

MEDDELELSER OM GRØNLAND

UDGIVNE AF

KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND

Bd. 101 · Nr. 3.

TREÅRSEXPEDITIONEN TIL CHRISTIAN DEN X's LAND 1931-34

UNDER LEDELSE AF LAUGE KOCH

THE VASCULAR PLANTS OF EAST GREEN-
LAND FROM 71°00' TO 73°30' N. LAT.

BY

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WITH 7 FIGURES IN THE TEXT AND 20 PLATES

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1933

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PREFACE

This paper contains the first results of my botanical investigations during the first year of the three-year scientific investigation of Christian den X's Land under the leadership of Dr. LAUGE KOCH.

During the first year of this investigation, 1931—32, I had my base at the southern main station situated on Ella Island in 72°53' N. lat. All my observations on the vegetation of the country were made within the southern part of the Franz Joseph Fjord area, and the present floristic survey likewise comprises the tracts of land between Scoresby Sound and Franz Joseph Fjord.

On thus publishing my first botanical work from this fascinating and magnificent country, I cannot but express my thanks to my wintering companions at the station for the pleasant company, on journeys and during the work in the field as well as at the station itself during the dark time, which made the often troublesome life a feast. My thanks are further due, and not least, to the leader of the expedition, Dr. LAUGE KOCH, for the interest he, though not a botanist, has taken in the botanical investigations in East Greenland, both during the preparations for the expedition and the working up of the material, as well as during the publication of the results.

Copenhagen, May, 1933.

INTRODUCTION

The present floristic survey comprises East Greenland between Scoresby Sound and Franz Joseph Fjord, i. e. the land between c. 71° and $73\frac{1}{2}^{\circ}$ N. lat. It may not, perhaps, seem very convenient to treat floristically such a limited area. Thus, to obtain a general view, it might have been preferable to furnish a complete survey of the floristic data for the whole of Northeastern Greenland, i. e. the Scoresby Sound area and the regions north thereof, which presumably form a floristic unit compared with the more southerly coastal tracts from Scoresby Sound to Ammagssalik and from Ammagssalik to Cape Farewell, from which parts floristic surveys are already under preparation by T. BØCHER and G. SEIDENFADEN respectively. A corresponding floristic survey of the more northerly regions, worked out by the botanist of the Eskimonæs station, P. GELTING, will appear simultaneously with this paper. Our publication of the total floristic results of the expedition in two parallel rather than in one single paper, which would undoubtedly have facilitated the general view, has been dictated by a desire to make as exact as possible the remarks, though sparse, on the ecology of the various species which it has been attempted to add under the individual species.

As the information given in the usual lists of vascular plants about the ecological conditions is generally very deficient, I have considered it of importance to furnish a contribution, if possible, to our knowledge of the ecology of the species, and during the work in the field throughout the year my attention has also been directed towards this branch of botany, all the more so because my investigations were chiefly of an analytic-plantgeographic kind. Since, however, it is unsafe to extrapolate from highly local observations to larger areas, I only consider it justifiable to treat as a whole this small area, the climatic conditions of which agree fairly well with those encountered in the localities examined. The consideration alone of the climatic differences between the outer coast and the inner ramifications of the fjords warns one to be cautious.

My investigations have contributed but slightly to the increase of the number of localities and species within the area. As my chief work has another object, being plant-sociological, I have only visited few localities, and the floristic investigations in the field treated in this paper have only been carried out to the extent necessary for the vegetation-statistical notes. To these must be added the sporadic and casual finds of plants which could not be avoided during the walks to and from the selected working fields, and these finds are the most essential in this connection. Altogether it hardly seems too pretentious to presume that my three "districts" have been at least just as carefully investigated, even floristically, as the "localities" of earlier florists during their rapid journeys. Since my statements as to habitat, snow-covering, and florescence almost exclusively refer to these districts, they have been kept distinct from the earlier localities in the list of species.

As regards the time for the investigations and consequently for the biological observations in the various "districts", the following brief information may be furnished about the time of my stays in the various places, in chronological order:

1931: September 1st—5th, Ymer Island; September 15th—21st, Cape Hedlund. Wintering at the southern station on Ella Island, Cape Oswald, whence most of the direct observations of the snow-covering in the actual winter months were made. — 1932: In April a short visit to Ymer Island and Cape Hedlund to supplement my observations on the snow-covering; June 7th to July 6th, Traill Island; July 10th—16th, Cape Hedlund. During the summer the east side of Ella Island was only visited once, on July 26th. The north side of Kempe Fjord and Röhss Fjord were visited on a motorboat trip on July 28th—29th. July 30th to August 19th, Ymer Island.

Even if the snow-covering and similar conditions could not, as a matter of course, be observed simultaneously within the three "districts" investigated, viz. Cape Hedlund in the inner fjord area, Ella Island and Ymer Island in the middle fjord area, and Traill Island in the outer coast area, still my stay in the various places at different times of the year has given me some idea of the climatic differences between the outer coast and the inner fjords.

The question of the climate, however, will be discussed in a work to be published later in connection with the plant-geography of the country. Here only some few remarks will be premised, partly to illustrate the difficulties that are encountered when one is to give universally valid data on biologic-ecological conditions, partly to point out the, unfortunately rather limited, value of such information.

During my stay at Cape Hedlund in the month of April I was astonished to ascertain that here in the inner fjord ramifications the

effects of the foehn winds were of a far less violent character than in the middle fjord areas and, as it proved later, in the outer coast area, judging from the nature of the snow-covering. In the interior of Kempe Fjord the snow had not even been blown so hard that it was suitable for sledging. Even in winter (the month of April) the dependence of the vegetation on the snow-covering showed a conspicuous difference from Ella Island. While the growths of dwarf-birch on Ella Island were covered with snow, they were characteristically free of snow at Cape Hedlund. Thus it seems probable that it is the desiccating effect of the foehn winds in connection with the wearing effect of the snow- and sand-drift that are inimical to the birch and its companions rather than the frost itself.

Thus, for instance, the dwarf-birch societies are free of snow at the head of Kempe Fjord, while they are covered with snow in the middle fjord area. However, it is hardly a universally valid rule that the foehn winds are less violent at the head of the fjords, but more probably it is a local phenomenon of Kempe Fjord, the inner parts of which lie partially sheltered below the nearly 2000 m high mountain walls. In fjords which by way of a glacier rise evenly to the heights of the inland ice, conditions are doubtless entirely different.

Thus the East Greenland climate is locally conditioned to a very great degree, which renders it exceedingly difficult to make any general statement as to the dependence of the species on climatic factors. The amount of precipitation also, and in connection with it the duration of the snow-covering, are subject to great local fluctuations. In the middle and inner fjord regions the snowfall is extremely slight and hardly attains half the amount of the snowfall at the outer coast, and on account of the greater heat and the dryness of the air during the spring in the inner fjords, the melting of the snow likewise takes place at a much quicker rate here than along the coast. Thus at my departure from Ella Island on June 5th the land was largely free of snow. On arrival at the region of Traill Island opposite the Scott Keltie Islands on June 7th, the land was still covered with snow except the hills exposed to the wind. Great, however, was my astonishment when on an excursion to a neighbouring mountain plateau at 500—700 m altitude I found no less than 37 species in flower; large stretches were free of snow, and one received the impression that it was summer here, while the lower regions still lay in their winter-sleep. Here *Salix arctica* with nearly fully developed, though not mature, capsules occurred on slopes with a southward exposure, and in small swamps on the mountain plateau *Eriophorum polystachyum* had already flocculose heads.

While on the slopes of the inner fjords the luxuriance of the vegetation shows a marked decrease upwards from the very sea-level, con-

ditions at the outer coast are quite reversed in this respect, the greatest luxuriance being here encountered from 300 to about 500—600 m altitude. At the outer parts of Traill Island a cold easterly wind usually blew at sea-level throughout the month of June, not rarely accompanied by fogs, while a warm and dry westerly wind was blowing at 400—500 m altitude. On approaching the outer coast the foehn-like winds, heated by the steep descent from the inland ice, are evidently forced upwards by the cold current of air that makes its way inland from the sea ice through fjords and valleys. In the middle fjord regions, in the broad foreland within the Franz Joseph Fjord area, however, the cold sea-winds hardly make themselves felt; here the vegetation exhibits very nearly the same luxuriance from sea-level to about 500 m altitude.

The more abundant precipitation and the later and more protracted melting of the snow in connection with the humid sea-winds create a more oceanic climate at the outer coast than in the inner fjords, which have practically a desert climate. This sets its mark not only on the floristic composition of the vegetation, which immediately catches the eye, but also on the occurrence of the species common to the various climatic belts. Thus *Vaccinium uliginosum*, which within the continental zone grows mainly in damp places, will be seen to replace the dwarf-birch within the oceanic zone, i. e. it mainly occurs, at any rate in pure growths, on dry and sunny slopes.

It will be evident from the above-mentioned examples that even within a relatively limited area like that here treated, the behaviour of the individual species as regards habitat, snow-covering, and altitudinal limit can only be given with certain, not too exactly computed, approximations.

In the determination of the altitudinal limits of the species we are further faced with the difficulty that within the area in question these are to a greater extent determined by the nature of the ground than by the actual altitude. In this respect the fjord area investigated by me, notably the inner parts, present great difficulties, since here the land rises steeply to about 2000 m altitude, in a sharp and bleak configuration, often entirely devoid of vegetation. On such ground the usual conditions of exposure, soil, and watering on which the existence of a species depends, may suddenly disappear on the way up the mountain, and its altitudinal limit thus becomes artificial, i. e. not altitudinal-climatically determined.

There is still another factor, varying from place to place and especially reflected in the composition of the individual local floras, which must be taken into consideration, viz. the greatly varying geological conditions within the area. The land round the inner fjord ramifications is mainly built up of gneiss. The middle fjord area, however,

is made up of older sedimentary deposits, of Algonkian and Cambrian age. Thus Ella Island and parts of my Ymer Island district are chiefly built up of the highly calcareous rocks of the Eleonore Bay Formation. The islands situated outside these areas consist mainly of Devonian sandstone and Carboniferous deposits, with basalt intrusions in patches in the outer parts (see LAUGE KOCH: The Geology of East Greenland. Medd. om Grøn. Bd. 73^{II}, 1929, Pl. II).

According to the statements of experienced members of expeditions and hunters, the climate varies considerably from year to year. Evidently the spring of 1932 set in rather early, which again caused an early appearance of the vegetation, the greater number of the species flowering exceptionally early. If the dates of florescence of the various species within the area now and then inserted by VAAGE are compared with my observations, all his dates for flowering will be seen to be so much later than mine that it is immediately obvious that they cannot be solely due to possible annual oscillations in the date for the breaking of the frost. As a matter of course, observations on the florescence made after the actual summer has ceased from a vegetative point of view, have chiefly reference to laggard late-flowering individuals, even if the special temperature conditions of the individual years may cause remarkable fluctuations in the dates for the florescence and fructification of the species.

The time for the setting in of the growth period is doubtless of essential importance for the fructification of the plants, especially the southern species. It was my impression that the great majority of the species were able to produce ripe seeds despite the short summer. As to species whose fructification was evidently deficient, these have been noted in the description of the individual species.

Throughout the year of my stay at the wintering station on Ella Island I made daily temperature measurements by means of a maximum and minimum thermometer placed, as far as possible, so as to avoid inaccuracies caused by the intense insolation¹⁾. The instruments were of the type (from FUESS, Berlin) usually employed at meteorological observation stations and now and then they were adjusted after standard thermometers. — To illustrate the dependence of the florescence upon the temperature, the curve showing the mean temperatures of the spring and summer months is given, computed for periods of five days on the basis of mean figures for the maximum and minimum temperatures of each twenty-four hours (fig. 1).

¹⁾ During my absence from the station, the remaining members, especially A. DE LEMOS, the wireless operator, has kindly undertaken the meteorological service.

The botanical collections made on earlier expeditions to the regions of Northeast Greenland which form the area of the Triennial Expedition, have especially contributed to our knowledge of the flora of the northernmost coast areas, while the southern tracts have to a less extent been subjected to botanical investigations. The first expedition on which botanical collections touching my area were made, is "Die zweite deutsche Polar-Expedition" 1869—70. The collections were made by COPELAND and PANSCH, and the bulk of them are derived from Clavering Island and adjacent tracts. But the expedition also penetrated far into Franz

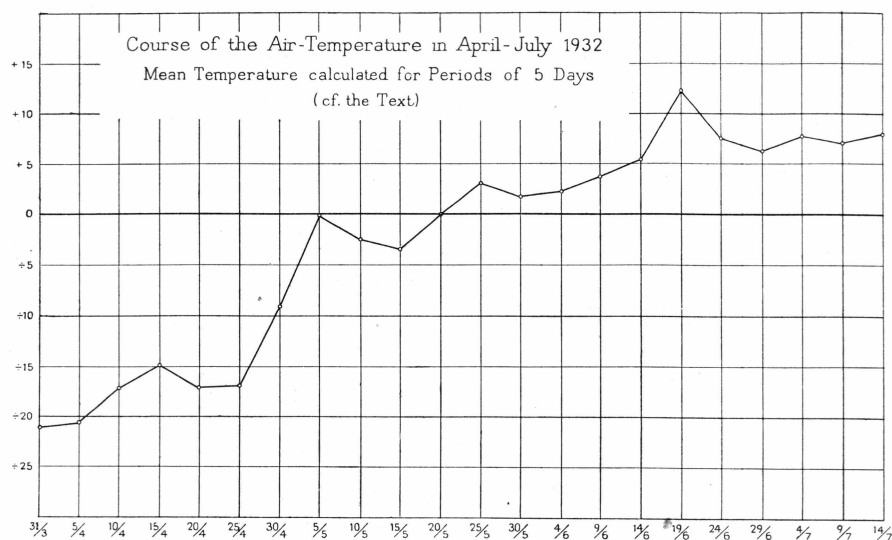


Fig. 1.

Joseph Fjord. However, no exact indications of the localities whence the collections are derived are at hand, and most of the plants from "Franz Joseph Fjord" were presumably collected at Cape Franklin and on the south coast of Gauss Peninsula. Valuable contributions to our knowledge of the flora of the area have further been yielded by NATHORST'S and DUSÉN'S collections on the Swedish expedition in 1899, during which the majority of the fjords within the area were first navigated and mapped. In the succeeding summer, 1900, the south coast of Davy Sound and Forsblad Fjord was visited by the Danish botanists HARTZ and KRUSE, members of the Carlsbergfondets Expedition, on a short excursion northward from Scoresby Sound. The whole journey to these southernmost fjord areas extended over eight days at the end of August. Considering the very short time at their disposal, the two botanists have furnished valuable contributions to the flora list of this stretch of the coast.

For more than twenty-five years no botanical nor other scientific investigations were made within the area. It was not till 1929 and 1930, during the Norwegian and Danish expeditions, that our knowledge of the flora of the area was essentially increased. The collections made by the botanist of the Danish expeditions, G. SEIDENFADEN, are especially derived from the regions north of my area; in 1929, however, a number of localities were visited in the interior of Franz Joseph Fjord and Kempe Fjord, while in 1930 collections were made in one single locality within my area, viz. Cape Elisabeth on Ella Island. The most complete flora lists so far available from the area here treated are, however, due to the Norwegian botanists VAAGE and SCHOLANDER, who made collections in 1929 and 1930. Finally some plants were collected by MENZIES, a member of LOUISE A. BOYD's tourist expedition in the summer of 1931, who has contributed one species to the flora list formerly unknown within the area, viz. *Pinguicula vulgaris*.

In the map in fig. 2 all the localities within the area from which collections of plants were made have been inserted. A complete list of the localities is given below.

In the map the three "districts" investigated by me are hatched, and in the following are denoted as the outer, the middle, and the inner district respectively.

My outer district, situated on Traill Island, comprises the region nearest the Scott Keltie Islands. On the slopes nearest Vega Sound the soil is made up of Devonian deposits, which by a basalt plateau at 500—700 m altitude are separated from a valley running parallel to the coast, Maanedalen, which opens towards the east, and where the Devonian rocks, mostly grey sandstones, are again exposed.

Of my middle district, Ella Island is built up of the Eleonore Bay Formation, i. e. calcareous sedimentary rocks interrupted at Cape Oswald by crests of tillite, i. e. conglomerates poor in lime. Here the ground is rather difficult of access, rising in terraces to 600—700 m, in the Bastion even to about 1500 m altitude.

On Ymer Island, Carl Jacobsen Bay and Botanikerbugt continue in a broad valley, the only actual lowland I visited, bounded on the west by mountains built up of the calcareous Eleonore Bay Formation, on the north and east by Angelin Mountain, about 2000 m high, and Røda Berget, about 1800 m high, which are built up of Devonian sandstones. The lower part of the valley is doubtless an ancient raised sea-floor; here numerous lakelets with shallow water occur, partially among dunes.

My inner district comprises only the small peninsula jutting out from Lyell Land and bounded by Kempe Fjord and Rhedin Fjord. The peninsula forms a small isolated mountain boss, rising to about

700 m altitude and separated by a transverse valley from a mountain massif, 2000—3000 m high, with hanging glaciers. The substratum, which crops out everywhere, consists of gneiss with black and white streaks.

To some of the localities marked on the map by a ■ I made only flying visits. From these only particularly noteworthy species are recorded.

Despite the distinct floristic differences existing between the outer coast and the inner fjord areas, an adequate division into natural floristic areas is difficult to make, since, as suggested above, we are here concerned not only with climatic differences, but also with varying geological conditions and hence it is often difficult to decide which of these factors exerts the greatest influence on the character of the floral composition of a particular locality.

As will appear from the map, my area has been divided into three parts running parallel to the outer coast and the edge of the inland ice. With certain reservations the easternmost part can be considered a climatic outer coast zone, when at the same time it is pointed out that the basalt is restricted to this zone. The outermost parts of Geographical Society Island and Traill Island are still rather deficiently investigated. Further investigations may possibly result in the ascertainment of an actual floristic coastal zone in a stricter sense, which for the time being, within the area here treated, is restricted to Bontekoe Island.

The two inner zones presumably differ but slightly in a climatic respect, but they differ all the more in a geological respect. The zone occurring nearest to the inland ice is chiefly built up of gneiss, the midmost zone, however, essentially of sedimentary rocks.

Below, in the indications of the localities, the three zones between the outer coast and the inland ice will be designated the outer, middle, and inner part respectively.

As regards the arrangement of the list of species it should be remarked that the Pteridophytes are mentioned first, then follow the Dicotyledons and the Monocotyledons respectively. Within these systematical main groups, families, genera, and species are mentioned in alphabetical order.

After the list of species follows a list — based upon my own observations and earlier statements — of climatic species of the outer coast and the inner fjords respectively, i.e. species comparatively oceanic or continental within the area, as also a list of basophilous and acidophilous species. As a matter of course, only a minority of the species occurring within the area can be tabulated according to the said factors with any degree of certainty.

Complete list of localities (cf. map in fig. 2):

(I) Original investigations:

Districts comparatively well investigated:

- A. Outer district: Traill Island, about $72^{\circ}40' - 72^{\circ}47'$ N. lat., $23^{\circ}00' - 23^{\circ}30'$ W. long.
- B. Middle district: Ymer Island, about $73^{\circ}07' - 73^{\circ}15'$ N. lat., $24^{\circ}20' - 25^{\circ}00'$ W. long., and Ella Island, about $72^{\circ}51' - 72^{\circ}54'$ N. lat., $24^{\circ}40' - 25^{\circ}20'$ W. long.
- C. Inner district: Lyell Land, Cape Hedlund, about $72^{\circ}51' - 72^{\circ}54'$ N. lat., $24^{\circ}40' - 25^{\circ}20'$ W. long.

Localities but slightly investigated, whence only rare species are recorded:

- a. Mineralbugten, north side of Kempe Fjord, about $72^{\circ}54'$ N. lat., $25^{\circ}40'$ W. long.
- b. About 5 km east of Cape Beijer, north side of Kempe Fjord, about $72^{\circ}47'$ N. lat., $26^{\circ}05'$ W. long.
- c. The current hole in Röhss Fjord, south side, about $72^{\circ}44'$ N. lat., $27^{\circ}06'$ W. long.

(II) Localities from earlier investigations, including some few, not formerly published, plant finds, partly available herbarium specimens, partly notes or collections made by other members of the expeditions:

(COPELAND's and PANSCH's localities: Those from "Franz Joseph Fjord" have been omitted on account of the lack of more accurate indications. They are, however, included in the list of literature (BUCHENAU & FOCKE) under the individual species, if finds are available from "Franz Joseph Fjord".)

Outer part:

- 1. Bontekoe Isl., about $73^{\circ}08'$ N. lat., $21^{\circ}20'$ W. long (DUSÉN, SEIDENFADEN 1932).
- 2. Cape Graah, Ymer Isl., about $73^{\circ}15'$ N. lat., $23^{\circ}10'$ W. long. (VAAGE).
- 3. Cape Humboldt, Ymer Isl., about $73^{\circ}10'$ N. lat., $23^{\circ}00'$ W. long. (VAAGE).
- 4. Mt. Celsius, Ymer Isl., about $73^{\circ}10'$ N. lat., $23^{\circ}05'$ W. long. (VAAGE).
- 5. S.W. of Robertson Isl., Geogr. Soc. Isl., about $73^{\circ}04'$ N. lat., $22^{\circ}00'$ W. long. (VAAGE).
- 6. Sanddal, Geogr. Soc. Isl., about $73^{\circ}04'$ N. lat., $23^{\circ}30'$ W. long. (VAAGE).
- 7. Husbugt, Geogr. Soc. Isl., about $72^{\circ}50'$ N. lat., $22^{\circ}55'$ W. long. (VAAGE).
- 8. 5 km W. of Husbugt, Geogr. Soc. Isl., about $72^{\circ}50'$ N. lat., $23^{\circ}00'$ W. long. (VAAGE).

