

Vegetation on Surtsey — Summer 1970

By

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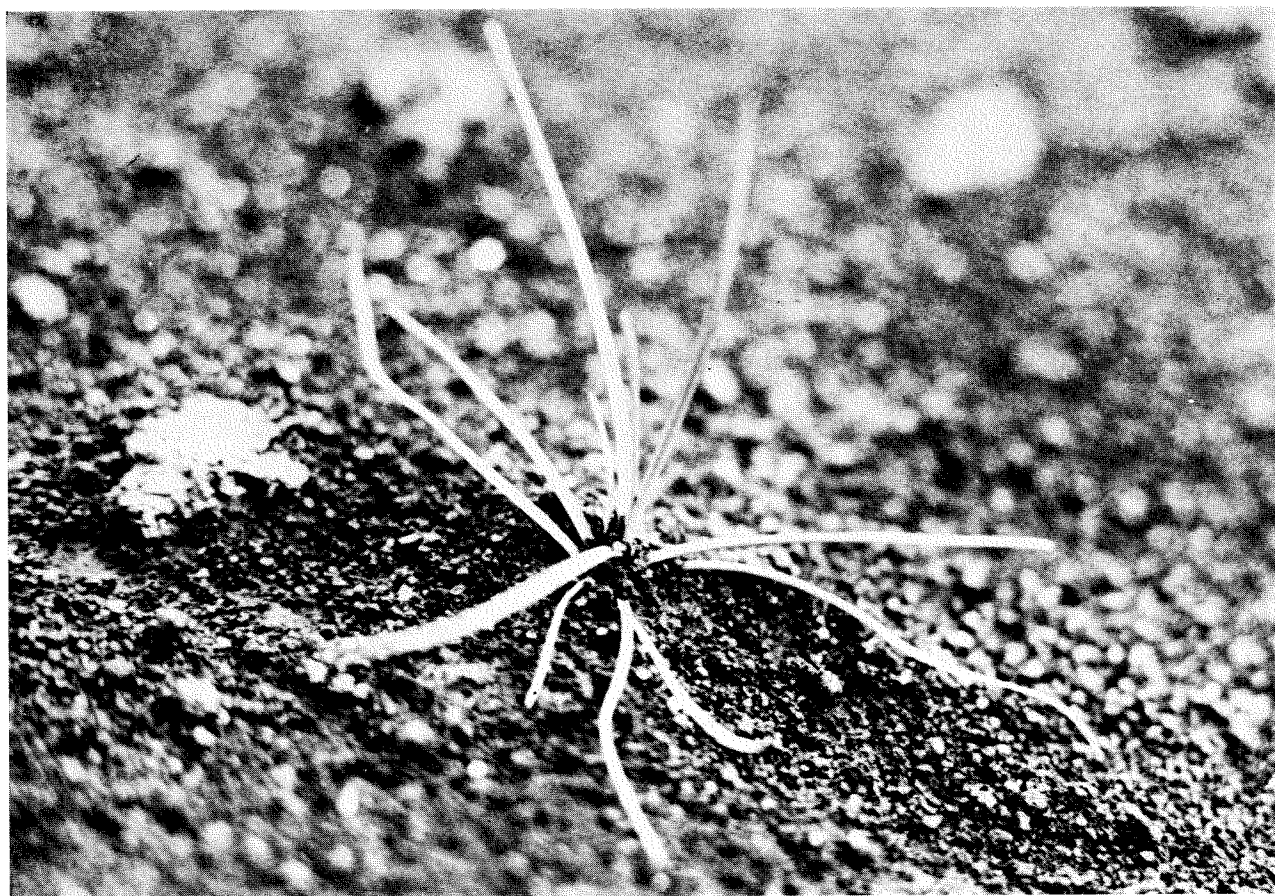
METHOD OF INVESTIGATION

In the summer of 1970, the studies of vegetation on the island of Surtsey, were conducted in a way similar to those of preceding summers. Two students, B. Sveinbjörnsson and S. Magnússon, kept the plants that were found under regular observation, while continuing to look for new ones. Each plant was marked with a numbered peg, where it was found and its length

in cm, together with the number of branches and leaves was recorded. Similar studies were carried out on a number of occasions throughout the entire period. Part of these results is shown in *Table 1*.

