

Moss Vegetation on Surtsey in 1971 and 1972

By

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INTRODUCTION

Moss was first found on Surtsey, in two locations, in the year 1967 (Jóhannsson, 1968). This situation prevailed during 1968, and it was not until 1969 that moss was found to any significant degree (Bjarnason and Fridriksson, 1972). The distribution map for that year showed that moss had been found in 29 of the island's quadrats. In 1970 the distribution was even greater (Fridriksson et al., 1970), at which time it was thus clear that the island had finally been colonized by mosses. Until this year, observations had been somewhat at random and directed solely at collecting samples of moss for analysis and keeping track of general distribution.

From 1969 to 1970 the number of moss species more than doubled, increasing from 6 to 16. This fact, in addition to a great jump in distribution pointed to the need for more exact observation of the island's moss flora. It was therefore decided to organize a careful and systematic investigation of the island in 1971. A division of the island into quadrats (Fridriksson et al., 1968) formed the basis of this research, and each and every quadrat (100×100 m) was investigated separately. This method produced a picture not only of general distribution but also of species count and the spread of each individual species.

In 1972 it was decided to carry out the same kind of investigation of distribution but to include observation of the habitat choice of the species and their covaregae in these habitats, and thereby attempt to discover which species were found together in communities and which species were typical for these communities.

RESEARCH PROCEDURES

1971: A careful search for mosses was made in all quadrats of the lava. It was considered un-

necessary to make such a careful search on that part of the island consisting of volcanic ash and sand, since moss does not yet appear to thrive in such environments.

An exception, however, was made in those quadrats containing fumaroles (such as I-12 and H-13). It was customary to confine the search for mosses to one quadrat at a time, and to cover this area thoroughly. The distribution of species identified on the spot was recorded on a chart, whereas samples of other species were taken for laboratory identification. A drawback of the sampling procedure was the way in which all samples from the same quadrat were collected in one box, which prevented a means of ascertaining a species' frequency of occurrence in each particular quadrat. The procedure established earlier (Fridriksson et al., 1970) was used to determine general distribution. An aerial photograph, with the quadrat boundaries drawn in, and a compass were used in determining location within a quadrat. In making up the maps showing general distribution for each species, a species was assigned to one of three groups according to its frequency of occurrence in that quadrat. (See Table I.)

1972: The area in question was combed in the same manner as in 1971. Collection procedures, however, were modified so that each sample was kept in a special container designated by a catalogue number and a quadrat number. For each species that was found in a quadrat, the investigators noted the extent of coverage and the habitat at the first ten discovery sites in the quadrat. If the species was found in ten or fewer spots, then its coverage and habitat were noted at each location. Habitats were described as soon as they were observed, and were designated by a number that was used later for cataloguing purposes. The following categories were used:

1. Perpendicular lava cliffs in hollows and narrow crevices.
2. Moist sand in caverns shaded by a lava formation, from which water drips onto the sand.
3. A thin layer of tephra on a lava surface; fully exposed and unaffected by fumaroles.
4. Same as Habitat 3, but affected by fumaroles.
5. Naked, exposed lava surface without sand.
6. Hollows with sandy bottoms, moist and somewhat shaded.
7. Narrow cracks in lava, filled with sand.
8. Moist shaded sand, warm from fumaroles.
9. Sand-covered lava, fully exposed.
10. Sand on a lava slope, partly shaded, more moist than in Habitat 9.
11. Moist, naked, and shaded lava slopes.
12. Sand at the bottom of deep and narrow cracks in the lava; shaded.

Cover was estimated as the average cover of the species in its habitat, which was determined with the use of a steel frame (25×25 cm) that contained a wire mesh with ten equal squares.

Cover was recorded in percentage, and the symbol + was used to designate cover less than 1%. In calculating the average cover for each species in the quadrats, + was counted as 0.2% cover.

Information about a species' frequency of occurrence in a quadrat was obtained later when the data was compiled. (Table I.)

In addition to the above-mentioned details, investigators noted which species were found with capsules and gemmae.

TABLE I

The following categories were used as criteria in determining the distribution symbols for each species in a quadrat:

Distribution Symbol	1971 Categories	1972 Categories
●	Species found often	Species found in 10 or more locations
◐	Species found in several locations	Species found in 2-9 locations
○	Species found once	Species found once

CONCLUSIONS

General distribution: Between 1970 and 1971 the general distribution of mosses increased considerably on the island, but further increase between 1971 and 1972 was little. The clearest overview of these trends will be obtained by comparing the attached distribution maps with that from the year 1970 (Fridriksson et al., 1972).

The maps show that the main increase in the moss distribution occurred in the west, especially in 1971. Most of this area is on the slopes south of Surtur II, that is, in quadrats J-6 and J 8-9, K 6-10, L 6-9, and M 6-9. In this area the lava is very rough, 50% to 90% covered with volcanic ash (cf Fridriksson, Magnússon, and Sveinbjörnsson, 1972, p. 62). The area is very dry, with caverns and small overhangings that provide good conditions for moss vegetation. The species *Racomitrium canescens* grew in this newly colonized area in very small and widely-scattered patches, and was responsible for the increase in distribution between 1971 and 1972 in quadrats J 5-6 and K 5-6. Mounds of volcanic ash limit the spread of moss to the north, since moss is not able to take hold there.

A minor constriction appears to have developed on the southeastern coast from 1971 to 1972, and is probably the result of coastline erosion and, as a consequence, increased proximity to the sea.

Although the rate of change in the distribution boundaries was slower in 1972 than in the previous year, this does not mean that propagation in moss areas came to a halt, since the general coverage of moss steadily increases from year to year.

LIST OF MOSS SPECIES IN SURTSEY FROM 1967-1972

The two first columns in the list show the distribution of each species in 1971 and 1972 according to the following legend.

+	= found in	1	quadrat
1	= - -	2-10	quadrats
2	= - -	11-20	-
3	= - -	21-30	-
4	= - -	31-40	-
5	= - -	41 or more	-

The six following columns in the list show the occurrence of each species each year from '67-'72.