9. 15 km W. of Husbugt, Geogr. Soc. Isl., about 72°50' N. lat., 23°05' W. long. (VAAGE).
10. Gaaseø, Vega Sound, about 72°48' N. lat., 23°00' W. long. (VAAGE).
11. Scott Keltie Isl., Vega Sound, about 72°45' N. lat., 23°00' W. long. (DUSÉN).
12. Veganeø, Traill Isl., about 72°48' N. lat., 23°04' W. long. (VAAGE).
13. Cape Parry, Traill Isl., about 72°25' N. lat., 21°50' W. long. (DUSÉN).
14. Cape Simpson, Traill Isl., about 72°08' N. lat., 22°00' W. long. (VAAGE).
15. Drømmebugt, Traill Isl., about 72°10' N. lat., 22°35' W. long. (NOE-NYGAARD, 1932).
16. Mt. Steenstrup, Traill Isl., about 72°15' N. lat., 23°00' W. long. (NOE-NYGAARD, 1932).
17. Antarctic Hbr., Scoresby Land, about 71°58' N. lat., 23°00' W. long. (DUSÉN, VAAGE).
18. Cape Seaforth and Ørsted Valley, Scoresby Land, about 71°50' N. lat., 22°50' W. long. (HARTZ & KRUUSE).
19. Pingel Valley, Head of Fleming Inlet, Scoresby Land, about 71°37' N. lat., 23°00' W. long. (HARTZ & KRUUSE).
20. Cape Brown, Scoresby Land, about 71°45' N. lat., 22°20' W. long. (HARTZ & KRUUSE).
21. Cape Fletcher, Canning Land, about 71°35' N. lat., 22°05' W. long. (HARTZ & KRUUSE).
22. Murray Isl., about 71°32' N. lat., 21°40' W. long. (DUSÉN).
23. Cape Greg, Liverpool Coast, about 70°58' N. lat., 21°40' W. long. (HARTZ & KRUUSE).

Middle part:

24. Blomsterbugt, Ymer Isl., about 73°20' N. lat., 25°14' W. long. (SEIDENFADEN, VAAGE).
25. Ruth Isl., about 73°00' N. lat., 24°55' W. long. (DUSÉN).
26. Marie Isl., about 72°56' N. lat., 24°55' W. long. (VAAGE).
27. N. of Mt. Swedenborg, Geogr. Soc. Isl., about 73°02' N. lat., 24°20' W. long. (DUSÉN).
28. Cape Elisabeth, Ella Isl., about 72°54' N. lat., 24°43' W. long. (SEIDENFADEN, VAAGE).
29. Holmsvig, Traill Isl., about 72°32' N. lat., 24°20' W. long. (VAAGE, ROSENKRANTZ 1929).
30. Cape Peterséns, Davy Sound, about 72°25' N. lat., 24°40' W. long. (VAAGE).

Inner part:

31. Junction Valley, Andrée Land, about 73°18' N. lat., 25°52' W. long. (SEIDENFADEN).

32. Renbugt, Andrée Land, about $73^{\circ}22'$ N. lat., $26^{\circ}38'$ W. long. (VAAGE).
 33. Head of Franz Joseph Fjord, north coast, about $73^{\circ}10'$ N. lat., $27^{\circ}30'$ W. long. (DUSÉN, SEIDENFADEN, MENZIES, ROSENKRANTZ 1929).
 34. Kjerulf Fjord, Suess Land, about $73^{\circ}08'$ N. lat., $27^{\circ}20'$ W. long. (DUSÉN, VAAGE).
 35. Nanortalik, Suess Land, about $73^{\circ}06'$ N. lat., $25^{\circ}48'$ W. long. (SEIDENFADEN).
 36. Mineralbugt, Suess Land, about $72^{\circ}54'$ N. lat., $25^{\circ}40'$ W. long. (SEIDENFADEN).
 37. Head of Dickson Fjord, about $72^{\circ}50'$ N. lat., $27^{\circ}10'$ W. long. (VAAGE).
 38. Röhss Fjord, north coast, about $72^{\circ}45'$ N. lat., $27^{\circ}05'$ W. long. (DUSÉN).
 39. Head of Röhss Fjord, about $72^{\circ}43'$ N. lat., $27^{\circ}10'$ W. long. (VAAGE).
 40. Röhss Fjord, south coast, about $72^{\circ}44'$ N. lat., $27^{\circ}05'$ W. long. (VAAGE).
 41. Cape Hedlund, Lyell Land, about $72^{\circ}42'$ N. lat., $26^{\circ}07'$ W. long. (SEIDENFADEN).
 42. Polhem Valley, Lyell Land, about $72^{\circ}27'$ N. lat., $25^{\circ}20'$ W. long. (HARTZ & KRUUSE).
 43. Head of Forsblad Fjord, about $72^{\circ}27'$ N. lat., $26^{\circ}10'$ W. long. (DUSÉN, HARTZ & KRUUSE).
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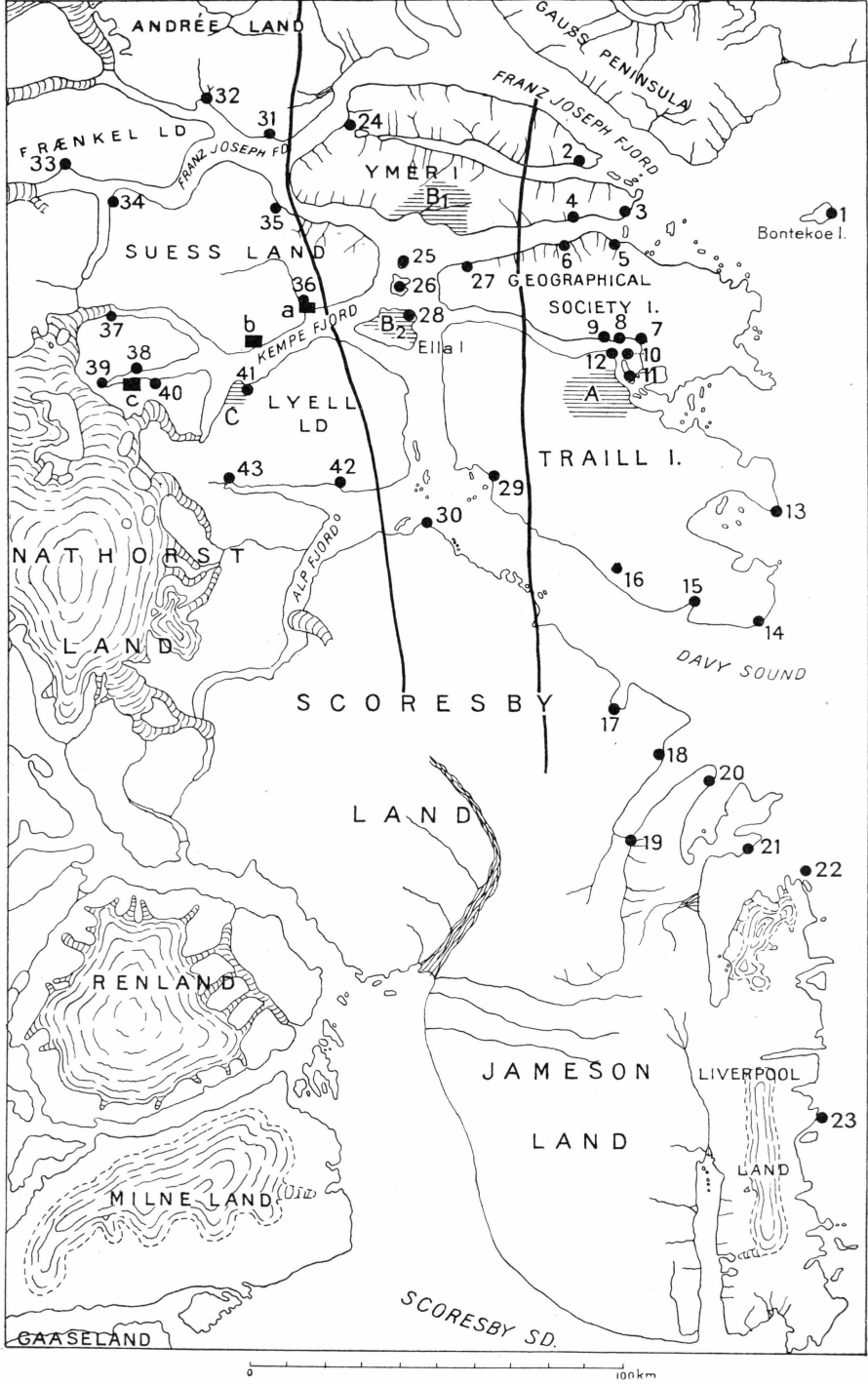


Fig. 2. Map of the localities investigated.

LIST OF SPECIES

(Abbreviations in the text: D = DUSÉN; H & K = HARTZ & KRUISE; SEIDF. = SEIDENFADEN; V = VAAGE.)

Pteridophyta.

Equisetaceae.

Equisetum arvense L.

LINNÆUS, Sp. pl., 1753, p. 1061.

Grows in damp soil, especially near running water and in snow-patches, but may also be met with in bogs.

Mostly snow-covered in the winter.

Ascends to about 500—600 m altitude.

Outer district: Very common.

Middle district: Common.

Inner district: Very common.

Former investigations:

DUSÉN 1901, p. 63 (*E. arvense* L. var. *alpestre* WAHLENB.). — KRUISE 1905, p. 208. — VAAGE 1932, p. 13.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 29. Holmsvig (V, ROSENKRANTZ, 1929); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

Fertile shoots are often developed, and appear in June. Sterile shoots generally low and prostrate. Submersed forms may sometimes occur. A luxuriant, tall form with sporophylls at the top of the green shoots, forma *campestris* (C. F. SCHULTZ) MILDE, Monographia Equisetorum, 1865, p. 225, was found in Maanedalen, Traill Island, on slopes with springs.

Equisetum variegatum SCHLEICH.

SCHLEICHER, Catal. Plant. Helvet., 1807, p. 27.

Grows in damp soil, especially in bogs and swamps and on shores of lakes.

Mostly snow-covered in the winter.

Ascends to 800—900 m altitude.

Outer district: Common.

Middle district: Very common.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 63. — KRUSE 1905, p. 207. — VAAGE 1932, p. 13.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Véganæs (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Petersens (V).

Inner part: 34. Kjerulf Fjord (D); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

Shoots with young sporophyll spikes enclosed in the uppermost leaf whorl are frequently met with, but the sporangia seem rarely to be fully developed.

Lycopodiaceae.

Lycopodium annotinum L.

LINNEUS, Sp. pl., 1753, p. 1566.

Outer district: Not observed.

Middle district: Not observed.

Inner district: Not observed at Cape Hedlund. Only one locality at the current hole in Röhss Fjord (c), where several well-developed colonies were found in the *Cassiope* heath at slight altitudes.

Specimens with stems up to 1 m long, and with well developed sporophyll spikes, were collected on July 29th, 1932. They belong to the forma *pungens* (LA PYL.) DESVAUX, Prodrôme de la famille des Fougères (Mem. d. l. Soc. Linneenne 1827), p. (182).

Not formerly observed in East Greenland north of the Scoresby Sound district.

Lycopodium Selago L.

LINNEUS, Sp. pl., 1753, p. 1102.

Grows in *Cassiope* heaths.

Snow-covered in winter.

Found up to 700 m altitude.

Outer district: Common.

Middle district: Not observed.

Inner district: Rather common.

Former investigations:

DUSÉN 1901, p. 62. — SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 13.

Localities:

Outer part: 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 17. Antarctic Hbr. (D, V).

Middle part: 27. North of Mt. Swedenborg (D).

Inner part: 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!).

The species seems only to be represented by the forma *appressa* DESVAUX, Prodrôme de la famille des Fougères (Mem. d. l. Soc. Linneenne 1827), p. (180).

Vegetative propagation by means of bulbils.

Ophioglossaceae.

Botrychium Lunaria (L.) Sw.

SWARTZ, Synopsis Filicum, 1806.

Outer district: One locality, Maanedalen, at 450 m, on a slope with a southern exposure and herbaceous vegetation.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 207.

Localities:

Outer part: 19. Pingel Valley (H & K).

The only specimen found had not fully developed sporophylls on June 19th. The species has its northern limit within the area, the locality mentioned being the northernmost known in Greenland.

Polypodiaceae.

Cystopteris fragilis (L.) BERNH.

BERNHARDI, Vers. Anordn. Farnkr. in Journ. f. d. Bot. herausg. v. SCHRADER, 1806, p. 27.

In rock-crevices and below rock-ledges.

Mostly snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Common.

Middle district: Rather rare.

Inner district: Rather common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 57. — DUSÉN 1901, p. 63. — KRUUSE 1905, p. 206. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 14.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 20. Cape Brown (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!). 34. Kjerulf Fjord (D,V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D).

Woodsia glabella R. Br.

ROB. BROWN, in RICHARDSON, App. FRANKLIN Journey, 1823 p. 754.

Mostly in dry, grassy places and in rock-crevices.

Generally free of snow in the winter.

Ascends to great altitudes, 1000 m and upwards.

Outer district: Common.

Middle district: Rather common.

Inner district: Rather common.

Former investigations:

[?] BUCHENAU & FOCKE 1874, p. 56 (sub nom. *W. ilvensis* R. Br.). — DUSÉN 1901, p. 63. — KRUUSE 1905, p. 207 (sub nom. *W. ilvensis* (R. Br.) γ *glabella* (R. Br.) TRAUTV.). — SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 14.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 19. Pingel Valley (H & K); 20. Cape Brown (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 36. Mineralbugt (SEIDF.!). 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K).

All moderately developed individuals were fructifying.

Spermatophyta.*Dicotyledones.**Choripetalae.**Betulaceae.**Betula nana* L.

LINNÆUS, Sp. pl., 1753, p. 983.

Mostly in dry, but also in damp soil.

Snow-covered in the winter, in the inner district, however, largely free of snow. Always free of snow early in the spring.

Ascends to about 600 m altitude.

Outer district: Here and there, most frequent from 200 to 400 m altitude.

Middle district: Very common, forming dense growths up to about 500 m altitude.

Inner district: Very common, dominating physiognomically over large areas.

Former investigations:

BUCHENAU & FOCKE 1874, p. 47 (sub nom. *B. nana* L. var. *genuina* REGEL). — DUSÉN 1901, p. 50. — KRUSE 1905, p. 187. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 42.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vaganæs (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.!); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord (V); 41. Cape Hedlund (SEIDF.!); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K).

Branches mostly more or less procumbent. Especially in open territory, where the main branches spread flatly over the surface of the ground, they send off roots from their under sides. These roots may be extremely vigorous, so that the individual shoots gradually become independent of the mother individual. In places less exposed to the wind, where the plant grows rather unhampered, it becomes more or less erect, but hardly attains a height of more than 30—40 cm.

Individuals of up to about 2 m length are frequently met with, but are then either prostrate or espalier-forming on rock walls. When the species grows in knolly marshes, one easily gets an exaggerated impression of its height, the knolls themselves, in which the plants have taken root, often attaining a height of 30—50 cm.

On Ella Island it was observed in incipient foliation on May 26th, and in flower on May 30th.

As early as July the leaves turn brown, but generally remain on the plant till next spring.

Callitrichaceae.

Callitriche verna L. emend. LÖNNR.

K. J. LÖNNROTH: *Observationes criticae plantae Suecicas illustrantes*, Upsaliae 1854, and *Botaniska Notiser* 1867, p. 3.

Outer district: Not observed.

Middle district: Not observed.

Inner district: One locality at the extreme point of Cape Hedlund in a desiccated "caldera" in gneissic rocks, at 50 m altitude.

The species was found creeping on damp soil on July 18th. At that time it bore flowers at the top of the shoots, while in the lower axils of the leaves there was an abundance of fruits, which, however, were not yet ripe.

Not formerly found within the area, and the locality mentioned is the northernmost known in Greenland.

Caryophyllaceae.

Arenaria ciliata L.

LINNÆUS, *Sp. pl.*, 1753, p. 425.

Subsp. *pseudofrigida* OSTF. & DAHL.

OSTENFELD & DAHL, *Nyt Mag. f. Naturvidensk.*, 55. Kristiania 1918, p. 217.

Grows in dry localities exposed to the wind.

Mostly free of snow in the winter.

Ascends to great altitudes (1000 m).

Outer district: Rather common.

Middle district: Common.

Inner district: Not observed.

Former investigations:

BUCHENAU & FOCKE 1874, p. 37 (sub nom. *A. ciliata* L.). — DUSÉN 1901, p. 20 (sub nom. *A. ciliata* L. var. *humifusa* (WAHLENB.)). — KRUSE 1905, p. 157 (sub nom. *A. ciliata* L. β *humifusa* (WBG.)). — SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 35 (sub nom. *A. pseudofrigida* OSTENF. & DAHL).

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 5. Mt. Celsius (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Veganæs (V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!); 21. Cape Fletcher (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D).

Incipient flowering observed on Traill Island at 500 m altitude on June 8th.

Cerastium alpinum L.

LINNEUS, Sp. pl., 1753, p. 438.

Mostly in dry, but also in damp soil.

Free of snow or, most frequently, snow-covered in winter.

Ascends to great altitudes (1000 m and even more).

Outer district: Very common.

Middle district: Common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 38 (sub nom. *C. alpinum* L. var. *lanatum*). — DUSÉN 1901, p. 21 and 22 (sub nom. *C. alpinum* L. et *C. alpinum* var. *lanatum* LINDBL.). — KRUUSE 1905, p. 158. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 36.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 13. Cape Parry (D); 14. Cape Simpson (V); 17. Antarctic Hbr. (D. V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K!); 22. Murray Isl. (D).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (D); 35. Nanortalik (SEIDF.!); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord (V); 41. Cape Hedlund (SEIDF.!); 43. Forsblad Fjord (D).

The very hairy forms seem to be of most frequent occurrence. The species was observed in flower on Traill Island at 500 m altitude on June 8th.

Cerastium Regelii OSTF.

OSTENFELD, Vasc. pl. coll. in arct. N. Am. by the Gjøa-Exped. 1904—1906 (Vid. Selsk. Skr., 1, Math. Nat. Kl. No. 8), Christiania 1910, p. 10.

Former investigations:

KRUUSE 1905, p. 159 (sub nom. *C. Edmondstonii* (WATSON) MURB. et OSTF. var. *caespitosum* (MALMGR.) DUSÉN [ex pte.]). — VAAGE 1932, p. 36 [ex pte.].

Localities:

Outer part: 1. Bontekoe Isl. (AANDSTAD!, 1932, Mus. Oslo); 17. Antarctic Hbr. (V!, AANDSTAD!, 1932, Mus. Oslo); 18. Cape Seaforth (H & K!).

I did not find this plant myself, and it hardly occurs at any great distance from the outer coast. VAAGE, however, records the species from (32) Renbugt and (24) Blomsterbugt (Vargbukta) within the inner fjord regions.

P. GELTING (cf. Medd. om Grøn. Bd. 101 Nr. 2 (under preparation)) has closely studied the question as to the identity of the Greenland plants with *C. Regelii* and the occurrence of this species on the whole. By revising VAAGE's material he failed, however, to find any specimens from the two said localities. Of KRUUSE's two localities for *C. Edmondstonii*, (18) Cape Seaforth and (19) Pingel Valley, only the former, likewise according to GELTING's determinations, is to be referred to *C. Regelii*, since on the same sheet are attached partly this species partly *C. alpinum*, and presumed hybrids between the two species. According to GELTING this is the only known locality for the presumed hybrid *C. alpinum* × *Regelii* in Greenland. The Pingel Valley specimens, however, are *C. alpinum*.

Cerastium trigynum VILL.

VILLARS, Hist. Pl. Dauph., 3, 1789, p. 645.

Former investigations:

KRUUSE 1905, p. 158. — VAAGE 1932, p. 36 (sub nom. *C. lapponicum* CR.).

Localities:

Outer part: 7. Husbugt (V); 19. Pingel Valley (H & K!).

I did not find this plant either. According to the previous finds within the area, the species is associated with the outer coast.

The species is here near its northern limit. North of Franz Joseph Fjord it has only been found at Cape Franklin by SEIDENFADEN.

Honckenya peploides (L.) EHRH.

EHRHART, Beitr. Naturk. u. verw. Wissensch. 2, 1788, p. 181.

The species is represented by var. *diffusa* HORNEMANN, Forsøg til en dansk oekonomisk Plantelære, Ed. 3. Kjøbenhavn 1821—37, p. 501.

Grows on sandy shores. Of sparse occurrence in all the localities observed.

Outer district: Traill Island, at Vega Sound, west of the bend.

Middle district: Ymer Island, Botanikerbugt.

Inner district: (b) The north side of Kempe Fjord, east of Cape Beijer.

Former investigations:

DUSÉN 1901, p. 20 (sub nom. *Halianthus peplodes* (L.) FR.). — KRUUSE 1905, p. 156 (sub nom. *Halianthus peplodes* (L.) FR. var. *diffusa* HORNEM.). — VAAGE 1932, p. 36.

Localities:

Outer part: 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 21. Cape Fletcher (H & K).

Middle part: 29. Holmsvig (V).

Inner part: 34. Kjerulf Fjord (D, V); 39. Head of Röhss Fjord (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

Further the species is recorded by NATHORST (DUSÉN 1901, p. 20) from a locality on the north coast of Ymer Island, DUSÉN, however, gives no closer indication of the locality.

Specimens collected on July 28th west of Cape Beijer on the north side of Kempe Fjord were richly flowering and had already developed big capsules.

Melandryum apetalum (L.) FENZL.

FENZL in LEDEB., Fl. Ross., 1, 1842, p. 326.

Mostly in damp places.

Generally snow-covered in the winter, and becomes free of snow rather late in the spring.