DESCRIPTION OF VEGETATION

In the beginning each plant was marked on an aerial photograph of the island. Later their exact



Elymus arenarius.

TABLE 1
VASCULAR PLANTS ON SURTSEY IN 1970

No:	NAME OF SPECIES:	Location	Plant from 69	Date of first observation	No. of branches	No. of leaves	Date of last observation	No. of branches	No. of leaves	Maximum length in cm	Remarks
1	<i>Honckenya peploides</i>	F-13	x	17.6	1	8	20.8	3	32	2	
2	—	J-18	x	17.6	4	36	20.8	5	101	10	
3	—	R-17	x	16.6	5	74	25.8	8	126	16	
4	—	J-18		20.6	1	6	20.8	1	10	1	
5	—	F-13		17.6	1	4	20.8	1	16	2	
6	—	I-18	x	17.6	6	82	20.8	8	161	9	
7	—	M-15		20.6	1	6	20.8	1	12	1	
8	—	M-15		20.6	1	2	8.7	disappeared			
9	—	J-18	x	16.6	2	39	20.8	8	137	6	
10	<i>Cochlearia officinalis</i>	L-17		18.6		17	20.8		18		
12	—	L-17		18.6		23	20.8		12		
13	<i>Honckenya peploides</i>	K-18	x	16.6	2	24	20.8	14	262	13	
14	—	K-17	x	16.6	1	8	20.8	7	128	10	
15	—		x	16.6	6	44	20.8	6	116	3	
16	—	J-18	x	17.6	1	12	20.8	4	56	3.5	
17	—	J-18	x	17.6	7	86	20.8	11	175	8	
18	<i>Cochlearia officinalis</i>	J-18		9.7		9					
19	—	N-6		3.8		6	27.8		7		
20	<i>Honckenya peploides</i>	J-18		16.6	2	18	20.8	2	36	3.5	
21	—	J-18	x	16.6	4	30	20.8	2	34	4	
23	—	J-18	x	16.6	4	26	20.8	3	54	3.5	
24	—	J-18	x	16.6	2	12	20.8	2	34	2.5	
25	—	J-17		16.6	1	6	20.8	1	12	1.5	
26	—	J-17	x	16.6	3	22	20.8	5	76	5	
27	—	J-17	x	16.6	1	6	20.8	2	16	1.5	
28	—	E-12		9.7	1	4	20.8	1	6	0.5	
29	<i>Cochlearia officinalis</i>	K-18		16.7		38					8 plants observed**
30	<i>Honckenya peploides</i>	J-18		22.6	1	10	20.8	1	16	1.5	
31	<i>Cochlearia officinalis</i>	K-18		22.6		13	20.8		33		
32	<i>Honckenya peploides</i>	E-12	x	20.6	1	8	20.8	1	14	3.5	
33	—	J-18	x	9.7	3	24	20.8	3	38	4	
34	—	E-15		9.7	1	6	21.8	1	6	0.5	
35	—	E-12		16.7	1	8	20.8	3	24	1.5	
36	—	E-13	x	17.7	1	9	20.8	1	17	2.5	
37	—	D-12		17.7	3	37	20.8	3	47	4	
38	—	E-11		17.7	1	5	20.8	1	4	0.7	
39	—	G-13		14.7	1	8	20.8	1	16	2.2	
40	—	E-12		9.7	1	8	20.8	2	14	1.5	
41	—	E-12		17.7	1	6	20.8	1	8	2.5*	
42	—	F-13		9.7	1	20	20.8	2	26	1.5	
43	—	E-12		17.7	1	6	20.8	1	6	0.5	
44	—	E-11		17.7	1	4	20.8	1	4	0.5	
45	—	E-12		17.7	1	6	20.8	1	6	2.5*	
46	—	E-12		17.7	1	6	20.8	1	8	0.5	
47	—	E-11		17.7	1	6	20.8	1	8	0.5	
48	—	E-11		17.7	1	6	20.8	1	12	0.5	
49	—	E-11		17.7	1	6	20.8	1	10	1	
50	—	E-12		3.8	1	7	20.8	1	6	2*	
51	—	E-12		3.8	1	9	20.9	1	9	3.15*	
52	—	E-12		3.8	1	10	20.8	1	8	1	
53	—	E-12		3.8	1	8	20.8	1	8	0.7	
54	—	E-12		3.8	1	6	20.8	1	6	2*	
55	—	E-11		3.8	1	6	20.8	1	6	0.5	
56	—	E-11		3.8	2	14	20.8	1	16	1.5	
57	—	E-11		3.8	1	4	20.8	1	4	1.5*	
58	—	E-14		3.8	2	16	20.8	2	20	2	
59	—	F-13		20.8	1	8				0.5	
60	—	F-13		20.8	1	10				1	
61	—	F-15		20.8	13	176				7	
62	—	E-15		20.3	1	8				0.5	
63	—	E-15		20.8	1	12				1	
64	—	J-18		20.8	4	14				2	
65	<i>Elymus arenarius</i>	L-12		20.8	4	19					
66	<i>Honckenya peploides</i>	E-11		20.8	1	6				0.5	
67	—	D-14		21.8	1	16				1.5	
68	—	F-13		21.8	1	12				1.5	
69	—	E-14		21.8	1	17				3.5*	
70	<i>Elymus arenarius</i>	M-12		21.8		1				5	
71	—	M-12		21.8		7				9	
72	—	M-12		21.8		12				6	
73	<i>Stellaria media</i>	S-14		25.8		80				10	4 plants
74	<i>Cochlearia officinalis</i>	S-14		25.8		25					
75	<i>Honckenya peploides</i>	E-12		27.8	1	10				1.5	