LIST OF MOSS SPECIES IN SURTSEY FROM 1967-1972

	'71	'72	'67	'68	'69	'70	'71	'72
POLYTRICHALES:								
<i>Atrichum undulatum</i> (Hedw.) Beauv.	1	2	..	..	..	x	x	x
<i>Pogonatum urnigerum</i> (Hedw.) Beauv.	1	2	..	..	x	x	x	x
<i>Polytrichum alpinum</i> Hedw.	+	1	..	..	..	..	x	x
<i>Polytrichum longisetum</i> Brid. . . . .	+	+	..	..	..	..	x	x
<i>Polytrichum piliferum</i> Hedw. . . . .	..	+	..	..	..	..	..	x
<i>Polytrichum sphaerothecium</i> (Besch.) Broth. . . . .	..	1	..	..	..	..	..	x
<i>Psilophilum laevigatum</i> (Wahlenb.) Lindb. . . . .	..	1	..	..	..	..	..	x
FISSIDENTALES:								
<i>Fissidens adianthoides</i> Hedw. . . . .	+	..	..	..	..	..	x	..
DICRANALES:								
<i>Aongstroemia longipes</i> (Sommerf.) B. S. G. . . . .	..	1	..	..	..	x	..	x
<i>Ceratodon purpureus</i> (Hedw.) Brid.	4	5	..	x	..	x	x	x
<i>Dichodontium pellucidum</i> (Hedw.) Schimp.	2	3	..	..	..	x	x	x
<i>Dicranella crispa</i> (Hedw.) Schimp.	2	2	..	x	x	x	x	x
<i>Dicranella heteromalla</i> (Hedw.) Schimp. . . . .	..	+	..	..	..	..	..	x
<i>Dicranella schreberiana</i> (Hedw.) Schimp. . . . .	+	..	..	..	..	..	x	..
<i>Dicranella subulata</i> (Hedw.) Schimp. . . . .	..	+	..	..	..	..	..	x
<i>Dicranella varia</i> (Hedw.) Schimp.	+	1	..	..	..	..	x	x
<i>Dicranoweisia crispula</i> (Hedw.) Lindb. . . . .	..	1	..	..	..	..	..	x
<i>Distichium capillaceum</i> (Hedw.) B. S. G.	+	1	..	..	..	..	x	x
<i>Ditrichum cylindricum</i> (Hedw.) Grout. . . . .	..	1	..	..	..	..	..	x
<i>Ditrichum heteromallum</i> (Hedw.) Britt. . . . .	..	+	..	..	..	..	..	x
<i>Onchophorus virens</i> (Hedw.) Brid. . . . .	+	+	..	..	..	..	x	x
POTTIALES:								
<i>Barbula fallax</i> Hedw. . . . .	..	1	..	..	..	..	..	x
<i>Barbula ichmadophila</i> C. Muell. . . . .	..	+	..	..	..	..	..	x
<i>Barbula recurvirostra</i> (Hedw.) Dix.	1	1	..	..	..	..	x	x
<i>Barbula unguiculata</i> Hedw. . . . .	..	+	..	..	..	..	..	x
<i>Barbula vinealis</i> Brid. var. <i>Cylindrica</i> (Tayl.) Boul. . . . .	..	+	..	..	..	..	..	x
<i>Encalypta ciliata</i> Hedw.	+	1	..	..	..	..	x	x
<i>Encalypta</i> sp. . . . .	..	+	..	..	..	..	..	x
<i>Trichostomum brachydontium</i> Bruch. . . . .	..	+	..	..	..	..	..	x
GRIMMIALES:								
<i>Grimmia apocarpa</i> Hedw.	1	4	..	..	..	..	x	x
<i>Grimmia maritima</i> Turn.	+	1	..	..	..	..	x	x
<i>Grimmia stricta</i> Turn.	1	5	..	..	..	..	x	x
<i>Grimmia torquata</i> Hornsch. . . . .	..	1	..	..	..	..	..	x
<i>Racomitrium canescens</i> (Hedw.) Brid.	5	5	..	..	x	x	x	x
<i>Racomitrium heterostichum</i> (Hedw.) Brid. . . . .	..	+	..	..	..	..	..	x
var. <i>sudeticum</i> (Funck) Grout. . . . .	..	..	..	..	..	..	..	..
<i>Racomitrium lanuginosum</i> (Hedw.) Brid.	5	5	..	..	..	x	x	x
FUNARIALES:								
<i>Funaria hygrometrica</i> Hedw.	5	5	x	x	x	x	x	x
BRYALES:								
<i>Amphidium lapponicum</i> (Hedw.) Schimp. . . . .	..	+	..	..	..	..	..	x
<i>Anomobryum filiforme</i> (Dicks.) Husn.	+	1	..	..	..	..	x	x
<i>Aulacomnium palustre</i> (Hedw.) Schwaegr. . . . .	..	+	..	..	..	..	..	x
<i>Bartramia ithyphylla</i> Brid.	1	3	..	..	..	..	x	x
<i>Bryum</i> spp.	5	5	..	x	x	x	x	x
<i>Bryum algovicum</i> Sendtn.	+	1	..	..	..	..	x	x
<i>Bryum arcticum</i> (R. Br.) B. S. G.	1	1	..	..	..	..	x	x
<i>Bryum argenteum</i> Hedw.	2	3	x	x	x	x	x	x
<i>Bryum calophyllum</i> R. Br. . . . .	..	1	..	..	..	..	..	x
<i>Bryum klinggraeffii</i> Schimp. . . . .	..	+	..	..	..	..	..	x
<i>Bryum pallens</i> Sw.	1	1	..	..	..	x	x	x
<i>Bryum pallescens</i> Schwaegr. . . . .	..	1	..	..	..	..	..	x
<i>Bryum stenotrichum</i> C. Muell.	2	5	..	..	..	..	x	x
<i>Leptobryum pyriforme</i> (Hedw.) Wils.	2	4	..	..	x	x	x	x
<i>Mnium hornum</i> Hedw.	1	1	..	..	..	..	x	x
<i>Philonotis</i> spp.	3	5	..	..	..	x	x	x
<i>Philonotis fontana</i> (Hedw.) Brid. . . . .	..	1	..	..	..	..	..	x
<i>Plagiomnium cuspidatum</i> (Hedw.) Kop. . . . .	..	1	..	..	..	..	..	x
<i>Pohlia annotina</i> (Hedw.) Loeske var. <i>decipiens</i> Loeske . . . . .	+	..	..	..	..	..	x	..