Found up to 1000 m altitude.

Outer district: Very common.

Middle district: Here and there.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 18. — SEIDENFADEN 1931, p. 18. — VAAGE 1932, p. 37.

Localities:

Outer part: 1. Bontekoe (D); 2. Cape Graah (V!); 3. Cape Humboldt (V!); 4. Mt. Celsius (V!); 5. S.W. of Robertson Isl. (V!); 6. Sanddal (V!); 7. Husbugt (V!); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vegaenæs (V!); 17. Antarctic Hbr. (D, V);

Midle part: 28. Cape Elisabeth (SEIDF., V!); 29. Holmsvig (V!); 30. Cape Peterséns (V!).

The species seems to be represented by var. *arctica* only (TH. FRIES, Kungl. Vet.-Akad. Förh. Övers., 1869, p. 133), which is distinguished by its densely tomentose flower stalks, much inflated subglobose calyx, and projecting petals.

On luxuriant grassy slopes on Traill Island I observed a vigorous form with a slightly more conical, not particularly inflated, calyx, not actually nodding, but projecting horizontally or obliquely upwards from the stem. Its petals are generally white or whitish. This form is, however, especially remarkable in that the capsule during maturation protrudes distinctly outside the calyx.

The Arctic Herbarium of the Botanical Museum of Copenhagen contains quite similar specimens from other localities. The form can, however, hardly be kept distinct from var. *arctica*. Still it seems to differ ecologically from the latter form, since it grows on dry sunny slopes. It is difficult to decide whether the form is merely a modification due to the locality or it is also genotypically conditioned.

M. apetalum flowers later than *M. triflorum*; the first expanded flowers were observed on Traill Island about the middle of June. Maturation of the seeds takes place in August.

Melandryum triflorum (R. Br.) J. Vahl; emend. REG. et TIL.

REGEL & TILING, *Florula Ajanensis*, Moskwa 1858, p. 69 [excl. var. *β ajanense*]. — *Lychnis triflora*, ROB. BROWN, in ROSS' Voy. Disc., App., London 1819, p. CXLII. — *Lychnis triflora* (BROWN) HORNEMANN, Fl. Dan. fasc. 37, 1836, p. 4, tab. 2173. — Treblomstret Pragstierne (*Lychnis triflora* BROWN), HORNEMANN, Dansk oecon. Plantel., 3. Udg., 2. Deel, Tillæg og Rettelser, Kjøbenhavn 1837, p. 186. — *Melandryum triflorum* (J. Vahl) et *Melandryum affine* J. Vahl, Fl. Dan. fasc. 40, 1843, p. 5, tab. 2356 et tab. 2173. — *Wahlbergella s. Gasterolychnis VahlII*, RUPRECHT, Beitr. z. Pflanzenkunde d. Russischen Reiches, 2, St. Petersburg 1845, p. 24. — *Lychnis affinis* J. Vahl *β typica*, REGEL, Bull. de Moscou 1861, 2, p. 565. — *Melandryum involucratum* (CHAM. & SCHLDL.) *β affine* et *Melandryum triflorum* (R. Br.) LIEBM., ROHRBACH, Linnaea, 36, Berlin 1869, p. 217 et p. 231. — *Melandryum involucratum* (CHAM. & SCHLDL.) *β affine* (J. Vahl) ROHRB. [ex parte] et *Melandryum triflorum* (R. Br.) J. Vahl, LANGE, Consp. Fl. Groenl. 1880, p. 20. — *Lychnis affinis* J. Vahl, BRITTON & BROWN, Illust. Fl. North America, 2, 1897, p. 15. — *Melandryum affine* J. Vahl, ASCHERSON & GRAEBNER, Synops. Mittel-Europ. Fl., 5, 2, 1920, p. 32. — *Melandryum pauciflorum* (LEDEB.) OSTF. [ex parte] et *Melandryum triflorum* (R. Br.) J. Vahl, OSTENFELD, Medd. om Grøn., 64, København 1923, p. 173—175. — *Melandryum affine* J. Vahl, s. str., TOLMATSCHEW, Travaux du Musée de l'Académie des Sciences de l'URSS, 24, 1932, p. 257.

Illustrations: Fl. Dan. tab. 2173 and tab. 2356. — BRITTON & BROWN, l. c. — OSTENFELD, l. c., pl. II, fig. 1, 4, 5, 6, 7, 8, and 15. — TOLMATSCHEW, l. c., fig. 2. — Pl. nostra. I.

In dry soil, frequent on hills exposed to the wind. Coprophilous. Often free of snow in the winter.

Found up to 1000 m altitude.

Outer district: Here and there.

Middle district: Common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 36 (sub nom. *M. affine* VAHL). — DUSÉN 1901, p. 18 (sub nom. *M. involucratum* (CHAM. et SCHLIECHT.) var. *affine* (J. VAHL) ROHRB. et *M. triflorum* (R. BR.) J. VAHL). — KRUUSE 1905, p. 154 (Sub nom. *M. involucratum* (CHAM. et SCHLIECHT.) β *affine* (J. VAHL) ROHRB. et *M. triflorum* (R. BR.) VAHL). — SEIDENFADEN 1930, p. 380 (sub nom. *M. affine*); 1931, p. 18 (sub nom. *M. affine*). — VAAGE 1932, p. 37 (sub nom. *M. affine* J. VAHL et *M. triflorum* (R. BR.) J. VAHL).

Localities:

Outer part: 1. Bontekoe (D); 2. Cape Graah (V); 3. Cape Humboldt (V!); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V!); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (D, V!); 20. Cape Brown (H & K).

Middle part: 24. Blomsterbugt (SEIDF.! V!); 26. Marie Isl. (V!); 27. N. of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V!); 30. Cape Peterséns (V!).

Inner part: 32. Renbugt (V!); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (V!); 35. Nanortalik (SEIDF.!); 37. Dickson Fjord (V!); 38. Röhss Fjord (D); 39. Head of Röhss Fjord (V!); 40. Röhss Fjord, south coast (V!); 41. Cape Hedlund (SEIDF.!); 42. Polhem Valley (H & K); 43. Forsblad Fjord (H & K).

Starting from the usual conception of species, the Greenland *Melandryum* species have given me a great deal of trouble. During my work in the field it was impossible to distinguish more than two species, viz. *M. triflorum*¹⁾ and *M. apetalum*. While in East Greenland *M. apetalum* is but slightly variable, the plants that I have included under the name *M. triflorum s. lat.* form a unit of a somewhat greater range of variation. It seems quite impossible, however, to divide it into two naturally delimited groups corresponding to the two species *M. triflorum* (R. BR.) *s. str.* and *M. affine* J. VAHL, with which earlier authors used to operate. — The form-complex is not only morphologically, but also ecologically, sharply delimited from *M. apetalum*. *M. triflorum s. lat.* grows in dry places, and is free of snow in the winter or at any rate becomes so very early in the spring, while *M. apetalum* grows in damp soil, is mostly snow-covered in the winter, and becomes free of snow very late. Forms

¹⁾ In the definition of the species given below, which later in the text will be designated *M. triflorum s. lat.* in distinction from *M. triflorum s. str.*

transitional between these two species may, however, occur, but numerically they form a very small minority.

A careful examination of the Arctic Herbarium of the Botanical Museum of Copenhagen did not turn out in favour of the usual conception of the species. *M. triflorum* s. str. and *M. affine* are only distinguishable by the seed character usually employed, and by means of this character no natural division can be arrived at, since all transitional forms from tuberculate seeds without membranous margins to nearly smooth seeds with a fairly broad winged margin may be found. Moreover the seed character does not always follow the other morphological characters; thus dense, extremely glandular-haired specimens often have winged seeds, while slightly pilose plants with unwinged seeds may likewise be met with.

Even if it is difficult to undertake a differentiation of species within this group, the Greenland forms prove to represent a group that is quite distinct from the Scandinavian. While the Greenland forms are distinguished by a robust growth, a dense covering with glandular hairs, relatively broad leaves, a more or less inflated or infundibular calyx, and a marked tendency to form a triflorous cyme, which may often (in the forms approaching *M. apetalum*) by elongation of the flower stalks be more or less candelabrum-shaped, the Scandinavian forms are generally much more slender, nearly glabrous at the base, with narrow leaves, and with a narrow, during the flowering nearly linear, calyx, which later becomes neither inflated nor infundibular, and with but a slight tendency to form regular triflorous cymes. As will be seen, the Greenland plants have thus essential characters peculiar to *M. triflorum* s. str. more or less blended with characters typical of *M. apetalum*.

All the specimens from Spitsbergen, Novaya Zemlya, and Waigats to which I have had access are of the same type as the Greenland specimens. The material from the regions west of Greenland, Baffin Land and Arctic North America, belong to the same form group, even if here the specimens with uniflorous stems dominate. The species seems here on the whole to be less sharply demarcated from *M. apetalum*. The westernmost specimens to which I have had access are from King Point, 137°40' W. long. In the same sheet are found typical specimens, and one specimen approaching the Scandinavian form. Possibly we have here reached the eastern limit of the Eurasiatic form group.

Judging from TOLMATSCHEW's map (l. c. p. 261), he refers the Spitsbergen and the Novaya Zemlya plants to *M. affine* J. VAHL s. str., which, likewise according to TOLMATSCHEW's map, further occurs in Arctic Siberia east of the mouth of the Yenisei. However, neither from the diagnosis nor from the picture (l. c. p. 257) does it appear clearly what is TOLMATSCHEW's conception of *M. affine* J. VAHL s. str. But

since the Spitsbergen plants, which according to my judgment agree with the Greenland specimens, are referred to this species, it must be assumed that TOLMATSCHEW'S *M. affine* J. VAHL *s. str.* belongs to our Greenland form group. Possibly the figured, evidently somewhat more slender, forms have been drawn from Siberian specimens. The said form-complex thus seems to have a circumpolar distribution, but the more robust and cymiferous forms are most frequent in the Greenland-Spitsbergen-Novaya Zemlya area. The other forms from the old world figured by TOLMATSCHEW evidently do not belong to this group. *M. taimyrense* A. TOLMATSCHEW (l. c. p. 264), whose stature somewhat recalls that of the Greenland plants, should according to the description be incanovillous, and its leaves also are evidently considerably narrower than those of *M. triflorum*; thus it would not seem to be referable to *M. triflorum s. lat.*

The few Siberian specimens which I have had the opportunity of examining, are decidedly more nearly allied to the Scandinavian than to the Greenland forms (cf. OSTENFELD, l. c. Pl. II, fig. 10), and agree rather closely with TOLMATSCHEW'S subsp. *tenellum*.

Starting from the above-mentioned points of view one arrives at a practical and rather natural definition of species. The definition of *M. pauciflorum* (LEDEB.) OSTF. as proposed by OSTENFELD seems to me to be highly artificial, since the Centralasiatic forms (like the Scandinavian) are far more distantly related to the Greenland forms (belonging to OSTENFELD'S species) than these are to *M. triflorum s. str.*, and his recapitulating characterisation of the three species is likewise quite theoretical, and at any rate pays regard to the character of the seeds only. And since this, as already stated, is not constant and does not always change with the outer morphological characters, I cannot consider it of such great systematical value as has been done by earlier systematists.

OSTENFELD'S characterisation of *M. pauciflorum* (LEDEB.) OSTF. (l. c. p. 175), "Flowers . . . solitary or in larger specimens few together" is not very adequate, since this character seems to a great extent to be hereditarily (or geographically) determined. Centralasiatic specimens found in the herbarium of the Botanical Museum are strictly uniflorous, although they are very strongly developed (l. c. Pl. II, figs. 11, 12, and 14); they seem to be more closely related to *M. apetalum*.

That the Greenland specimens figured in the same place (figs. 5, 6, 7, and 15) are not typical of *M. affine* J. VAHL is obvious if we look through the collections of the Arctic Herbarium. No. 6 represents a transitional form to *M. apetalum* like No. 1 from Ellesmere Land. No. 3 from Hudson Strait is simply a specimen of *M. apetalum* var. *arctica* THORE FRIES. Comparatively glabrous and slender forms seem

within Greenland to be restricted to a small area on the west coast about 70° N. lat. (where, however, the normal forms are not lacking), possibly a southwestern intrusion. At any rate a similar specimen is at hand from Churchill (58°50' N. lat.), Hudson Bay (l. c. fig. 2). All the specimens figured are derived from this limited area, viz. Nos. 5, 6, 7, and 15, of which Nos. 7 and 15 are carefully selected slender forms.

In several places in the literature, in the works of both earlier and recent authors, the Greenland (*M. affine* J. VAHL) and the Scandinavian (*Wahlbergella affinis* FRIES) forms of *M. affine* s. lat. are kept distinct, e.g. by RUPRECHT 1845, REGEL 1861, ROHRBACH 1869, and GRAEBNER 1920.

Only REGEL & TILING (l. c.) have further discussed the question as to the close relationship between *M. triflorum* (R. BR.) J. VAHL and *M. affine* J. VAHL¹): "Vergleichen wir die Fig. 2173 [*M. affine*] und 2376²) [*M. triflorum*] in der Fl. danica mit einander, so findet sich durchaus kein Unterschied zwischen diesen. Die Flora danica hat offenbar zweimal die gleiche Pflanze unter verschiedenen Namen abgebildet." (l. c. p. 70). From this the authors draw the only logical conclusion: to consider *M. affine* J. VAHL synonymous with *M. triflorum* (R. BR.) J. VAHL. In this I agree with REGEL & TILING, since, looking apart from the seed character (cf. above), I hold the view that the two said figures in the Flora danica can hardly serve as a basis for a distinction between the species.

Also as regards the definition of the species (*M. triflorum* s. lat.) in relation to the Scandinavian forms I agree in the main with these authors: "Werfen wir noch einen Blick auf das *M. angustiflorum* RUPR. (*Wahlbergella affinis* FR.), so ist dieses allerdings von *M. triflorum* gut verschieden, dagegen steht es dem *M. apetalum* FENZL sehr nahe und unterscheidet sich von diesem nur durch aufrechte Blumen, einen länger gestreckten weniger aufgeblasenen Kelch und kleine Blumen, deren Blumenblätter wenig länger als der Kelch [sind]" (l. c. p. 72).

It should, however, be remarked that REGEL & TILING evidently have not known the range of variation of *M. triflorum* as to seed character, since under the description of the species they state as follows: "Seminibus immarginatis, tuberculatis."

That REGEL later (l. c. 1861) attaches greater importance to the seed character and thus returns to the usual conception of the species, which according to my view motivated above only means a backward step, is of little importance in this connection.

If we employ REGEL & TILING's definition, the most important

¹) HART, Journ. of Bot. 18 (New Ser. 9), 1880, p. 181, employs the designations *M. affine* and *M. affine* var. *triflora*,

²) Misprint for 2356.

distinguishing marks of the two species, as suggested above, are briefly these:

Melandryum triflorum (R. BR.) J. VAHL emend. REGEL & TILING (l. c.).

Stem robust, mostly erect.

The whole plant hairy, upwards glandular-haired.

Basal leaves obovate-lanceolate, hairy.

Calyx during the flowering infundibular, more or less inflated, at maturation oval, less closely embracing the capsule.

Stem uni- or multiflorous. Shows a great tendency to form triflorous cymes, whose flowers may be head-like aggregated, or whose stalks (especially during the postfloration) are elongated, so that the cyme becomes candelabrum-shaped.

Geographical distribution: Greenland, Spitsbergen, Novaya Zemlya, Waigats, ?Arctic Siberia, Ellesmere Land, Arctic North America, ?North American Archipelago.

I have collected plants with entirely unwinged seeds in the Cape Hedlund district only.

The species flowered on Traill Island at 500 m altitude on June 8th. In the inner fjords it had mature capsules from the end of July.

Petals mostly pink, more rarely pure white.

Lychnis affinis, FRIES, NOV. FL. Suec. Mant. III, 1842, p. 36. — *Wahlbergella affinis* FRIES, Summa Veget. Scand. I, 1846, p. 155. — *Melandryum involucratum* z. Th., GRAEBNER in ASCHERSON & GRAEBNER, Synops. Mittel-Eur. Fl. V, 2, 1920, p. 32, ubi syn. — *Melandryum affine* subsp. *angustiflorum* (RUPR.) et subsp. *tenellum* TOLMATSCHEW, l. c., p. 258.

Stem thin and slender, often drooping.

Plant glabrous at the base or slightly hairy, upwards with glandular hairs.

Basal leaves lineate-lanceolate, smooth or ciliate.

Calyx during the flowering narrow, ovally-linear, at maturation elliptical, closely embracing the capsule.

Stem frequently uniflorous. If multiflorous, no regular cyme is formed, the bud of the one prefolium being favoured, so that the inflorescence becomes irregularly furcate (often biflorous).

Geographical distribution: Arctic-Subarctic Scandinavia and Russia, Arctic-Subarctic Siberia.

Minuartia biflora (L.) SCHINZ & THELL.

SCHINZ & THELLING, Bull. Herb. Boiss., 2 sér. 7, 1907, p. 403.

Grows in patches with a moderate snow-covering.

Ascends to great altitudes (1000 m).

Outer district: Very common.

Middle district: Rather common.

Inner district: Rather rare.

Former investigations:

DUSÉN 1901, p. 19 (sub nom. *Alsine triflora* (L.) WAHLENB.). —

KRUUSE 1905, p. 155 (sub nom. *Alsine biflora* (L.) WBG.). — VAAGE 1932, p. 38.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 3. Cape Humboldt (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 13. Cape Parry (D); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K!).

Inner part: 32. Renbugt (V); 43. Forsblad Fjord (D).

Individuals with lilac-coloured petals are sometimes met with.

The species was in incipient flowering on Traill Island at 500 m altitude on June 8th. The floescence proper, however, occurs at a much later date.

A rather deviating specimen was found on Traill Island on July 2nd; it may possibly be regarded as the hybrid *M. biflora* × *M. stricta*. The plant seems, however, to have a normal fructification, having developed big capsules.

Minuartia Rossii (R. BR.) GRAEBN.

GRAEBNER in ASCHERSON & GRAEBNER, Synops. Mittel-Eur. Fl., 5, 1918, p. 772.

Outer district: Not observed.

Middle district: One locality, viz. Ymer Island, west of Carl Jacobsen Bay, in damp, gravelly soil, at 1000 m altitude.

Inner district: Not observed.

The species was found on August 11th. By far the greater number of the individuals were sterile, and only after a prolonged search were some few flowering plants observed.

SIMMONS (Rep. Sec. Norw. Exp. "Fram" 1898—1902, Kristiania 1906, p. 116) states that in Ellesmere Land, too, the species rarely flowers, and as regards the fructification he says as follows (l. c. p. 116): "Developed fruit was not seen, but it must, of course, ripen its seed some years, as it has no other means of propagation." As to this latter point I cannot agree with SIMMONS. The species no doubt propagates vegetatively, the buds at the apices of the shoots with their head-like

aggregated, somewhat succulent, inwards-curved leaves loosening at the slightest touch. Despite the fact that my specimens were carefully kept in a bag, a great number of these buds had fallen off on the way back to the camp. — Such leafy buds may easily be carried along by the streams of melting snow in the spring. Thus the plant occurred chiefly among pebbles across which such streams had had their course.

The species has not formerly been observed within the area, and the above-mentioned locality is the southernmost known in Greenland.

Minuartia rubella (WAHLENB.) GRAEBN.

GRAEBNER in ASCHERSON & GRAEBNER, Synops. Mittel-Europ. Fl., 5, 1918, p. 733.

Most frequently in dry, not too dense vegetations of grass and dwarf-shrubs.

Free of snow as well as snow-covered in the winter.

Ascends to great altitudes (1000 m).

Outer district: Very common.

Middle district: Common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 37 (sub nom. *Alsine rubella* WAHLENB.). — DUSÉN 1901, p. 19 (sub nom. *Alsine rubella* WAHLENB.). — KRUSE 1905, p. 156 (sub nom. *Alsine verna* BARTL.). — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 38 (sub nom. *M. verna* (L.) HIERN.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganes (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!, V); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!, V); 34. Kjerulf Fjord (D); 37. Dickson Fjord (V); 43. Forsblad Fjord (D).

Found in flower on Traill Island at 500 m altitude on June 8th.

Minuartia stricta (Sw.) HIERN.

HIERN, Journ. of Bot., 37, 1899, p. 320.

Grows in damp grass and dwarf-shrub vegetations.

Mostly snow-covered in winter.

Found up to 600 m altitude.

Outer district: Rather common.

Middle district: Rather common.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 72.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt; 9. 15 km W. of Husbugt (V); 12. Veganæs (V).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V).

Inner part: Renbugt (V).

Flowered somewhat later than *M. rubella*, at the end of June. The plant is normally dark-green, with a more or less reddish tint and with dark brownish-red stems and sepals. On Ella Island a form of a fresh green to yellowish green colour has been found in several places, sometimes in company with normal individuals. Intermediate forms between this — albino — form and the normal one do not seem to occur.

Sagina intermedia FENZL.

FENZL, in LEDEB., Fl. Ross., I, 1842, p. 339.

Grows in snow-patches and in damp soil.

Snow-covered in the winter.

Outer district: Common, found up to 600 m altitude.

Middle district: One locality, east side of Ella Island, at 250 m.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 155 (sub nom. *S. Linnei* PRESL.). — VAAGE 1932, p. 39.

Localities:

Outer part: 3. Cape Humboldt (V); 6. Sanddal (V); 10. Gaaseø (V); 12. Veganæs (V); 28. Cape Seaforth (H & K!).

Middle part: 29. Holmsvig (V).

The first flowering plants were observed on Traill Island on June 16th. Even if the species is common here, I almost exclusively observed small and rather poorly developed individuals.

Silene acaulis L.

LINNÆUS, Sp. pl., Ed. 2, Vol. I, 1762, p. 603.

In dry, and, more frequently, somewhat damp places.

