

## BIOLOGY

# Vascular plants on Surtsey

1971—1976

by

Sturla Friðriksson

The Agricultural Research Institute  
Keldnaholti, 110 Reykjavík, Iceland

## INTRODUCTION:

The vascular flora of Surtsey has been investigated ever since the first higher plant was observed growing on the island in June 1965. An account of this study has been given in previous Surtsey Research Progress Reports, which cover a six year period including 1970. (Friðriksson et al. 1972). The investigation during the following three years, i.e., 1971, 1972 and 1973, has been reported on in a book on the development of life on Surtsey (Friðriksson 1975). However, in order to keep continuity of reports of this investigation in the Surtsey Research Society's records, the description of annual variation and development of higher plant life on the island in the period 1971 to 1976, (incl.) will be covered here.

## METHODS OF RESEARCH:

The methods used in this study have been described previously (Friðriksson 1970). Every year during the summer months trips were taken to the island. In the early summer all overwintering plants were counted and marked on a map. The map bore a grid so that the location of the plant could be given by a coordinate system with plotted out quadrats of 100 m square each. These were marked numerically and alphabetically. Aerial photographs were used to obtain a more precise location of the plants within the quadrat.

In the latter part of summer any new plants that started growth were marked with a stake. Plants that had become at least one year old were given a serial number. A description was given of the stage of growth of individual plants; indicating length and number of branches, number of leaves, flowering and development of fruits. Photographs were also taken of individual plants to document their appearance.

## DESCRIPTION OF DISTRIBUTION AND POPULATION SIZE:

An unusually large percentage of vascular plants survived the winter of 1970 to 1971, or 40 of 101 (40%) compared with 18 of 63 (29%) in the previous summer. The corresponding percentages of overwintering plants in the previous winters had been 20% in 1968—69 and 35% in 1969—70. There are doubtless many reasons for this high number of overwintering plants in 1971. One is, that in the summer of 1970 no plants grew in the northernmost part of the island (in quadrats A, B, and C), which is flooded by the sea in winter. Moreover, the winter and spring were unusually mild, much milder than the previous year.

Altogether 85 individual vascular plants were found, belonging to five species: 52 *Honckenya peploides* (syn. *Minuartia peploides*), 21 *Cochlearia officinalis*, 3 *Elymus arenarius*, 3 *Cystopteris fragilis*, 2 *Stellaria media*, and four unidentified individuals. The number of species and individuals of other vascular plants found in Surtsey during that year and in various other years are listed in Table I.

The distribution of plants in 1971 was considerably greater than in the previous year (see map Fig. 1).

In the summer of 1969 plants grew in 17 quadrats, in 1970 in 22 quadrats, and in 1971 in 36 quadrats. The biggest increase, however, was in individual plants scattered throughout the lava, the main growing areas being the same as before, i.e., the hollows between Bólfell and the western cinder cone in Svartagil and between the lava and the eastern cinder cone.

In extensive areas of lava, the tuff had drifted from the tephra mounds. At first this drifting was mainly in the old lava to the west, and consisted largely of tephra from the small volcanic island Jólnir. After the new lava had flowed to the east,

TABLE I.  
Plants in Surtsey 1968—1976

SPECIES	68	69	70	71	72	73	74	75	76
<i>Cakile edentula</i> ssp. <i>islandica</i>	0	2	0	0	1	33	3	5	0
<i>Elymus arenarius</i>	6	5	4	3	0	66	26	12	10
<i>Mertensia maritima</i>	4	0	0	0	15	25	44	11	6
<i>Honckenya peploides</i>	103	52	63	52	71	548	857	428	500
<i>Cochlearia officinalis</i>		4	30	21	98	586	372	863	501
<i>Stellaria media</i>			4	2	2	1	0	0	0
<i>Cystopteris fragilis</i>				3	4	3	3	2	2
<i>Carex maritima</i>					1	1	1	3	2
<i>Tripleurospermum maritimum</i> ssp. <i>phaeocephalum</i>					1	5	2	1	2
<i>Puccinellia retroflexa</i>					2	1	9	9	8
<i>Angelica archangelica</i>					2	2	0	0	0
<i>Festuca rubra</i>						1	1	2	1
<i>Cerastium fontanum</i> ssp. <i>scandicum</i>								106	99
<i>Equisetum arvense</i>								2	0
<i>Sagina</i> sp.								1	0
<i>Silene vulgaris</i> ssp. <i>maritima</i>								1	0
<i>Juncus</i> sp.								1	0
Unidentified plants	1	0	0	4	2	1	1	2	1
TOTAL	114	63	101	85	199	1273	1319	1449	1132

the drifting of tuff from the mounds to the northern part of the lava continued and sandstorms were frequent, resulting in sand and dust blowing over the surface of the lava and especially in its hollows. It was not until 1971 that most of the lava had become covered with a loose substrate and this explains, to some extent, the increased distribution of plants.

Of the 85 vascular plants that grew on the island in 1971, only 49 individuals survived the winter of 1971—72 or 58%. This was, so far, the highest percentage of surviving individuals recorded on Surtsey. The majority of the plants grew in relatively secure sites of the lava, with fewer individuals growing on the ness than in previous years. This latter location was often flooded during winter storms, which are quite hazardous for the overwintering of plants.

During the previous years *Honckenya peploides* was the most abundant plant in Surtsey, but in the summer 1972 the individuals of *Cochlearia officinalis*

outnumbered all others. This was mostly due to the fertility of one plant (No. 38) which produced a number of offspring in 1972.

The main location of the vascular plants during the summer 1972 was in general the same as in previous years, east of the eastern cone in quadrats J-17 and 18, near the hut in quadrats E-12 and 13 and in the Svartagil quadrats F-13 and G-13. The fourth location was on the northern ness, occupied by 40 plants all of which were new colonizers (Fig. 2).

The fifth location was in quadrat S-14 on the southern part of the lava where 91 plants were found occupying an area of 80—100 sq.m.

During the summer 1972 four new species colonized Surtsey for the first time. These species are commonly found on the other islands of the Westman Islands or on lava fields of the mainland, Table I.