<i>Pohlia cruda</i> (Hedw.) Lindb.	1	4	..	x	..	x	x	x
<i>Pohlia proligera</i> Kindb. . . . .	..	+	..	..	..	..	..	x
<i>Pohlia schleicheri</i> Crum. . . . .	..	+	..	..	..	..	..	x
<i>Pohlia wahlenbergii</i> (Web. & Mohr.) Andr.	3	5	..	..	..	x	x	x
HYPNALES:								
<i>Amblystegium serpens</i> (Hedw.) B. S. G. . . . .	..	1	..	..	..	..	..	x
<i>Brachythecium albicans</i> (Hedw.) B. S. G. . . . .	..	1	..	..	..	..	..	x
<i>Brachythecium rivulare</i> B. S. B. . . . .	..	+	..	..	..	..	..	x
<i>Brachythecium salebrosum</i> (Web. & Mohr.) B. S. G. . . . .	..	1	..	..	..	x	..	x
<i>Calliergon stramineum</i> (Brid.) Kindb. . . . .	+	+	..	..	..	..	x	x
<i>Campylium polygamum</i> (B. S. G.) C. Jens.	1	2	..	..	..	..	x	x
<i>Drepanocladus aduncus</i> (Hedw.) Warnst. . . . .	..	1	..	..	..	..	..	x
<i>Drepanocladus uncinatus</i> (Hedw.) Warnst.	1	2	..	..	..	x	x	x
<i>Hypnum lindbergii</i> Mitt. . . . .	..	+	..	..	..	..	..	x
<i>Isopterygium pulchellum</i> (Hedw.) Jaeg. & Sauerb. . . . .	..	1	..	..	..	..	..	x
<i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst.	1	+	..	..	..	..	x	x
MARCHANTIALES:								
<i>Marchantia polymorpha</i> L. . . . .	+	+	..	..	..	..	x	x
JUNGERMANNIALES:								
<i>Cephaloziella</i> sp. . . . .	..	+	..	..	..	..	..	x
<i>Scapania</i> sp. (<i>curta</i> or <i>scandica</i>) . . . . .	..	+	..	..	..	..	..	x
<i>Solenostoma</i> sp. (<i>Atrovirens</i> or <i>pumilum</i>) . . . . .	..	+	..	..	..	..	..	x

LIST OF SPECIES

A great increase of species has occurred since 1970. In that year 16 species were known to exist on the island (cf. Fridriksson et al., 1972). When samples from the summer of 1971 had been analyzed, the number of known species had risen to 37, that is, an increase of 20, or more than half the total number. All these new species were rare that year, except *Bryum stenotrichum*, which in all probability had arrived on the island earlier, but specimens of which had not been identified as a distinct species as the fruiting bodies had not developed until 1971. All specimens had, up to this point, been recorded as *Bryum spp.*

It is significant that the first liverwort species to be detected on Surtsey, *Marchantia polymorpha*, was among these new species. Two or three small individuals of this species were found on a rock in a moist hollow of a cavern in quadrat 0-17. After all the samples collected in the summer of 1972 had been identified, the number of species had risen to 72, or twice the number noted in 1971. Like the new species identified in 1971, the new species in 1972 were all rare, — found only in a few places.

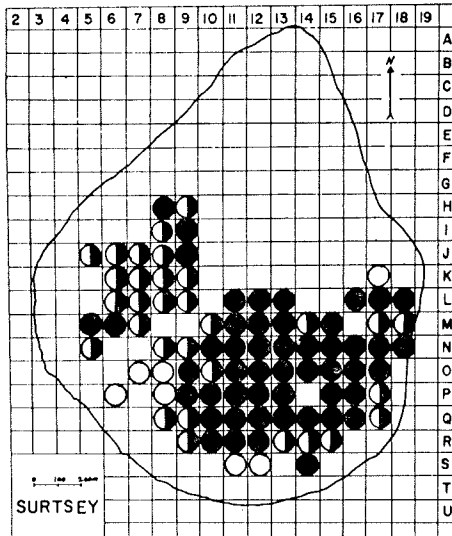
Three new liverworts were added to the list of known species, but it did not prove possible to assign them to a species with any certainty. They are species of the genera *Cephaloziella*, *Scapania*, and *Solenostoma*, all of which belong to the order *Jungermanniales*. The *Scapania* species is a member of either *S. scandica* or *S. curta*, whereas the *Solenostoma* species belongs either to *S. atrovirens* or *S. pumilum*.

Reference to the accompanying list discloses that two species that were observed in 1970 and 1972 were not found in 1971. These are the species *Aongstroemia longipes* and *Brachythecium salebrosum*. Both were found in one place in 1970; in 1972 the former was found in two quadrats, the latter in eight. This indicates that both species were present in 1971, but went undetected. This is particularly true of the latter species.

In 1972 three species on the 1971 list, *Fissidens adianthoides*, *Dicranella schreberiana*, and *Pohlia annotina*, were not rediscovered. There is reason to believe that *F. adianthoides* has died out on the island, in view of the fact that its precise location was known, that is, a small cave in L-12, where steam emission and optimum conditions were present. In 1972 the steam emission had ceased and a great deal of sand had blown in, so that the moss eventually dried up and perished for the most part.

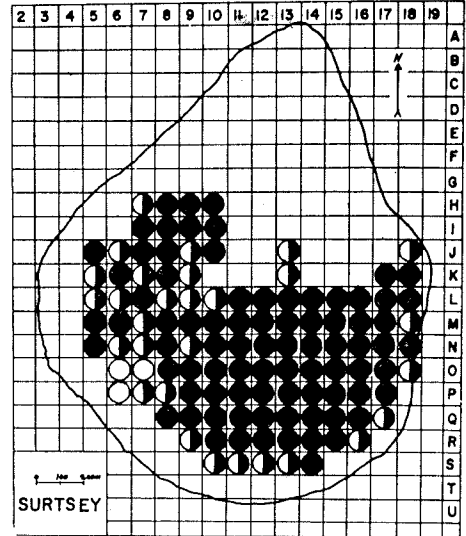
The other two species are probably still subsisting, although there was no trace of them, but it is of course never possible, in terrain like that of Surtsey, to make a corroborative search. Thus, whatever rare species are found each year is largely a matter of coincidence. The species *Bryum klingraeffii* Schimp., which was discovered in quadrat H8 at a tephra fumarole, had not previously been found in Iceland and is therefore new to the region.

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



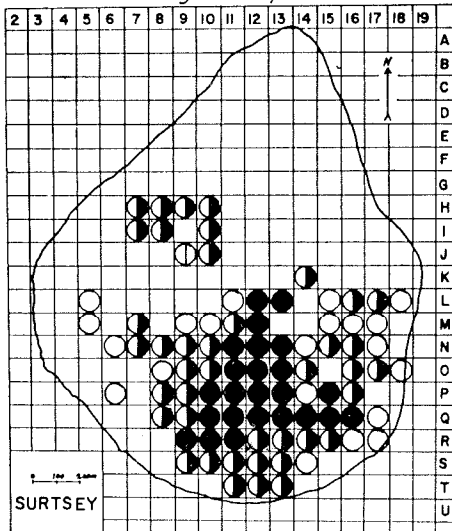
Distribution of moss species 1971.