Generally snow-covered in the winter, but may be encountered free of snow.

Ascends to 700—800 m altitude.

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

DUSÉN 1901, p. 17. — KRUUSE 1905, p. 153. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 39.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vegenæs (V); 13. Cape Parry (D); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 38. Röhss Fjord (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord (V); 42. Polhem Valley (H & K); Forsblad Fjord (D).

Forms large and dense tufts, which, when the plant occurs in places exposed to the sun, characteristically enough die away gradually on the southern side.

Found in incipient flowering on Traill Island at 500 m altitude on June 8th.

Individuals bearing white flowers sometimes occur.

Stellaria humifusa ROTTB.

ROTTBØLL, Kiøbenh. Selsk. Skrifter, 10, 1770, p. 447.

Occurs on clayey sea-shores.

Snow-covered in the winter.

Outer district: Not observed.

Middle district: Several localities on Ella Island and Ymer Island.

Inner district: Cape Hedlund and at the current hole in Röhss Fjord (c).

Former investigations:

DUSÉN 1901, p. 20. — KRUUSE 1905, p. 157. — SEIDENFADEN 1931, p. 18. — VAAGE 1932, p. 39.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 18. Cape Seaforth (H & K!); 21. Cape Fletcher (H & K).

Middle part: 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V).

Inner part: 39. Head of Röhss Fjord (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D).

Flowers in July, the flowering often continuing till winter sets in.

Nearly mature capsules were observed on Ymer Island about the middle of August.

Stellaria longipes GOLDIE.

GOLDIE, Edinb. Philosoph. Journ. 6, 1822, p. 327.

Grows in damp places covered with vegetation.

Evidently mostly snow-covered in winter.

Recorded by VAAGE from 800 m altitude (Cape Humboldt).

Outer district: Rather common, found up to 600 m altitude.

Middle district: Not observed.

Inner district: One locality at 600 m altitude.

Former investigations:

BUCHENAU & FOCKE 1874, p. 38. — DUSÉN 1901, p. 21. — KRUISE 1905, p. 157. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 39.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K).

Middle part: 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 36. Mineralbugt (SEIDF.!); 41. Cape Hedlund (SEIDF.!).

Flowers rather late. The first flowering plants were observed on Traill Island on June 21st.

In places exposed to the wind the species sometimes develop evidently very slow-growing sterile "pillar-forms", whose short decussate leaves give them a superficial resemblance to *Saxifraga oppositifolia*.

A hairy form was observed on Traill Island.

Viscaria alpina (L.) G. DON.

G. DON, Gen. Syst., 1, 1831, p. 415.

Former investigations:

VAAGE 1932, p. 40.

Localities:

Outer part: 3. Cape Humboldt (V).

The species has its northern limit within the area, where it has only been found at (3) Cape Humboldt by VAAGE in 1929.

*Crassulaceae.**Sedum roseum* (L.) SCOP.

SCOPOLI, Fl. Carniol., Ed. 2, 1, 1772, p. 326.

Mostly in rock-crevices and in thin sod on rocky underground.

Generally free of snow in the winter.

Found up to about 500 m altitude.

Outer district: Here and there.

Middle district: Rather rare.

Inner district: Rare.

Former investigations:

DUSÉN 1901, p. 38 (sub nom. *S. Rhodiola* D C.). — KRUUSE 1905, p. 174 (sub nom. *S. Rhodiola* D C.). — SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 17.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 22. Murray Isl. (D); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!, V).

Inner part: 31. Junction Valley (SEIDF.!).; 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

Found flowering on Traill Island on June 7th at 400 m altitude.

*Cruciferae.**Arabis alpina* L.

LINNÆUS, Sp. pl., 1753, p. 664.

Most frequent at sandy river banks, sometimes in moderate snow-covering.

Snow-covered in the winter.

Found up to 400 m altitude.

Outer district: Here and there.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 165. — VAAGE 1932, p. 26.

Localities:

Outer part: 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Incipient flowering on Traill Island on June 15th.

Although the species is here near its northern limit, it develops vigorous and richly fructifying individuals.

Arabis arenicola (RICHARDS.) GELERT.

GELERT, Bot. Tidsskr., 21, København 1898, p. 290.

Former investigations:

VAAGE 1932, p. 26.

Locality:

Outer part: 17. Antarctic Hbr. (V).

The species has its northern limit within the area, where it has been found by VAAGE at (17) Antarctic Harbour south of Davy Sound.

Braya STERNB. & HOPPE.

As within the *Draba* genus, here too we find transitional forms between the various species. *B. purpurascens* forms a very variable unit, sharply delimited from the two other species.

The two other species, *B. glabella* and *B. humilis*, together form a unit, with a great range of variation, it is true, and with the pure species as the extremes. By investigations in the field it proved that *B. glabella* and *B. humilis* generally grow in the same kind of soil, in the dry, much desiccated moving soil and on dry grassy slopes, the former, however, preferring the hard clayey, the latter the looser sandy soil; accordingly the species often occur together. Unmixed growths of *B. humilis*, which seems to be the commonest of the two species, is not rarely met with, while I have observed unmixed *B. glabella* growths in a few places only. Most frequently the pure species are not represented in such populations, by far the greater number of the individuals belonging to the intermediate forms, which, however, in most cases seem to be more closely related habitually to *B. humilis*. All the intermediate forms fructify normally.

Where *B. purpurascens* and *B. glabella-humilis* occur together (which they often do although the former prefers damper soil), individuals may be met with which should doubtless be regarded as hybrids between the two form complexes, all the more so since these intermediate forms are sterile or only sparsely fructifying.

As *B. glabella* and *B. humilis* sometimes occur in unmixed growths, I still maintain them as good species. I consider it quite probable, however, that the specific difference is increasingly effaced by continued hybridisation.

For the reasons stated above it has, as a rule, been impossible by vegetation-analytical notes to distinguish between more than two "species" within the genus *Braya*, viz. *B. purpurascens* and *B. glabella-humilis*.

Braya glabella RICHARDS.

RICHARDSON, FRANKLIN 1 st. Voy. Ap. 1823, pag. 743.

Grows in dry, hard solifluction soil and on dry, grassy slopes.

Mostly free of snow in the winter.

Found up to 500—600 m altitude.

Outer district: Not observed.

Middle district: Rather common.

Inner district: Not observed.

Former investigations:

BUCHENAU & FOCKE 1874, p. 29 (sub nom. *Arabis petraea* LAM.). — DUSÉN 1901, p. 27 (sub nom. *B. alpina* (STERNB. et HOPPE)). — KRUISE 1905, p. 164 (sub nom. *B. alpina* STERNB. et HOPPE). — SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 27.

Localities:

Middle part: 24. Blomsterbugt (SEIDF., V); 25. Ruth Isl. (D); 26. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V).

Inner part: 31. Junction Valley (SEIDF.); 33. Head of Franz Joseph Fjord (D, SEIDF.).

At the end of July the species had nearly mature siliques. At that time flowering individuals were occasionally met with. The petals are usually of a light pink colour.

Braya humilis (C. A. MEYER) ROBINS.

ROBINSON in A. GRAY, Man. Bot. U. S., Ed. 7, 1908, pag. 430.

Grows in dry solifluction soil and on dry, grassy slopes, frequently also in loose sand.

Both free of snow and snow-covered in the winter.

Found up to 500—600 m altitude.

Outer district: Not observed.

Middle district: Common.

Inner district: Not observed.

Former investigations:

SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 27.

Localities:

Outer part: 2. Cape Graah (V).

Middle part: 24. Blomsterbugt (SEIDF., V).

Inner part: 31. Junction Valley (SEIDF.); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.); 36. Mineralbugt (SEIDF.).

The species had nearly mature siliques at the end of July. Is more frequently found flowering late in the summer than *B. glabella*. Evidently it can better withstand a protracted snow-covering, and hence the flowering may occur comparatively late. The flowers observed in the late summer often occur on plants that already bear mature siliques. According to my observations, the species is more liable to refluorescence than any other species within the area.

Growing in loose sand, the species may form especially luxuriant forms with a gregarious habit, since the plant on being covered with sand exhibits a kind of vegetative propagation, the individual plants becoming many-headed and forming colonies.

Flowers usually of a pale lilac colour.

Braya purpurascens (R. BR.) BGE.

BUNGE in LEDEB., Fl. Ross., 1, 1842, p. 195.

Mostly in damp places where there is no close cover of vegetation, in sandy as well as clayey soil.

Generally snow-covered in the winter, but also encountered free of snow.

Ascends to great altitudes (1000 m).

Outer district: Rather common, locally in quantity.

Middle district: Common.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 26 (sub nom. *B. glabella* RICHARDS.). — KRUISE 1905, p. 163 (sub nom. *B. purpurascens* (R. BR.) BGE. f. *siliculis glabris* HARTZ). — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 27.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V); 18. Cape Seaforth (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (D); 37. Dickson Fjord (V).

The species is very variable as regards several morphological characters as for instance the length of the mature racemes, the form of the siliques, and the whole mode of growth of the plant. When occurring in dune sand, the plant propagates vegetatively by the formation of buds on the roots, as in *Rumex acetosella*.

The first flowering individuals were observed on Traill Island on June 16th, and the florescence proper occurred at the end of June.

On Ymer Island the species had mature siliques at the beginning of August, and often only the bright partitions of the siliques remained.

All the plants which I observed in flower had pure white petals.

Cardamine bellidifolia L.

LINNÆUS, Sp. pl., 1753, p. 654.

Grows in damp dwarf-shrub vegetations and in snow patches.

Snow-covered in the winter.

Ascends to great altitudes (1000 m).

Outer district: Common.

Middle district: Ymer Island, rare; Ella Island, not seen.

Inner district: Rather common.

Former investigations:

DUSÉN 1901, p. 27. — KRUUSE 1905, p. 164. — VAAGE 1932, p. 27.

Localities:

Outer part: 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 23. Cape Greg (H & K!).

Midle part: 29. Holmsvig (V).

The species was found in incipient flowering on Traill Island at 500 m altitude on June 8th. It is richly fructifying. At maturity the siliques are considerably longer than the vegetative parts of the plant.

Cardamine pratensis L.

LINNÆUS, Sp. pl., 1753, p. 656.

Grows among moss at the shores of lakelets.

Snow-covered in the winter.

Outer district: Not observed.

Middle district: Ella Island; two localities in the area round Cape Oswald, Langesø (30 m), and Bjørnesø (200 m). — Ymer Island, Botanikerbugt: a couple of localities at 50 m.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 165. — VAAGE 1932, p. 28.

Localities:

Outer part: 6. Sanddal (V); 8. 5 km W. of Husbugt (V); 18. Cape Seaforth (H & K!).

All the specimens collected belong to var. *angustifolia* HOOKER, Flora Boreali-Americana I, 1833, p. 45.

Flowering individuals as well as individuals partially out of flower were found on Ella Island on July 25th. The species hardly produces seeds, and must be assumed to reproduce chiefly in a vegetative way by development of bulbils on the leaves. Fresh, small individuals originating in this way are usually found in great number in the damp, mossy carpets in which the plant generally grows.

Cochlearia officinalis L.

LINNÆUS, Sp. pl., 1753, p. 647.

var. *groenlandica* (L.) GELERT and var. *oblongifolia* (D C.) GELERT.

GELERT in ANDERSSON & HESSELMAN, Bih. till K. Sv. Vet.-Akad. Handl., 26, Afd. III, No. 1, 1900, p. 37 and 39.

Grows on the sea-shore and in damp clay and sand far from the coast.

Snow-covered in the winter.

Outer district: Several localities up to 550 m altitude.

Middle district: Ymer Island, Carl Jacobsen Bay, on the shore and by lagoons in the river delta.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 23 (*C. officinalis* L. var. *oblongifolia* (D C.) GEL.).

— KRUUSE 1905, p. 160. — VAAGE 1932, p. 28 (*C. groenlandica* L.).

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 3. Cape Humboldt (V); 7. Husbugt (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 22. Murray Isl. (D).

Middle part: 29. Holmsvig (V).

No doubt the species is hapaxanthic, biennial or perennial, forming in the course of the first year, or years, a rosette of leaves, from whose centre the main stem breaks very early next spring. Observed in flower and with immature siliques on Traill Island at the end of June.

I have only found var. *groenlandica* within the area, and it must likewise be assumed that VAAGE's *C. groenlandica* L. (l. c.) is the same form. DUSÉN's specimens from Murray Island belong to var. *oblongifolia*, which is also recorded from the outer coast regions north of the area in question.

Draba L.

As I was not at the outset familiar with the abundance of forms within this genus, it was necessary to make more comprehensive collections of this than of most other species which could be definitely identified even in the field. The material collected has been kindly determined by Mrs. ELIS. EKMAN, for which I beg her to accept my most cordial thanks.

An exhaustive treatment of the occurrence and distribution of the individual species and groups of species within the climatic belts and altitudinal limits of the area would, however, require a time-wasting working together of the determined herbarium material and the notes made in the field. Time has not permitted me to undertake such a preparation of the material, and hence I have found it best to

postpone the final publication of the various facts concerning this genus to a later work, all the more so since in the coming summer there will be ample opportunity for adding to the collections and observations in nature.

I shall therefore confine myself to giving here a list of the species brought home (excluding varieties and possible hybrids), according to Mrs. ELIS. EKMAN's determinations, to which will be added some few remarks on their occurrence, based upon the preliminary knowledge of the species which I have obtained during my work in the field.

Draba alpina L. grows on wet ground only. It is evidently snow-covered in the winter, but is absent from places exposed to a protracted snow-covering. — A species easily recognisable in nature, even in a vegetative state, rather common in the outer district, but not observed in the two inner districts.

Draba Bellii HOLM is more of a snow-patch plant, since it evidently withstands a protracted snow-covering better than *D. alpina*, and thus flowers later than that species. In nature it is easily distinguishable from *D. alpina* on account of its pilosity; furthermore it seems to have a greater tendency to form large tufts than *D. alpina*. I was, however, unable to distinguish it from *D. macrocarpa*, which seems to be of rare occurrence. — *D. Bellii* has been brought back in a single collection only from the Traill Island district. In the middle district it was rather common, especially at great altitudes. Thus it was a common snow-patch plant at 1000 m altitude. No specimens were brought back from my inner district.

Draba cinerea ADAMS occurs in dry places and is often free of snow in the winter. It has been brought back from all three districts, but seems to be less frequent in the outer district. On Ymer Island it was collected up to 1000 m altitude. — A species easily recognisable in nature.

Draba crassifolia GRAHAM. I was unable to recognise this species in nature, thinking it belonged to forms which have been determined by ELIS. EKMAN as *D. lactea* × *nivalis*. The material brought back is very sparse, and is derived from the Traill Island district only, where it was collected at 200—400 m altitude. It is doubtless not common here, and is evidently entirely absent from the inner fjord regions. The specimens collected are derived from localities that are snow-covered in the winter.

Draba daurica D C. is doubtless the most common *Draba* species within the area. It is common in all my three districts, but is rare at great altitudes and is hardly encountered above 500—600 m altitude. It grows principally in dry soil, and may be both free of snow and snow-covered in the winter, but usually becomes free of snow early in the

spring. — In a fairly well developed state the species is easily recognisable in nature.

Draba fladnizensis WULF and *Draba lactea* ADAMS. I was unable to tell these species from each other. According to Mrs. EKMAN's determinations, both species are at hand from all my three districts, pure *fladnizensis*, however, not from the inner district. On Ymer Island I collected both species at 1000 m altitude, but not in the lowland. At Cape Hedlund *D. lactea* occurred right down to sea-level. — These species were very common in my outer district, but far less common in the inner districts. They grow in damp soil and are snow-covered in the winter.

Draba macrocarpa ADAMS. Specimens which have been referred with some doubt to this species by Mrs. EKMAN, were collected on Ymer Island at 1200 m altitude. I was, however, unable to distinguish it from *D. Bellii*.

Draba micropetala R. BR. and *Draba oblongata* R. BR. were considered by me as one species, since I was unable to distinguish them from one another. They were not rare in the Traill Island district. I did not notice them in the inner districts, since all the specimens which I took to belong to these species, proved to be *D. Bellii*. Both in ecology and in vegetative outfit they resemble *D. Bellii*. *D. micropetala-oblongata* and *D. Bellii* may thus in some degree be regarded as vicarious species, in that they seem to be geographically separated within the districts investigated by me.

Draba nivalis LILJEBL. If we disregard the presumed hybrids with other species, it is a comparatively easily recognisable plant, and doubtless rather rare within the area. From Cape Hedlund I collected only a couple of plants from a single locality, the only specimens I observed there. From the middle district likewise only very few specimens are at hand. Some *nivalis*-like forms which I collected on Traill Island, have been determined by Mrs. EKMAN as *D. cinerea* × *nivalis*. It grows in dry soil among grasses and becomes free of snow early in the spring.

Draba rupestris R. BR. I did not observe this species during my work in the field. A few specimens have been determined by Mrs. EKMAN as *D. rupestris forma*; on a superficial view, however, they rather recall *D. daurica* than the form of *D. rupestris* I know from Iceland. The specimens mentioned here grew in localities snow-covered in the winter.

Draba subcapitata SIMM. is rather easily recognisable when in a "pure" state. It was not uncommon on Traill Island, but never occurred in quantity. On Ymer Island I collected it at 1000 m altitude only, and never noticed it in the low-lying tracts. In the inner district it seems to be entirely lacking. The species evidently occurs on dry as well as

on more damp soil, and I have likewise observed it in localities that must be assumed to be free of snow, as well as in such that are snow-covered in the winter.

For the localities of earlier investigators reference may be made to Mrs. ELIS. EKMAN's series, not yet concluded, of critical works on the Greenland *Draba* species, and to the publications of SEIDENFADEN and VAAGE, whose lists of species are likewise due to the determinations of the specialist in the *Draba* genus, Mrs. ELIS. EKMAN.

Eutrema Edwardsii R. BR.

ROB. BROWN, App. PARRY Voy. disc. (Chlor. Melv.), 1823, p. 9.

Occurs mostly in bogs with a substratum of moving soil, always singly or in small numbers.

May be free of snow as well as snow-covered in the winter.

Found up to 1000 m altitude.

Outer district: One locality near Vega Sound at 100 m altitude.

Middle district: Common.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 35.

Localities:

Outer part: 5. S.W. of Robertson Isl. (V).

Middle part: 28. Cape Elisabeth (V).

Observed in flower on Traill Island on July 1st. On Ella Island, however, the plant had big buds one month earlier, and hence has doubtless flowered there early in June. Siliques ripen in July.

The species has its southern limit within the area.

Lesquerella arctica (WORMSKJ.) WATSON.

S. WATSON, Proc. Am. Acad., 23, 1888, p. 254.

Grows in dry places, open to the wind, and in places with solifluction.

Free of snow in the winter.

Ascends to about 600 m altitude.

Outer district: Rare; near Vega Sound and Basalt Plateau, at 500 m.

Middle district: Very common.

Inner district: Rather rare.

Former investigations:

BUCHENAU & FOCKE 1874, p. 30 (sub nom. *Vesicaria arctica* R. BR.).
— DUSÉN 1901, p. 22. — KRUUSE 1905, p. 159. — SEIDENFADEN 1931, p. 18. — VAAGE 1932, p. 35.

Localities:

Outer part: 2. Cape Graah (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 9. 15 km W. of Husbugt (V).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V).

Inner part: 31. Junction Valley (SEIDF.!). 32. Renbugt (V); 33. Head of Franz Joseph Fjord (D, SEIDF.!). 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

The first flowering plant was observed on Ella Island on a slope with a southward exposure on May 29th. On Ymer Island I have often found it reflorescent in the month of August, when at the same time it bore mature siliques from the first flowering. However, judging from the herbarium specimens of the Botanical Museum of Copenhagen, this does not seem to be the rule, so the case mentioned has possibly some connection with the early occurrence of the spring in 1932.

Hippuridaceae.

Hippuris vulgaris L.

LINNEUS, Sp. pl., 1753, p. 4.

Occurs in shallow-watered lakes.

Found up to 300 m altitude.

Outer district: Not observed (no lakes met with).

Middle district: Rather common.

Inner district: Several localities.

Former investigations:

SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 26.

Localities:

Outer part: 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V).

Middle part: 24. Blomsterbugt (SEIDF.!).

The species was as a rule in flower, and specimens collected on Ymer Island on August 16th bore fully developed fruits.

Oenotheraceae.

Chamaenerium latifolium (L.) SWEET.

SWEET, Hort. Brit., Ed. 2, 1830, p. 198.

Grows in sandy soil, dominating physiognomically over large areas in river deltas. Occurs also on dry, windswept hills, where it is often free of snow in the winter.

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 40 (sub nom. *Epilobium latifolium* L.).
— DUSÉN 1901, p. 16. — KRUISE 1905, p. 152. — SEIDENFADEN 1930,
p. 380 (sub nom. *Epilobium latifolium*); 1931, p. 18 (sub nom *Epilobium*
latifolium). — VAAGE 1932, p. 25.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vaganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 33. Head of Franz Joseph Fjord (SEIDF. !); 34. Kjerulf Fjord (D); 35. Nanortalik (SEIDF. !); 36. Mineralbugt (SEIDF. !); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF. !); 43. Forsblad Fjord (D, H & K!).

The species belongs to the latest flowering plants within the area. The first expanded flowers were observed on Traill Island on June 24th. The florescence proper does not occur until July or August. Still it is capable of producing ripe seeds to a great extent. Extensive vegetative reproduction by subterranean runners.

A population of f. *stenopetala* HAUSSKN. (HAUSSKNECHT, Monogr. Gatt. *Epilob.*, 1884, p. 191) was found together with the main species east of Cape Beijer (b) on the north side of Kempe Fjord.

Epilobium arcticum SAM.

SAMUELSSON, Bot. Notiser, Lund 1922, p. 260.