The distribution of plants increased heavily in

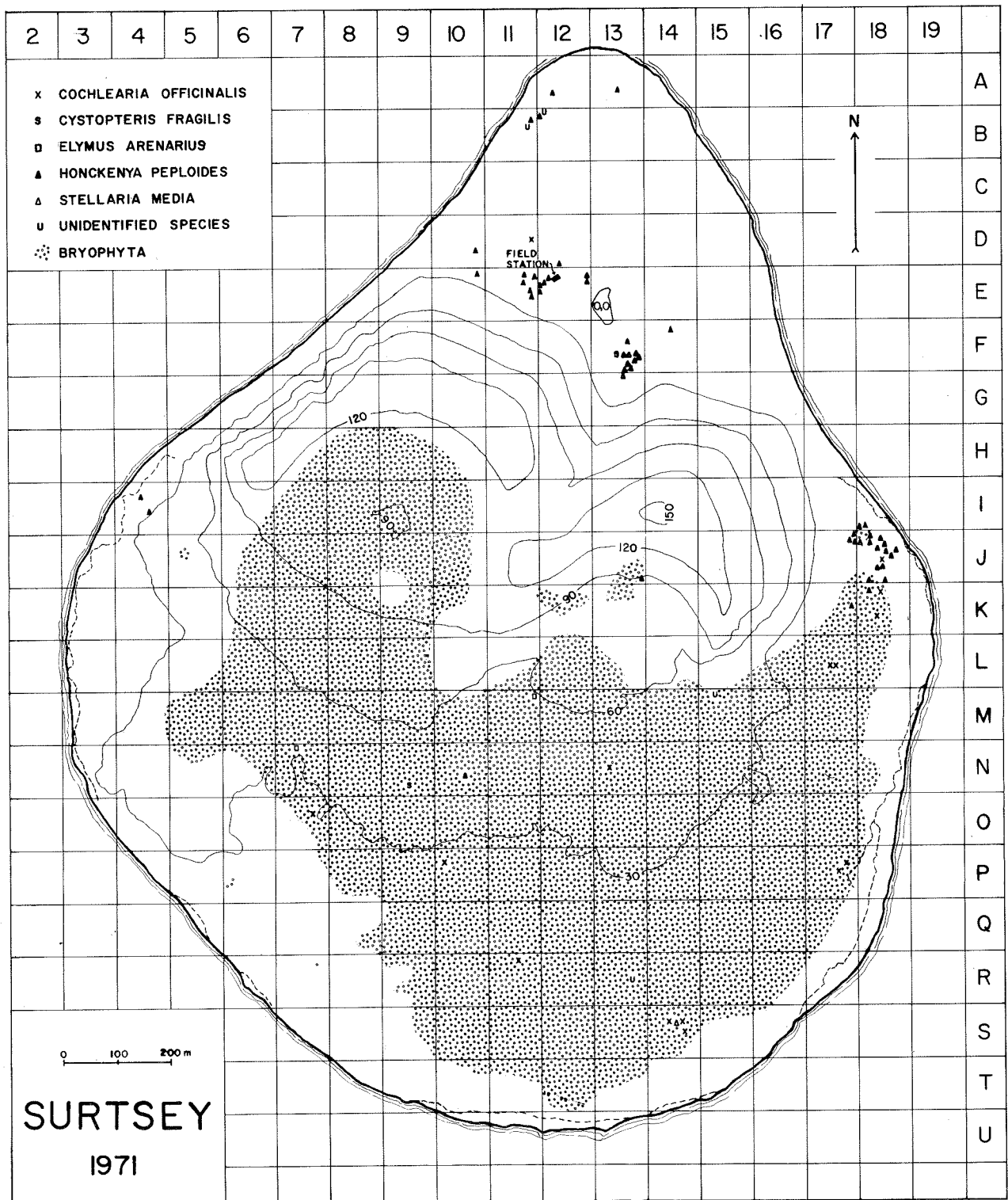


Fig. 1

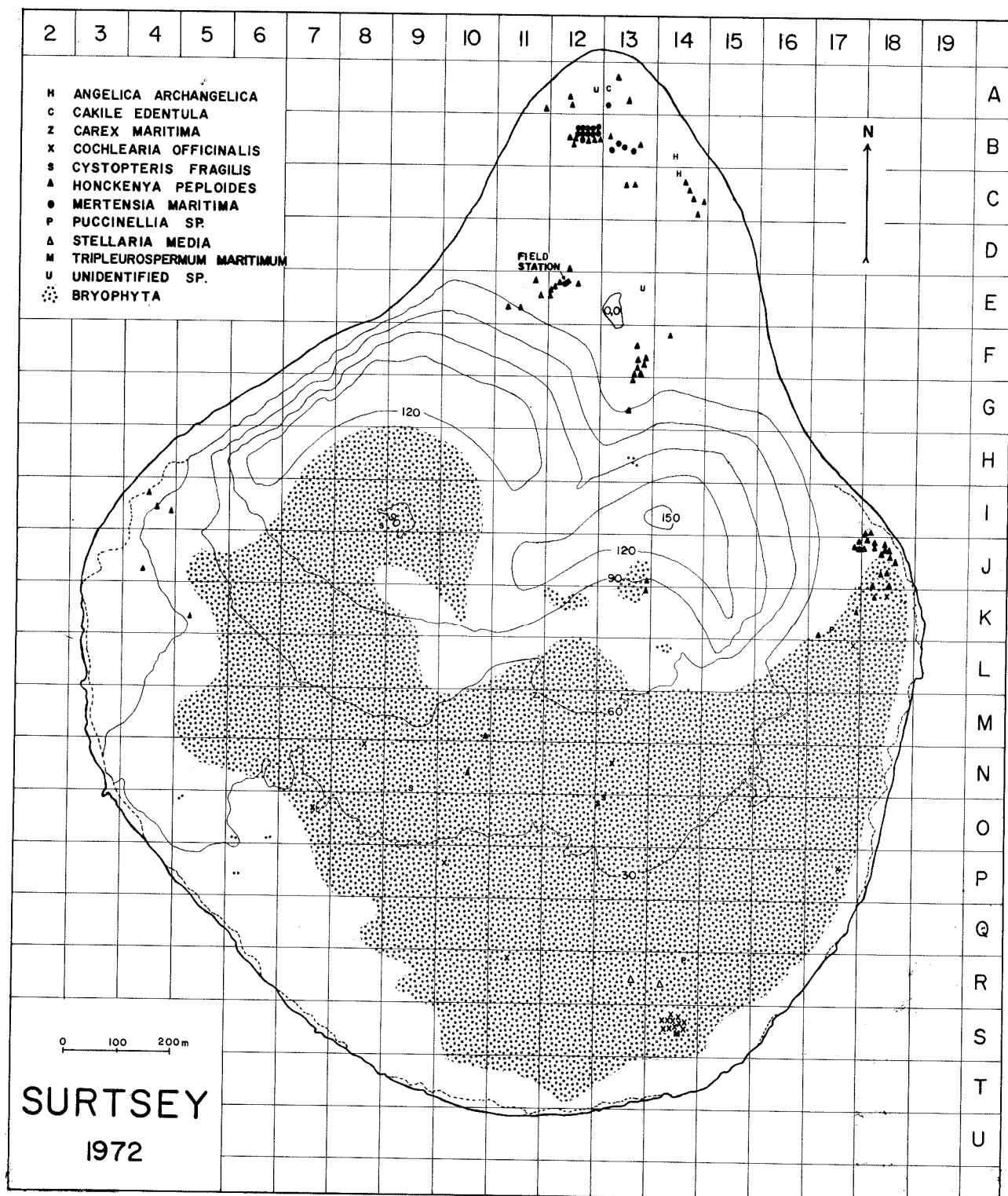


Fig. 2

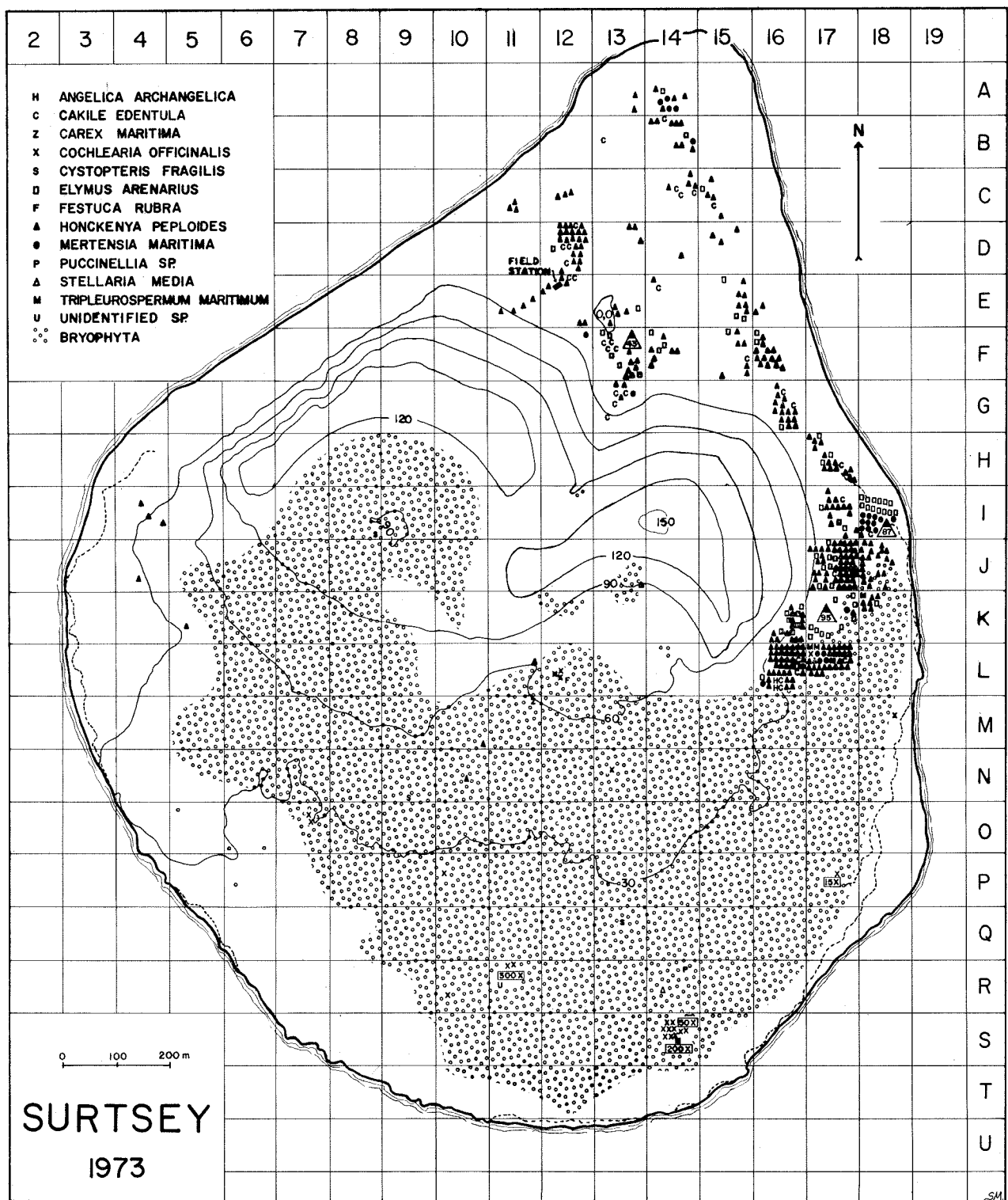


Fig. 3

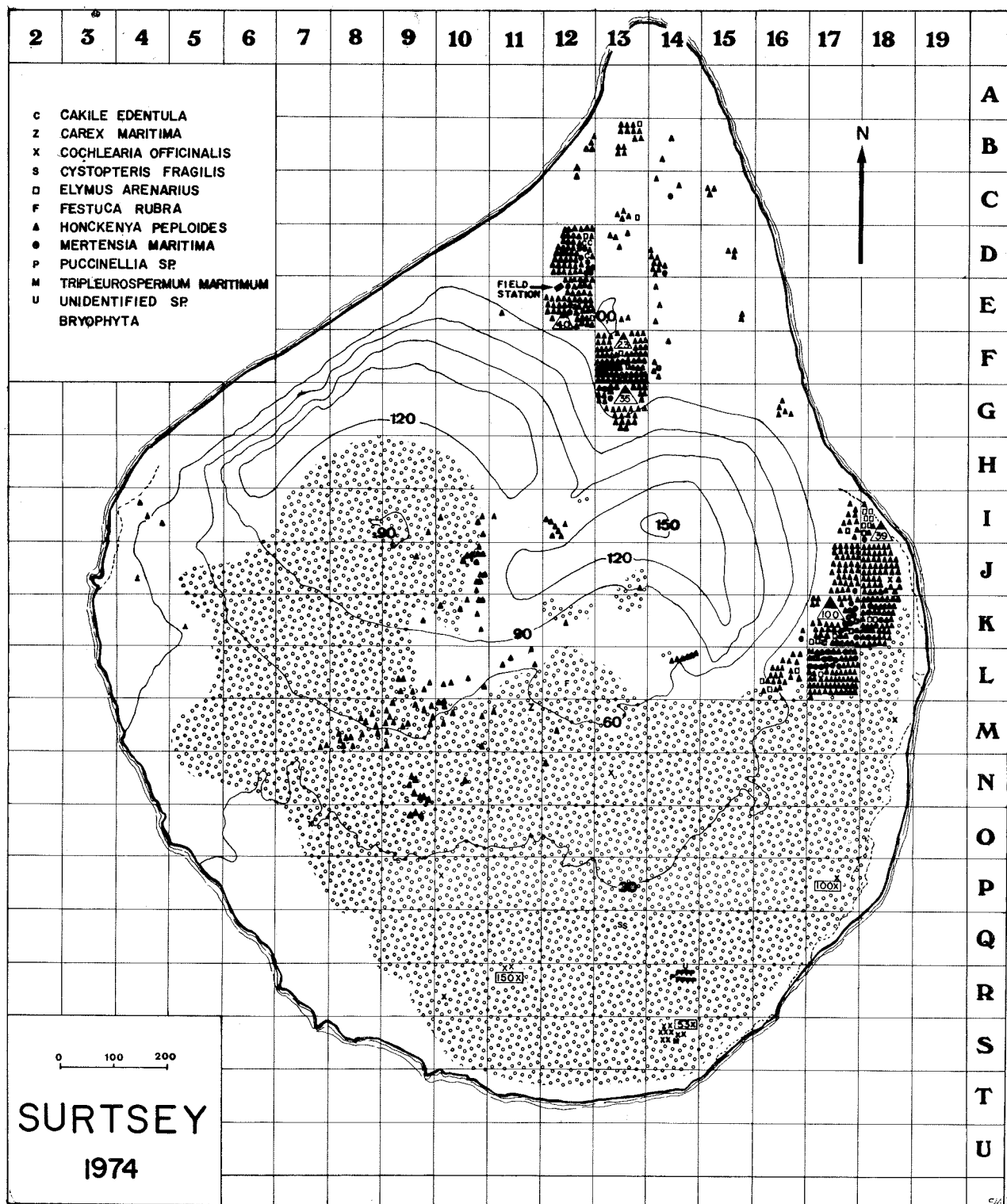


Fig. 4

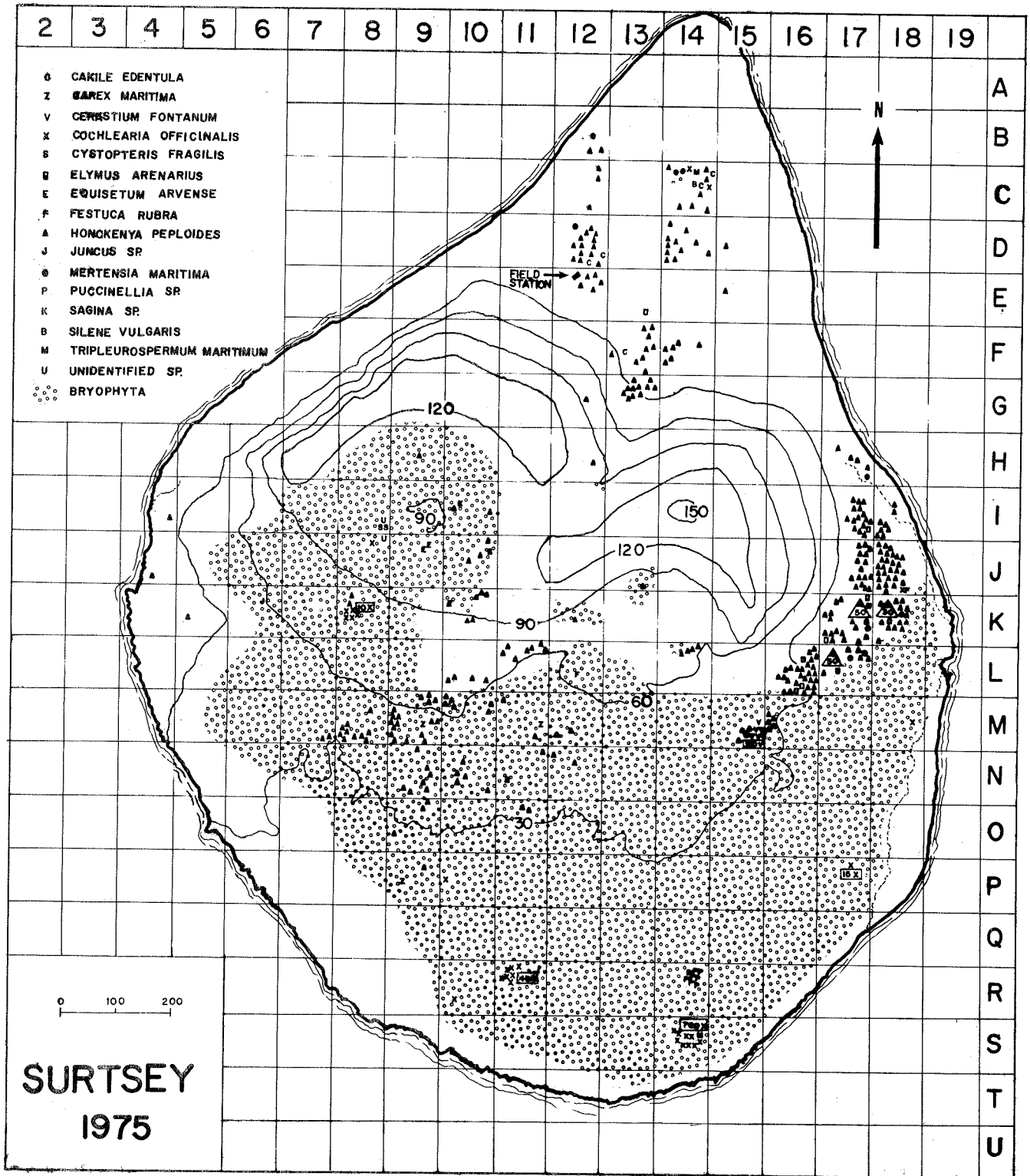


Fig. 5



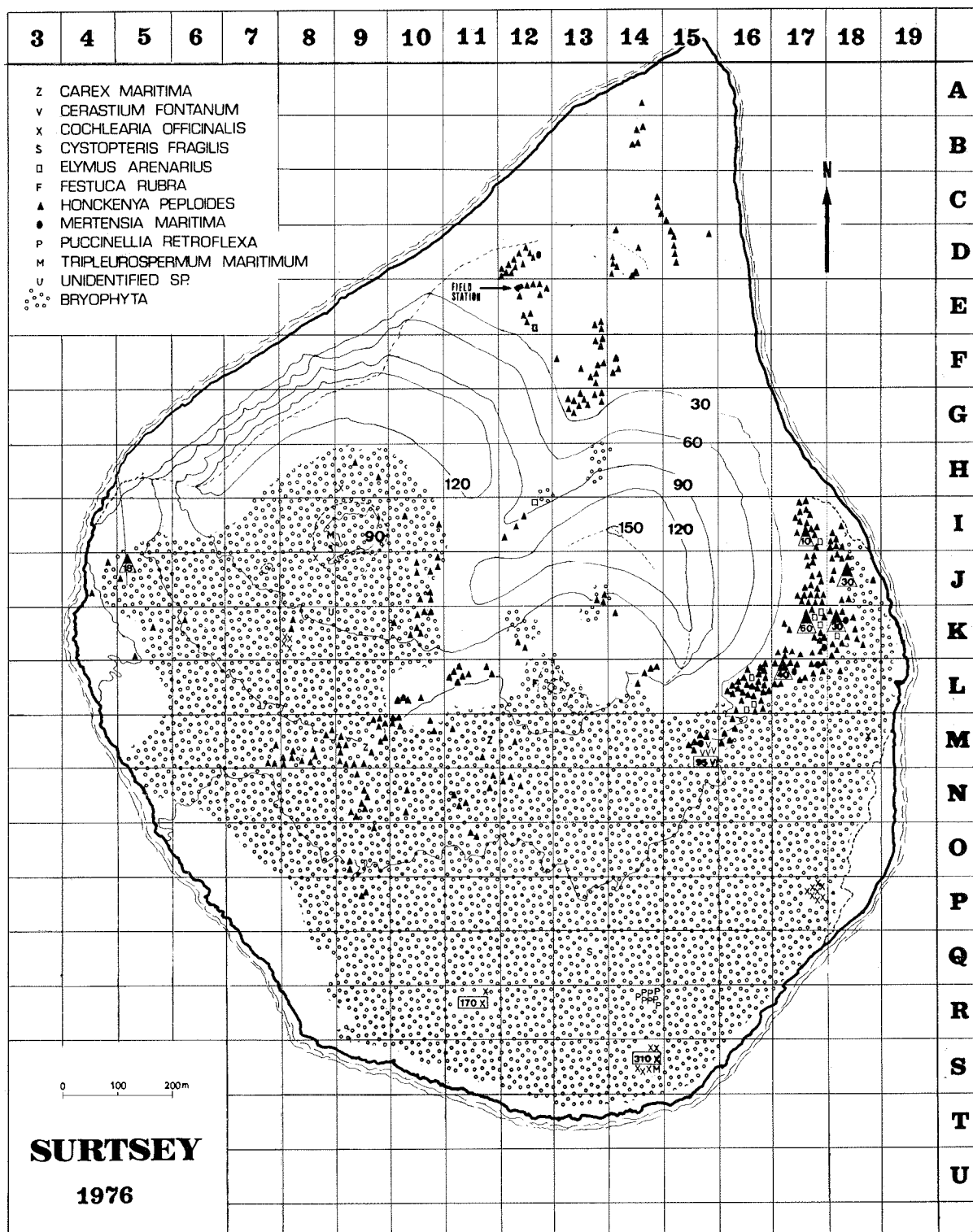


Fig. 6

1973. The number of individual plants jumped to 1273, and these occupied 58 quadrats. The main location of these plants was along the northern ness, extending into the lava on the eastern side, Fig. 3. Of the 1273 plants from 1973 only 537 overwintered but 782 new plants started growth so the total plant number for the year 1974 was 1319. The map in Figure 4 shows locations of the various vascular plants in 1974, however, only 446 of these plants were found in 1975, but as 1003 new plants were recorded the total number of plants was thus increased by about 130, principally due to a large number of new seedlings of *Cochlearia officinalis*. The chief changes in distribution were that new plants were found in quadrats M-15, M-16, N-11, O-11, and P-9, where *Honckenya peoploides* plants had not previously been observed, so that it appeared to the extending its distribution towards the south of the island, Fig. 5.

The total number of species were 15, in addition to two unidentified plants.

Only ten of these species were found again in the summer of 1976. One additional species was discovered but could not be identified. Thus, altogether 11 species of vascular plants grew in Surtsey in 1976.

Species not found in 1976, but grew there the previous year, were: *Cakile edentula* ssp. *islandica*, *Equisetum arvense*, *Juncus* sp., *Sagina* sp., and *Silene vulgaris* ssp. *maritima*.