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



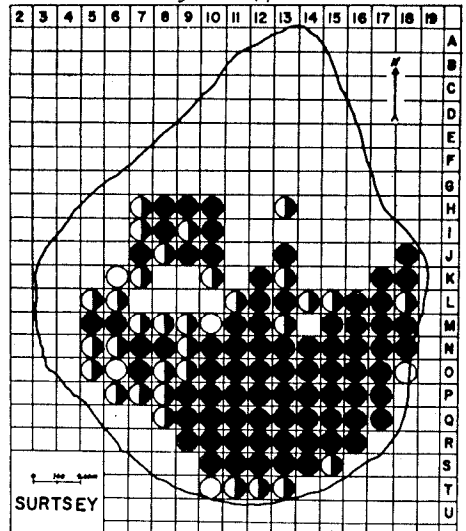
Distribution of moss species 1972.

Species: *Bryum* sp.



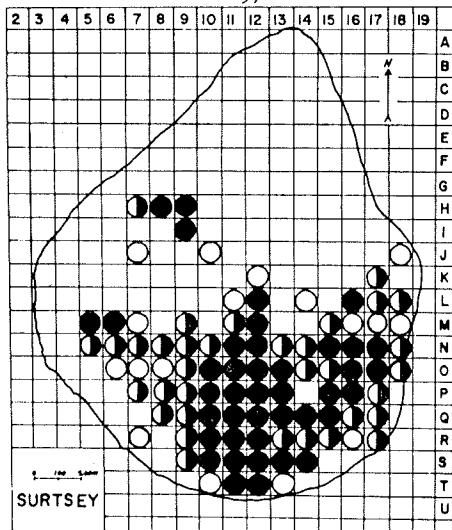
Distribution of moss species 1971.

Species: *Bryum* spp.



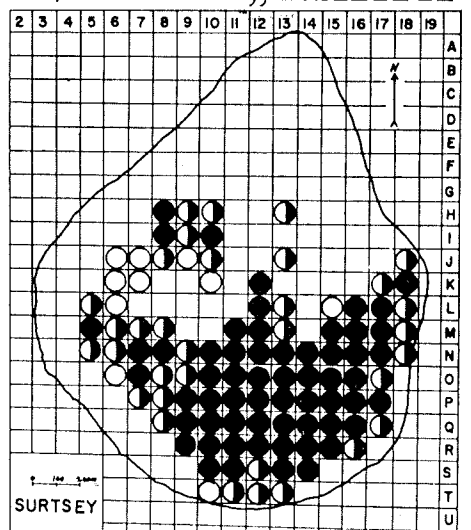
Distribution of moss species 1972.

Species: *Funaria hygrometrica* Hedw.



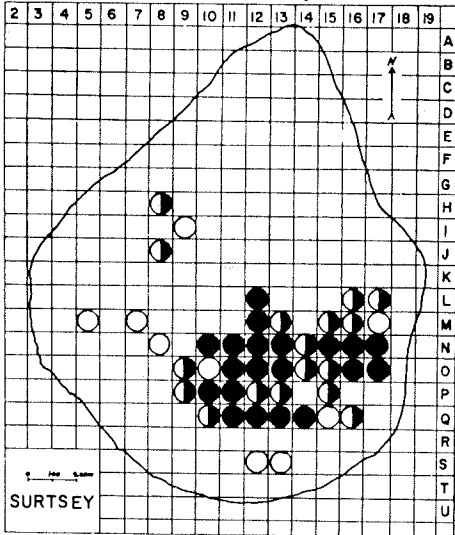
Distribution of moss species 1971.

Species: *Funaria hygrometrica* Hedw.



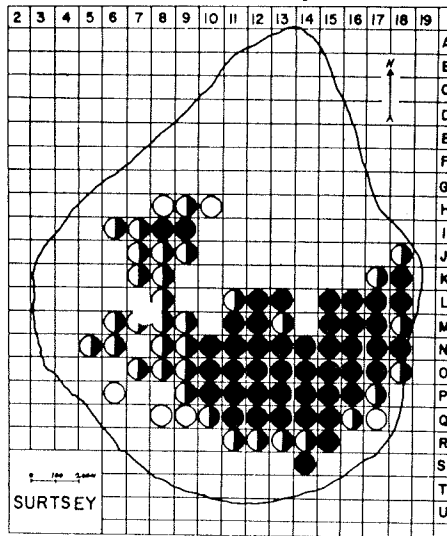
Distribution of moss species 1972.

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



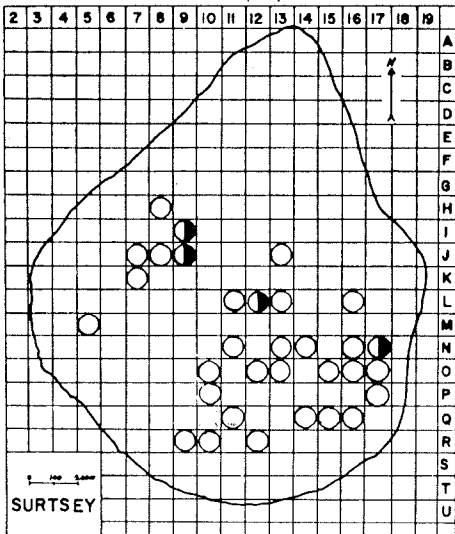
Distribution of moss species 1971.

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



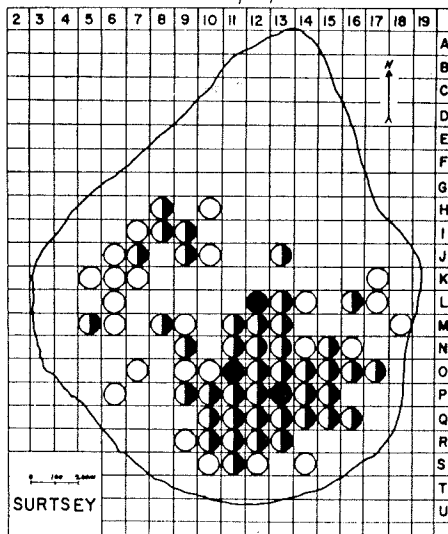
Distribution of moss species 1972.

Species: *Ceratodon purpureus* (Hedw.) Brid.



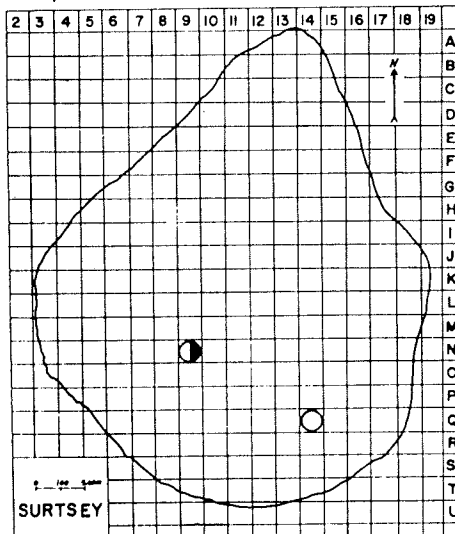
Distribution of moss species 1971.