* A part of the root was exposed, and measured with the stem.

** Sixteen *Cochlearia officinalis* plants were unmarked.

location was measured, from which a map was drawn. The relative positions of individual plants can be seen on the attached map. Altogether, 101 plants of four vascular species were found. These were classified as follows:

<i>Cochlearia officinalis</i>	30	plants
<i>Elymus arenarius</i>	4	—
<i>Honckenya peploides</i>	63	—
<i>Stellaria media</i>	4	—
		<hr/>	
		101	

Honckenya peploides: As in the summer of 1969, *Honckenya peploides* was in the summer of 1970 the most widespread plant. It seems to have obtained a fairly firm foothold on the island, for it is known that 18 of these 63 plants survived the winter of 1969–70, and 14 of them were three years old during 1970. Fifteen of these eighteen plants are in the lava in the eastern part of the island (cf. Table 1).

If the attached distribution map is compared with corresponding maps from previous reports, the most striking feature is the lack of all vegetation in the extreme north of the northern part of the island, in plots B and C. The reason is probably that the lagoon that was there has now dried up and the sea can no longer flow into it. It is also interesting to note the large numbers of plants around Pálsbaer. Only *Honckenya* plants grow in the northern part. Plants of other species all grow in the lava. An isolated *Honckenya* plant was found in plot I–4. None of these 63 plants of the *Honckenya* species succeeded in flowering in the summer of 1970.

Cochlearia officinalis: Though the number of this species is quoted as 30 plants, only 7 of them are marked in Table 1 by numbers. The reason is that beside plastic containers full of rainwater that had been installed for research purposes, there grew up 24 very small and feeble *Cochlearia* plants, which had evidently been brought by birds alighting at this artificial water supply. Beside one of the containers there were 8 of these plants (marked peg no. 29), and beside the other 16 unmarked plants. The plants grew in very thin substrate and thrived very badly. The remaining 6 plants were much stronger and bigger. Four of these, nos. 18, 19, 31 and 74 did not grow near the containers.

Beside plant no 19 there were some remains of halfeaten bird carrion, feathers and droppings. Beside plant no. 74 were also feathers, bird



Stellaria media.



Cochlearia officinalis. Plant no. 74. (Photo by S. Magnusson.)

