It is an annual plant and although it has produced seed on the island, it has to rely on the annual seed maturity and seed supply to the island as well as the growing conditions at the tide mark. The Cochlearia officinalis occupies a more secure location and develops seed earlier than the Cakile. Plants of Monckenia peploides are the most permanent colonizers. They are perannual and are gradually increasing in size and development of flowering branches.

During the summer 1972 several new species colonized Surtsey for the first time. These species are commonly found on the other members of the Vestmann islands or on lava fields of the mainland.

Table 1

List of plants found on
Surtsey in 1972.

No. of plant	Species.	Notes	No. in 1971	Location	First route 6.6 - 12.6				
					No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm
1	<i>Honckenya peploides</i>		1	F-13	9	76			3.5 x 3
2	<i>Honckenya peploides</i>		2	G-13	4	56			10 x 6
3	<i>Mertensia maritima</i>			B-13	1	2			0.3
4	<i>Honckenya peploides</i>		4	F-13	1	6			0.5
5	<i>Honckenya peploides</i>		5	J-18	18	288	8		32 x 16
6	<i>Honckenya peploides</i>		6	D-12	5	68			6 x 4
7	<i>Honckenya peploides</i>		7	E-11	1	8			0.5
8	<i>Honckenya peploides</i>			B-13	1	4			0.5
9	<i>Honckenya peploides</i>		9	E-11	1	2			1
10	<i>Honckenya peploides</i>		10	E-12	1	2			1
11	<i>Honckenya peploides</i>		11	E-12	2	10			2 x 1
12	<i>Honckenya peploides</i>		12	E-12	3	12			1 x 1
13	<i>Honckenya peploides</i>		13	F-13	3	46			5.5 x 2
14	<i>Honckenya peploides</i>		14	J-18	25	480	16		28 x 26
15	<i>Honckenya peploides</i>		15	J-18	6	86			9 x 6
16	<i>Honckenya peploides</i>		16	J-18	7	88			8 x 5
17	<i>Honckenya peploides</i>	*	17	I-18	49	1190	27		24 x 24
18	<i>Honckenya peploides</i>		18	E-12	1	14			2
19	<i>Honckenya peploides</i>		19	J-17	18	240	5		22 x 11
20	<i>Honckenya peploides</i>		20	J-17	4	36			3 x 2
21	<i>Honckenya peploides</i>		21	J-17	9	84			6 x 3.5
22	<i>Honckenya peploides</i>	*	22	J-18	9	134	4		9 x 5.5
23	<i>Honckenya peploides</i>		23	J-18	5	48	4		5 x 3.5
24	<i>Honckenya peploides</i>		24	J-18	16	204			12 x 6
25	<i>Honckenya peploides</i>		25	J-18	1	12			1
26	<i>Honckenya peploides</i>		26	J-18	2	34			5 x 4
27	<i>Honckenya peploides</i>		27	J-18	3	42			3 x 3
28	<i>Honckenya peploides</i>		28	J-18	5	74	2		6 x 6
29	<i>Cochlearia officinalis</i>			L-17		7			7 x 2
30	<i>Honckenya peploides</i>			J-4	5	82			5 x 3
31	<i>Honckenya peploides</i>		31	K-18	32	500	8		16 x 8
32	<i>Honckenya peploides</i>		32	K-17	10	138			9 x 5.5
33	<i>Cochlearia officinalis</i>		35	R-11		28			11 x 7.5
34	<i>Cochlearia officinalis</i>	*		S-14		10			1 x 1
35	<i>Honckenya peploides</i>	*	35	I-4	24	442			14 x 6
36	<i>Cochlearia officinalis</i>	*	36	O-7	6	25	30	51	6 x 4
37	<i>Cochlearia officinalis</i>	*		S-14					See notes
38	<i>Cochlearia officinalis</i>		38	S-14		18			6 x 6
39	<i>Carex maritima</i>	*	39	M-11	1	6			max 11.5
40	<i>Tripleurospermum maritimum</i>	*		S-14	1	4			1
41	<i>Cochlearia officinalis</i>			S-14		6			1 x 1
42	<i>Cochlearia officinalis</i>			S-14		7			4 x 2
43	<i>Honckenya peploides</i>		43	F-13	1	14			1.5
44	<i>Cochlearia officinalis</i>			S-14		8			2 x 2
45	<i>Cochlearia officinalis</i>			S-14		5			1 x 0.5
46	<i>Honckenya peploides</i>		46	F-13	7	62			9 x 6
47	<i>Honckenya peploides</i>		47	F-13	7	10			1
48	<i>Cochlearia officinalis</i>		57	P-17		31			7 x 5
49	<i>Cochlearia officinalis</i>		71	P-10		9			5 x 3
50	<i>Cystopteris fragilis</i>		72	N-9		3			1.5

No. of plant.	Second route 3.7. - 9.7.					Third route 25.7. - 3.8.					Fourth route 12.8. - 29.8.				
	No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm	No. of branches	No. of flowers	No. of flowers	No. of fruits	Seize in cm	No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm
1	23	200			6.5 x 5	23	250		10 x 7	22	244				13 x 9
2	12	172	2		20 x 10	13	248	4	20 x 10	12	222				28 x 10
3	1	3			0.5	1	3		3 x 1		3				1.5 x 0.5
4	1	16			2.5	2	30		5 x 1	2	22				5 x 2
5	26	520		42	28 x 15	52	800		30 x 17	51	510			17	30 x 20
6	21	300			10 x 6	27	300		18 x 9	19	228				19 x 10
7	1	20			2	1	24		3	1	26				4
8	1	14			1.5	5	46		7 x 2.6	5	66				8.5 x 4
9	1	18			2	2	22		3.5	1	22				4.5
10	1	20			2	1	18		3.5	1	18				2.5
11	2	14			2 x 1	2	32		3.5 x 1.5	2	30				4 x 2
12	2	14			1.5 x 1	3	20		2 x 1	2	20				3 x 2
13	6	88			8 x 3	6	120		10 x 4	6	114				10 x 4
14	38	600		22	32 x 26	51	800		30 x 30	54	750			13	35 x 31
15	7	134		2	12 x 7	10	180		13 x 8	10	186			2	14 x 8
16	8	128		2	8 x 6	6	136		9 x 7	6	90				10 x 6.5
17	52	1200			25 x 27	39	850	10	28 x 24	90				64	24 x 28
18	1	24			3	1	30		4	1	22				5
19	23	360	25		27 x 19	47	850	16	28 x 25	47	800	1		15	25 x 24
20	4	82			8 x 4	7	92		8.5 x 7.5	7	76				13 x 6
21	9	122			10 x 5	11	184		10 x 6	11	188				11 x 7
22	9	178	16		10 x 6	16	300	16	14 x 7	17	250				14 x 7
23	6	104	1	5	8 x 4	9	192		10 x 5	9	170				10 x 5
24	17	440	9	2	18 x 15	52	660	8	16 x 4	60	560				2 x 16
25	1	12			2	1	14		1.5	1	12				1
26	2	54			6 x 3	2	62		7 x 5	2	52				8 x 5
27	3	60			8 x 3	3	68		10 x 2	3	60				10 x 5
28	5	156	2	3	21 x 8	8	208		22 x 10	8	174				24 x 8
29		8			5 x 2		8		7 x 4		6				10 x 4
30	5	116			7 x 4	5	146		11 x 5	5	122				12 x 7
31	38	760	69	76	26 x 23	91	1200	2	29 x 24	90	1150			170	33 x 30
32	18	330	9	2	20 x 12	29	580	4	28 x 22	29	300	5		18	28 x 20
33		25			12 x 10		25		10 x 12		31				12 x 7
34		6 x 7			1.5 x 1.5		7 x 7		2 x 3		8 x 6				3 x 3.5
35	50	700	7	16	16 x 15	66	1300		18 x 19	90	1000				21 x 20
36	1	4		27	6 x 4	1	4		6 x 4		1	5			1.5 x 1
37		510			See notes		560		See notes		400				See notes
38		19			6 x 7		13		7 x 5		16				7 x 7
39	2	9			max 10		14		max 11		24				See notes
40	1	4			1 x 1		6		2 x 2		8				2 x 2
41		5			1 x 1.5		3		1 x 2		3				2 x 1.5
42		8			4 x 3		9		4 x 5		9				6 x 8
43	3	40			4 x 1.5	4	62		6.5 x 2.5	4	68				11 x 3
44		7			2 x 3		8		4 x 4		8				4 x 4
45		5			1 x 1		5		1 x 1		5				2.5 x 1
46	18	280			21 x 9	18	360		20 x 15	18	322				29 x 16
47	3	34			3 x 1.5	3	20		2 x 2	2	16				2 x 1
48		30			8 x 6		25		7 x 6		30				8 x 6
49		7			5 x 2		8		6.5 x 4		7				6 x 5
50		3			1.5		3		1.5		3				1.5