Species: *Ceratodon purpureus* (Hedw.) Brid.



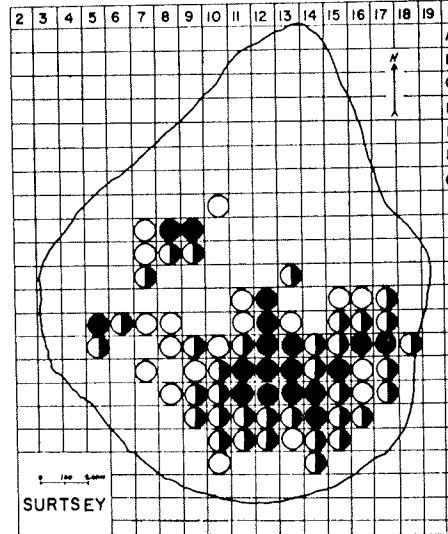
Distribution of moss species 1972.

Species: *Grimmia stricta* Turc. ---



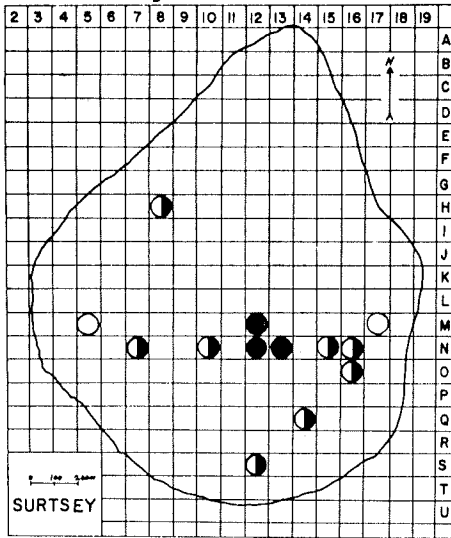
Distribution of moss species 1971.

Species: *Grimmia stricta* Turc. ---



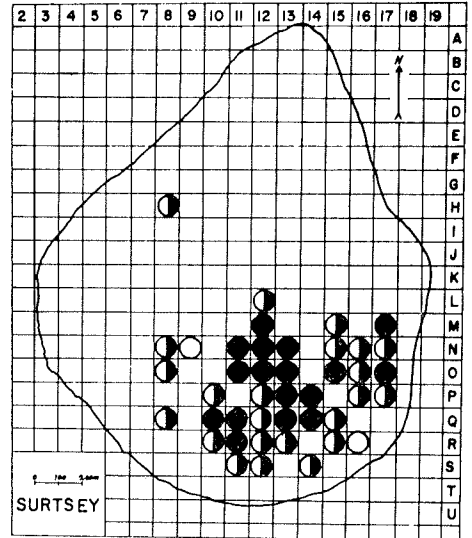
Distribution of moss species 1972.

Species: *Bryum stenotrichum* C. Muell.



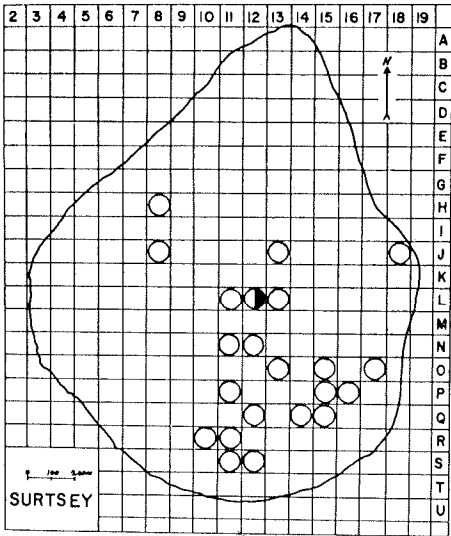
Distribution of moss species 1971.

Species: *Bryum stenotrichum* C. Muell.



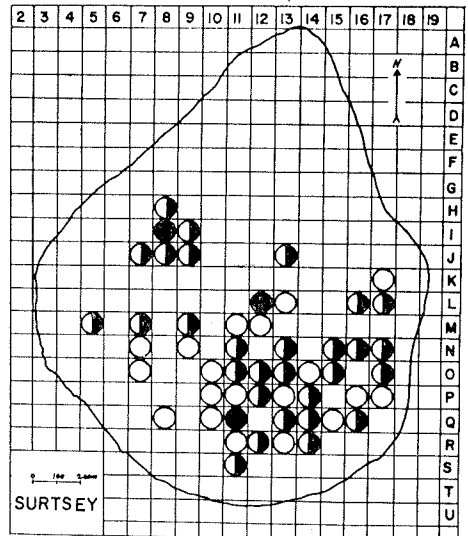
Distribution of moss species 1972.

Species: *Philonotis* spp.



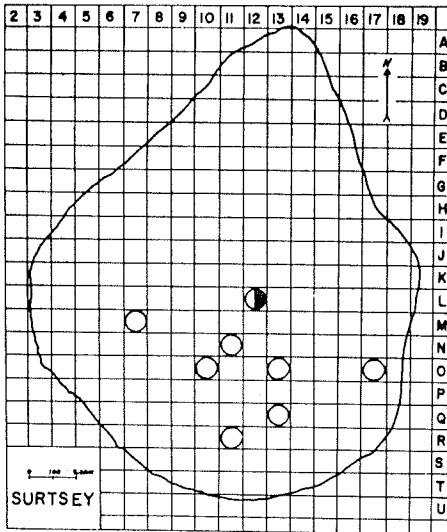
Distribution of moss species 1971.

Species: *Philonotis* spp.



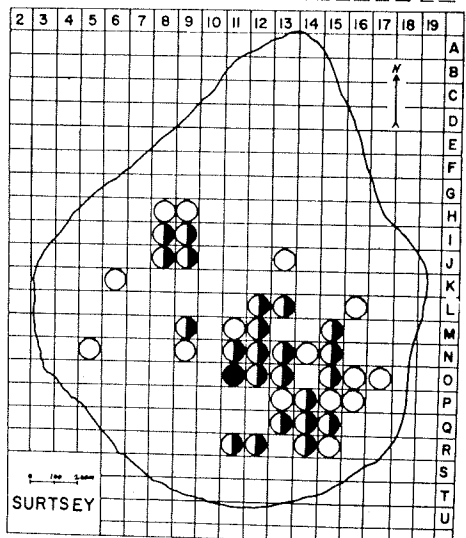
Distribution of moss species 1972.