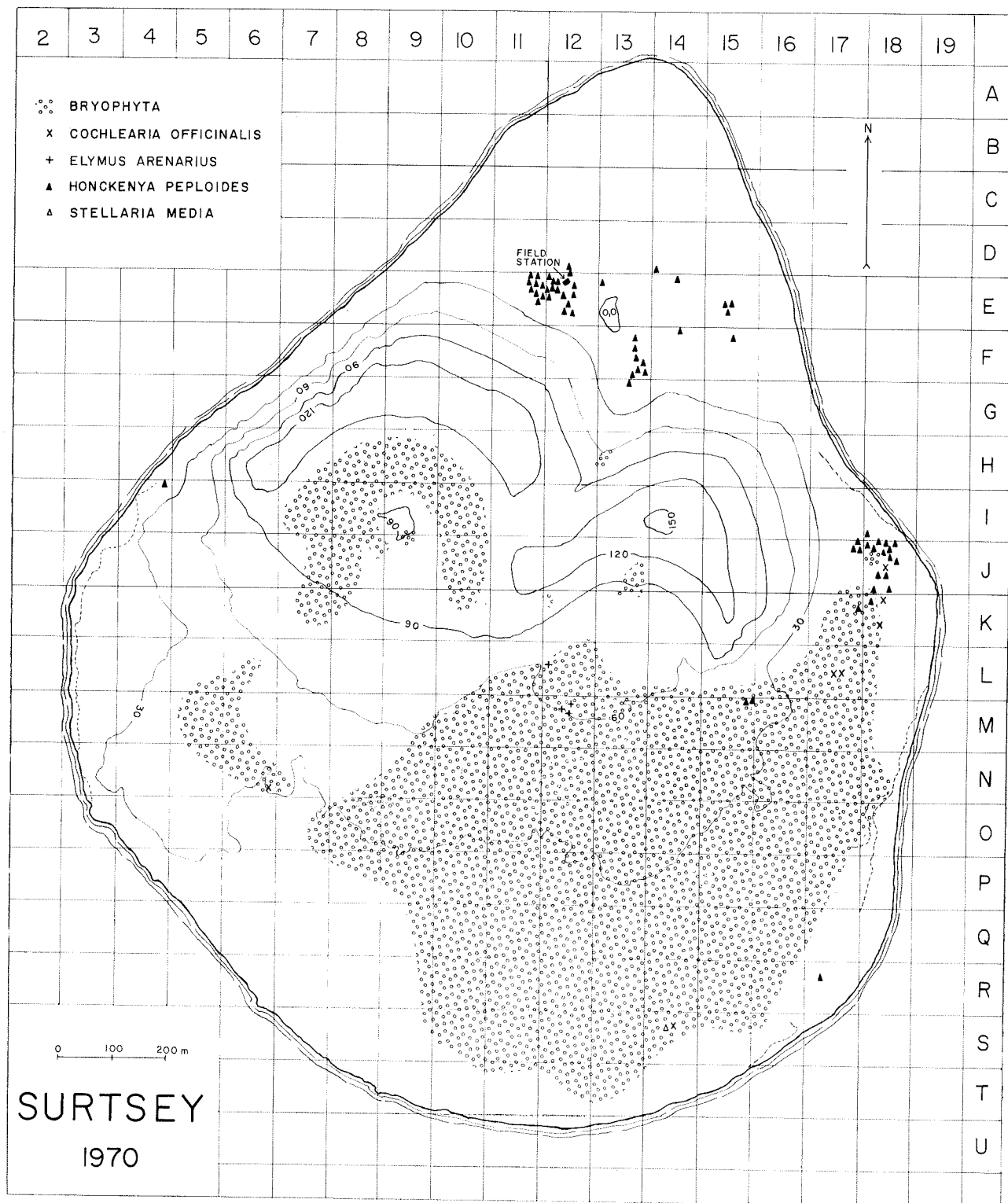
droppings and shell fragments, so that it is almost certain that these plants had been brought by birds.