No of plant	Species.	Notes	No. in 1971	Location	First route 6.6 - 12.6				
					No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm
51	Cochlearia officinalis		70	N 13		5			3 x 3
52	Honckenya peptoides		68	I 4	4	46			4 x 2
53	Cochlearia officinalis			S 14					
54	Cochlearia officinalis		54	S 14		16			15 x 15
55	Cochlearia officinalis		55	S 14		13			4 x 3.5
56	Honckenya peptoides			K 5	58	812	34	13	12 x 10
57	Honckenya peptoides			E 12					
58	Honckenya peptoides			C 14					
59	Honckenya peptoides		45	F 13					
60	Honckenya peptoides			B 12					
61	Mertensia maritima			B 12					
62	Honckenya peptoides			C 14					
63	Honckenya peptoides	*	63	J 13	20	162	3		17 x 7
64	Mertensia maritima			B 12					
65	Mertensia maritima			B 12					
66	Honckenya peptoides			B 12					
67	Mertensia maritima			B 12					
68	Mertensia maritima			B 12					
69	Honckenya peptoides			B 12					
70	Mertensia maritima			B 12					
71	Mertensia maritima			B 12					
72	Mertensia maritima			B 12					
73	Honckenya peptoides			B 12					
74	Honckenya peptoides			C 14					
75	Mertensia maritima			B 12					
76	Mertensia maritima			B 12					
77	Mertensia maritima			B 13					
78	Honckenya peptoides			C 14					
79	Honckenya peptoides			B 12					
80	Mertensia maritima			B 13					
81	Mertensia maritima			B 12					
82	Honckenya peptoides			B 12					
83	Honckenya peptoides			F 14					
84	Honckenya peptoides			A 13					
85	Honckenya peptoides		67	I 18					
86	Cochlearia officinalis			S 14					
87	Honckenya peptoides		69	N 10					
88	Unidentified sp.	*		E 13					
89	Honckenya peptoides			G 13					
90	Puccinellia sp.			R 14					
91	Honckenya peptoides		29	J 18					
92	Cochlearia officinalis		30	K 18					
93	Honckenya peptoides			C 13					
94	Mertensia maritima			A 13					
95	Cakile maritima			A 13					
96	Unidentified sp.			A 12					
97	Honckenya peptoides			C 13					
98	Honckenya peptoides			A 13					
99	Honckenya peptoides			E 11					
100	Honckenya peptoides			E 11					

No. of plant	Second route 8.7 - 9.7.					Third route 25.7 - 3.8.					Fourth route 12.8 - 29.8.				
	No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm	No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm	No. of branches	No. of green leaves	No. of flowers	No. of fruits	Seize in cm
51		7			4x3		8			3x3		8			4x4
52	5	84			7x4	6	142			6x8	6	128			8x8
53							6			3x4		6			4x6
54		14			16x11		15			16x11		12			16x14
55		13			4x3		15			4x3		20			5x5
56	58	1160	4	34	17x15	76	1500		38	18x17	70	1400			24x18
57	1	8			0.5	1	8			0.5	DISAP	PEA	RED		
58	1	4			0.5	1	6			0.5	1	6			1
59	3	24			4x3	6	70			8x7	6	58			12x5
60	1	10			1	2	16			1	2	18			2.5x2
61	1	2			1x0.5	1	3			1x1	1	2			1.5x0.5
62	1	8			0.5	2	14			0.7	2	14			1x0.5
63	53	420	5	5	38x20	?	1500	11	9	30x40	?	?			50x36
64	1	4			2x6	1	3			2x1	1	2			1.5x1
65	1	3			1.5x0.5	1	5			2.5x2	1	5			2.5x1.5
66	1	2			0.5	8	seem	to	be	dead	D	E	A	D	
67	1	6			3x0.5	1	6			1.5x3	1	5			5.5x3.5
68	1	5			4x2	1	4			5x3	1	5			5.5x3.5
69	1	8			1	4	24			3x2	4	34			4.5x2.5
70	1	4			1.5x1	1	3			3x1	1	3			3.5x2.5
71	1	3			1.5x1	1	3			3x1	1	3			4x2
72	1	4			3.5x1	1	5			4x1	1	5			3x3
73	1	8			1	1	12			1.5	1	14			1.5
74	1	8			0.5	2	14			1	2	16			1.5x0.5
75	1	3			1x0.5	1	2			1x0.5	1	2			1.5x0.5
76	1	4			2x1.5	1	3			2x1	1	3			4x2
77	1	2			1x0.5	1	2			1x0.5	DI	SAP	PEA	RED	
78	1	8			0.5	1	12			0.5	1	8			1
79	1	6			0.5	1	12			1.5	1	14			2
80	1	3			1x0.5	1	2			1x0.5	1	3			2x1
81	1	3			1.5x0.5	1	2			1.5x0.5	1	2			2x0.5
82	1	12			1	1	18			2.5	1	20			2.5
83	4	38			3x3	4	44			3.5x3	4	34			3.5x3
84	1	6			0.5	1	8			1	1	6			0.5
85	2	14			2x0.5	2	24			3x1	2	28			3x1.5
86		5			1x1		5			1.5x1.5		3			2x1.5
87	5	128			17x8	6	180			10x23	7	174			30x10
88							3			max 3		2			max 2.5
89						1	29			2.5	1	20			3
90						20	60			5x5	20	60			7x7
91	1	16			3	1	22			5	1	26			7
92		6			1x1		7			1.5x2		7			2x0.5
93						1	14			1	1	12			1
94						1	4			2.5x2.5	1	1			1x0.5
95						1	4			6x2	1	2			
96						1	8			2	D	E	A	D	
97						1	10			0.5	1	8			0.5
98						1	8			1.0	DI	SAP	PEA	RED	
99						1	16			2	1	10			1.5
100						2	22			2x1	2	14			2x1.5

No. of plant.	Species.	Notes.	No. in 1971	Location	First route 6.6 - 12.6				Seize in cm.
					No of branches	No of green leaves	No of flowers	No of fruits	
101	Mertensia maritima			B 13					
102	Angelica archangelica			B 14					
103	Honckenya peploides			A 12					
104	Honckenya peploides			A 12					
105	Honckenya peploides			B 13					
106	Cochlearia officinalis			N 8					
107	Stellaria media			R 13					
108	Honckenya peploides			M 10					
109	Honckenya peploides			J 18					
110	Puccinellia sp.			K 17					
111	Honckenya peploides			K 17					
112	Honckenya peploides			J 18					
113	Cystopteris fragilis			I 8					
114	Honckenya peploides			I 4					
115	Stellaria media			R 14					
116	Honckenya peploides			K 13					
117	Cystopteris fragilis			O 13					
118	Cystopteris fragilis			O 13					
119	Honckenya peploides			C 14					
120	Angelica archangelica			B 14					
121	Honckenya peploides			A 11					

Notes:

First route: No 34 : Two Cochlearia officinalis plants, both of the same seize. 1x1 cm, the first with six leaves and the other with four leaves.

No. 39 : Length of leaves 11.5 cm, 10 cm, 9 cm, 6 cm, 5 cm, 1.5 cm.

No. 37 : 90 Cochlearia officinalis plants, dispersed on ca. 0.15 m². Mean number of leaves: 6 per plant. These plants are offsprings of plant NO. 38. So are also plants No. 44, 41, 42, 34, 45, 53 and 86.