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



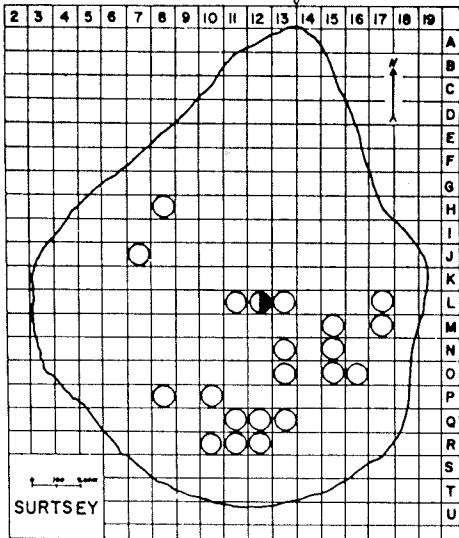
Distribution of moss species 1971.

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



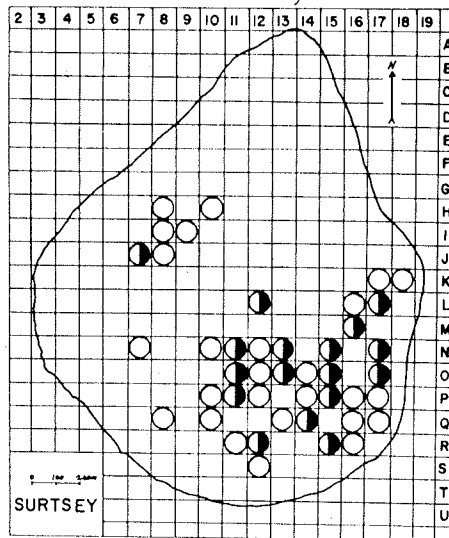
Distribution of moss species 1972.

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



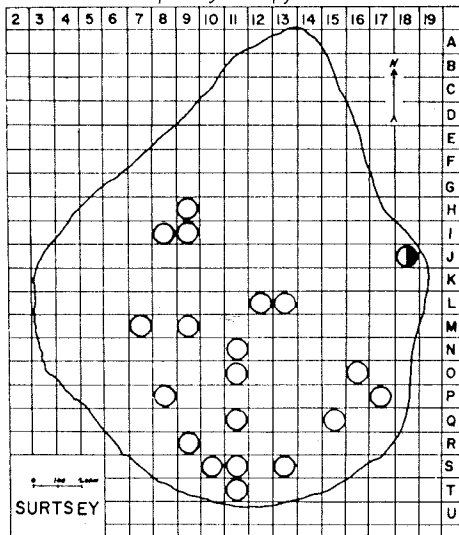
Distribution of moss species 1971.

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



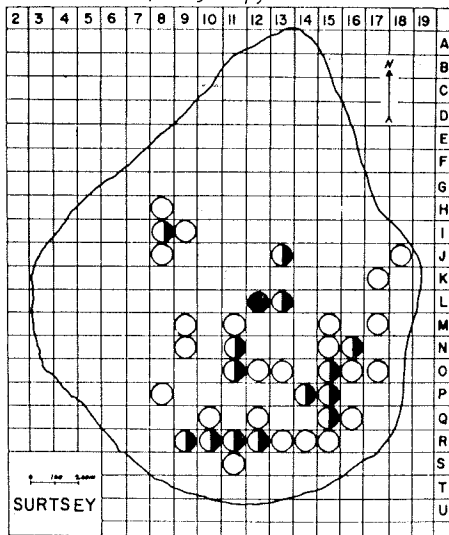
Distribution of moss species 1972.

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



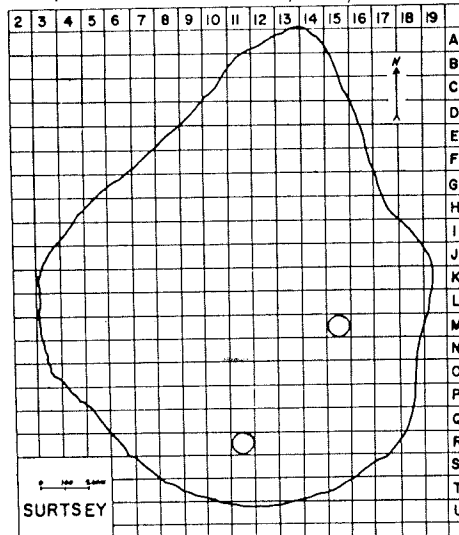
Distribution of moss species 1971.

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



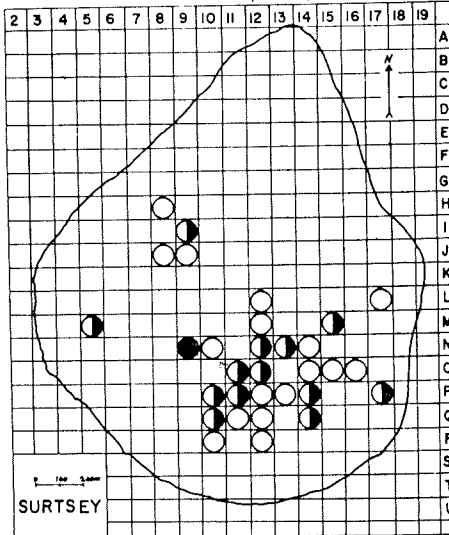
Distribution of moss species 1972.

Species: *Grimmia apocarpa* Hedw.



Distribution of moss species 1971.

Species: *Grimmia apocarpa* Hedw.



Distribution of moss species 1972.

SPECIES DISTRIBUTION

The accompanying maps show the distribution of only the most common species, since there is not adequate space for maps comprising all the species in a short article like this one. This omission is justifiable, since only the most common species have real ecological significance in the formation of soil and vegetation cover on the island. When reviewing the maps it should be remembered that they show only what the moss search revealed, and, as mentioned earlier, it was often coincidence that determined what species were found in a quadrat and the frequency with which they were observed. The frequency of species not shown on the maps may be found in the distribution signs in the list of species.

All the major species that were observed in 1971 spread greatly in 1972, not a surprising fact in view of the rapid increase that was apparent from 1969 to 1971. Unexpected, however, was the spread of the species *Grimmia stricta* and *G. apocarpa* in 1972, both of which were found in 1971 in only two quadrats. By 1972 they had become common species and were often found with capsules.

Difficulties in classifying *Bryum spp.* made it necessary to represent their distribution com-

bined on one map. The *Bryum* species are among the island's most common, but it is not yet possible to state with any precision the role of each species in the general distribution. (Exceptions are *B. argenteum* and *B. calophyllum*.) It was possible to map the distribution of particular *Bryum* species as some specimens bore capsules and could be identified with certainty.