Of the *Cochlearia* plants, plant no. 74 was the biggest and strongest (see picture). When it was found it had 25 leaves. Twenty of these were 4 cm or more in diameter, and the remainder 2.5 cm in diameter.

Elymus arenarius: On 20th and 21st August, four plants of this grass species, which had been discovered shortly before, were marked. They were growing in driftsand to the west of Surtur I. Plant no. 65 was growing just west of the crater, and the other three 100 metres to the south.

Number 71 had wilted, only one leaf of seven being alive. The others seemed to be in a healthy state. No signs of flowering were observed in any of these plants.

Stellaria media: On August 25th, the first plant



of this species was found on Surtsey. But, a closer observation revealed that there were in fact four plants growing in a compact bunch. They were all marked by one peg no. 73. The plants were 6 meters apart from plant no. 74. Around them were fragments of shells, bird droppings and feathers. The plants appeared to have grown up from the droppings in a small hollow in the lava. The substrate there was only some sand in cracks

and hollows. It is almost certain that the plants, like no. 74, were brought by birds.

These plants had flowered and matured seed when they were found. Two of them were mostly withered, but the other two were quite alive. Altogether there were 12 fruits on the plants. Two of them were not fully ripe, but others had already dehiscent seed. One such seed was found lying beside the plants.

MOSSES

In addition to the observations that were made of the vascular plants, the distribution of mosses on the island was studied, and samples taken for analysis. In measuring the distribution of mosses the method used was to walk across all the lava and to record the outer boundaries of those areas in which moss was found. In most parts of the lava in the southern section of the island, a special search for moss patches had to be made, as

colonies were small and scattered. An aerial photograph was used for fixing their positions from where they were plotted on a map. The distribution of the mosses is shown on the attached map.

Altogether 16 species of mosses were found that could with certainty be classified according to species, as well as species of two genera, which could not be classified further.

TABLE 2

1967 *Funaria hygrometrica* Hedw. 3 samples
Bryum argenteum Hedw. 1 sample
 Collectors: Bergthór Jóhannsson & Eythór Einarsson.

1968 *Funaria hygrometrica* Hedw. 9 samples
Ceratodon purpureus (Hedw.) Brid. 3 samples
Bryum argenteum Hedw. 1 sample
Dicranella crispa (Hedw.) Schimp. 1 sample
Bryum spp. 2 samples
Pohlia cruda 1 sample
 Collectors: Eythór Einarsson & G. H. Schwabe.

1969 *Funaria hygrometrica* Hedw. 7 samples
Bryum argenteum Hedw. 1 sample
Dicranella crispa (Hedw.) Schimp. 1 sample
Racomitrium canescens (Hedw.) Brid. 1 sample
Leptobryum pyriforme (Hedw.) Wils. 1 sample
Pogonatum urnigerum (Hedw.) Beauv. 1 sample
Bryum spp. 9 samples
 Collectors: Eythór Einarsson, G. H. Schwabe & Ágúst H. Bjarnason.

	May 9.	May 11.—13.	June 18.—19.	June 26.—27.	July 13.—16.	August 24.—26.	Total
1970							
<i>Funaria hygrometrica</i> Hedw.	3	4	9	1	2	7	26
<i>Racomitrium canescens</i> (Hedw.) Brid.	3	5	5		4	5	22
<i>Ceratodon purpureus</i> (Hedw.) Brid.		2	1	3	2	4	12
<i>Leptobryum pyriforme</i> (Hedw.) Wils.					1	4	5
<i>Dicranella crispa</i> (Hedw.) Schimp.			1		1	2	4
<i>Pogonatum urnigerum</i> (Hedw.) Beauv.						2	2
<i>Pohlia wahlenbergii</i> (Web. & Mohr.) Andr.						2	2
<i>Bryum argenteum</i> Hedw.			1				1
<i>Pohlia cruda</i> (Hedw.) Lindb.		1					1
<i>Brachythecium salebrosum</i> (Web. & Mohr.) B. S. G.			1				1
<i>Dichodontium pellucidum</i> (Hedw.) Schimp.					1		1
<i>Drepanocladus uncinatus</i> (Hedw.) Warnst.					1		1
<i>Aongstroemia longipes</i> (Sommer.) B. S. G.						1	1
<i>Atrichum undulatum</i> (Hedw.) Beauv.						1	1
<i>Racomitrium lanuginosum</i> (Hedw.) Brid.						1	1
<i>Bryum pallens</i> Sw.		1	2		1	2	6
<i>Bryum</i> spp.	1	4	7	3	6	7	28
<i>Philonotis</i> sp.		1	1			3	5