Of 1449 individual plants growing on Surtsey in 1975, 502 were found in the spring of 1976. The new additions numbered 630 plants. The total number of plants found in 1976 was thus 1132 individuals, or 317 individual plants fewer than in 1975, Fig. 6. The main reason for the decrease was the smaller number of scurvy grass seedlings compared with the previous year. Apart from seedlings of scurvy-grass and *Cerastium fontanum* ssp. *scandicum* the number of plants was 680, and the mature plants had therefore increased by 175 (Table I). The high mortality of plants was due to a severe winter but other casualties also took place. A pair of great black-backed gulls that nested in quadrat N-10 used, for instance, *Festuca rubra* No. 73—370, *Carex maritima* No. 70—72, and 20 sea sandwort plants for their nest. The birds were particularly fond of the *Festuca rubra* and the *Carex maritima*. For overwintering of plants see Fig. 10.

#### THE INDIVIDUAL PLANT SPECIES:

*Cakile edentula* (Bigel) Hooker ssp. *islandica* (Gand.) Á. & D. Löve (syn. *Cakile maritima*):

The first vascular plant on Surtsey found in

1965 was of the species (Fridriksson 1965, 1975). Since then the sea rocket has been observed now and then but it has never been a permanent settler. In 1967 there were 21 individuals growing on the island, of which 15 flowered. It was thus the first higher plant species to flower on Surtsey. During the years 1968, 1970 and 1971 no plants of this species grew on the island. In 1969 there were two plants and in 1972 one individual was discovered, i.e., plant No.95 in quadrat A-13. It was small and situated on the northern ness. In 1973 there were 33 plants recorded on the ness and in 1974 only three were discovered at the high tide line in quadrat D-12. In 1975 five plants were found and three of these managed to flower and bear seed. Plant No.75—89 in C-14 was particularly vigorous and produced 100 mature seeds. This species was not rediscovered on Surtsey 1976.

#### *Elymus arenarius* L:

This species was first discovered in 1966 and was the second attempt made by higher plants to invade Surtsey (Fridriksson 1966). In 1968 there were six plants found but these decreased in number to only three plants in 1971 and none was found in 1972. In 1973 there appears to have been a great invasion of seed and 66 seedlings of lyme grass were discovered during that summer, but there were only 26 plants left in 1974. Eleven of these plants survived the following winter and only one new plant was found during 1975. The



Fig. 7. The lyme-grass, *Elymus arenarius*.

number of plants had, therefore, decreased considerably. Nine lyme-grass plants over-lived the next winter and one additional new plant was found in 1976 making a total of ten plants of this species on the island. The largest plant was from 1974, No. 74—51 in K-18. It had 6 culms and 28 leaves, covered an area of 12×3 cm, and was about 45 cm. in height. Other lyme-grass plants

were smaller, most having 1—2 culms and 3—8 leaves. None of the plants has managed to flower yet. (Fig. 7).

*Mertensia maritima* (L.) S.F.Gray:

In 1967 the northern shore-wort was first discovered on Surtsey and four seedlings were found in 1968. During the following three years no individuals of this species were observed growing on the island but it reappeared in 1972 with 15 plants and increased to 25 plants in 1973 and to 44 in 1974 but since then their number has decreased.

Of 11 *Mertensia maritima* plants growing on the island in 1975, 6 were found alive in 1976. No new specimen was discovered. All these plants were small, with 5—7 leaves, and they did not flower. The poor development of these plants was probably due to the low nitrogen content of the soil. One *Mertensia maritima*, No.75—6 in M-15, had been injured when it was inspected in August 1976, probably cut up by a raven. The species is a perennial and two of the plants growing on Surtsey in 1976 are from 1974 and two from 1975.

*Honckenya peploides* (L.) Ehrh.:

The sea sandwort, a common perennial on the southern shore of Iceland, was first discovered on Surtsey in 1967. It has grown on the island ever since. In 1968 there were 103 plants but the number had dropped to 52 in 1971. Five of these plants flowered and one matured seed. The following summer 71 plants were observed of which 38 had overwintered. After the large invasion of seed in 1973 there were 548 sea sandwort plants found on the island and this number still increased to 857 in 1974 (Fig. 8).

The new colonists of 1974 were mostly found on the eastern and central parts of the island as well as on the northern ness. Many were offsprings of earlier colonizers. In one instance, in quadrat K-17, a *Honckenya* plant, No.68—56, had 50 offsprings that formed a colony in the same quadrat and in the adjacent one, J-17. The number of plants of *Honckenya peploides* decreased drastically after 1974, principally, because such a small part of the 1974 crop survived to the following year. The reduction was greatest in quadrats D-12, E-12 and F-13, and similarly in the main plant area on the eastern part of the island. Relatively few new plants were found, or about 167, which is much fewer than in the previous two years. In 1975 there were discovered 428 plants. Of these 337 survived the winter, and as there were altogether 163 new plants the total became 500 in 1976. There was thus comparatively little loss, most having been in



Fig. 8 The sea sandwort, *Honckenya peploides*, in 1971.

quadrats B-12, C-12, and G-14, over which the sea flows in the winter. For overwintering of this species see Fig. 9.

By far, the most losses occur in the first year, often being due to drifting sand. If the new seedling is not submerged during the first winter, it will most likely continue to survive, if it is in a fairly favorable habitat, or not in the drifting sand where it may be washed away. In its second year, the plant already attains a considerable size, and may cover an area of about 30—50 cm<sup>2</sup>. Most of the sea sandworts cover about 50—100 cm<sup>2</sup> and have 5—10 culms. Some of the largest are No.-70—39 (90×90 cm) in quadrat G-13, No.58—83 (100×80 cm) in F-13. The largest sea-sandwort plants from 1968 and 1969 now cover an area of 8000 cm<sup>2</sup>, and are the most conspicuous plants on the island.

These permanent flat tufts are gradually increasing in size and productivity and are annually producing flowers and pods. In 1976 plant No. 58—56 in quadrat K-18 produced the greatest number of pods, or about 1000, and a total of 73 sea-sandwort plants flowered during 1976. But the propagation of single plants may sometimes be slowed down by the blowing sand or even by injuries caused by birds. The pair of great black-backed gulls that nested in quadrat N-10 in 1976, for example, disturbed 20 sea sandwort plants when building their nest, but these partly recovered during the summer. The distribution of the species, however, increases steadily and surprisingly evenly as may be seen on the map. Sea-sandwort was found in 50 quadrats in 1976 so that the species has gradually colonized new areas and spread to four new quadrats since 1975. However, up to now, the sea sandwort cover on Surtsey is relatively small in the vast open fields of lava and sand, but then other plants have even less cover.