There is no doubt, however, that *Bryum stenotrichum* is the most common *Bryum* species on Surtsey, since by far the greatest number of capsulated specimens that have been found are of this species.

The *Philonotis spp.* map shows the general distribution of all *Philonotis* species on the island, that is to say, if there are any other species than *P. fontana*. It has been possible to assign only a few specimens to species, and they are all of *P. fontana*, so it is likely that most of the *Philonotis* samples belong to this species. These identification difficulties stem from the immaturity of the specimens.

SPORE DISPERSAL

The following table shows which species were found with spores in 1971 and 1972 and their location:

TABLE II

This table shows which species were found growing with capsules in '71 and '72 and where on the island this was found.

Species:	Found in '71	Found in '72
<i>Funaria hygrometrica</i>	Common	Common
<i>Bryum stenotrichum</i>	Common	Common
<i>Ceratodon purpureus</i>	R-10	
<i>Dicranella crispa</i>	O-17, S-10, M-5	I-8, M-5, N-14, O-7, O-11
<i>Racomitrium canescens</i>	O-6, O-12	
<i>Bryum algovicum</i>	P-10	M-18, N-11, O-11, O-13, P-13, Q-14, R-12, R-13
<i>Leptobryum pyriforme</i>	R-12	
<i>Encalypta ciliata</i>	N-13	
<i>Grimmia stricta</i>		N-17, N-18, O-17, P-9, P-10, Q-11, Q-13
<i>Grimmia apocarpa</i>		L-17, M-15, N-14, I-9, N-17, N-18, O-16
<i>Racomitrium lanuginosum</i>		I-8, L-12, P-11, Q-12
<i>Barbula recurvirostra</i>		P-11
<i>Dicranoweisia crispa</i>		N-12
<i>Bryum pallescens</i>		H-8, M-12, N-8, N-13, O-11, O-12, P-12, P-13, O-14, R-10
<i>Bryum arcticum</i>	N-10, N-13	N-11, O-11, O-12, P-16, R-10

When a species reaches the stage of forming spores and capsules, its chances for spreading on the island are no doubt increased all the

more. But in general it is not known exactly to what extent propagation by spore contributes to the increase of each distinct species. In addition

to sexual reproduction, asexual reproduction by means of gemma and other plant parts, is very common.

Gemmae (asexual reproduction) have been found on the following species:

- Marchantia polymorpha*
- Bryum Klingraeffii*
- Bryum pallens*
- Pohlia prolifera*
- Pohlia annotina* var. *decepiens*
- Pohlia schleicheri*

Although asexual reproductive organs have been found only on those species mentioned above, it is certain that other species have propagated asexually on the island, that is, with plant bodies, such as leaves and stalks, which break off the parent plant and are carried to a new location where they form new colonies.

HABITATS

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

The following table represents the conclusion of these observation for 23 of the most common species on the island. They are arranged accord-

ing to distribution, with the most common listed first, and so forth.

This arrangement, however, does not apply to the *Bryum* species, except *B. argenteum*, which is easily identifiable with the naked eye. The others were recorded as *Bryum* spp.

The frequency figures indicate how often species were recorded in the various habitat categories. Thus, for example, the species *R. canescens* was recorded at a total of 966 locations, being in the habitat category No. 5 in 954 instances.

According to the number of samples, category No. 5 is the most common habitat on the island. It is favoured by various species, such as *Racomitrium canescens* and *R. lanuginosum*, *Grimmia stricta* and *G. apocarpa*, all of which can be said to be characteristic for this habitat.

These four species seem to thrive well on the island but have not yet undergone the competition that will show which one will eventually dominate this community in the future. Several other species were found growing in this habitat, but they are so far only associate species in this primary succession. An example of these is *Bartramia ithyphylla*, a species which also grows under various other conditions.

TABLE III
Samples of moss in Surtsey '72 arranged according to habitats.

Species:	Number of samples in each habitat:											Total observations	
	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				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 pellucidum</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>Drepanocladus 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
Total	176	243	119	191	1988	921	62	31	549	283	9	21	4593

An other common habitat on Surtsey is the category No. 6. It is favored by many species, such as various *Bryum* species like *B. stenotrichum*, as well as *Funaria hygrometrica*, which are still the most dominant species. Associate species are *Pohlia cruda*, *Pohlia wahlenbergii*, *Philonotis* sp., *Ceratodon purpureus*, *Bartramia ithyphylla*, and others.

The other habitats can be examined in the same way as these two.

This arrangement is based on 4.593 observations. Classical sociological measurements could not be applied because the moss colonies are still rather scattered.

COVER

The total cover of mosses on Surtsey is still very small, and exact measurements of their cover are therefore very difficult to obtain. The roughness of the lava surface also adds to these difficulties.

As mentioned above, the cover of each species in its habitats was recorded in each quadrat. The accompanying cover maps show the mean cover value in each quadrat for the six most common species, as estimated in 1972.

The maps reveal that although *Racomitrium canescens* is the most common species on the island, it ranks only third in cover, the patches being usually much smaller than those of *Bryum* spp. (mostly *B. stenotrichum*) and *Funaria hygrometrica*, which show the highest cover values. Other species have much less average cover per quadrat.

ACKNOWLEDGEMENTS

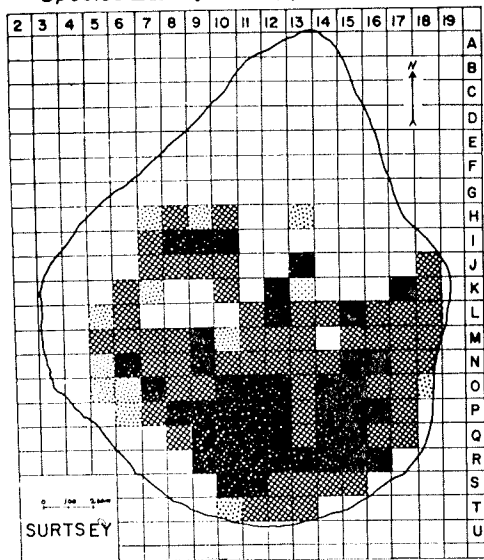
Bergthór Jóhannsson of the Museum of Natural History, Reykjavík, has checked all of the identifications on which this paper is based, in addition to identifying all uncertain specimens. The writer extends his deepest thanks for this invaluable assistance.

The work on which this paper is based was sponsored by the Surtsey Research Committee, with a grant from the U.S. Atomic Energy Commission, Div. of Biology and Medicine, under contract No. AT (11-1)-3531.