Collectors: May 9.: Bergthór Jóhannsson.
 May 11.—13.: Hálfmán Björnsson.
 June 18.—19.: Skúli Magnússon & Bjartmar Sveinbjörnsson.
 June 26.—27.: Eythór Einarsson.
 July 13.—16.: Skúli Magnússon & Bjartmar Sveinbjörnsson.
 August 24.—26.: Skúli Magnússon & Bjartmar Sveinbjörnsson.

Bergthór Jóhannsson, of the Icelandic Institute of Natural History, has analyzed all the moss samples from Surtsey, and kept a record of the species and the number of samples every year since the start of the studies. This record is published here, with his permission (Table 2). Table 2 shows the names of the species and the number of samples of each species. The Table thus gives some idea of the frequency of each species.

Of the 16 known species of mosses found on Surtsey, 8 are new, found there in 1970, viz:

<i>Racomitrium lanuginosum</i> .	L-12
<i>Atrichum undulatum</i>	Western crater
<i>Aongstroemia longipes</i>	L-12
<i>Drepanocladus uncinatus</i> . .	K-17
<i>Dichodontium pellucidum</i> .	L-12
<i>Brachythecium salebrosum</i> .	L-12
<i>Bryum pallens</i>	L-12, western crater
<i>Pohlia wahlenbergii</i>	L-12, and near the heat emission at the western crater

And in addition *Philonotis* and *Bryum* spp.

If the attached map is compared with the plant map for 1969 (Fridriksson, Bjarnason, Sveinbjörnsson, 1971), the great increase in distribution over the previous year is clearly visible.

Funaria hygrometrica and *Racomitrium canescens*, together with *Bryum* species, are largely responsible for this distribution. Other species have limited distribution in specific places.

Racomitrium canescens grows mainly on bare lava, where there is no sand, but *Funaria hygrometrica* and *Bryum* species grow in caves and beneath protruding lava where sand collects.

Most moss is found near steam emissions, particularly in Surtur I (L-12), where 13 of 16 known species were encountered. *Bryum argenteum* was found at the steam vent in K-10. In a cave in N-9, where there is a steam emission, the following species were found: *Funaria hygrometrica*, *Leptobryum pyriforme*, *Bryum* spp and *Philonotis* sp.

metrcia, *Leptobryum pyriforme*, *Bryum* spp and *Philonotis* sp.

The following species were found on Surtur II (western crater): *Atrichum undulatum*, *Racomitrium canescens*, *Pohlia wahlenbergii*, *Bryum pallens*, *Funaria hygrometrica* and *Bryum* spp.

Only three species were found with capsules, i.e., *Funaria hygrometrica*, *Ceratodon purpureus* and *Dicranella crispa*. These species are thus now able to multiply by spores on the island.

DISCUSSION

The vascular plants found on Surtsey during the summer of 1970 had increased in numbers since the previous year from sixty-three to one hundred and one. The four species found, however, were not the same. *Cakile maritima* (Syn: *C. edentula*) did not reappear, but instead four plants of *Stellari media* were discovered. Both *Stellaria media* and *Cochlearia officinalis* seem to be brought in by birds. The seed apparently passes through the alimentary tract of the birds, most likely seagulls, and is deposited with their excrements in the interior of the island.

These spots may become pioneer centers of colonization, and might be succeeded by other higher or lower organisms. Many of these centers are quite naturally formed, but others are influenced by the presence of the containers with rainwater that attract the birds.

These findings collaborate previous observations to the effect that the main dispersal routes to the island of vascular plants are by sea and by birds.

ACKNOWLEDGEMENTS

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