Outer district: One locality, Maanedalen, on a wet, gravelly flat, at 475 m.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 25.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 7. Husbugt (V).

In the only locality in which I observed this plant, it was nearly out of flower on June 23rd. The individual plants were but small in

size, and the immature capsules were in many cases longer than the vegetative parts of the plant.

Papaveraceae.

Papaver radicum ROTTB.

ROTTBØLL, Kiøbenh. Selsk. Skrifter, 10, 1770, p. 455.

Occurs in dry as well as fairly damp soil.

Both free of snow and snow-covered in the winter.

Ascends to great altitudes (1000 m and even more).

Outer district: Very common.

Middle district: Rather common; on Ella Island, however, rather rare.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 28 (sub nom. *P. nudicaule* L.). — DUSÉN 1901, p. 28. — KRUSE 1905, p. 166. — SEIDENFADEN 1931, p. 18. — VAAGE 1932, p. 26.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 13. Cape Parry (D); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 38. Röhss Fjord (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V).

Plants with white as well as with yellow flowers occur in most places, but the form with yellow flowers is the commonest. On Traill Island it would seem as if the white-flowered form is most frequent on a Devonian substratum, while the yellow was dominant on a basaltic substratum. I am, however, not certain that this rule is always valid.

Depauperate forms with stems of only a few cm height and flowers measuring only about 1.5 cm in diameter may occasionally be met with.

The first flowering individuals were observed on Traill Island at 300 m altitude on June 8th. At great altitudes the flowering occurs rather late, and continues till the growth is stopped by the frost; this also applies to certain other species growing at similar great altitudes. The capsules ripened on the lowland in the month of August.

*Polygonaceae.**Koenigia islandica* L.

LINNEUS, Mant. pl. 1, 1767, p. 35.

Grows in wet places comparatively destitute of vegetation.

Outer district: Rather common, found up to 500—600 m altitude.

Middle district: Not observed.

Inner district: One locality at 600 m altitude.

Former investigations:

DUSÉN 1901, p. 48. — VAAGE 1932, p. 40.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K).

Middle part: Holmsvig (V).

The species is a summer-annual. It is the smallest vascular plant within the area, the whole plant often attaining a height of 2—3 mm only. In addition to the two cotyledons, the most conspicuous parts of the plant, such small individuals often produce but one single diminutive leaf and a solitary sessile flower. Flowering plants were found on Traill Island on June 23rd. Specimens collected on August 12th, 1931, bore ripe fruits.

Oxyria digyna (L.) HILL.

HILL, Hort. Kew., 1768, p. 158.

Grows in moist soil, mostly in snow-patches.

Snow-covered in winter.

Ascends to 900—1000 m altitude.

Outer district: Very common.

Middle district: Rather common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 47. — DUSÉN 1901, p. 49. — KRUSE 1905, p. 185. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 40.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K).

Middle part: 24. Blomsterbugten (SEIDF., V); 27. North of

Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!); 43. Forsblad Fjord (D).

The species was found in incipient flowering on Traill Island at 500 m altitude on June 8th.

Polygonum viviparum L.

LINNEUS, Sp. pl., 1753, p. 360.

Grows nearly everywhere, except in the driest places and the deepest snow-patches.

Both free of snow and snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 47. — DUSÉN 1901, p. 48. — KRUSE 1905, p. 185. — SEIDENFADEN 1930, p. 380; 1931, p. 18. — VAAGE 1932, p. 41.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 13. Cape Parry (D); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (D); 35. Nanortalik (SEIDF.!); 36. Mine-ralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

The spike often bears only bulbils, which develop very early, become detached, and fall off. Thus as early as June 8th individuals with well developed bulbils were observed on Traill Island. The species may, however, also develop fruits. Thus vigorous specimens, collected on Ymer Island on August 7th, bore big and well developed fruits enclosed in the persistent pink rosy petals in the upper part of the spike, while

the bulbils of the lower part of the spike had at that time already fallen to the ground.

Rumex acetosella L.

LINNÆUS, Sp. pl., 1753, p. 538.

Most frequent in very dry "calderas" in rocky territory, but also in dry, grassy places.

Generally snow-covered in the winter.

Outer district: Not observed.

Middle district: Not observed.

Inner district: Here and there, found up to 400—500 m altitude. Further on the north side of Kempe Fjord east of Cape Beijer (b).

Former investigations:

DUSÉN 1901, p. 49. — KRUUSE 1905, p. 185. — SEIDENFADEN 1930, p. 380. — VAAGE 1932, p. 41.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V).

Middle part: 24. Blomsterbugt (SEIDF.!, V).

Inner part: 31. Junction Valley (SEIDF.!), 33. Head of Franz Joseph Fjord (D!); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.!), 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord (V); 41. Cape Hedlund (SEIDF.!), 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

Flowered abundantly at Cape Hedlund on July 10th. The female plants seemed to be dominant. It mostly occurs in patches, on account of its vegetative propagation by means of buds that develop on the roots.

Presumably it is only in rare cases that it produces mature seeds.

Ranunculaceae.

Ranunculus affinis R. BR.

ROB. BROWN, App. PARRY Voy. disc. (Chlor. Melv.), 1823, p. 265. — (Pl. IV).

Outer district: One locality (Basalt Plateau), dry polygon soil, at 700 m altitude, scarce.

Middle district: Ella Island, east side: dried up "calderas" in rocky ground, at 250 m. Ymer Island: north of Carl Jacobsen Bay, stony soil with solifluction, at 700 m altitude.

Inner district: Not observed.

Former investigations:

BUCHENAU & FOCKE 1874, p. 27 (sub nom. *R. auricomus* L.). — KRUUSE 1905, p. 169 (sub nom. *R. arcticus* R. BR. [ex pte.]). — VAAGE 1932, p. 15.

Localities:

Middle part: 28. Cape Elisabeth (V!).

The species was in full flower on Traill Island at 700 m altitude on June 8th. On Ella Island it bore mature fruits on July 26th.

Ranunculus auricomus L.

LINNEUS, Sp. pl., 1753, p. 551.

Var. *glabrata* LYNGE.

B. LYNGE, Rep. scient. res. Norweg. exped. Novaya Zemlya 1921, Oslo 1928, p. 35, Pl. XXII. — (Pl. II).

Outer district: Not observed.

Middle district: One locality, Ymer Island, Botanikerbugt, in a luxuriant *Betula nana* vegetation, at 250 m altitude.

Inner district: Not observed.

LYNGE (l. c.) describes and pictures a new variety of *Ranunculus auricomus* L. from Novaya Zemlya with perfectly glabrous fruits. Judging from the description and the picture, the plant I found on Ymer Island on July 31st is precisely the same. At that time it was already out of flower, and the most advanced plants had nearly ripe fruits; I succeeded in finding only one single plant bearing flowers. — At first sight one believes oneself confronted with an *auricomus* form, and I think that LYNGE is quite right in referring the plant to this species in spite of the glabrous fruits.

R. auricomus is not previously recorded from Greenland. BUCHENAU & FOCKE (l. c. p. 27), it is true, records *R. auricomus* from the area as collected by COPELAND & PANSCH, but states that they cannot distinguish it from *R. affinis* R. BR. COPELAND & PANSCH's plants are by later authors (HARTZ 1895 and KRUUSE 1905) referred, no doubt rightly, to *R. affinis* R. BR. I have not seen these specimens, but the remark upon its occurrence, "ziemlich hoch hinauf namentlich auf feuchten Boden zwischen Felsblöcken", alone indicates that we are here concerned with *R. affinis* and not *R. auricomus*.

In the Arctic Herbarium of the Botanical Museum, Copenhagen, some specimens are found, labelled "Nr. 352. *Ranunculus arcticus* RICHARDS. v. *amoena* (LEDEB.), Leg. C. KRUUSE ad Kap Dalton 69°00' n. Br. 20 Juli, 1900"; they are evidently the same specimens that are described by KRUUSE (l. c. p. 169) as "*Ranunculus arcticus* R. BR." (KRUUSE's "*R. arct.* var. *Willanderi* (NATT.) FREYN." is actually *R. affinis* R. BR.). All the above-mentioned herbarium specimens have by an unfortunate accident lost their heads, but judging from the vegetative parts there is hardly any doubt that they represent the same species as my *R. auricomus* specimens from Ymer Island. The plant

collected by KRUSE presumably grew on basalt at about 300 m altitude (cf. HARTZ & KRUSE 1911, p. 345). Thus the two localities mentioned seem to be the only localities of *Ranunculus auricomus* L. var. *glabrata* LYNGE in Greenland so far known.

Another collection of *Ranunculus* (Pl. III, figs. 4—7), labelled “leg. N. HARTZ ad Scoresby Sund, fugtig Skrænt 200' o. H. [moist slope c. 60 m above sea-level], 7/7 1892”, and determined as *Ranunculus affinis* R. BR., recorded in the literature by HARTZ (l. c. p. 332) as “*Ranunculus affinis* R. BR. (*R. auricomus* L.)” and by KRUSE (l. c. p. 169) as “*Ranunculus arcticus* R. BR.”, is doubtless *R. auricomus* L. (main species); in all respects it is larger and more robust than var. *glabrata* LYNGE, and has hairy ovaries. This locality, Scoresby Sound, Gaaseland, with a luxuriant herbaceous vegetation, is the only one known in Greenland for *R. auricomus* L. (main species).

LYNGE describes the stem leaves of his plant as “sessile with linear leaflets”. His picture of the plant (l. c. Pl. XXII), however, shows the leaflets to be lanceolate, precisely the character in which it differs from *R. affinis* R. BR., whose stem leaflets are linear. The great tendency of the latter species to develop linear leaf sections is also distinctly displayed in the difference between the basal leaves of the two species. The two species further differ markedly in the structure of their vegetative parts. While *R. auricomus* has thin and slender stems and thin leaves, *R. affinis* has thicker and more succulent stems and leaves, much like *R. nivalis* and *R. sulphureus*.

LYNGE states that *R. affinis* subsp. *Wilanderi* NATH. collected by JØRGENSEN at Cape Thorsden, Spitsbergen, is closely related to his new plant. I have seen some of these specimens of subsp. *Wilanderi* NATH. (Pl. III, figs. 1—3), and must admit that they exhibit a considerably closer affinity to *R. auricomus* var. *glabrata* than to *R. affinis*. As regards the last-mentioned character they agree entirely with (LYNGE's and) my plants. The essential difference seems to be that the two stem-leaves, whose leaflets are rather linear or linear-lanceolate, are seated so close together as to form a veritable involucre as in *Anemone* and *Eranthis*.

Thus *Ranunculus auricomus* L. seems to form an Arctic group of forms clearly distinguished from *Ranunculus affinis* R. BR. and its various forms. (Cfr. Pl. II, III, and IV).

Ranunculus glacialis L.

LINNEUS, Sp. pl., 1753, p. 553.

Grows in wet, gravelly snow-patches and at waterstreams originating from the melting snow.

Outer district: Here and there from 400 m to 700 m, but

probably ascends to still higher altitudes. Collected by NOE-NYGAARD in the southeastern part of Traill Island, at the head of Drømmebugt (15) in about 72°10' N. lat.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 167. — VAAGE 1932, p. 15.

Localities:

Outer part: 1. Bontekoe Isl. (SEIDF., 1932); 3. Cape Humboldt (V); 15. Drømmebugt (NOE-NYGAARD, 1932).

The first expanded flowers were observed on June 8th or 9th, at about 500 m altitude.

Ranunculus hyperboreus ROTTB.

ROTTBØLL, Kjöbenh. Selsk. Skrifter, 10, 1770, p. 458.

Occurs in small shallow tarns and among wet moss, sometimes in the innermost snow-free belt of the perennial snow-patches.

Found up to 1000 m altitude.

Outer district: Several localities.

Middle district: Several localities.

Inner district: Several localities.

Former investigations:

DUSÉN 1901, p. 30. — KRUUSE 1905, p. 168. — VAAGE 1932, p. 15.

Localities:

Outer part: 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 12. Vega-næs (V); 17. Antarctic Hbr. (D); 18. Cape Seaforth (H & K!).

Middle part: 29. Holmsvig (V).

The species flowered on Traill Island at the end of June. On Ymer Island, where it grew at the shore of a small lake at 1000 m altitude, it had nearly fully developed fruits on August 12th. The species seems on the whole to be richly fructifying within the area. — In somewhat deeper water it develops forms with floating leaves; here it rarely flowers, and hardly produces ripe seeds.

Ranunculus nivalis L.

LINNÆUS, Sp. pl., 1753, p. 553.

Mostly in moist, gravelly soil.

Evidently snow-covered in the winter.

Outer district: Here and there.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 168. — VAAGE 1932, p. 16.

Localities:

Outer part: 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 10. Gaaseø (V); 12. Veganæs (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K).

Middle part: 28. Cape Elisabeth (V).

R. nivalis seems to be less frequent than *R. sulphureus*. The two species are easily distinguishable in nature, and intermediate forms do not seem to occur.

Found richly flowering on Traill Island at 500 m altitude on June 8th.

In places where the two species occur together, *R. nivalis* flowers earlier than *R. sulphureus*, even so decidedly that, in the same place, I have observed all the *nivalis* specimens to be in a rather advanced stage of fructification, while the *sulphureus* individuals had just began to flower.

Ranunculus pygmaeus WAHLENB.

WAHLENBERG, Fl. Lapp., 1812, p. 157.

Grows in snow-patches.

Ascends to about 800 m altitude.

Outer district: Very common.

Middle district: Here and there.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 30. — KRUUSE 1905, p. 167. — VAAGE 1932, p. 16.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!).

Middle part: 29. Holmsvig (V); 30. Cape Peterséns (V).

Found flowering on Traill Island at 450 m altitude on a damp slope with a southern exposure on June 8th. Probably, however, it is quite exceptional that it flowers so early. Thus it may be met with in flower even late in the summer, since the last specimens do not become free of snow in the snow-patches until very late.

Var. *Langeana* NATH. (A. G. NATHORST, Öfv. K. Vet.-Akad. Förh. Stockholm 1884, Nr. 1, p. 46) was found by HARTZ and KRUUSE in Fleming Inlet (19). I did not observe this variety within the area, but

since my attention was not especially directed towards it, I may have overlooked it.

Ranunculus sulphureus SOLAND.

SOLANDER in PHIPPS, Voy. N. Pole, London 1774, p. 202.

Grows in damp soil, mostly among mosses and grass.

Found up to 600—700 m altitude (recorded by VAAGE from 1000 m, Hoelsbu, Musk-ox Fjord).

Outer district: Rather common.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 30 (sub nom. *R. altaicus* LAXM.). — KRUUSE 1905, p. 168 (sub nom. *R. altaicus* LAXM.). — VAAGE 1932, p. 16.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!); 22. Murray Isl. (D).

Found in incipient flowering on Traill Island on June 8th at 250 m altitude.

Ranunculus trichophyllus CHAIX.

CHAIX in VILLARS, Hist. Pl. Dauph., 1, 1786, p. 335.

Occurs in shallow-watered lakes. Also in ponds drying up in the summer.

Found up to 300 m altitude.

Outer district: Not observed. (No lakes met with).

Middle district: Here and there.

Inner district: A couple of localities.

Former investigations:

VAAGE 1932, p. 17.

Localities:

Outer part: 7. Husbugt (V); 12. Veganæs (V); 17. Antarctic Hbr. (V).

The species frequently develops creeping terrestrial forms.

In places where it is covered with water in the spring only, and in the summer found creeping on the damp soil, it flowers and fructifies earlier than where it is actually submerged. At Cape Hedlund, where it grew in water 20—30 cm deep, it had not yet begun to flower about the middle of July. On Ella Island submerged patches of the species were in flower at the end of July, while at that time the terrestrial forms had in addition fully developed fruits. The submerse plants may,

however, fructify, too; such plants were observed with fruits at the setting in of the frost in September, 1931.

As regards the hibernation, it is noteworthy that the plant endures the severe frost in an entirely desiccated state. Thus I have encountered it on dusty dry ground without snow-covering in the month of February. That it did actually withstand these conditions was evidenced by the fact that it grew abundantly in the same place the following summer.

Thalictrum alpinum L.

LINNÆUS, Sp. pl., 1753, p. 545.

Grows especially in grassy spits affected by solifluction, sometimes in moderate snow-covering.

Often free of snow in the winter.

Outer district: Here and there from 200 m to 500 m altitude.

Middle district: Two localities, Ella Island, Cape Oswald, at 50 m and 300 m altitude.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 166. — VAAGE 1932, p. 17.

Localities:

Outer part: 3. Cape Humboldt (V); 4. Mt. Celsius (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 19. Pingel Valley (H & K!).

The species flowers late, the first flowering individuals being observed on Traill Island on June 23rd.

Rosaceae.

Dryas octopetala L.

LINNÆUS, Sp. pl., 1753, p. 501.

Incl. var. *integrifolia* (M. VAHL) CHAM. & SCHLECHT.

CHAMISSE & SCHLECHTENDAL, Linnaea, 2, 1827, p. 3.

Most frequent in dry, but also in damp soil, e. g. bogs.

Very frequently free of snow in the winter, does not, evidently, withstand a protracted snow-covering.

Ascends to about 1000 m altitude.

Outer district: Very common, often dominating physiognomically.

Middle district: Very common, often forming dense growths.

Inner district: Very common. Hardly forming dense growths.

Former investigations:

BUCHENAU & FOCKE 1874, p. 38 (*D. octopetala* [s. str.]). — DUSÉN 1901, p. 13 (sub nom. *D. octopetala* L. var. *minor* Hook. et var. *argentea* BLYTT et subsp. *integrifolia* (M. VAHL)). — KRUUSE 1905, p. 148 (*D. octo-*

petala cum var. et subsp. *integrifolia* (M. VAHL) HARTZ). — SEIDENFADEN 1930, p. 381 (*D. octopetala* [s. str.]); 1931, p. 19 (*D. octopetala* [s. str.]). — VAAGE 1932, p. 24 (*D. integrifolia* M. VAHL et *D. octopetala* L.).

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 6. Sanddal (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Voganæs (V); 13. Cape Parry (D); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K). — var. *integrifolia*: 7. Husbugt (V!); 8. 5 km W. of Husbugt (V!); 9. 15 km W. of Husbugt (V!); 12. Voganæs (V!).

Middle part: 24. Blomsterbugt (SEIDF., V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.); 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D). — var. *integrifolia*: 32. Renbugt (V!); 33. Head of Franz Joseph Fjord (D); 37. Dickson Fjord (V!); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V!); 40. Röhss Fjord, south coast (V!); 42. Polhem Valley (H & K).

Within the area in question it seems impossible to keep the two *Dryas*-species distinct. The majority of the *Dryas* growths should probably be referred to *octopetala* s. str., however, in most places a careful search will reveal specimens (or parts of such) with nearly undivided leaves, and as far as I have been able to make out, the *integrifolia* forms are not associated with a special habitat. They seem, however, as also pointed out by VAAGE (l. c., p. 24), to be most frequent in the inner fjord regions. — Forms with leaves tomentose both on the upper and under side are of frequent occurrence, notably in dry localities exposed to the wind.

About May 24th the *Dryas* flats on Ella Island began to assume a green colour. The first flowers were observed on June 1st. The main flowering occurs in the month of June, but is comparatively prolonged, the species occurring both in snow-free and snow-covered soil. The maturation of the fruits takes place in August, when the flocculose heads lend to the *Dryas* flat a greyish-white colour.

Potentilla Crantzii BECK.

G. BECK, in Sched. ex Fl. N. Östr., 1892, p. 760.

Grows on sunny slopes with a herbaceous vegetation. Occurs in quantity.

Snow-covered in the winter.

Found up to 500—600 m altitude. VAAGE records it from 1000 m altitude (Cape Humboldt).

Outer district: Here and there from 200 to 600 m altitude.

Middle district: Ella Island and Ymer Island. Several localities.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 149 (sub nom. *P. maculata* POUR.). — SEIDENFADEN 1931, p. 19 (sub nom. *P. maculata*). — VAAGE 1932, p. 22 (sub nom. *P. alpestris* HALL.).

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 12. Veganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!); 21. Cape Fletcher (H & K).

Middle part: 28. Cape Elisabeth (SEIDF.).

The species occupies a special position within the *Potentilla* species of the area in that transitional forms between this and the other species never occur, and it also differs from them with regard to locality.

On Traill Island it was in incipient flowering on June 14th. The various patches flower simultaneously, but for a short time only.

Potentilla emarginata PURSH.

PURSH, Fl. Am. Septentr., I, 1814, p. 353.

Mostly in not too dry soil.

Evidently generally snow-covered in the winter.

Found up to 700 m altitude (VAAGE records it from 1000 m altitude at Cape Humboldt).

Outer district: Common.

Middle district: Not observed.

Inner district: One locality, at 600 m.

Former investigations:

DUSÉN 1901, p. 14. — VAAGE 1932, p. 23.

Localities:

Outer part: 5. S.W. of Robertson Isl. (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (D, V).

Middle part: Holmsvig (V).

Inner part: 39. Head of Röhss Fjord (V).

The species varies but little, even if the degree of pilosity may

differ somewhat. Very hairy forms with yellowish hairs were of common occurrence on Traill Island. That *P. emarginata* seems to be a far more constant species than *P. nivea*, is probably due to the fact that transitional forms will generally be referred to the latter species. Apparent intermediate forms between these two species were observed on Traill Island. I, too, consider it most natural to refer such forms to *nivea*, since by its multiflorous stems and the more or less tomentose leaves it most resembles this species. That such forms may be of hybridogenous origin, seems to me very probable, since they often occur among both of the presumed primitive species, even in greater number than these. Further it seems to be of interest in this connection that an undoubted *emarginata* character may sometimes be found in these *nivea* forms, in that the petals are not deciduous, but remain on the plant after withering. The other *emarginata* characters, with the exception, perhaps, of the higher degree of pilosity, which on a superficial view is indistinguishable from tomentosity, can hardly be ascertained with certainty, for which reason *emarginata* keeps "purer" than *nivea*. Thus the result of a continued hybridisation between the two species will be: a fairly constant *P. emarginata* and a variable *P. nivea*. Employing the hairiness instead of the tomentum as a distinguishing character, precisely the opposite result is arrived at.