No. 40 : Two cotyledons and two leaves.

Second route: No. 37 : 85 C. officinalis plants Mean number of leaves 6. 6 leaves x 85 plants = 510 leaves

No. 88 : Unidentified grass species. Three leaves of the following seize : 3 cm, 2.5 cm, 1.5 cm.

Third route: No. 35 : Fruits did not mature.

No 36 : All seeds had dispersed. Six cotyledons growing around the mother plant.

No. of plant	Second route 3.7. - 9.7.					Third route 25.7 - 3.8.					Fourth route 12.8. - 29.8				
	No. of branched	No. of green leaves	No. of flowers	No. of fruits	Seize in cm	No. of branched	No. of green leaves	No. of flowers	No. of fruits	Seize in cm	No. of branched	No. of green leaves	No. of flowers	No. of fruits	Seize in cm
101						1	3			1.5 x 3	1	3			1.5 x 3
102						1	3			3 x 1	1	4			2 x 2
103						1	12			1.5	1	10			1.5
104						1	8			1	1	10			1.5
105						1	12			0.5	1	12			0.5
106							14			2.5 x 2.0		12			2.5 x 1.5
107						1	6			3	1	10			6.5
108						16	260			10 x 8	16	300			11 x 9
109											1	10			1.0
110												8			max 8
111											1	20			3
112											1	8			0.5
113												3			max 3
114											6	114			5 x 4
115											1	6			2.5
116											7	96			20 x 2
117												1			0.5 x 0.5
118												2			1.5 x 1
119															
120															Found dead

No. 39 : New propagated plant 5 cm from the mother plant
 Mother plant with ten leaves: 10.5 cm, 10 cm, 4 cm, 10.5 cm, 10 cm, 6 cm
 11 cm, 10 cm, 10.5 cm, 9 cm. Propagated offspring with four leaves:
 2.5 cm, 8 cm, 7.5 cm and 11 cm.

No 63 : Has grown very much since July observation. Impossible to count
 the branches and the leaves.

No 37 : 80 *C. officinalis* plants with mean number of leaves as 7.
 7 leaves x 80 plants = 560 leaves.

Fourth route: No. 17 : Leaves mostly wilted and 37 fruits didn't mature

No. 22 : No fruits matured.

No. 36 : Sixteen cotyledonous offsprings growing around the plant.

No. 37 : 80 *C. officinalis* plants with mean number of green leaves as
 5 and of wilted leaves as 2. 5 green leaves x 80 pl. = 400
 leaves

No 39 : Three new propagated offsprings around the mother plant.
 Mother plant : Twelve leaves, max. length of 10.5 cm.
 1. offspring : Six leaves, max length 11 cm, min. length 2 cm.
 2. offspring : Three leaves, max length 5 cm, min. length 2 cm.
 3. offspring : Three leaves, max length 7 cm, min length 4.5 cm

NÓV 1972

Chochlearia officinalis, Surtsey 1972

NÓV 1972

The debris of the northern ness with
stakes marking the locations of plants.

NÓV 1972

Honckenya peploides, plant nr. 5, Surtsey 1972.

NÓV 1972

A *Honckenya* plant in flower on Surtsey 1972.

NÓV 1972

Mertensia maritima nr. 68 on Surtsey 1972.

NÓV 1972

Matricaria maritima
no. 40
syn: *Tripleurospermum*
maritimum.

Name of species	'65	'66	'67	'68	'69	'70	'71	'72	
<i>Cakile edentula</i>	23	1	22		2			1	
<i>Elymus arenarius</i>		4	4	6	5	4	3		
<i>Honckenya peploides</i>			24	103	52	63	52	71	
<i>Mertensia maritima</i>			1	4				15	
<i>Cochlearia officinalis</i>					4	30	21	98	
<i>Stellaria media</i>						4	2	2	
<i>Cystopteris fragilis</i>							1	4	
<i>Angelica archangelica</i>								2	
<i>Carex maritima</i>								1	
<i>Puccinellia</i> sp.								2	
<i>Tripleurospermum maritimum</i>								1	
Unidentified plants				1			4	2	

Number of plants per species per. year

APPENDIX II.

Records of Plants found dispersing to
Surtsey in 1972.

Sturla Fridriksson, Skuli Magnússon
and Ragnar Jónsson.

The shores of Surtsey were searched regularly from 6 June to 1 August 1972 and records made of any plant parts in the debris.

In table I the results of these observations are given by listing the species, plant parts and the date of discovery.

The greatest drift occurred during early June during a stormy period but in July there was negligible drift or no drift at all.

Most of the plant parts that disperse to Surtsey are of species common on the neighbouring islands such as parts of Cochlearia officinalis, Festuca rubra, Matricaria maritima and Elymus arenarius.

In table II there is a list of plant parts of all the species discovered in the debris on Surtsey during the period 1964 to 1972. The plant parts listed indicate that the vascular species now growing on the island are also mostly represented in the debris.

Table 1

Species and plant parts recorded drifted ashore on Surtsey in 1972.

Species	First route							Second route					1.8.
	6.6	7.6	8.6	9.6	10.6	11.6	12.6	3.7	4.7	5.7	6.7.	7.7	
Grass species	LS >30	LS 13	LS 9	LS 7	L 5		LS 5 I 1						
<i>Festuca rubra</i>	I 6	I 2	I 1	I 1	I 1					L 6 I 6		LS 5 SI 5	I 3
<i>Poa pratensis</i>		I 1					L 1 I 3						SB 1
<i>Cochlearia officinalis</i>	L >30 I 9 SF 1		L 2 I 3		L 9 I 2 SF 1					L 10 SF 7		SI 2	
<i>Matricaria maritima</i>	L >30		L 3	L 1	L 6		L 4			L >30 I 7 SF 1	L 2	S 2 I 5	
<i>Cerastium fontanum</i>	LS 4 I 4					drift				SI 1			
<i>Taraxacum</i> sp.	I 2	I 1½	I 1			other		drift	drift				
<i>Elymus arenarius</i>	Fl 1	Fl 9	I 1			No	Fl 2	No	No				
Lichenes	Th 2	Th 1			1								
Bryophyta	B 5			B 1	B 1	B 1							
<i>Saxifraga caespitosa</i>			LS 1										
<i>Stellaria med</i>										SI 2			

Fl - Flower
B - Branch
F - Fruit
I - Inflorescence
L - Leaves
R - Roots
S - Stems
Se - Seeds
Th - Thallus

Fl - Flower
 B - Branch
 F - Fruit
 I - Inflorescence
 L - Leaves
 R - Roots
 S - Stems
 Se - Seeds
 Th - Thallus

Table II

Species and plant parts recorded drifted ashore on Surtsey
during the summermonth in the period 1964-1972.