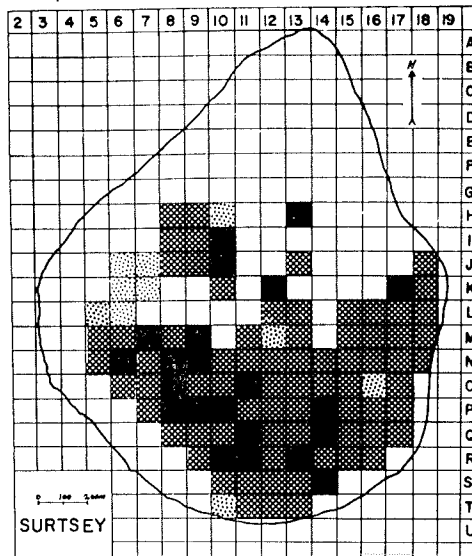
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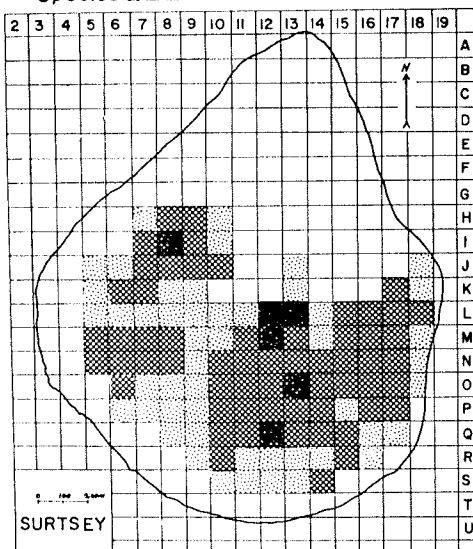
Species: Bryum spp.



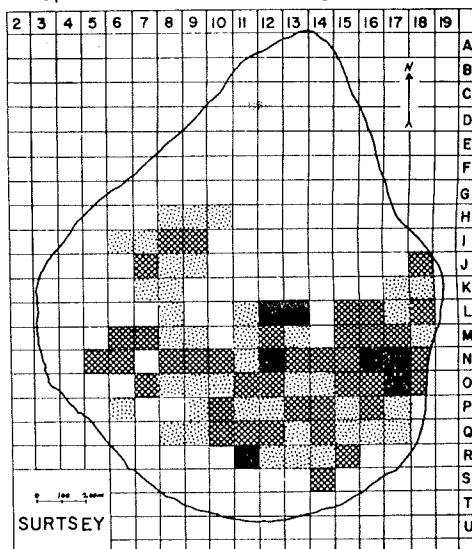
Species: Funaria hygrometrica Hedw.



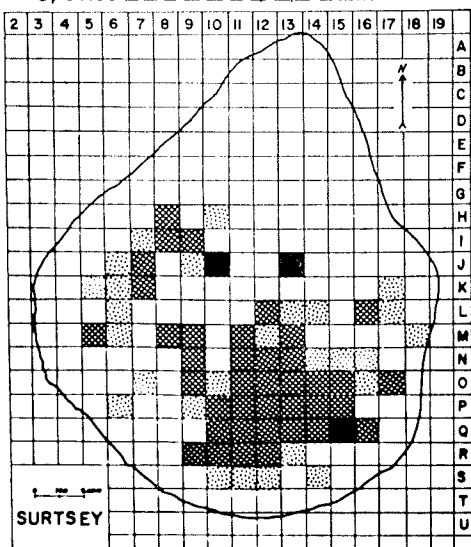
Species: Racomitrium canescens (Hedw.) Brid.



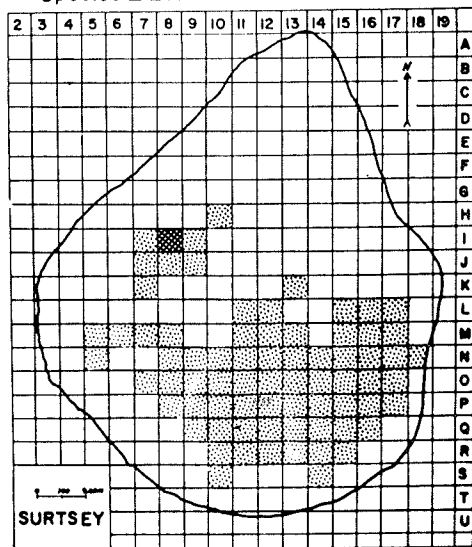
Species: Racomitrium lanuginosum (Hedw.) Brid.



Species: Ceratodon purpureus (Hedw.) Brid.

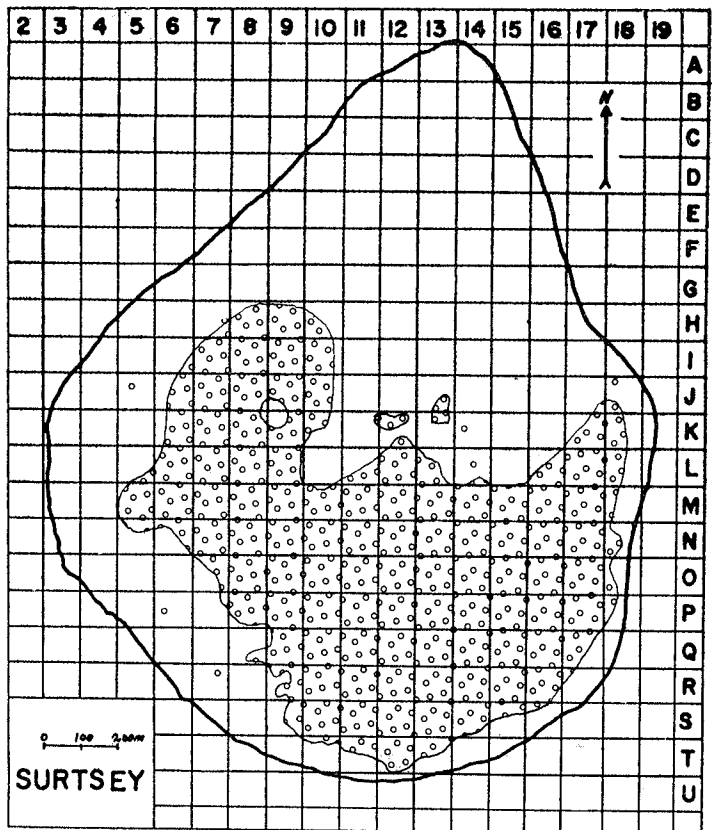


Species: Grimmia stricta Turn.



0 - 10,0 % Cover
 1,1 - 10,0 % -
 >10,0 % -

Total distribution of mosses 1971



Total distribution of mosses 1972