However, the hybridisation hypothesis alone hardly furnishes a satisfactory basis for a natural division of these forms or on the whole for an explanation of their origin. Thus unmixed growths of the very pilose *nivea* often occur in places where *emarginata* could not be ascertained in the neighbourhood (see further *P. nivea* and *P. rubricaulis*).

P. emarginata is evidently the earliest flowering *Potentilla* within the area. It was observed in flower in company with *nivea* on Traill Island on June 7th at 400 m altitude. The species is evidently better able to withstand a relatively protracted snow-covering than *P. nivea*. As late as July 12th I found it in incipient flowering on Cape Hedlund at 600 m altitude, growing in a moderate snow-covering.

Potentilla nivea L.

LINNÆUS, Sp. pl., 1753, p. 499.

Grows in dry soil, common in places exposed to the wind.

Very often free of snow in the winter.

Ascends to great altitudes, 1000 m and even more.

Outer district: Common.

Middle district: Common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 39. — DUSÉN 1901, p. 15. — KRUSE

1905, p. 150. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 23 and 24 (sub nom. *P. nivea* L. et *P. Pedersenii* (RYDB.) OSTF. [ex pte.]).

Localities:

Outer part: Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K); 21. Cape Fletcher (H & K!); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V!); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.!); 38. Röhss Fjord, north coast (D); 43. Forsblad Fjord (D).

The species is very variable, and as the forms are not sharply delimited, a division of them is very difficult. Hence I shall refrain from classifying them under the many, often deficiently defined, varieties which have in the course of time been erected on paper.

I shall, however, briefly mention the forms which caught my eye as the most characteristic within the area. It seems to me a point of no little interest that the forms occurring in the inner fjords generally differ from those of the outer coast areas.

1) (Pl. V) Forms with multiflorous, often erect, stems, tridigitate basal leaves, with often slightly incised, broadly obovate leaflets, smooth on the upper surface, are the most frequent and occur throughout the area, more rarely, however, in the outer coastal regions.

2) (Pl. VI) A characteristic desert form, which I observed on Cape Hedlund and on Ymer Island. It grows in extremely dry places, and is conspicuous on account of the leaves which are white- or grey-tomentose on both the upper and the under side. The basal leaves, which have comparatively long stalks, are tridigitate, with big oblong-obovate coarsely serrate leaflets. The stems bear only one (to three) long-stalked flowers.

3) (Pl. VII) On Cape Hedlund and Ymer Island (and Ella Island) I likewise collected a form with quindigitate basal leaves, which sometimes even show a tendency to becoming bijugate, and whose leaflets are narrow and deeply divided, nearly pectinate, and often with scattered hairs on both the upper and the under side. Stems usually ascending, relatively multiflorous.

4) (Pl. VIII) An interesting form was of common occurrence on Traill Island. It was particularly luxuriant at bird cliffs, and thus

proved to be decidedly ornithocoprophilous, even if it was not absent from dry and less favourable places. It is distinguished by having small, tridigitate basal leaves. The leaflets are more cuneate and with fewer teeth than the other *nivea* forms, and very sericeous, especially on the under side. Stems mostly erect, reddish, and multiflorous. Flowers usually of a deep yellow colour. This form seems in many respect to form transitions to *P. emarginata* (which see). A character noteworthy in this connection is the richly flowering inflorescences, since *P. emarginata* generally bears only a single long-stalked flower on each stem. The form is possibly of a hybridogenous origin, and hardly sharply marked off from the other *nivea* forms, but it seems most natural to me to regard it as a form adapted to the humid cold climate of the outer coastal regions.

5) (Pl. IX and X) Farther north, in the coastal zone proper, but also as far south as the Scoresby Sound area, similar forms are evidently of common occurrence, judging from the available herbarium material. They differ, however, from (4) by having more vigorous and often ascending stems, and somewhat larger flowers with broader sepals¹). Of characters common to (4) and (5) may be mentioned the multiflorous cyme with rather short-stalked flowers, the reddish calyx and the sericeous pilosity of the leaves, which lends to the plant a peculiar lustre, by which latter character they approach the Greenland *rubricaulis*.

With form (5) we have reached the outer limits of OSTENFELD'S *P. Pedersenii* (Pl. IX shows some specimens referred by OSTENFELD to *P. nivea*, Pl. X specimens determined by OSTENFELD as *P. Pedersenii*).

This form, however, is hardly identical with RYDBERG'S *P. Pedersenii*, which has "stems low, less than 1 dm high 1—3 flowered" (RYDBERG 1908, p. 332. See further *P. rubricaulis* LEHM.).

Pulvinate specimens from the north coast of Greenland often bear only one or two flowers on each stem (cf. e.g. OSTENFELD: The Vegetation of the North-coast of Greenland, based upon the late Dr. TH. WULFF'S collections and observations. Medd. om Grøn. Bd. 64, 1923, p. 239, Pl. III, fig. 3). It seems mostly natural, however, to consider these as depauperate specimens, belonging to the same form-complex as the East Greenland forms mentioned under (5).

It is hardly possible to draw sharp lines of demarcation between the above-mentioned types. If the northerly sericeous forms are to be

¹) It is uncertain whether these forms occur in the outermost coastal regions of Traill Island and Geographical Society Island. At any rate one floral element characteristic of the more northerly coastal regions seems to be absent here. The cause, however, is possibly to be sought in the deficient investigation of these parts.

regarded as a unit opposed to "*nivea*", the most natural line should in my opinion be drawn between my groups (3) and (4). The question as to the justification of such a division can, however, only be solved by means of further investigations in nature of the occurrence of the various forms.

Potentilla pulchella R. BR.

ROB. BROWN in Ross Voy., Ed. 2, 1819, p. 193.

Outer district: Not observed.

Middle district: Ymer Island, in sandy soil near the shore. Not found above 100 m altitude.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 24 (sub nom. *P. Pedersenii* (RYDB.) OSTF. [ex pte.]

Localities:

Middle part: 28. Cape Elisabeth (V!).

The species varies within wide limits as to degree of pilosity. My specimens from Ymer Island were generally of a vigorous growth and not particularly hairy, and hence must be referred to LANGE's *β elatior* (Consp. Fl. Groenl. 1880, p. 4). There seems to be less foundation for considering this form a separate species (*P. subarctica* RYDBERG, North American Flora Bd. 22, 1908, p. 347).

The species seems to be rare within the area, having formerly only been collected by VAAGE at Cape Elisabeth, Ella Island. On Ymer Island it formed large tufts among the dunes, and was entirely out of flower at the beginning of August.

Potentilla rubricaulis LEHM.

LEHMANN, Nov. et min. cogn. Stirp. Pugill., 2, Hamburg 1856, p. 11, et Revis. Potent. icon. illust., Nov. Act. Acad. Caes. Leop. Carol. Nat. Curios., 23 suppl., Breslau & Bonn 1856, p. 68. — Non RYDBERG, Monogr. N.-Amer. Potent., Mem. Dep. Bot. Columbia Univ., Lancaster Pa., 1898, p. 101. — WOLF, Monogr. Gatt. Potent., Bibl. Botanica, 71, Stuttgart 1908, p. 170. — SIMMONS, Rep. sec. Norw. arct. exped. "Fram" 1898—1902, 1, Kristiania 1906, p. 50 (var. *arctica* SIMM.) and 16, 1909, p. 61. — RYDBERG, North Amer. Flora, 22, part 4, New York 1908, p. 337. — *Potentilla Pedersenii* (RYDB.) OSTENFELD (1), Medd. om Grøn., 64, 1923, p. 182 [ex parte]. [E. g. non OSTENFELD (2), Medd. om Grøn., 64, p. 239]. — Non *P. subquinata* (LGE.) *Pedersenii* RYDBERG, Contrib. New York Bot. Garden, 13, 1901, p. 182, nec *P. Pedersenii* (RYDB.) RYDBERG, North Amer. Flora, 22, part 4, New York 1908, p. 332.

Illustrations: LEHMANN 1856 (Revis. Pot.), tab. 30. — SIMMONS 1906, pl. 5 (var. *arctica* SIMM.). — Pl. nostra XI. — Non RYDBERG 1898, tab. 40, fig. 1—4. — Non *P. Pedersenii*, OSTENFELD (2) 1923, pl. III, fig. 3.

Former investigations on *Potentilla rubricaulis* LEHM. in Greenland:

?DURAND, Journ. Acad. Nat. Sc. Philadelphia, 3. ser. 2, 1856, p. 190

(sub nom. *P. pulchella* R. BR.). ?TAYLOR, Transact. Bot. Soc. Edinburgh, 7, part 2, 1862, p. 327 (sub nom. *P. nivea* L.). ?HART, Journ. of Bot., 18 (New Ser. 9) 1880, p. 206 (sub nom. *P. nivea* L. [ex parte]). — NATHORST, Öfvers. K. Vet.-Akad. Förh. Årg. 41, No. 1, Stockholm 1884, p. 23 (sub nom. *P. nivea* L. var.). — DUSÉN, Bih. K. Sv. Vet.-Akad. Handl., 27, Afd. 3, No. 3, Stockholm 1901, p. 14 (sub nom. *P. pulchella* R. BR. f. *elator*). — OSTENFELD, Medd. om Grøn. 33, København 1905, p. 66 (sub nom. *P. aff. (nivea vel) rubricaulis*). — SIMMONS, l. c. 1909, p. 61. — OSTENFELD, Medd. om Grøn., 64, 1923, p. 203 (sub nom. *P. Pedersenii* (RYDB.) OSTF. [ex parte]). — OSTENFELD, *ibid.*, 68, 1925, p. 17 (sub nom. *P. Pedersenii* (RYDB.) RYDB. [ex parte]). — SEIDENFADEN, *ibid.* 74, 1930, p. 381 (sub nom. *P. nivea* [ex parte]). — SEIDENFADEN, *ibid.*, 87, Nr. 2, 1931, p. 16 and 19 (sub nom. *P. nov. sp.*). — VAAGE, Skrifter om Svalbard og Ishavet, Nr. 48, Oslo 1932, p. 24 (sub nom. *P. Pedersenii* (RYDB.) OSTF. [ex parte]). — GELTING, Medd. om Grøn., Bd. 101, Nr. 2, 1933 (under preparation).

Localities (whole Greenland). Map fig. 3.

West Greenland:

1. Inglefield Land, Marshall Bay (2-VII-1921, leg. J. NOE NYGAARD)!..... ca. 78°55' N. lat.
2. Inglefield Land, Anoretok, W. of Rensselaer Bay (20-VII-1921, leg. J. NOE NYGAARD)!..... ca. 78°35' N. lat.
3. Etah, Foulke Fjord (Nr. 221, 1461, and 1882, H. G. SIMMONS, l. c. pag. 61) ca. 78°20' N. lat.
4. Agpat and Umanak, Wolstenholme Sound (5—8-VIII-1905, leg. BALLE)!..... ca. 76°35' N. lat.
5. Thule, Wolstenholme Sound (1919, leg. J. NOE NYGAARD)! ca. 76°30' N. lat.
6. Cape York, Ivsugigsok (26-VII-1893, leg. A. G. NATHORST)!..... ca. 76°10' N. lat.
7. Cape York, Parker Snow Bay (3-VIII-1927, leg. E. LANGBERG and K. RASMUSSEN)! ca. 76°05' N. lat.

East Greenland:

8. Wollaston Foreland, Landingsdalen (28-VII-1929, leg. J. VAAGE; Mus. Oslo)! ca. 74°27' N. lat.
9. Wollaston Foreland, Cape Herschell (29-VII-1929, 18-VII-1930, leg. J. VAAGE; Mus. Oslo)! ca. 74°15' N. lat.
10. Clavering Island, Cape Mary (1-IX-1931, leg. P. GELTING)!..... ca. 74°10' N. lat.
11. Clavering Island, Elvsborg (22-VII-1929, leg. G. SEIDENFADEN)!..... ca. 74°09' N. lat.



Fig. 3.
The distribution within Greenland of *Potentille rubricaulis*.

12. Clavering Island, Eskimonæs (19-VI-1932, leg.
P. GELTING)! ca. 74°06' N. lat.
13. Jackson Island, east side (31-VII-1929, leg. J.
VAAGE; Mus. Oslo)! ca. 73°44' N. lat.
14. Cape Stosch (ca. 20-VIII-1932, leg. M. KØIE)! ... ca. 74°05' N. lat.
15. Ymer Island, Botanikerbugt (7-VIII-1932, leg.
TH. SØRENSEN)! ca. 73°10' N. alt.
16. Ella Island, Cape Elisabeth (17-VIII-1930, leg.
G. SEIDENFADEN)! ca. 72°54' N. lat.
17. Ella Island, east side (26-VII-1932, leg. TH.
SØRENSEN)! ca. 72°53' N. lat.

During my work in the field I found, on July 26th, on the east side of Ella Island a *Potentilla* growing on hard dry solifluction soil and differing markedly from *P. nivea*, in company with which it occurred, i. a. by having bijugate leaves. I took it to be *P. Pedersenii* (RYDBERG) OSTENF. At the beginning of August I observed, on Ymer Island on the opposite side of Sophia Sound, another *Potentilla* out of flower; I took it to be a rather deviating form of *P. pulchella* R. BR., which was here fairly common, and in company with which it occurred.

After a close study of the literature bearing on the subject, and a comparison of the plants collected by me with the collections of arctic *Potentilla* of the Botanical Museum of Copenhagen, I consider it best to refer both these forms to *Potentilla rubricaulis* LEHMANN.

The identification of these plants necessitated a close study of the taxonomic units proposed lately within this relationship, viz. *P. subquinata Pedersenii* RYDBERG (1901, p. 186), *P. rubricaulis* LEHM. var. *arctica* SIMMONS (1906, p. 50), *P. Pedersenii* RYDBERG (1908, p. 332), and *P. Pedersenii* (RYDB.) OSTENFELD (1923 (1), p. 182).

The type specimen of RYDBERG's *P. subquinata Pedersenii* (later *P. Pedersenii* RYDB. and *P. Pedersenii* (RYDB.) OSTF.) was collected at Assuk on the island of Disko by M. PEDERSEN PORSILD in 1898. This plant is of a somewhat doubtful character and possibly of hybridogenous origin. OSTENFELD (l. c. p. 186) attaches great importance to "the small extra-leaflets beneath the three upper leaflets" (which, however, are lacking in by far the majority of the leaves), and is of opinion that RYDBERG had not noticed them. Even if RYDBERG's description of the plant (1901, p. 182) is rather incomplete, the mere fact that he erected it as a variety under *P. subquinata* (LGE.) RYDB. (syn. *P. nivea* L. var. *subquinata* LGE.) would seem to indicate that he was aware of this character, and in 1908 he likewise writes (l. c. p. 332, under *P. Pedersenii*) "basal leaves 3—5-foliolate". According to OSTENFELD (l. c. p. 186), WOLF, too, (l. c. p. 239) has not been aware of the said extra-

leaflets. WOLF considers the plant a specimen of *P. Vahlia* LEHM., to which species it bears a considerable habitual resemblance. The shape of the leaf, however, differs greatly from that typical of *P. Vahlia*, rather approaching *P. nivea*, and the sepals and bractlets also are fairly narrow.

In 1906 SIMMONS described and pictured a var. *arctica* of *P. rubricaulis* LEHM. (l. c. p. 51, Pl. 5), "characterised by low growth; mostly 3-digitate leaves, or by very small basal leaflets, furnished only with one or few feeble teeth". SIMMONS states, however, that his plant is very closely related to *P. rubricaulis*, which name alone is given below the figure.

OSTENFELD (l. c. p. 186), however, held the view that RYDBERG'S *P. subquinata Pedersenii* and SIMMON'S *P. rubricaulis* var. *arctica* are identical, and proposed the name *P. Pedersenii* (RYDB.) OSTF. There is, at any rate, no slight similarity between the two forms, even if the latter seems to be more closely related to *rubricaulis* than the former. Both forms approach *Vahlia*, i. a. in their much branched caudex covered with the brown scarious stipules and remains of old leaves. The name has, however, been employed for a number of mutually differing intermediate forms which could only with difficulty be placed elsewhere.

RYDBERG did not, evidently, agree with OSTENFELD, for in 1908 (l. c. p. 337) he gives the distribution of *P. rubricaulis* as follows: "Arctic America from the Mackenzie to Ellesmere Land". In this is evidently included SIMMON'S var. *arctica*, the species having formerly only been known from Bear Lake, Mackenzie, the Arctic coast of North America, and Banks Land. The distribution of *P. Pedersenii* he very wisely states to be only the "Island of Disco".

During the identification of my above-mentioned collections it has been of great help to me that mag. sc. SEIDENFADEN kindly placed at my disposal a specimen of *Potentilla* collected by him at Cape Elisabeth on Ella Island (cf. SEIDENFADEN 1931, p. 16) which according to notes attached to the herbarium specimens, was referred with some hesitation to *P. rubricaulis* LEHM. by the late Professor OSTENFELD.

While my plants from Ymer Island agree fairly well with those collected by SEIDENFADEN (which seem to be rather weak, evidently shade forms of the species), my specimens from Ella Island bear a superficial resemblance to *P. nivea*, the leaves being short-stalked and the leaflets more approximate. Since, as mentioned above, I took the plant to be *P. Pedersenii*, I was led to a closer study of this "species". The copious Greenland material gathered in our Arctic Herbarium under this name proved to be fairly heterogeneous. However, after a careful examination of the material I think it doubtful whether *P. Pedersenii*

can be maintained as a distinct species, since it is not even tolerably well marked off from the species within whose areas it occurs, viz. *P. nivea*, *P. Vahlia*na, *P. emarginata*, and *P. rubricaulis*. Like the other species it seems, however, to be distinct from *P. pulchella*, in spite of the sericeous pilosity which it has in common with this latter species.

I have attempted to separate what might be regarded as variants of *P. rubricaulis*. In my classification of the plants I suppose I agree most closely with SIMMONS, who has formerly recorded *P. rubricaulis* from Greenland (cf. SIMMONS 1909). For the material from Northwest and North Greenland, the classification is fairly easy. Apart from a large collection from Disco, determined by PORSILD as *P. Pedersenii* (RYDB.) RYDB. and consisting of indubitable *nivea* forms (var. *pinnatifida* s. l. LEHM. l. c. p. 168 emend. WOLF l. c. p. 239, cf. also my types 2 and 3 of *P. nivea*), it comprises, in addition to RYDBERG's specimen, several specimens which are hardly distinguishable from *P. Vahlia*na, as well as highly sericeous *nivea*-forms (*Potentilla Pedersenii*?). As to East Greenland the question seems more intricate, since here *P. Vahlia*na disappears while sericeous *nivea*-forms become more frequent. Even if these form no well-defined unit, there seems to occur a relatively characteristic form, an exceedingly beautiful large-flowered *Potentilla* with rather short-stalked flowers gathered in a multiflorous cyme and with tridigitate (rarely 5-digitate) leaves (but never pinnate, the leaflets issuing from the same point), tomentose on the under side and very sericeous, sometimes with yellowish hairs, on both sides. This form was collected in quantity by LUNDAGER on Germania Land (about 77° N. lat.) and by SEIDENFADEN in Musk-ox Fjord and on Clavering Island (74°—76° N. lat.). In spite of its lack of small leaflets OSTENFELD evidently considered this form the *P. Pedersenii* proper. It is not, however, identical with RYDBERG's plant from Disco, nor with SIMMONS's specimen from Ellesmere Land, and is hardly distinguishable from *P. nivea*. Future investigations in the field may possibly decide whether a species with this type as a centre and also including forms referred by OSTENFELD to *nivea* can be maintained. At any rate, these forms seem to be partially ecologically distinct from the "purer" *nivea*-forms, and according to my observations, they are absent from the inner fjord ramifications in contrast to the latter forms (cf. further *P. nivea* L.). Nevertheless I prefer for the time being to regard it as a high-arctic form of the polymorphous collective species *P. nivea*. It is intermediate in certain respects between *P. nivea* and *P. emarginata*, and some specimens quite naturally suggest a hybridogenous origin. It also shows the same distribution as *P. emarginata*.

On the whole *P. nivea*, *emarginata*, and *Vahlia*na seem to constitute a big form-complex in North Greenland, of which *P. Vahlia*na is pre-

sumably the latest differentiated species and has a comparatively limited area of distribution within Northeast Greenland and the adjacent regions of Arctic North America. Unfortunately I have never seen this species in nature, but it is evidently rather closely related to *P. emarginata*. — In Northeast Greenland the said intermediate forms are probably not yet sufficiently differentiated to form a well-defined species (cf. OSTENFELD'S remarks on this form in LUNDAGER & OSTENFELD. Medd. om Grønl. 43, 1. Afd. (1910), p. 27: "The specimens collected vary somewhat, as is usual with specimens of arctic *P. nivea*. But I think that they may all be named var. *pinnatifida* LEHM. (Pugill. plant. IX, Hamburg 1851, p. 67; TH. WOLF (l. c., emendavit) under which variety I place f. *subquinata* LANGE (l. c. p. 9). I fully agree with TH. WOLF in not following P. RYDBERG (Bull. Torr. Bot. Club, 28, 1901, p. 181), who makes a separate species of LANGE'S form.")

Thus intermediate forms between *P. nivea*, *Vahlia*na, *emarginata*, and *rubricaulis* are not lacking in North Greenland. RYDBERG'S type specimen of *P. Pedersenii* is one of these, even if it seems to be more closely related to *nivea-Vahlia*na than to *rubricaulis*.