(Tegund) Species.	'64		'65		'66		'67		'68		'69		'70		'71		'72	
	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds	Veget. parts	Seeds
3 <i>Apocynum prolatum</i>	x	x																
4 <i>Angelica archangelica</i>	x			x					x	x	x		x					
5 <i>Anthriscus odoratum</i>	x	x																
7 <i>Atriplex palustris</i>	x	x					x											
9 <i>Cakile edentula</i>		x		x	x	x			x	x	x		x	x	x	x		
13 <i>Cochlearia officinalis</i>	x		x				x		x		x		x	x	x	x	x	
14 <i>Elymus arenarius</i>		x				x		x				x	x	x	x		x	
18 <i>Euphorbia</i> sp.	x																	
19 <i>Festuca rubra</i>	x		x			x		x	x	x			x		x		x	
20 <i>Galium boreale</i>	x																	
25 <i>Ligusticum scoticum</i>	x																	
40 <i>Tripleurospermum maritimum</i>	x	x	x			x		x	x				x		x	x	x	
26 <i>Mercurialis maritima</i>	x								x				x					
27 <i>Poa pratensis</i>	x		x			x		x					x		x		x	
29 <i>Polygonum viviparum</i>		x																
35 <i>Sedum rosea</i>	x							x	x	x								
36 <i>Silene maritima</i>	x							x	x	x								
6 <i>Agrostis tenuis</i>						x		x							x			
8 <i>Setula</i> sp.						x			x									
17 <i>Ericaceae</i> sp.						x												
24 <i>Juncus bellicus</i>						x												
30 <i>Puccinellia maritima</i>						x		x										
31 <i>Rumex acetosa</i>						x												
33 <i>Sedum album</i>						x												
39 <i>Tritolium repens</i>						x												
6 <i>Armeria maritima</i>								x			x				x	x		
11 <i>Carex maritima</i>								x			x		x					
15 <i>Angelica nigra</i>								x			x							
23 <i>Honckenya peploides</i>								x	x		x		x	x				
28 <i>Poa trivialis</i>								x										
38 <i>Taraxacum officinale</i>								x									x	
16 <i>Equisetum arvense</i>									x				x					
22 <i>Hippuris vulgaris</i>									x									
34 <i>Sedum acre</i>									x									
37 <i>Stellaria media</i>									x						x	x		
20 <i>Festuca</i> sp.											x							
10 <i>Calluna vulgaris</i>															x	x		
1 <i>Achillea millefolium</i>															x			
12 <i>Oxardium ponderosum</i>																	x	
32 <i>Saxifraga caespitosa</i>																	x	
41 <i>Polytrichum hibernicum</i>								x									x	

+ *Syn. Malvaria maritima*

The Mosses of Surtsey 1972

by

Skúli Magnússon and Sturla Fridriksson

Introduction.

Studies of the moss flora of Surtsey were continued during the summer months of 1972 especially in regards to the number of species, their distribution and occupation of the various habitats and the composition of the primary moss communities.

The moss cover on Surtsey increases with every year and the same trend continued in 1972. The increase in distribution is becoming slower compared to its rapid development during previous years, as the most favourable habitats have already been invaded.

The quantity and cover of moss in each habitat however still increases rapidly and the same is the case with the number of species.

Method of research.

As the Surtsey study is in many ways a rather unique investigation it has been necessary to apply different research methods with the increased development of the moss flora. In the Surtsey study it has been difficult to apply the conventional sociological measurements as the total cover has

up to reasently been very small and the formation of communities has been negligible.

During the summer 1972 the study applied was similar to that described for the year 1971 in such respect that each quadrat was studied as a separate unit. The moss cover for individual quadrats was plotted on a separate format and records made of the various species found as well as the kind of habitat. When it was not possible to identify the species on the site samples were collected for a laboratory study. The samples were collected in such a way that each unidentified species was placed in a separate container so that several samples were collected from some of the quadrats. Thus all together 6-700 samples were collected which were studied during the winter 1972.

The cover estimate of each species was carried out within a 25x25 cm frame at ten locations within a quadrat or less in case of rare species and a record made of the habitat. The cover was recorded in percentage and marked for a cover less than 1%. In calculation the average cover for each quadrat that was counted as 0.2% cover.

For evaluation of the habitats following categories were used:

1. Perpendicular lava cliffs in hollows and narrow crevaces.
2. Moist sand in caverns shaded by a block of lava from where the condensed vapour drips onto the sand.

3. A thin layer of tephra on the lava surface. Fully exposed and no effect from fumarols.
4. Same as habitat 3 but effected by fumarols.
5. The naked exposed lava surface without sand.
6. Hollows with sand, moist and somewhat shaded.
7. Narrow cracks in the lava filled with sand.
8. Sand, moist and warm from the fumarols.
9. Sand covered lava with full light.
10. Sand on a lava slope, partly shaded and with more moisture than in habitat 9.
11. Naked and shaded lava slopes.
12. Sand at the bottom of a deep and narrow crack in the lava.

The cover map for each species was then plotted according to the same three categories as applied in the 1971 study as follows:

1. The species is common in the quadrat. Found on ten or more locations.
2. A few individuals of the species occur in the quadrat, at 2-9 locations.
3. The species is only found once in the quadrat.

The format used is presented as a sample on the following page.

Moseathugun i Surtsey 1972.

Reitur:
M-5

[illegible]

Albugo semdir: * With capsules.

Results.

1. Total distribution.

The total distribution was determined in the same manner as described in 1971 (Magnússon et.al.1972).

In general the distribution has not increased markedly from 1971. However some addition has taken place in the quadrats J and K, 5 and 6. New moss colonies were also found in the quadrats 0-5 and 6 and in P-6. When the distribution maps from 1971 and 1972 are compared it looks like there has been a retreat of the moss cover on the south-eastern part of the island. This may be due to the fact that the shore on this part has been cut down by waves during winter storms and that the sandy beach was washed away. The salt spray from the ocean is thus more affective than during previous years. Other parts of the lava, which are not yet colonized by moss, are rather hostile habitats for these plants. Some are to close to the splashing zone other habitats of the island have sandy substrats or loose tephra which are more difficult for moss to colonize. The following map shows the general distribution of the moss cover in 1972.

TOTAL DISTRIBUTION OF MOSSES 1972.

2. The distribution of species.

In the report 1971 a description is given of the method used in evaluating the distribution of single species. (Magnússon and Fridriksson 1971). The distribution of individual species was mapped on special charts showing the relative frequency per quadrat and listed according to the following four categories:

- a. Common species. Found in more than twenty five quadrats.
- b. Rather common. Found in six to twenty five quadrats.
- c. Rare species. Found in two to five quadrats.
- d. Very rare species. Found only in one quadrat.

In the classification some of the species have been grouped differently than in 1972 than in 1972. This is due to the increase in distribution of some of the species and the new introduction of others. By comparing the charts from 1971 with those from 1972 the change in distribution and addition of new species can be noted. It is however worth mentioning a few of the major changes.

There has been a great increase in the frequency of the following species: Dichodontium pellucidum, Leptobryum pyriforme, Pohlia cruda, Pohlia wahlenbergii and Philonotis sp. and these have accordingly been transferred from class 2 to 1. Even more spectacular is the rapid increase of Grimmia stricta. During this one year its frequency jumped from being found at only one site to being

the fifth most common species on the island. The same trend is to be found among the related species Grimmia apocarpa. It was discovered on only two quadrats in 1971 but in 1972 it inhabited 31 quadrats.

The most common species have also increased in number such as Racomitrium canescens, R. lanuginosum, Funaria hygrometrica and Bryum sp.

The species Bryum stenotrichum is listed among the species in group 1 as it is very likely the main species of the Bryum population on Surtsey. It, however, can not yet be definitely stated as the identification for each sample is not complete, but the various Bryum spp can only be separated by their difference in peristome.

The same is the case with the Philonotis that P. fontana is considered to be the main species representing that genus on Surtsey, although it has not been definitely shown but in the well developed samples. This is also what could be expected as P. fontana is the most common species of that genus in Iceland.

In the groups 2,3 and 4 there are not many drastic changes. Most of the species have increased in distribution. The rate of spreading can be seen by comparing the maps from different years and are an indication to the potentiality of the different species.

Species: Bryum spp.

COMMON SPECIES:

Distribution of moss species 1972.

Species: Bryum stenderichum

Distribution of moss species 1972.

Species: *Ceratodon purpureus* (Hedw) Brid.

Distribution of moss species 1972.

Species: *Dichodontium pellucidum* (Hedw) Schimp.

Distribution of moss species 1972.

Species: *Funaria hygrometrica* Hedw.

Distribution of moss species 1972.

Species: *Grimmia apocarpa* Hedw.

Distribution of moss species 1972.

Species: *Grimmia stricta* Turn.---

Distribution of moss species 1972.

Species: *Leptobryum pyriforme* (Hedw.) Wils.

Distribution of moss species 1972.

Species: Philonotis sp.

Distribution of moss species 1972.

Species: Philonotis fontana (Hedw) Brid.

Distribution of moss species 1972.

Species: *Pohlia cruda* (Hedw.) Lindb.

Distribution of moss species 1972.

Species: *Pohlia wahlenbergii* (Web. & Mohr.) Andr.

Distribution of moss species 1972.