# HONCKENYA PEPLOIDES

NO. OF PLANTS

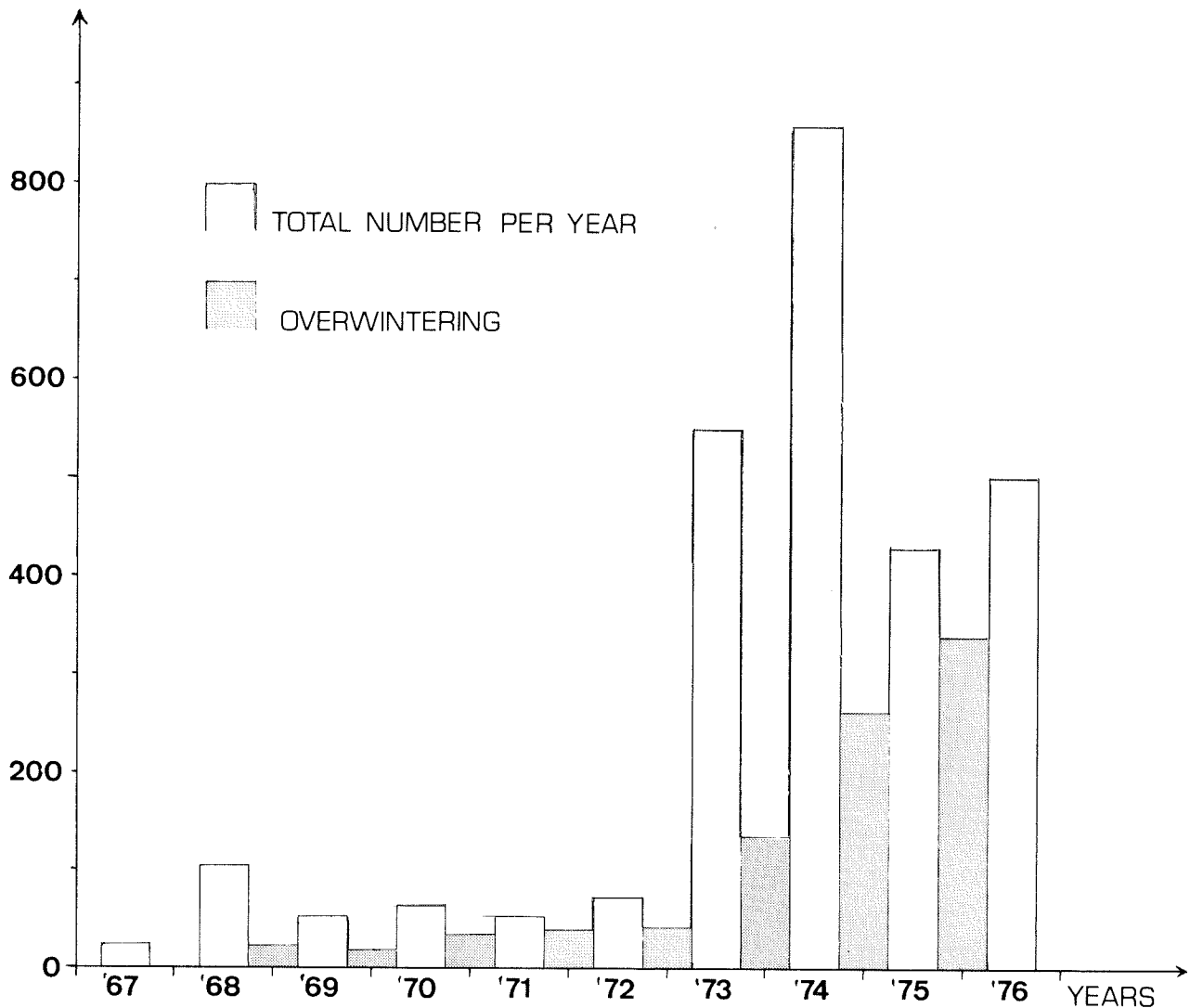


Fig. 9. The total number and overwintering *Honckenya* plants per year on Surtsey.

## *Cochlearia officinalis* L.:

In 1969 the scurvy grass was added to the flora of Surtsey when four plants of this species were discovered in the lava on the eastern side of the island, and this species has since become a permanent resident. In 1970 there were 30 plants found growing at the same location and in 1971 the population amounted to 21 plants. The plants varied greatly in size, or from 1.5 to 30 cm. in diameter. The biggest one was plant No.38 in quadrat S-14 from 1970. It flowered early and siliculae had already formed in June. Observations made in late August, revealed 8 seedlings that had grown up from its seeds, and more seeds were germinating. Similarly many other scurvy grass plants flowered and dehisced seed that same summer. During these years many of the plants

were found near a water container and had obviously been dispersed by birds, that had been attracted by the drinking water.

The other plants of the species that were found growing in Surtsey had probably all been dispersed by birds. In some cases the plants have grown up out of bird droppings or bird carcasses, though in other cases no definite assertion can be made. *Cochlearia* is widely distributed over the island, much more so than *Honckenya*, which tends to support the abovementioned theory of the dispersal route.

In 1972 the scurvy grass became the most abundant species on Surtsey with 98 individuals and it has outnumbered all others ever since except in 1974 when the sea-sandwort took the lead. Most of the scurvy grass in 1972 were seedlings, the

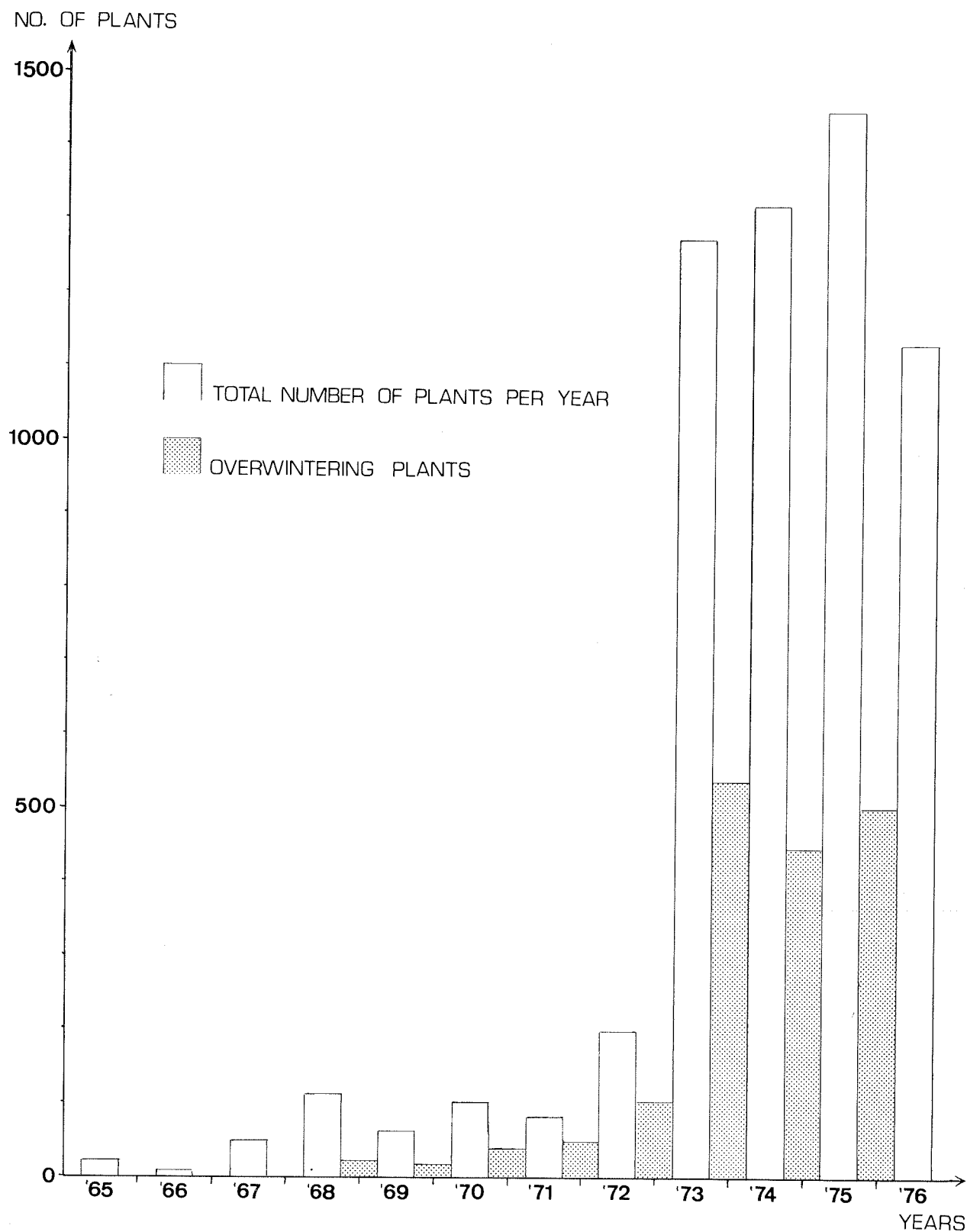


Fig. 10. The total number of vascular plants per year and overwintering plants on Surtsey.