In view of the remarks set down above I consider it best to disregard *P. Pedersenii* as a separate species. On the other hand *P. rubricaulis* LEHM. may be regarded as a good species within the Greenland flora, even if in the western regions it seems less well marked off from *P. nivea* and *Vahlia*na (*P. rubricaulis* LEHM., var. *arctica* SIMMONS).

Even the available Northwest Greenland material of this species is sparse, however, the most recent investigations in East Greenland have shown that it is rather common there, at any rate locally.

Within the area treated in this paper the species has only been found in the two localities mentioned above. My colleague, P. GELTING, has, however, placed his material from the more northerly regions at my disposal, and the Botanical Museum of Oslo has likewise kindly lent me VAAGE'S collections of *P. Pedersenii*, which proved to contain exceedingly beautiful collections of *P. rubricaulis*. According to SIMMONS (1906, p. 52) the species has been collected in East Greenland (Cape Mary, Clavering Island) by DUSÉN.

The species is characterised by its relatively long-stalked pinnate leaves with 5 (3—7) obovate, rather deeply and regularly pectinate leaflets, the lowermost of which are often but small, cuneate, and with few teeth. The leaves are sparsely white-tomentose on the under side, and densely covered with long silky hairs, while the upper side is sparsely covered with hairs. The pilosity is generally bright snowy-white, sometimes with a slight pinkish tinge. The stem-leaves are 3(—5)-digitate, the lowermost stalked, with ovate-lanceolate stipules. Several stems often issuing from the same rosette, generally ascending, stained with

red, multiflorous. Flowers medium-sized, petals obcordate, about one and a half times the length of the sepals. Sepals broadly triangular-ovate, bractlets linear-lanceolate. It differs from *nivea* by its pinnate leaves and broad sepals (the Arctic *nivea*-forms, however, have often fairly broad sepals). It is distinct from *pulchella* by its big flowers and the obcordate petals, and in its vegetative stage by its leaflets of the basal leaves being broadly cuneate, while in *pulchella* they taper towards the base, which makes the terminal leaflet look stalked on a superficial inspection. Further it is noteworthy that *P. rubricaulis* shows but slight tendency to form big many-headed tufts, caudex, in contrast to that of *P. pulchella*, being short and unbranched. It should not, perhaps, be disregarded that the species may have originated by hybridisation between *P. nivea* and *P. pulchella*, with which latter it has both pilosity and occurrence at the outer coast in common.

The often elongated and branched caudex in *P. pulchella* and *P. Vahlia* is evidently in close agreement with the habitat of the plants, in that it makes them particularly well suited for enduring sudden changes in the upper soil strata, as for instance solifluction and sand-drift. On Ymer Island, where I often observed *P. rubricaulis* and *P. pulchella* growing side by side, only *pulchella* found its way into the "live" dunes, where it formed huge tufts. During attempts at digging out such individuals from the sand, I have dug down about 30 cm without reaching the roots, the plants being attached still deeper by means of the long sub-terranean stems, which are coated far down with a dense covering of the brown scarios remains of old leaf-bases. On sandy soil not disturbed by drift, the two species grew in company.

A list of the localities of *Potentilla rubricaulis* hitherto recorded within Greenland is given above. The figures refer to the attached map (fig. 3).

Unfortunately I have not seen the American specimens of the principal form, but judging from LEHMANN's description and figure, all the East Greenland specimens belong to that species. The greater number of the West Greenland specimens seem to be somewhat more closely related to SIMMON's var. *arctica* (1906, Pl. 5), the basal leaflets often being more poorly developed. As to the justification of placing this form under *rubricaulis*, I shall merely quote SIMMONS's remarks on this question (1906, p. 51): "The RICHARDSON-specimens [presumably from the original locality, Great Bear Lake] especially, were larger and had larger and more deeply incised leaves than my Ellesmereland-specimens, but they only had two pairs of leaflets (or even one only) and the basal ones are at least somewhat smaller than the upper ones. The difference between this form and the arctic one is consequently not greater than might be expected¹⁾".

¹⁾ Spaced by us.

It should, however, be pointed out that neither LEHMANN nor WOLF mention the sericeous pilosity of the under side of the leaves. If this hairiness is absent from LEHMANN's original specimen, it would seem to be more closely related to the usual *nivea*-forms than our East Greenland specimen, and hence this latter is most closely related to var. *arctica* SIMM., with which it has this hair character in common, despite the distinctly pinnate leaves.

Sibbaldia procumbens L.

LINNÆUS, Sp. pl., 1753, p. 284.

On sunny, not too dry slopes.

Snow-covered in the winter.

Recorded by VAAGE from 650 m altitude (Cape Humboldt).

Outer district: Here and there from 150 to 500 m altitude.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

KRUUSE 1905, p. 150. — VAAGE 1932, p. 24.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Found in full flower on Traill Island on June 17th.

The species has not been found north of the area here treated.

Salicaceae.

Salix arctica PALL. (s. l.).

PALLAS, Fl. Ross., II, 1790, p. 86.

Grows in dry as well as in damp soil, mostly in bogs and places with a moderate snow-covering.

May be both free of snow and snow-covered in the winter; when forming dense growths, however, it is as a rule snow-covered.

Ascends to great altitudes (1000 m and more).

Outer district: Very common, dominating physiognomically over large areas.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 48. — DUSÉN 1901, p. 50. — KRUUSE 1905, p. 186. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 44 (sub nom. *S. arctica* (PALLAS) × *arctophila* (COCK.) × *glauca* L.).

Localities:

Outer part: 1. Bontekoe Isl. (D, SEIDF., 1932); 2. Cape Graah (V);

3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vegganæs (V); 13. Cape Parry (D); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!, V); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!, V); 34. Kjerulf Fjord (V); 35. Nanortalik (SEIDF.!, V); 36. Mineralbugt (SEIDF.!, V); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!, V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

An extremely variable species, all the various forms of which, according to FLODERUS, are referable to the triple hybrid *S. arctica* PALL. × *S. glauca* L. × *S. arctophila* COCK. (B. FLODERUS in Medd. om Grøn. Bd. 63. København 1923).

In dry localities exposed to the wind it tends to form vigorous and rigid, more or less erect shoots. The willow branches that are free of snow in the winter are preferably eaten by the snow-hares. The characteristic "wind forms" figured by HARTZ (Medd. om Grøn. Bd. 18. København 1894, pp. 309—310) are doubtless often chiefly due to the browsing of the hares.

In damper soil, where the species is most frequent, it generally forms long, closely prostrate, often meandering, stems, from which rise only the short catkin-bearing shoots, which often die down after the close of the growth period.

In bogs the species often occurs as small and slender forms rising but slightly above the mossy carpet and not attaining the height of the herbaceous vegetation.

Incipient foliation observed on Ella Island on May 23rd. The first fully developed catkins (flowering) were observed on May 28th.

Mature capsules, distinguishable on account of their wool, were observed on Traill Island in the latter part of June, i.e. considerably earlier than the foliation of individuals growing in snow-patches in the same place, the last of which had not yet become free of snow on July 7th.

Salix herbacea L.

LINNEUS, Sp. pl., 1753, p. 1018.

Grows in moderate snow-patches, sometimes in *Cassiope* heaths. Nearly always gregarious and occurring in great numbers.

Always snow-covered in winter.

Found up to 600 m altitude.

Outer district: Here and there.

Middle district: Not observed.

Inner district: Rather common, especially at 300—600 m altitude.

Former investigations:

DUSÉN 1901, p. 49. — KRUUSE 1905, p. 186. — VAAGE 1932, p. 44.

Localities:

Outer part: 3. Cape Humboldt (V); 4. Mt. Celsius (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt; 12. Veganes (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!).

Inner part: 43. Forsblad Fjord (D).

The species flowered on Traill Island from the middle of June.

Saxifragaceae.

Saxifraga aizoides L.

LINNÆUS, Sp. pl., 1753, p. 403.

Grows in damp soil, especially in river-beds and in other places flooded in the early summer.

Snow-covered in the winter.

Ascends to 500—600 m altitude.

Outer district: Here and there.

Middle district: Very common.

Inner district: Here and there.

Former investigations:

BUCHENAU & FOCKE 1874, p. 42. — DUSÉN 1901, p. 34. — KRUUSE 1905, p. 172. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 18.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganes (V); 17. Antarctic Hbr. (D); 18. Cape Seaforth (H & K); 21. Cape Fletcher (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!.); 34. Kjerulf Fjord (D); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V).

Flowers very late; the first expanded flowers were observed on June 22nd on Traill Island. It belongs to the small number of species characterised by a continuous flowering till the setting in of the winter.

Mature capsules observed on Ymer Island about the middle of August.

Saxifraga caespitosa L.

LINNÆUS, Sp. pl., 1753, p. 404.

Subsp. *eucaespitosa* ENGL. et IRMSCH.

ENGLER & IRMSCHER, in ENGLER'S Pflanzenreich, IV, 117, 1916, p. 369.

In the lowland it occurs mostly on dry slopes that become free of snow early in the spring, but also in the shadow below mountain walls. Always rather sparse.

Generally snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Here and there.

Middle district: Here and there, especially at high levels.

Inner district: Here and there.

Former investigations:

DUSÉN 1901, p. 33. — KRUUSE 1905, p. 171 (sub nom. *S. decipiens* EHRH.). — SEIDENFADEN 1930, p. 381 (sub nom. *S. groenlandica*); 1931, p. 19 (sub nom. *S. groenlandica*). — VAAGE 1932, p. 19 (sub nom. *S. groenlandica* L.).

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K); 23. Cape Greg (H & K!).

Middle part: Blomsterbugt (SEIDF., V); 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 34. Kjerulf Fjord (D); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D).

Found in flower on Traill Island at 500 m altitude on June 8th.

Saxifraga cernua L.

LINNÆUS, Sp. pl., 1753, p. 403.

Occurs both on dry and on damp soil, also in snow-patches. Endures severe drought in the late summer.

Mostly snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Here and there.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 41. — DUSÉN 1901, p. 32. — KRUISE 1905, p. 170. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 18.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vagnæs (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K); 22. Murray Isl. (D).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!), 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.!), 36. Mineralbugt (SEIDF.!), 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!), 43. Forsblad Fjord (D).

The species propagates chiefly (exclusively?) in a vegetative way by means of bulbils. Only vigorous individuals develop one or a few flowers at the summit of the stem. It flowers rather late. On Traill Island the first flowers were observed on June 22nd.

Saxifraga flagellaris WILLD.

WILLDENOW in STERNBERG, Revis. Saxifrag., 1810, p. 25.

Former investigations:

DUSÉN 1901, p. 34 (sub nom. *S. flagellaris* WILLD. var. *setigera* (PURSH) ENGL.).

Localities:

Outer part: 1. Bontekoe Isl. (D, SEIDF., 1932).

A northern outer coast species, within the area in question only recorded from (1) Bontekoe Island. This locality indicates the provisional southern limit of the species in East Greenland.

Saxifraga hieraciifolia W. & K.

WALDSTEIN & KITABEL, Descr. pl. rar. Hungariae, I, 1802, p. 17.

Grows in damp or wet soil, mostly among mosses.

Snow-covered in winter.

Found up to 500 m altitude.

Outer district: Here and there.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 31. — KRUUSE 1905, p. 169. — VAAGE 1932, p. 20.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Veganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 42. Polhems Valley (H & K); 43. Forsblad Fjord (D).

The species flowers rather late; the first expanded flowers were observed on June 21st on Traill Island. Withered stems with open capsules from the preceding year were often encountered.

Saxifraga Hirculus L.

LINNEUS, Sp. pl., 1753, p. 402.

Localities:

Outer part: 1. Bontekoe Isl. (SEIDF., 1932).

Like *S. flagellaris*, this species is characteristic of the northerly coastal regions. It was not formerly known from my area.

The species is recorded by SEIDENFADEN, 1932, from (1) Bontekoe Island, which is thus the southernmost locality known in East Greenland.

Saxifraga Nathorsti (DUSÉN) HAYEK.

A. v. HAYEK: Monographische Studien über die Gattung *Saxifraga*. I, Die Sektion *Porphyron* TAUSCH. Denkschr. d. Kaiserl. Akad. d. Wissensch. Mathem. naturwissensch. Kl. Bd. 77. (Wien 1905) pag. 661.

Saxifraga oppositifolia L. var. *Nathorsti* DUSÉN, P. DUSÉN (1): Några viktigare Växtfynd från nordöstra Grönland. Botaniska Notiser 1901 (Lund 1901), pag. 73 and 76. — P. DUSÉN (2): Gefasspflanzen Ostgrönlands. Bihang till K. Sv. Vet.-Akad. Handl. Bd. 27, Afd. III, No. 3 (Stockholm 1901), pag. 35.

Saxifraga oppositifolia L. subsp. *euoppositifolia* ENGL. & IRMSCH. var. *proles Nathorsti* DUSÉN [ex parte], A. ENGLER & E. IRMSCHER in ENGLER'S Pflanzenreich IV. 117. (Leipzig 1916—1919) pag. 637.

Illustrations: DUSÉN, l. c. (2), fig. pag. 36; pl. 6. — HAYEK, l. c., pl. 1, fig. 22; pl. 2, fig. 17 and 18. — Pl. nostra XII, fig. 4—9.

Grows on moist ground, especially in river-beds and desiccated ponds. Shows great ecological agreement with *S. aizoides*.

Snow-covered in winter.

Found up to about 500 m altitude.

Outer district: Here and there, common locally.

Middle district: Very common.

Inner district: Not observed.

Former investigations on *Saxifraga Nathorstii* (DUSÉN) HAYEK. in Greenland:

(?)BUCHENAU & FOCKE 1874, p. 32 (sub nom. *S. oppositifolia* L. [ex pte.]). — DUSÉN 1901, p. 35 (sub nom. *S. oppositifolia* L. var. *Nathorstii* DUSÉN). — KRUISE 1905, p. 173 (sub nom. *S. oppositifolia* L. β *Nathorstii* DUSÉN). — SEIDENFADEN 1930, p. 381 (sub nom. *S. oppositifolia* v. *Nathorstii*); 1931, p. 19 (sub nom. *S. oppositifolia* v. *Nathorstii*). — VAAGE 1932, p. 21 (sub nom. *S. oppositifolia* [ex pte.]).

Localities (all the known localities of the species). The numbers correspond to the numbers in map fig. 4:

1. Hochstetter Foreland, Petersbugt (SEIDENFADEN)..... about 75°18' N. lat.
2. Payer Land, Revet (AANDSTAD 1932, Mus. Oslo)!..... — 74°24' N. lat.
3. Clavering Island, at Revet (VAAGE, Mus. Oslo)! — 74°25' N. lat.
4. Clavering Island, Granat River, 400 m above sea-level (GELTING)..... — 74°10' N. lat.
5. Clavering Island, Eskimonæs (GELTING)!..... — 74°06' N. lat.
6. Clavering Island, Eskimobugt (GELTING) — 74°07' N. lat.
7. Clavering Island, Dødmandsbugt (GELTING).. — 74°08' N. lat.
8. Clavering Island, Elvsborg (SEIDENFADEN, GELTING)!..... — 74°08' N. lat.
9. Great Finsch Island (GELTING)..... — 74°04' N. lat.
10. South of Wordie Glacier, Promenade Valley (SEIDENFADEN)!..... — 74°08' N. lat.
11. Cape Stosch (KØIE 1932)! (VAAGE, Mus. Oslo)! — 74°05' N. lat.
12. Røjevandet, Loch Fyne (VAAGE, Mus. Oslo)!.. — 73°57' N. lat.
13. Mt. Nordhoek, Loch Fyne (SEIDENFADEN)! .. — 73°48' N. lat.
14. Hudson Land, Mt. Anker (SEIDENFADEN)! (VAAGE, Mus. Oslo)!..... — 73°28' N. lat.
15. Hudson Land, Prospect Valley (SEIDENFADEN)! — 73°37' N. lat.
16. Gauss Peninsula, Mt. Sederholm (SEIDENFADEN)!..... — 73°36' N. lat.
17. Strindberg Peninsula, East of Mt. Gunver (TH. SØRENSEN)! Stordalen (AANDSTAD 1932, Mus. Oslo)!..... — 73°45' N. lat.
18. Gauss Peninsula, Mt. Wieman (GELTING) — 73°25' N. lat.
19. Gauss Peninsula, Cape Franklin (K. A. G. GREDIN)..... — 73°15' N. lat.

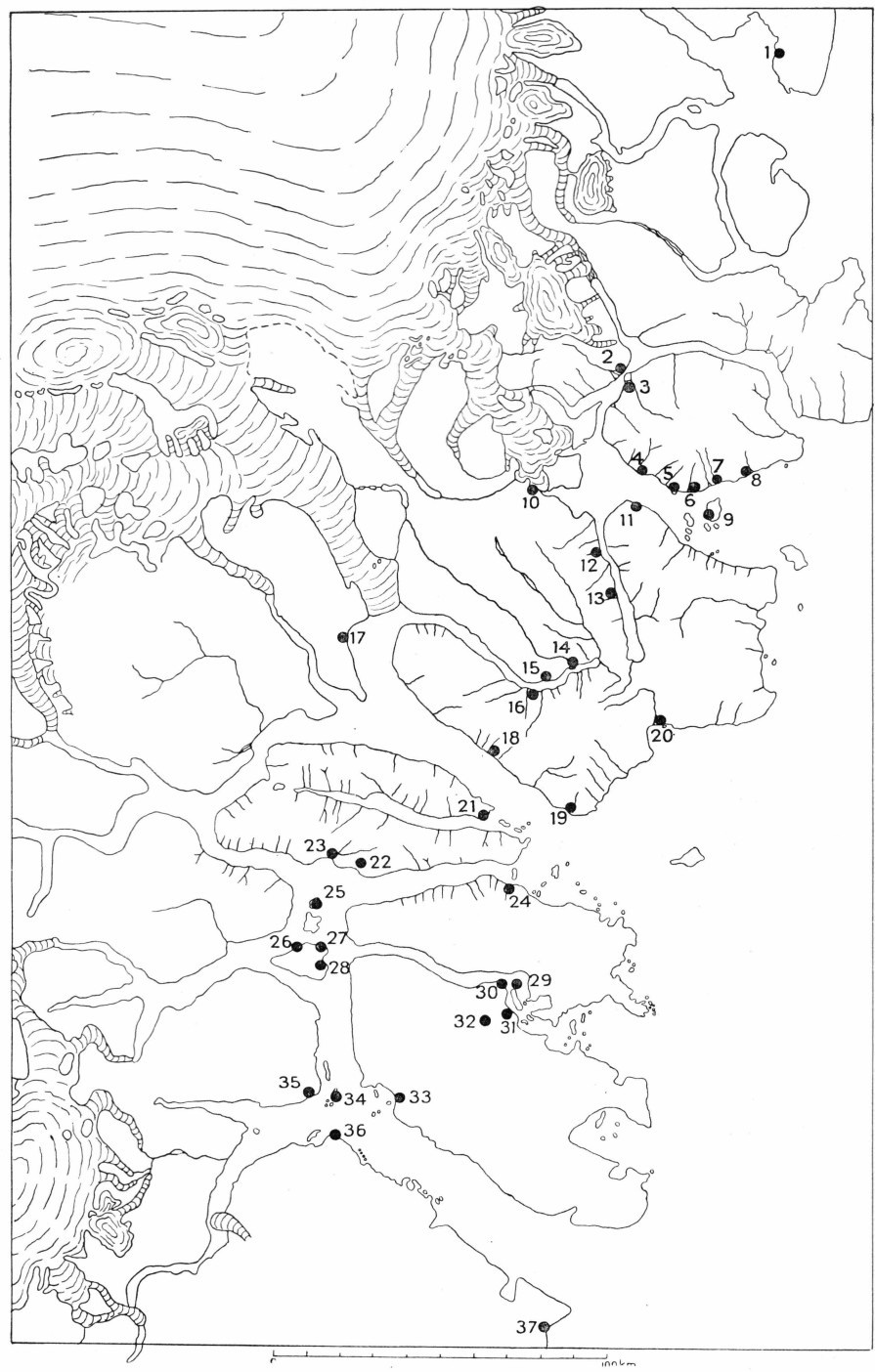


Fig. 4.
The total distribution of *Saxifraga Nathorstii*.

- | | |
|--|----------------------|
| 20. Mackenzie Bay (K. A. G. GREDIN)! Myggebugt (VAAGE, Mus. Oslo)! | about 73°28' N. lat. |
| 21. Ymer Island, Cape Graah, Dusén Fjord (A. G. NATHORST) | — 73°15' N. lat. |
| 22. Ymer Island, Botanikerbugt (TH. SØRENSEN)! | — 73°10' N. lat. |
| 23. Ymer Island, Carl Jacobsen Bay (TH. SØRENSEN)! | — 73°10' N. lat. |
| 24. Geogr. Soc. Island, near Mt. Rudbeck, Sofia Sound (A. G. NATHORST)! | — 73°04' N. lat. |
| 25. Ruth Island (A. G. NATHORST) | — 73°00' N. lat. |
| 26. Ella Island, Cape Oswald (TH. SØRENSEN)! | — 72°53' N. lat. |
| 27. Ella Island, Cape Elisabeth (SEIDENFADEN)! (VAAGE, Mus. Oslo)! | — 72°54' N. lat. |
| 28. Ella Island, east side (TH. SØRENSEN)! | — 72°52' N. lat. |
| 29. Gaaseø, Scott Keltie Islands, Vega Sound (VAAGE, Mus. Oslo) | — 72°48' N. lat. |
| 30. Traill Island, Veganæs (VAAGE, Mus. Oslo)! | — 72°48' N. lat. |
| 31. Traill Island, west of Scott Keltie Island (TH. SØRENSEN)! | — 72°47' N. lat. |
| 32. Traill Island, Maanedal, 300—500 m above sea-level (TH. SØRENSEN)! | — 72°47' N. lat. |
| 33. Traill Island, Holmsvig (VAAGE, Mus. Oslo)! | — 72°32' N. lat. |
| 34. Åkerblom Island, Kong Oskar Fjord (A. G. NATHORST) | — 72°32' N. lat. |
| 35. Lyell Land, near Mt. Berzelius (A. G. NATHORST) | — 72°31' N. lat. |
| 36. Scoresby Land, Cape Peterséns (VAAGE, Mus. Oslo)! (AANDSTAD, 1932, Mus. Oslo)! | — 72°25' N. lat. |
| 37. Scoresby Land, Cape Seaforth (HARTZ & KRUUSE)! | — 71°50' N. lat. |

During the work in the field I had ample opportunity of making observations on this plant, which differed in so many respects from *S. oppositifolia* that I gradually arrived at the conviction that it deserves to be considered a well-founded species. Hence I was much pleased during my study of the literature concerning this plant to learn that v. HAYEK (l. c.) had already earlier arrived at the conception of the plant which according to my judgment was the right one, although he had not seen the plant in its habitat and had only had a comparatively sparse herbarium material at his disposal. An examination of the plant and its occurrence in nature can only strongly support v. HAYEK's conception that the species is well defined.