Species: *Racomitrium canescens* (Hedw.) Brid.

Distribution of moss species 1972.

Species: *Racomitrium lanuginosum* (Hedw.) Brid.

Distribution of moss species 1972.

Species: *Atrichum undulatum* (Hedw.) Beauv.

RATHER FREQUENT -

RATHER RARE SPECIES:

Distribution of moss species 1972.

Species: *Bartramia ithyphylla* Brid.

Distribution of moss species 1972.

Species: *Barbula recurvirostra* (Hedw.) Dix.

Distribution of moss species 1972.

Species: *Brachythecium salebrosum* (Wils. & Mohr) B.S.P.

Distribution of moss species 1972.

Species: *Bayum argenteum* Hedw. —

Distribution of moss species 1972.

Species: *Campylium polygamum* (BSG) C. Jens.

Distribution of moss species 1972.

Species: *Drepanocladus uncinatus* (Hedw.) Wernst.

Distribution of moss species 1972.

Species: *Pogonatum urnigerum* (Hedw.) Beauv.

Distribution of moss species 1972.

Species: *Polytrichum alpinum* Hedw.

Distribution of moss species 1972.

Species: *Imblystegium serpens* (Hedw.) BSG

RARE SPECIES:

Distribution of moss species 1972.

Species: *Anomobryum liliforme* (Dicks.) Hasn.

Distribution of moss species 1972.

Species: *Acrostroemia longipes* (Sommerf.) B.S.G.

Distribution of moss species 1972.

Species: *Barbula fallax* Hedw.

Distribution of moss species 1972.

Species: *Prochythecium albicans* (Hedw.) B.S.G.

Distribution of moss species 1972.

Species: *Bryum calophyllum* R.Br.

Distribution of moss species 1972.

Species: *Dicranella varia* (Hedw.) Schimp.

Distribution of moss species 1972.

Species: *Dicranoweisia crispula* (Hedw.) Lindb.

Distribution of moss species 1972.

Species: *Ptilichium cylindricum* (Hedw.) Grout.

Distribution of moss species 1972.

Species: *Neoparmeladus adurcus* (Hedw.) Arnst.

Distribution of moss species 1972.

Species: *Grimmia maritima* Turn.

Distribution of moss species 1972.

Species: *Grimmia torquata* Hornsch.

Distribution of moss species 1972.

Species: *Isophragma pulchellum* (Hedw.) Jæg. & Sauerb.

Distribution of moss species 1972.

Species: *Mnium hornum* Hedw.

Distribution of mass species 1972.

Species: *Plagiomnium cuspidatum* (Hedw.) Kop.

Distribution of mass species 1972.

Species: *Polytrichum sphaeridiceum* (Besch.) Broth.

Distribution of moss species 1972.

Species: *Polytrichum laevigatum* (Wahlb.) Lixab.

Distribution of moss species 1972.

Species: *Amphidium japonicum* (Hedw.) Schimp.

VERY RARE SPECIES:

Distribution of moss species 1972

Species: *Palacomium palustre* (Hedw.) Schumagr.

Distribution of moss species 1972

Species: *Barbula ichmadophila* C. Muell.

Distribution of moss species 1972.

Species: *Barbula unguiculata* Hedw. ---

Distribution of moss species 1972.

Species: *Portula vinealis* var. *cylindrica* ---

Distribution of moss species 1972.

Species: *Brachythecium rivulare* BSG ---

Distribution of moss species 1972.

Species: *Calliergon stramineum* (Brid.) Kindb.

Distribution of moss species 1972.

Species: *Cephaloxiella*

Distribution of moss species 1972.

Species: *Dicranella heteromalla* (Hedw.) Schimp

Distribution of moss species 1972.

Species: *Dicranella subulata* (Hedw.) Schimp

Distribution of moss species 1972.

Species: *Ditrichum heteromallum* (Hedw) Britt

Distribution of moss species 1972.

Species: *Encalypta* sp.

Distribution of moss species 1972.

Species: *Encalypta ciliata* Hedw. --

Distribution of moss species 1972.

Species: *Hypnum lindbergii* Mitt. --

Distribution of moss species 1972.

Species: *Marchantia polymorpha* L.

Distribution of moss species 1972.

Species: *Onchophorus vicens* (Hedw.) Brid.

Distribution of moss species 1972

Species: *Pohlia prodigiosa* Kindb. ---

Distribution of moss species 1972.

Species: *Polytrichum longisetum* Brid. ---

Distribution of moss species 1972.

Species: *Polytrichum piliferum* Hedw.

Distribution of moss species 1972.

Species: *Racomitrium heterostichum* (Hedw.) Brid.

Distribution of moss species 1972.

Species: *Rhytidadelphus squarrosus* (Hedw.) Wernst.

Distribution of moss species 1972.

Species: *Scapania* sp.

Distribution of moss species 1972.

Species: *Sclerostoma* sp. -----

Distribution of moss species 1972.

Species: *Trichostomum brachydontium* Bruch.

Distribution of moss species 1972

A list of species for 1972 grouped accordingly
to the four frequency categories:

1. Common species: (found in 25 or more quadrats).

Bryum stenotrichum
Ceratodon purpureus
Dichodontium pellucidum
Funaria hygrometrica
Grimmia apocarpa
Grimmia stricta
Leptobryum pyriforme — *Philonotis fontana*
Pohlia cruda
Pohlia wahlenbergii
Racomitrium canescens
Racomitrium lanuginosum

2. Rather frequent — rather rare species: (found in 6-25 quadrats).

Altrichum undulatum
Bartramia illyphylla — *Barbula recurvirostra*
Brachythecium salebrosum
Bryum argenteum
Campylium polygamum
Dicranella crispa
Distichium capillaceum
Drepanocladus uncinatus
Pogonatum urnigerum
Polytrichum alpinum

3. Rare species: (found in 2-5 quadrats).

Amblyopogon aeneus — *Anomobryum filiforme*
Angstroemia longipes
Barbula fallax
Brachythecium albicans
Bryum calophyllum
Dicranella varia
Dictanoweisia crispula
Ditrichum cylindricum
Drepanocladus aduncus
Grimmia maritima
Grimmia torquata
Isopleuridium pulchellum
Mnium hornum
~~*Ptilidium*~~ *Plagiomnium cuspidatum*
Polytrichum sphaerathecium
Psilophidium laevigatum

4. Very rare species: (Only found in one quadrat)

Amphidium lapponicum

~~*Amphidium*~~ ~~*littorale*~~

Aulacomnium palustre

Barbula ichmadophila

Barbula unguiculata

Barbula vinealis var. *cylindrica*

Brachythecium rivulare

Calliergon abramineum

Cephalozia sp.

Dicranella heteromalla

Dicranella subulata

Ditrichum heteromallum

~~*Encalypta*~~ sp.

Encalypta ciliata

Hypnum lindbergii

Marchantia polymorpha

Onchophorus virens

~~*Phagium*~~ ~~*scapellato*~~

Pohlia prolifera

Polytrichum longisetum

Polytrichum piliferum

Racomitrium heterostichum

Rhytidia delphus squarrosus

Scapania sp. (*curta* or *scandica*)

Solenostoma sp. (*atrovirens* or *pumilum*)

Trichostomum brachydontium

Following species were recorded in 1971 but not found again in 1972:

Bryum angustirete
 Bryum arcticum
 Bryum pallens
 Dicranella schreberiana
 Fissidens adianthoides
 Pohlia annotina

The species of moss recorded in Surtsey are 69 altogether of which 63 were known to be present in 1972. The greatest increase of species occurred in 1972 when 32 new species were discovered including three new species of liverworts ^{of the} (Jungermanniales).

4. Moss species which produced capsules in Surtsey 1972.

The various moss species are gradually getting well established and some are already developing reproductive organs. In the following table are listed the species found bearing capsules in 1972 and a note made of the quadrat number where the capsul-bearing plants were found.