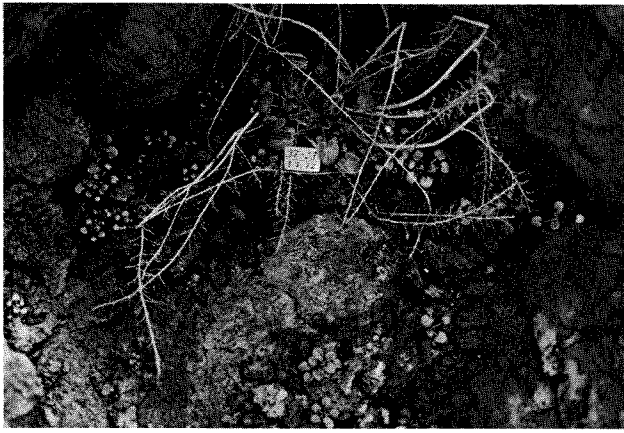


Fig.11 The scurvy grass, *Cochlearia officinalis*, a mature plant and a colony of seedlings in 1972.

Photo: Skúli Magnússon

descendants of plant. No.38. They occupied an area within a 50 cm distance from the mother plant. Over 80 seeds germinated in 1972 but at least 10 seedlings failed to mature due to crowding and various other reasons. In quadrat S-14 there were seven additional plants of the same species which were very likely also the descendants of the same mother plant and had only dispersed farther away. Plant No.30 in quadrat K-18 also matured seed during that same summer but none of these developed.

The only *Cochlearia* to flower during the summer 1972 was plant No.36 in quadrat O-7. 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 *Cochlearia* plants found that summer had survived in Surtsey since the year before (Fig. 11).

In 1973 there was an enormous increase in scurvy grass plants, when 586 plants were counted. Some of these were, however, only small seedlings and mostly offsprings of two plants on the southern side of the lava in quadrats R-11 and S-14. In 1974 there was a decrease in number of plants to 372 individuals. The number of plants increased again by about 491 in 1975 as a result of the large number of seedlings from local sources that year. About 6 plants flowered in the summer and dropped seeds which sprouted as soon as they reached the earth, with the result that a large number of small seedlings were immediately formed around the mother plant. Plant No. 75—1 in S-14 was the main contributor; about 550 seedlings were counted around that plant alone. *Cochlearia officinalis* plants were now found in two new quadrats, J-8 and K-8.

The number of scurvy-grass plants decreased somewhat in 1976 compared with the previous

year, or from 863 down to 501. This decrease was mainly due to a great loss of seedlings, which was unusually high. Most of the scurvy-grass plants did not reach maturity, and only three of them produced seed during 1976. Scurvy-grass vanished from three quadrats during that year, from: J-18, P-10 and R-10, but a new plant was discovered in quadrat H-9. Scurvy-grass thus existed in altogether 7 quadrats and usually formed a colony of 10—20 plants, if seedlings were not included. Scurvy grass is not as conspicuous as the sea sandwort but it is a good seed producer and capable of occupying crevices in the lava which it colonizes readily.

#### *Stellaria media* (L.)Vill.:

The common chickweed became the new addition to the island's flora in 1970. It was apparent that it had grown up from bird droppings, as four plants were growing together among fragments of shells. That same summer two of these plants bore 12 fruits and a number of seeds. Two plants grew up from those in 1971. During the final observation that summer they were still only seedlings and had not developed much. In 1972 there were two plants of that species still growing on the island. In 1973 only one plant was left, and since it perished in 1974, the species has not been rediscovered.

#### *Cystopteris fragilis* (L.)Bernh.:

During a thorough search in the lava in 1971, three specimens of brittle bladder-fern were found growing down from a cave roof in quadrat N-9. The plants were 2 to 3 cm. long and about 0.5 cm broad. They grew above a sand heap deposited under the lava shelf (Fig. 12)

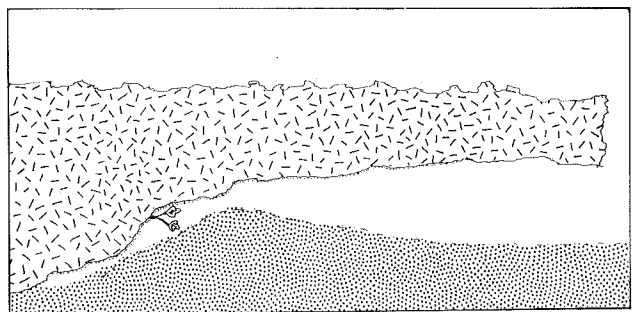


Fig. 12. Schematic drawing of the cave with *Cystopteris fragilis* growing down from its roof.

One of these plants survived the winter, being well protected under the protruding lava. In addition to this plant three new ferns were discovered during 1972. Two of these were found in shallow lava hollows in quadrat O—13, i.e., No. 117 and 118. The third plant was discovered in the lava crater in quadrat I-8. The conditions were the most fa-

vourable for this individual as it grew at 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. Three plants survived in 1973 and 1974. Only one of the plants from 1974 survived the winter of 1975, No.72—113 in I-8 but a new plant, No.75—62, was found in the same hollow. Both plants were very small, the older having only two leaves, the larger of which was 7 cm in length. Neither of the plants was fertile, but both were alive in 1976, had three blades each but neither produced any spores during the year.

*Angelica archangelica* L.:

In 1972 two plants of this species were discovered on the north-eastern shore of Surtsey in quadrats B and C-14. This was the first time members of this species colonized the island although its seed had previously been found on the shores of Surtsey. The two plants were only small seedlings with cotyledons and the seed coat attached. They were found growing at the high-tide mark, which indicates that the plants developed from seed which had drifted to Surtsey by the ocean. One of the plants, No.120, died already during the summer 1972 and the other was lost the following winter.

In 1973 the species was again represented. This time by two small seedlings growing at the edge of the lava in quadrat L-16. Their fate was the same as the previous ones and the species has not been rediscovered since.

*Carex maritima* Gunn.:

A small grasslike plant had been growing up on the lava in quadrat M-11 since 1970. It had previously been incorrectly recorded as lyme-grass but was in 1972 identified and listed as the sedge *Carex maritima*. It did not produce flower stalks but increased in size by stolons and propagated vegetatively so that a colony of several plants was formed. This plant developed until 1975, when it had 86 culms and 8 panicles, but in 1976 it was badly damaged, because the pair of great black-backed gulls, that were nesting in quadrat N-10, tore at it and used it for building material in their nest. It was nearly annihilated, but later that summer it was showing some recovery and had again formed two culms and eight leaves (Fig. 13).

Two additional *Carex maritima* were found in 1975. One was in quadrat P-9 and did not survive the winter, but the other in quadrat M-9 produced



Fig. 13. The curved sedge, *Carex maritima*, plant No. 70—72 showing vegetative propagation.

Photo: Skúli Magnússon.

one leaf in June which had disappeared by August. No new plant was found in 1976. *Carex maritima* thus suffered much loss during that year.

*Puccinellia retroflexa* (Curt.) Holmb.:

In 1972 two small plants, 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 the water containers had been placed. It is thus very likely that these plants developed from seed dispersed to this area by birds. It was first believed that they were of the species *maritima* but it may now be considered certain that they belong to the species *retroflexa*. The plant in quadrat R-14 flowered and developed seed in 1973.

In 1974 there were eight offspring of that plant growing in quadrat R-14. Four of these second generation plants flowered in the summer of 1975 and bore seed. One unidentified plant, No.74—89 in quadrat R-14 from 1974, proved also to be *Puccinellia* so the total number of plants in that year became ten. In 1976 there were, however, only eight plants found at this spot. Two of them grew in a fissure, the others up on the lava table. The plants growing in the fissure were considerably larger than those on the lava. One of those, No.74—89, produced three panicles, and this was the only *Puccinellia retroflexa* to flower that year. Two of the panicles that emerged in August produced mature seed and one emerged at the end of the season but did not develop further.

*Tripleurospermum maritimum*, (L.) Koch ssp. *phaecephalum* (Rupr.) Hämet-Ahti (syn. *Matricaria maritima*):

One scentless mayweed, No. 40, grew in quadrat S-14 in 1972. Its habitat was a sand covered lava hollow, and the plant grew there among the *C.officinalis* individuals that occupied the same hollow.

There is no indication as to how this plant may have been dispersed to this place, but it could have been brought in by birds like the *C.officinalis* plants. The plant is common on the neighbouring islands and various plant parts had previously been found in the drifted material on Surtsey's shores.

In 1973 four more individuals were discovered on the lava on the easternside of the island in quadrats K-18 and L-17. These may very well have developed from seaborne seeds. In 1974 there were only two plants left and the year after only one plant remained in quadrat S-14. It had not grown any larger nor flowered, which was probably due to the soil's infertility. The plant was still very small in 1976. It had only two leaves, each of which was about 1 cm in length.

Another specimen of scentless mayweed was found in the lower part of the lava crater in quadrat I-18. It was given the number 76—171. This plant was much larger than the old one. It produced 20 leaves, had a diameter of 7 cm, but did not flower. It is almost certain that its seeds were carried by a bird for the plant is too far from the sea to have been brought that way. Sheltered by the crater the future of this plant would seem to be fairly secure.

#### *Festuca rubra* L.:

The red fescue is the most common grass species on the Westman Islands and it was reasonable to expect it to become a colonizer on Surtsey. In 1967 this species was found growing in sand in quadrat F-15 (Einarsson, 1967) but the specimen was washed away by the sea the following winter. In 1973 a seedling of the red fescue was found on a sandy ridge in quadrat L-12. It continued to develop in 1974.

There were two specimens of *Festuca rubra* on the island in 1975. One was a new colonizer that year, growing in a hollow, together with scurvy-grass, in quadrat J-18 and it is safe to conclude that a bird must have brought the seeds to this spot at the same time but that the scurvy-grass seed germinated first. When inspected in June, 1976 the hollow had filled with sand and the plant had therefore been covered up.

The other *Festuca rubra*, in quadrat L-12, had grown on the island since 1973. It gradually increased in size until 1975, when it had 90 culms. In 1975, the pair of great black-backed gulls that nested in in quadrat N-10 used it for material in nest building. All the surface part of the plant had been thus removed. In August this red fescue plant had formed one culm with three leaves, however the plant's future is now very uncertain.

#### *Cerastium fontanum* Baumg.ssp. *scandicum* H. Gartner:

A whole colony of *Cerastium fontanum* ssp. *scandicum* plants was found in quadrat M-15. These may have developed from a single plant, which was not detected in 1974. On June 24, 1975, the colony consisted of seven plants, of which four were in flower. By August 15, 1975, the plants had increased to eight, all had flowered and dropped seed. About 98 minute seedlings had also formed around them by that time.

The following summer of 1976, there were 38 plants growing at the same site in a plot of about 10 m<sup>2</sup>. Many of these plants matured during the summer, 16 plants flowered and when inspected on August 12th there were 250 flowers and 250 pods with seeds. At the end of the summer there were 99 plants including seedlings in the colony.

*Cerastium fontanum* ssp. *scandicum* is a common dry-land plant throughout Iceland, including Heimaey. It is not easy to say how it was carried to Surtsey, though it is not likely that the seed was brought by sea, since the plant grows quite a distance inland on the island. It is most likely that the seed was brought by a bird. Conditions on the island seem to suit the plant very well; it grows in sand which has blown onto the lava and settled in depressions. The future of this species would seem to be fairly secure on the island, and its propagation area is likely to increase in the next few years.

#### *Equisetum arvense* L.:

Two *Equisetum arvense* plants, No.75—74 and No. 75—75, were found in 1975 in quadrat J-9 by the lava crater Surtur II. They were growing on the same patch on the bare lava beside a heat vent. The plants were both very small with traces of three stems on each, all less than 2 cm long, but they were growing up out of the prothallium. About 12 additional prothallia were found in the neighbourhood which had not formed stems.

*Equisetum arvense* is the most common species of the Equisetaceae in Iceland and grows, amongst other things, on sand and pumice. It has been very



prominent on Heimaey since the eruption there in 1973 and the accompanying fall of ash.

The plant was no doubt brought to Surtsey through windborne spores, but it is not easy to say when, since it is not known for certain how long the gametophyte takes to mature after the spore sprouts. Conditions ought to be very favourable for the plant on Surtsey and it will probably hold its own there although it was not found again in 1976.

#### *Sagina* sp.

A very small plant, No. 75—78, of the genus *Sagina* was found in 1975 in quadrat No. I-10, probably *S. saginoides* or *S. procumbens*, but because of its small size and absence of flowers it was not possible to reach a conclusion. Both these species are very common all over Iceland and grow in similar conditions.

It is most likely that the seed was brought to the island by a bird, though it is not out of the question that it may have been carried by the wind, since the seed is small and light. It can hardly have come by sea, since the plant is growing far away from the shore at an altitude of about 90 meters above sea level.

#### *Silene vulgaris* (Moench) Garcke ssp. *maritima* (With.) Å.&D. Löve:

A small plant of *Silene vulgaris* ssp. *maritima* No. 75—94, was found in C-14; it was without flowers and not very mature. This species is very common in sandy soil throughout the country and thrives well by the sea. It is very common on Heimaey. The seed was without doubt carried to Surtsey by sea. It is very unlikely that the plant will survive in this spot since it is covered by the sea in the wintertime.

#### *Juncus* sp.

A small plant, No. 75—64, was found in 1975 in quadrat K-6. It had 11 needle-shaped leaves, but no flower. It seemed safe to assume that this plant was of *Juncus* sp. and probably *Juncus trifidus*, a common moorland plant throughout Iceland, which also thrives well in sandy soil. Judging from its location, there can be little doubt that the seed was carried to Surtsey by a bird. Transport by the sea is out of the question, and the seed is too large to be carried by the wind. The plant was vigorous and its future on the island looked promising, but the plant was not rediscovered in 1976.

#### Unidentified Plants:

During the course of this study a small number of unidentified plants have been recorded every year. These have been small seedlings, too underdeveloped to be identified with any certainty. Sometimes these plants have lived long enough to obtain proper names on the records, in other cases they have died out the following winter and been lost.

Two unidentified plants were, for example, found in quadrat J-8 in 1975. These were minute seedlings and thought to be of the family *Caryophyllaceae*. Similarly, a plant, which has not yet been identified and is probably a new species on the island was found in quadrat K-8 in 1976.

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