<u>Species</u>	<u>Quadrat no.</u>
<u>Funaria hygrometrica</u>	capsules common in many quadrats
<u>Bryum stenotrichum</u>	- " -
<u>Dicranella crispa</u>	I8, M5, N14, O7, O11
<u>Grimmia stricta</u>	N17, N18, O17, P9, P10, Q11, Q13
<u>Grimmia apocarpa</u>	L17, M15, N14, I9, N17, N18, O16
<u>Racomitrium lanuginosum</u>	I8, L12, P11, Q12
<u>Barbula recurvirostra</u>	P11
<u>Dicranoweisia crispula</u>	N12

As indicated earlier the Bryum species are subdivided by characteristics of the capsules. These moss samples have not yet all been keyed out so it may be possible that other Bryum species are among the material than B. stenotrichum.

It is worth noting that the species Racomitrium lanuginosum was for the first time found bearing capsules in Surtsey in 1972. There was quite a high number of capsule-bearing plants found in four quadrats. This moss is the most common species on the Icelandic lava flows and will probably also eventually dominate the Surtsey lava. It was slower to invade the island and mature than many other moss species, but as the capsules have now developed the species has acquired greater possibilities of spreading on the island.

It may also be indicated that the species Grimmia stricta and Grimmia apocarpa which were rather rare in 1971 have become common during this last year. They are both bearing capsules and thus have a local source for spore dispersal.

Marchantia polymorpha produced gemmae like in 1971. These have apparently developed into new plants as the species has increased somewhat in the quadrat (017).

4. Habitats

As indicated earlier the various habitats were recorded for each species observed in the different quadrats on Surtsey.

By classifying the species according to the frequency of habitats it is thus possible to show the environment favoured by the species. In the following table the 23 most common species are listed according to their dominance in the moss flora of Surtsey. In such a way that the first species on the list is the most common species on the island and so on.

The frequency figures indicate how often the species were recorded in the various habitat classes. Thus for example the species R. canescens was observed altogether at 966 locations being in the habitat class nr. 5 in 954 of the instances. The highest frequency figure for each species is underlined in the table and shows the most common habitat class in every case.

From the table it can also be noted that some of the habitats are common for various species while others are only specific for one or a few species. Thus class no 5 is the most common habitat on the island. It is favoured by various species such as the two most common Racomitrium and two Grimmia species. These four species seem to thrive well on the island but they have not yet had the competition to show which will eventually dominate in the various

Samples of moss in Surtsey classified according to habitats

Taxon	Habitat nr:												Alt. alls
	1	2	3	4	5	6	7	8	9	10	11	12	
<i>Racomitrium canescens</i>	1				954	1	2	1	6	1			966
<i>Bryum</i> spp.	41	124	62	59	25	329	19	10	132	81	5	10	897
<i>Funaria hygrometrica</i>	25	72	23	23	13	274	22		216	82	1	6	780
<i>Racomitrium lanuginosum</i>	15	2			556	4	2	1	2			1	583
<i>Grimmia stricta</i>	13				331	4	5		1				354
<i>Ceratodon purpureus</i>	10	7	4	21	17	64	8	6	90	20	1	1	249
<i>Philonotis</i> sp.	8	5	4	13	2	70	1	4	20	30	1		158
<i>Pohlia cruda</i>	11	5		7	6	40	1		26	16			112
<i>Pohlia wahlenbergii</i>	7	4		6	2	59		5	8	5		1	97
<i>Bryum argenteum</i>			21	25		6			7	4			63
<i>Leptobryum pyriforme</i>	2	20		7		12		1	2	17			61
<i>Bartramia ithyphylla</i>	10			3	14	12			9	5		1	54
<i>Grimmia apocarpa</i>	4				46		1		1				52
<i>Dichodontium pallidum</i>	5	1	2	5	4	20			6	7		1	51
<i>Dicranella crispa</i>	5		3	14	6	2	1	1	3	5			40
<i>Pogonatum urnigerum</i>				3		7		1	9				20
<i>Atrichum undulatum</i>	3			3		4		1	4	3			18
<i>Drepanodactylus uncinatus</i>	3				6	3			2	2			16
<i>Campylium polygamum</i>	6				3	2			1	1	1		14
<i>Distichium capillaceum</i>	3				2	1			2	1			9
<i>Polytrichum alpinum</i>				2		4			2				8
<i>Barbula recurvirostra</i>	3	2								2			7
<i>Brachythecium salebrosum</i>	1	1			1	3				1			7
	176	243	119	191	1988	921	62	31	549	283	9	21	4593

moss communities. Several other species were found growing in this habitat. But they are so far only associate species in this primary succession. As an example of the associate species is Bartramia ithyphylla which also grows under various other conditions.

An other common habitat on Surtsey is classified as no. 6. It is favoured by many species of moss such as various Bryum species for ex. B. stenotrichum and Funaria hygrometrica, which are the most dominating species but also a number of associate species such as Philonotis, Pohlia cruda, Pohlia wahlenbergii and Dichodontium pellucidum.

Other habitats are more rare and have specialized conditions. These are for example occupied by species that require more special moisture or shading conditions than the common species.

The classification is based on 4593 observations. Classical sociological measurements were not applied as the moss colonies are as yet rather spread. But these samples which total 4593 observations give the frequency of the species per quadrat as well as the favoured habitats. The habitat classes, however, were based only on the topography of the lava, substrate, moisture and heat emission but other microclimatic measurements were not investigated.

5. Cover.

The total cover of moss in Surtsey is still rather small, and measurements are difficult due to the rough surface of the lava. The cover was evaluated for each species in every quadrat. On the accompanying maps the cover evaluation is given in average percentages.

It may be noted that the cover estimates vary according to species and position in the lava. The species Bryum (mostly B. stenotrichum) and Fumaria hygrometrica have obtained the greatest cover. The Racomitrium species being second in coverage. Others have less average cover per quadrat.

If the distribution and cover maps are compared. It can be noted that cover estimates do not always follow the frequency classes. Where the frequency classes are high the cover estimate is most reliable.

MEAN COVER ESTIMATES IN EACH QUADRAT

FOR THE SEVEN MOST COMMON SPECIES.

Species: *Racomitrium canescens* ---

Species: *Racomitrium lanuginosum* ---

Species: *Grimmia stricta* ---

Species: *Ceratodon purpureus* ---

Species: ^{Bryum} *Bryum* spp.

Species: *Funaria hygrometrica*

Species: *Philonthus* sp.

6. Moss.

The moss species have gradually been invading Surtsey and colonizing the island. During the moss studies some species have been recorded in one year and not been rediscovered in the following year. This, however, does not mean that the species could not have been growing on the island. In other cases a new species has increased so rapidly that its colonization has been obvious in every year.

In the following table all the moss species are listed that were discovered on Surtsey in every year since moss first appeared on the island.

The species are in the same order as in Johannsson, B. 1971 except that the liverworts is at the end of the list.

LIST OF SPECIES FOUND ON SURTSEY
IN THE YEARS 1967 - 1972.

Polytrichales:

Fissidentales:

Dicranales:

Pottiales:

Grimmiales:

- Grimmia apocarpa Hedw.
 Grimmia marifima Turn.
 Grimmia stricta Turn.
 Grimmia torquata Hornsch.
 Racomitrium canescens(Hedw.)Brid.
 Racomitricum heterostichum(Hedw.)Brid.
 Racomitricum lanuginosum(Hedw.)Brid.

Funariales:

- Funaria hygrometrica Hedw.

Bryales:

- Pohlia annotina(Hedw.)Loeske
 Pohlia cruda(Hedw.)Lindb.
 Phlia prolifera Kindb.
 Pohlia wahlenbergii(Web & Mohr.)Andr.
 Anomobryum filiforme(Dicks.)Husn.
 Leptobryum pyriforme(Hedw.)Wils.
 Bryum spp.
 Bryum angustirete Kindb.
 Bryum arcticum(R.Br.)B.S.G.
 Bryum argenteum Hedw.
 Bryum calophyllum R.Br.
 Bryum stenotrichum
 Bryum pallens Sw.
 Mnium hornum Hedw.
 Plagiomnium cuspidatum(Hedw.)Kop.
 Aulocomnium palustre(Hedw.)Schwaegr.
 Philonotis sp.
 Philonotis fontana(Hedw.)Brid.
 Bartramia ithyphylla Brid.

Hypnales:

- Drepanocladus aduncus(Hedw.)Warnst.
 Drepanocladus uncinatus(Hedw.)Warnst.
 Calliergon stramineum(Brid.)Kindb.
 Campylium polygamum(B.S.G.)C.Jens.
 Amblystegium serpens(Hedw.)B.S.G.
 Brachythecium albicans(Hedw.)B.S.G.
 Brachythecium rivulare B.S.G.

'67 '68 '69 '70 '71 '72

Brachythecium salebrosum(Web & Mohr.BSG.

Hypnum lindbergii Mitt.

Rhytidiadelphus squarrosus(Hedw.)Warnst.

Isopterygium pulchellum(Hedw.)Jaeg & Sauerb.

Marchantiales:

Marchantia polymorpha L.

Jungermanniales:

Cephaloziella

Scapania sp.

Solenostoma sp.

PRELIMINARY LIST OF MOSSES FOUND ON HEIMAËY 1972.

<u>Species:</u>	<u>Found on</u> <u>Surtsey:</u>	<u>Found with</u> <u>capsules:</u>	<u>Found with</u> <u>gemmae:</u>
<u>Amblystegium serpens(Hedw.)B.S.G.</u>	X		
<u>Amphidium lapponicum(Hedw.)Schimp.</u>	X	X	
<u>Amphidium mougeotii (B.S.G.)Schimp.</u>			
<u>Andreaea rupestris Hedw.</u>		X	
<u>Aneura pinguis (L.) Dum.</u>			
<u>Anoetangium aestivum(Hedw.)Mitt.</u>			
<u>Anomobryum filiforme(Dicks.)Husn.</u>	X		
<u>Antitrichia curtipendula (Hedw.)Brid.</u>			
<u>Atrichum undulatum (Hedw.) Beauv.</u>	X		
<u>Barbula ichnadenophila C.Muell.</u>	X		
<u>Barbula fallax Hedw.</u>	X		
<u>Barbula recurvirostra (Hedw.) Dix.</u>	X	X	
<u>Barbula rigidula (Hedw.) Mitt.</u>			X
<u>Barbula tophacea (Brid.)Mitt.</u>			
<u>Barbula unguiculata Hedw.</u>	X	X	
<u>Barbula vinealis var. cylindrica</u>	X		
<u>Bartramia ithyphylla Brid.</u>	X	X	
<u>Blindia acuta (Hedw.) B.S.G.</u>			
<u>Brachythecium albicans(Hedw.)B.S.G.</u>	X		
<u>Brachythecium rivulare B.S.G.</u>	X		
<u>Brachythecium rutabulum (Hedw.)B.S.G.</u>			
<u>Brachythecium salebrosum(Web.&Mohr.)B.S.G.</u>	X		
<u>Bryum angustifolium Kindb.</u>	X	X	
<u>Bryum argenteum Hedw.</u>	X	X	
<u>Bryum bicolor Sm.</u>		X	
<u>Bryum capillare Hedw.</u>			X
<u>Bryum stenotrichum</u>	X		
<u>Calliergonella cuspidata(Hedw.)Loeske.</u>			
<u>Campylium crysophyllum(Brid.)J.Lange</u>			
<u>Campylium stellatum (Hedw.) C.Jens.</u>			
<u>Ceratodon purpureus(Hedw.) Brid.</u>	X	X	
<u>Cirriphyllum piliferum (Hedw.)Grout.</u>			
<u>Climacium dendroides (Hedw.) Web.&Mohr.</u>			
<u>Cratoneuron filicinum(Hedw.) Spruce.</u>			
<u>Dichodontium pellucidum(Hedw.)Schimp.</u>	X		
<u>Dicranella crispa (Hedw.) Schimp.</u>	X		
<u>Dicranella schreberiana(Hedw.)Schimp.</u>	X		

Species:	Found on Surtsey:	Found with capsules:	Found with gemmae:
<u>Dicranella subulata(Hedw.)Schimp.</u>	X	X	
<u>Dicranum scoparium DeNot.</u>			
<u>Diphyscium foliosum (Hedw.) Mohr.</u>		X	
<u>Distichium capillaceum(Hedw.)B.S.G.</u>	X	X	
<u>Distichium inclinatum (Hedw.)B.S.G.</u>		X	
<u>Ditrichum flexicaule (Schwaegr.)Hampe</u>			
<u>Drepanocladus uncinatus(Hedw.)Warnst.</u>	X		
<u>Encalypta ciliata Hedw.</u>	X	X	
<u>Encalypta rhabdocarpa Schwaegr.</u>		X	
<u>Entodon concinnus (DeNot.)Par.</u>			
<u>Euhrynum praelongum(Hedw.)B.S.G.</u>			
<u>Fissidens cristatus Wils.</u>			
<u>Frullania tamarisci (L.) Dum.</u>			
<u>Funaria hygrometrica Hedw.</u>	X	X	
<u>Grimmia apocarpa Hedw.</u>	X	X	
<u>Grimmia funalis (Schwaegr.)B.S.G.</u>			
<u>Grimmia maritima Turn.</u>	X	X	
<u>Grimmia stricta Turn.</u>	X	X	
<u>Gymnomitrium concinnatum(Light)Corda.</u>			
<u>Gymnomitrium corallioides Nees.</u>			
<u>Gymnostomum aeruginosum Sm.</u>			
<u>Gymnostomum recurvirostrum Hedw.</u>		X	
<u>Homalothecium sericeum (Hedw.)B.S.G.</u>			
<u>Hylocomium splendens (Hedw.)B.S.G.</u>			
<u>Hypnum cupressiforme Hedw.</u>			
<u>Hypnum vaucheri Lesq.</u>			
<u>Isopterygium pulchellum (Hedw.)Jaeg&Sauerh</u>	X		
<u>Isothecium myosuroides Brid.</u>			
<u>Lophocolea bidentata (L.) Dum.</u>			
<u>Marchantia polymorpha L.</u>	X	X	X
<u>Metzgeria furcata (L.) Dum.</u>			
<u>Mnium hornum Hedw.</u>	X		
<u>Mnium stellare Hedw.</u>			
<u>Myurella julacea(Schwaegr.) B.S.G.</u>			
<u>Orthotrichum anomalum Hedw.</u>		X	
<u>Pellia neesiana (Gottsche.) Limpr.</u>			
<u>Philonotis capillaris Lindb.</u>			
<u>Philonotis fontana (Hedw.) Brid.</u>	X		
<u>Philonotis fontana var. pumila</u>			
<u>Plagiochila asplenioides (L.)Dum.</u>			

Species:	Found on Surtsey:	Found with capsules:	Found with gemmae:
<u>Plagiomnium undulatum (Hedw.)Kop.</u>			
<u>Plagiothecium roeseanum B.S.G.</u>			
<u>Platydictya jungermannioides (Brid.)Crum.</u>			
<u>Pogonatum urnigerum (Hedw.)Beauv.</u>	X		
<u>Pohlia cruda (Hedw.)Lindb.</u>	X		
<u>Pohlia drummondii (C.Muell.)Andr.</u>			
<u>Pohlia nutans (Hedw.)Lindb.</u>		X	
<u>Pohlia schleicheri Crum.</u>			
<u>Polytrichum alpinum Hedw.</u>	X		
<u>Polytrichum juniperinum Hedw.</u>			
<u>Polytrichum norvegicum Hedw.</u>			
<u>Polytrichum piliferum Hedw.</u>	X		
<u>Pottia heimii (Hedw.)Hampe.</u>		X	
<u>Racomitrium canescens(Hedw.)Brid.</u>	X	X	
<u>Racomitrium fasciculare(Hedw.)Brid.</u>		X	
<u>Racomitrium lanuginosum(Hedw.)Brid.</u>	X	X	
<u>Radula complanata (L.) Dum.</u>		X	X
<u>Rhizomnium punctatum (Hedw.)Kop.</u>			
<u>Rhytidiadelphus squarrosus(Hedw.)Warnst.</u>	X		
<u>Rhytidiadelphus triquetrus(Hedw.)Warnst.</u>			
<u>Saelania glaucescens(Hedw.)Broth.</u>		X	
<u>Scleropodium purum(Hedw.)Limpr.</u>			
<u>Thuidium philibertii Limpr.</u>			
<u>Thuidium tamariscinum (Hedw.)B.S.G.</u>			
<u>Timmia austriaca Hedw.</u>			
<u>Tortella fragilis (Hook.& Wils.)Limpr.</u>			
<u>Tortella tortuosa (Hedw.)Limpr.</u>			
<u>Tortula mucronifolia Schwaegr.</u>		X	
<u>Tortula muralis Hedw.</u>		X	
<u>Tortula ruralis (Hedw.)Gaertn.,Meyer & Scherb.</u>			
<u>Tortula subulata Hedw.</u>		X	
<u>Trichostomum brachydontium Bruch.</u>	X		
<u>Tritomaria quinquedentata(Huds.)Buch.</u>			
<u>Ulotia phyllantha Brid.</u>			X
<u>Weissia controversa Hedw.</u>		X	
<u>Zygodon viridissimus(Dicks.)Brid.</u>			X

References:

Jóhannsson, B.: 1968.

Biological observation on Surtsey, Summer 1967
Surtsey Research Progress Report IV:61

Fridriksson, S.: 1970.

The Colonization of vascular plants on Surtsey
in 1968.
Surtsey Research Progress Report V:14

Bjarnason, A.H. and Fridriksson, S.: 1972.

Moss on Surtsey, Summer 1969
Surtsey Research Progress Report VI:9-10

Fridriksson, S.et.al.: 1972.

Vegetation on Surtsey, Summer 1970.
Surtsey Research Progress Report VI:54-59.

Magnússon, S. and Fridriksson, S.: 1972.

The mosses of Surtsey 1971.
Technical Progress Report of Biological
Research on the Volcanic Island Surtsey and
Environment for the Year 1971 : Appendix III.

Jóhannsson, B.: 1971.

Íslenzkar mosategundir, Skrá.

Nyholm, E.: 1954-1969.

Illustrated Moss Flora of Fennoscandia. Musci.
Fasc. 1-6. Malmö and Lund, Sweden.

Watson, E.V.: 1968.

British Mosses and Liverworts
Cambridge.

APPENDIX IV.

Biomass of mosses in Surtsey and Heimaey 1972.

by

Sturla Fridriksson.

The organic matter produced on Surtsey every year has been negligible to present time. A quantitative measurement of the biomass of moss was performed in 1971 in the three quadrats showing the densest cover. The maximum biomass was in quadrat M-11 giving an average of 1.020 g/m^2 . (See Progress Report 1971). Other areas had a much lower biomass.

In the late summer 1972 the measurements of biomass were continued in the same manner as the year before. Samples of moss were collected from three areas which had the densest moss growth. These were sites in quadrats J-8, M-11 and L-18. The samples were dried at 100°C for a few hours, weighed and burned at ca. 550°C .

The calculated biomass from each area was as follows:

Biomass of moss from Surtsey in 1972 in g/m².

Quadrat	Sample no.	g/m ²	Average
J-8	1	20.720	8.671
	2	5.168	
	3	0.126	
L-18	1	0.027	0.096
	2	0.083	
	3	0.178	
M-11	1	0.525	0.460
	2	0.647	
	3	0.208	
Total average			3.076 g/m ²

The total average in 1971 was 0.518 g/m² compared to 3.076 g/m² in 1972. So there has been a large increase in the quantity during this one year. The high average is mostly due to one sample from a dens cover in quadrat J-8.

In comparison measures of biomass were carried out at Heimaey in three different plant communities in September 1972.

The following results were obtained:

Biomass of moss from Heimaey in 1972 in g/m².

<u>Communities</u>	<u>Sample no.</u>	<u>g/m²</u>	<u>Average</u>
Meadow land	1		
	2		
	3		828,5
<hr/>			
Heath vegetation	1		
	2		
	3		898,1
<hr/>			
Puffin ground vegetation	1		
	2		
	3		991,5
<hr/>			
Total average			906,1 g/m ²

These few figures indicate how small the biomass of the Surtsey communities is in comparison with the productive and well established communities on Heimaey.

APPENDIX V.

Lichens on Heimaey in 1972.

by

Ragnar Jónsson and Sturla Fridriksson..

During the summer 1972, Ragnar Jónsson stayed for some time on Heimaey (Home Island) collecting lichens. This collection was undertaken in order to acquire a broad view on the lichen flora of the island and to obtain information of the various species distribution. The investigation was performed in such a way that each day a certain zone was examined and every available species collected. Most part of the island was thus investigated and a great deal of material collected and dried. The main stress was laid on the study of foliose and fruticose lichens and crustase lichens were equally collected although on a smaller scale, due to difficulties of identification. Identification of species is not yet completed but from the number of species already identified, it can be estimated that in the lichen flora of Heimaey there are over 40 species of foliose and fruticose lichens.

The most common species are: Cladonia pyxidata and C. rangiformis on the lava, Peltigera canina on grass land and Xanthoria parietina on seakliffs.

A list of 20 species is presented below.

Species of Lichens on Heimaey.

1. Anaptychia ciliaris
2. Cetraria islandica
3. Cladonia arbuscula
4. Cladonia pocillum
5. Cladonia pyridata
6. Cladonia rangiformis
7. Cornicularia aculeata
8. Parmelia saxatilis
9. Pettigera canina
10. Pettigera leucophlebia
11. Physcia subobscura
12. Physonia muscigena
13. Polychidium muscicola
14. Ramalina subfarinacea
15. Solarina saccata
16. Sphaerophorus globosus
17. Stereocaulon sp.
18. Thamnolia subuliformis
19. Xanthoria candelaria
20. Xanthoria parietina.

The number of lichen species is influenced by the relatively mild and highly oceanic climate of Heimaey and the distribution of the various species on the island is affected by the seaspray.

With the identification we have been assisted by dr. Þórdur Kristinsson to whom we wish to express our thanks.

Referenches: Kristinsson H.: 1971
Greiningarlykill yfir íslenskar
bláð- og runnkenndar fléttur.

APPENDIX VI.

Bird observation on Surtsey in 1972

by

Jón Eldon and Sturla Fridriksson.

Observations on the bird life on Surtsey were carried out during the summermonth from 6 June to the end of August.

In two previous summers the fulmar (Fulmarus glacialis) and the black guillemot (Cepphus grylle) had started breeding on the cliffs of the western coast of Surtsey. (Ólafsson 1971).

In 1972 these two bird species continued to occupy the island and breed on the cliffs.

Thus 13 nests of fulmar and possibly 6-8 nests of the black guillemot were noticed.

The fulmar nests were on the same sites as in previous years. They were discovered on June 6-12th. The eggs were hatched on July 4th and the youngs were still in the nest August 27th. Of the 13 nests which were occupied, five were successful with youngs reaching maturity, one young died in a nest and seven nests were ruined.

There were probably 6-8 black guillemot nests on the island in 1972 but these are very difficult to locate. Only two of the nests could be reached. One had two youngs and the other

with one egg. Only the former was successful, the other being abandoned a week after it was discovered.

References: Ólafsson, Erling 1971.: Bird observation on Surtsey in 1971. Technical Progress Report 1971. Appendix VI.

NÓV 1972

A young *Fulmarus glacialis* in its nest
on Surtsey in 1972.

NÓV 1972

An egg of *Fulmarus glacialis* in the lava
cliff on the southern shore of Surtsey in
1972.

A cross section of a breeding ground from Súlnasker. The puffin (Fraterecula arctica) excavates a burrow in the loamy soil which may be 1 m thick on top of the tuff bedrock. In between the entrances to the nesting hole are tussocks of red fescue (Festuca rubra) growing on a dense carpet of turf. The fescue turf often hang over the opening hiding the entrance of the hole. At the top of the island the gannet (Sula basana) breeds in colonies which are so dense and become so heavily fertilized that vascular plants are wiped out.