Already at a very early date it attracted the attention of botanists as a remarkable species, and there is hardly any doubt that PANSCH's

notes (Die zweite deutsche Polarfahrt, I. Leipzig 1874, p. 614) from the south coast of Clavering Island, on July 16th, 1870, have reference to this species: "Bemerkenswert war in dieser Gegend.... die Beobachtung, dass die meisten Pflanzen von dem kriechenden gewöhnlichen Steinbrech (*Saxifraga oppositifolia*) lauter helle, fleischrote Blüten zeigten und zwar schon vom ersten Aufblühen aus der Knospe an."

The remark in BUCHENAU & FOCKE's description of the material collected by COPELAND and PANSCH (l. c. p. 40), "auf der Südseite der Clavering-Insel eine Form [of *S. oppositifolia*] mit sehr blassen Blumen", no doubt refers to the same locality.

One immediately receives the impression that *S. Nathorsti* is an intermediate (hybrid) form between *S. oppositifolia* and *S. aizoides*, which has also been pointed out by HARTZ (HARTZ & KRUSE 1911, p. 414). Also with regard to its floescence, it is intermediate; *S. oppositifolia* belongs to the earliest flowering plants in East Greenland, *S. aizoides* to the latest flowering. While *S. aizoides* has yellow flowers, and *S. oppositifolia* generally dark purple flowers, the colour varies in *S. Nathorsti* from sordid yellow (rather rarely) to more or less deep red or purple, a sordid pink to flesh colour, however, being by far the most frequent.

The ecology of the plant is also suggestive of a hybridogenous origin of the species, since ecologically it shows great similarity to *S. aizoides*, in company with which it generally occurs.

While *S. oppositifolia* grows practically everywhere, even to the greatest altitudes where suitable conditions for plant life exist, i. e. to about 1500 m altitude, *S. Nathorsti* chiefly occurs in places that are flooded in the early summer and are more or less desiccated in the late summer without being subjected to the extreme desiccation that characterises the greater part of the East Greenland soil, and has hardly been noticed above c. 500 m altitude. It grows principally in sandy-clayey river deltas and in a kind of ponds on the lowland with a fairly thin covering of vegetation. These ponds come into existence when the water originating from the melting of the snow in the spring gathers in flat depressions. Later in the summer they are dried up, thus excluding any formation of peat.

In such places the species often occurs in company with *S. aizoides*. *S. oppositifolia*, too, may occur here, even though more rarely, since, as mentioned above, it grows everywhere. During the statistical investigations, when one has often only the vegetative parts at one's disposal for identification of the species, *S. Nathorsti*, though readily recognisable, would sometimes more easily be confused with *S. aizoides* than with *S. oppositifolia*.

I fully agree with v. HAYEK in rejecting the theory of a hybrid-

ogenous origin of *S. Nathorsti*. Since *S. oppositifolia* and *S. aizoides* have large areas in common in the Arctic regions, it would be very peculiar if the hybrid should not occur outside the very limited area of *S. Nathorsti* in East Greenland. Against a hybridogenous origin speaks the fact that the nuclear division of the pollen mother cells takes place regularly¹⁾ and that the fructification is perfectly normal.

ENGLER & IRMSCHER classify the species as a variety under *S. oppositifolia*, pointing out (l. c. p. 638) that a specimen from Holsteinsborg, West Greenland, 66°55' N. lat. (DEICHMANN — Herb. v. DEGEN), forms the transition to *S. oppositifolia*. Personally I have hardly observed plants in nature which I would consider actual transitional forms. In the Arctic Herbarium of the Botanical Museum of Copenhagen I have found specimens from a single locality (Gaaseland, Scoresby Sound, leg. N. HARTZ), habitually resembling *S. Nathorsti* and on some few stems bearing leaves that were not strictly opposite²⁾ (Pl. XII, fig. 3). The keepers of the Botanical Museum of Oslo have kindly handed over to me for inspection the Norwegian collections of *S. oppositifolia* (s. l.) from East Greenland and Spitsbergen, and I have thus been enabled to give a fairly complete list of the localities of the species. During my examination of the material I came across two apparently transitional forms to *S. oppositifolia*, viz. specimens collected at Cape Stosch by VAAGE in 1930 (together with *S. Nathorsti*) and on Spitsbergen, Beeren Island, by THORE M. FRIES in 1868 (Pl. XII, figs. 1—2). In both cases it appears distinctly from the available herbarium specimens that the plants have grown on wet clayey soil. Compared with normal specimens of *S. oppositifolia*, the flower-bearing stems have more elongated internodes, the cilia of stem leaves and sepals is coarser and the flowers bigger, i.e. they have assumed characters typical of *S. Nathorsti*. But certain essential characters are not lacking. While in *S. oppositifolia* the leaves of the flower-bearing stems are normally broadest towards the apex and more or less blunt, opposite, the leaves of *S. Nathorsti* are more or less lanceolate and acute, and the uppermost leaves always alternate. These latter *Nathorsti*-characters are not found in the transitional forms. The opposite, broadly-obovate leaves distinctly show these forms to be *S. oppositifolia*. No doubt DEICHMANN's plant, mentioned by ENGLER & IRMSCHER, should be referred to this category, all the more so since it is derived from West Greenland, where *S. Nathorsti* has never been

¹⁾ In a provisional cytological investigation it proved impossible to ascertain with certainty the number of chromosomes.

²⁾ On examination of a large material, occasional shoots in which the position of the leaves is not strictly opposite will always be found in otherwise normal specimens.

observed. (To illustrate how well defined the two species are, the only three specimens out of hundreds of *S. oppositifolia* which may habitually be confused with *S. Nathorsti* are represented in Pl. XII.)

In the map (fig. 4) all hitherto known localities of the species have been inserted. As sources have been used DUSÉN's and NATHORST's statements (DUSÉN 1901 (2), p. 35), the Arctic herbaria of the museums of Oslo and Copenhagen, and localities not yet published and kindly submitted to me by my colleagues, cand. mag. P. GELTING and mag. sc. G. SEIDENFADEN.

Thus the whole area of the species is restricted to the east coast of Greenland from about 71°30' to 75°30' N. lat. Even if these limits cannot be claimed to be absolutely exact, it can be stated with some degree of certainty that the species does not occur very far to the north or south of this area.

LUNDAGER, who during the Danmark Expedition in 1906—08 made investigations in Germania Land round Danmarkshavn in 76°46' N. lat., has given attention to the various forms of *S. oppositifolia*. Thus he writes (Medd. om Grønland. Bd. 43, I Afd., 1910, p. 25): "In some places around Danmarks Havn an unusually large-flowered form was found, the flowers reaching a diameter of 18—23 mm." His photograph of the plant (l. c. Pl. IV) shows distinctly that we are not concerned with *S. Nathorsti*, nor is this plant found in his rich collections.

HARTZ's detailed description of his finding of the plant at Cape Seaforth (HARTZ & KRUSE 1911, p. 412) shows that it was known to him, but that he did not find it during his stays in the Scoresby Sound area in 1891—92 and 1900, nor is it represented in his exceptionally rich collections from this region.

V. HAYEK discusses rather closely the plantgeographical position of the species compared with *S. oppositifolia*, from which he thinks it originates, and gives his opinion in favour of the view that *S. Nathorsti* should have arisen suddenly by a casual mutation, since he finds no probable reason for assuming that the differentiation of this species is an adaptation to external conditions.

Without entering more closely into the theoretical problem concerning the evolutionary history of the species, I shall not omit to put forward my views on some of the questions propounded by v. HAYEK. Thus he remarks (l. c. p. 662—663):

"Nun aber ist es.... gar nicht wahrscheinlich, dass seit der Abtrennung der *S. Nathorsti* besonders lange Zeiträume verstrichen sind, andrerseits sind auch gar keine Einflüsse erkennbar, welche eine derartige allmähliche Umprägung zur Folge gehabt haben können. Eine Anpassung an besondere klimatische oder geologische Verhältnisse liegt nicht vor; denn einerseits ist *S. Nathorsti* von *S. oppositifolia* geographisch nicht

getrennt, andererseits ist überhaupt das Klima in der Arktis ein überall derart ähnliches, dass wir innerhalb dieser Region fast nirgends eine Ausbildung besonderer geographischer Rassen wahrnehmen können. Auch eine Anpassung an besondere Standortsverhältnisse ist nicht wahrscheinlich, da einerseits nichts über eine besondere standörtliche Trennung beider Arten bekannt ist, andererseits standörtliche Einflüsse bei *S. oppositifolia* niemals so hochgradige Veränderungen mit sich bringen."

From the deficient knowledge at his time of the climatic conditions of East Greenland v. HAYEK must naturally arrive at the conclusions just quoted. The distribution of the species within the Franz Joseph Fjord area is noteworthy in that, like certain other species, it is restricted to the middle fjord area, while it is almost entirely absent from the outer coast as well as the fjord ramifications cutting far into the country.

The climate of East Greenland from a plant-geographical point of view will be discussed in a later paper. It should merely be remarked here that the distribution of the species has doubtless some relation to the great differences in climate between the outer coast and the inner fjords. The question of "Standortsverhältnisse" has been discussed above.

The fact that *S. oppositifolia* may form the above-mentioned modification when growing on the same soil as is inhabited by *S. Nathorsti*, seems to me to speak in favour of the probability that *S. Nathorsti* has originated from the former species as an adaptation to the peculiar ecological conditions prevailing in the above-mentioned ponds with the greatly varying height of the water conditioned by the arctic desert climate of the area.

The species was observed in flower from the latter part of June to the close of the summer. In contrast to *S. oppositifolia*, whose flowering soon comes to an end, the florescence of *S. Nathorsti* extends over a longer period; in the same plant flowers and capsules in a rather advanced stage of development may occur together. By the middle of August it was observed on Ymer Island with mature seeds.

Saxifraga nivalis L.

LINNEUS, Sp. pl., 1753, p. 401.

Incl. var. *tenuis* WAHLENB.

WAHLENBERG, Fl. Lapp., 1812, p. 114.

In the lowland the main species occurs mostly on dry slopes and hills that become free of snow early in the spring.

Often free of snow in the winter.

Var. *tenuis* WBG. is most frequent in wet gravelly snow-patches. Ascends to great altitudes (1000 m and more).

Outer district: Common.

Middle district: Rather common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 41. — DUSÉN 1901, p. 32. — KRUUSE 1905, p. 169. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 20.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 13. Cape Parry (D); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (V); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

It does not always seem possible to keep var. *tenuis* WAHLENB. distinct from the main species. Var. *tenuis* is most frequent in the outer district, where it occurs in damper places than the main species, often with protracted snow-covering. Transitional forms often occur, and in the inner fjords, in particular, it was not always possible to distinguish sharply between the two forms.

The species was first observed in flower on Traill Island on June 14th.

Saxifraga oppositifolia L.

LINNEUS, Sp. pl., 1753, p. 402.

Occurs both in dry and in damp soil.

May be both free of snow and snow-covered in the winter.

Ascends to great altitudes (1000 m and upwards).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 32 [? ex pte.]. — DUSÉN 1901, p. 34. — KRUUSE 1905, [excl. β *Nathorstii* DUSÉN]. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 21 [ex pte.].

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932; AANDSTAD, Mus.

Oslo!); 2. Cape Graah (V!); 3. Cape Humboldt (V!); 4. Mt. Celsius (V!); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V!); 17. Antarctic Hbr. (V!, AANDSTAD, Mus. Oslo!); 18. Cape Seaforth (H & K); c. 19. Pingel Valley (AANDSTAD, Mus. Oslo!); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V!, AANDSTAD, Mus. Oslo!).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D!, V); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D, H & K!).

This species was the earliest flowering plant within the area, being observed in flower on Ella Island as early as May 21st. The florescence proper falls in the first half of June. In places that are snow-covered in the spring, it may, however, be encountered in flower at a somewhat later date.

Even the first expanded flowers were assiduously visited by humble bees, which made their appearance at the same time.

The species is highly variable. In dry places, exposed to the wind, it is generally caespitose. In damper soil, however, creeping forms with elongated internodes and solitary flowers at the apex of the stem, with stellate corollas composed of narrow petals, may be met with. However, the forms often occur mingled with one another, and must be assumed to be hereditarily different and not dependent on outer conditions alone.

Saxifraga rivularis L.

LINNEUS, Sp. pl., 1753, p. 404.

Occurs in snow-patches.

Ascends to 600—700 m altitude.

Outer district: Common.

Middle district: Ymer Island: Rare; Ella Island: Only a couple of localities at Cape Oswald.

Inner district: Rather common.

Former investigations:

DUSÉN 1901, p. 33. — KRUSE 1905, p. 170. — VAAGE 1932, p. 22.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K).

Inner part: 43. Forsblad Fjord (D).

Observed in flower for the first time on Traill Island on June 14th.

Sometimes one would think there were two varieties, a slender form, shot with red and with small reddish corollas, and a more robust form of a fresh green colour and with big corollas. The first form is possibly identical with var. *purpurascens* LGE. (J. LANGE, Consp. Fl. Gr. København 1880, p. 62), which, however, is stated to be "dense pulvinate-caespitose". The less vigorous of my plants had, as a rule, only one stem and inconspicuous, often only tripartite basal leaves; in reality they showed no slight superficial resemblance to *S. tridactylites* L. The form with red flowers was especially common on Traill Island, and seems to be a *rivularis*-form analogous to the var. *tenuis* WAHLENB. of *S. nivalis*, in company with which plant it often occurs.

The two forms of *S. rivularis* mentioned above cannot always be kept distinct, since when they occur in company, intermediate forms will always arise.

Saxifraga stellaris L.

LINNEUS, Sp. pl., 1753, p. 400.

Var. *comosa* RETZ.

RETZIUS, Fl. Scand. Prodrom., 1779, p. 79.

Grows in wet soil, especially in spots without vegetation among the knolls in bogs, and in wet, gravelly snow-patches.

Snow-covered in winter.

Outer district: Rather common up to 500 m altitude.

Middle district: Not observed.

Inner district: Rare, not found above 50 m.

Former investigations:

DUSÉN 1901, p. 32. — KRUSE 1905, p. 170. — VAAGE 1932, p. 19 (sub nom. *S. comosa* (RETZ) FELLM.).

Localities:

Outer part: 3. Cape Humboldt (V); 5. S.W. of Robertson Isl (V); 7. Husbugt (V); 8. 5 km W of Husbugt (V); 9. 15 km W of Husbugt (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 23. Cape Greg (H & K!).

Middle part: 29. Holmsvig (V)

Vigorous specimens with a single flower at the top of the stem were observed at the beginning of July. Most of the plants, however, bore only bulbils.

Thus the species propagates chiefly (presumably exclusively) by vegetative means.

Saxifraga tricuspidata ROTTB.

ROTTBØLL, Kiøbenh. Selsk. Skrift., 10, 1770, pag. 446.

Localities:

- Outer part: 20. Cape Brown (SEIDF., 1931).

This species was not formerly known from the area north of Scoresby Sound, and I have not observed the plant myself.

SEIDENFADEN states, however, that he saw this plant in flower at Cape Brown (20) in August 1931.

*Sympetalae.**Campanulaceae.**Campanula rotundifolia* L.

LINNÆUS, Sp. pl., 1753, p. 163.

Grows on dry, sunny slopes.

Mostly free of snow in the winter, or at any rate early in the spring.

Found up to 650 m altitude. VAAGE records it from 800 m (Cape Humboldt).

Outer district. Rather common.

Middle district: Here and there.

Inner district: Common, especially in the lowland.

Former investigations:

BUCHENAU & FOCKE 1874, p. 43 (sub nom. *C. rotundifolia* var. *arctica* LGE.). — DUSÉN 1901, p. 44 (sub nom. *C. rotundifolia* var. *arctica* LGE.). — KRUSE 1905, p. 182. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 50.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Véganæs (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF., V); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF., V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF., V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K).

The species is one of the latest flowering plants within the area. On Traill Island the flowering began on June 27th. May often produce mature seeds.

The arctic forms of this species occurring in East Greenland are especially remarkable on account of their very open infundibular corolla. The species is rather variable. Forms referable to var. *Gieseckiana* (VEST.) SIMM. (H. G. SIMMONS: Über einige lappländische Phanerogamen. Arkiv f. Botanik Bd. 6, No. 17. Uppsala & Stockholm 1907, p. 20) are most commonly met with. I have, however, also collected forms which agree exactly with specimens found in the Arctic Herbarium of the Botanical Museum, Copenhagen, and determined by SIMMONS as var. *lapponica* (WIT.) SIMM. (l. c. p. 21). The latter variety evidently prefers slopes with a favourable southward exposure.

Campanula uniflora L.

LINNEUS, Sp. pl., 1753, p. 163.

Grows on dry, sunny slopes and among grass.

Mostly free of snow in the winter.

Found up to 650 m altitude, but is presumably able to thrive at considerably greater altitudes. Thus VAAGE records it from 800 m altitude (Cape Humboldt).

Outer district: Common.

Middle district: Rare; Ymer Island, W. of Carl Jacobsen Bay at 500 m; Ella Island, Cape Oswald at 300 m.

Inner district: Common, especially from 200 to 600 m altitude.

Former investigations:

DUSÉN 1901, p. 43. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 50.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 21. Cape Fletcher (H & K!).

Middle part: 28. Cape Elisabeth (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 36. Mineralbugt (SEIDF.!); 38. Röhss Fjord, north coast (D).

Flowers appreciably earlier than *C. rotundifolia*, and is more frequently than the latter species seen to bear well developed capsules.

Was first observed in flower on Traill Island on June 14th.

Compositae.

Antennaria alpina (L.) GÄRTN.

GAERTNER, De fruct. et sem. plant., 2. 1791, p. 410.

Incl. var. *Porsildii* (EKMAN).

Antennaria Porsildii, ELIS. EKMAN, Sv. Bot. Tidskr., 21, p. 51, Pl. I, figs. 10 and 11.

On sunny slopes with a herbaceous vegetation.

Snow-covered in winter.

Found up to 700 m altitude.

Outer district: Here and there from about 200 to 500 m altitude. The two forms were practically always found together.

Middle district: The principal species was found in several places both on Ella Island and Ymer Island, on the latter island up to 700 m altitude. Var. *Porsildii* was only found in a few places, in company with the principal species, at the foot of Mt. Angelin, at about 400 m.

Inner district: Not observed.

Former investigations:

KRUSE 1905, p. 183. — VAAGE 1932, p. 51 (incl. *A. Porsildii* ELIS. EKMAN).

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Véganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Var. *Porsildii*: 3. Cape Humboldt (V); 7. Husbugt (V); 9. 15 km W. of Husbugt (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

This species occurs in two forms within the area, one (the principal form) greyish-white on account of the dense tomentum, the other green, without tomentum. As the two forms are generally found growing together, or at any rate under the same ecological conditions, in company with the same species, and as the green form on the whole only differs from the whitish-grey by the lack of tomentum, they are possibly only to be regarded as two parallel forms of the same species. Hence it would be more natural to designate the green form as var. *glabrata*. This name was formerly given to a glabrous *Antennaria* from West Greenland by J. VAHL (Fl. Dan., fasc. 47, 1869, p. 9, tab. 2786, fig. 4). It appears, however, that VAHL's plant differs from the true *A. alpina* in various morphological characters. This has been pointed out by GREENE (Pittonia, vol. 3, part 18, Washington 1898, p. 285. Cf. also M. P. PORSILD, Medd. om Grøn. Bd. 51, 1915, p. 273), who has separated it as a distinct species, *A. glabrata* (J. VAHL) GREENE.

Mrs. ELIS. EKMAN (l. c.), however, has described and figured our green *A. alpina* as a separate species, *A. Porsildii*. As the plant seems to be merely an ordinary *A. alpina* without tomentum, it should in my opinion be regarded as a glabrous form of this species, and hence I class it as an *alpina* variety, retaining the name proposed by Mrs. EKMAN.

The species was found in incipient flowering on Traill Island on June 14th. On Ymer Island it had mature heads in the first half of August.

Arnica alpina (L.) OLIN.

J. H. OLIN, Dissert. d. *Arn.*, Upsala 1799, p. 11.

Mostly on dry slopes.

Often free of snow in the winter.

Found up to 700 m altitude.

Outer district: Common.

Middle district: Rather rare.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 42. — DUSÉN 1901, p. 48. — KRUISE 1905, p. 184. — VAAGE 1932, p. 51.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V); 25. Ruth Isl. (D); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D).

On Traill Island the species was in incipient flowering at 500 m altitude on the most favourable sunny slopes on June 8th. The actual flowering, however, does not occur till the end of June.

The heads move in the course of the day so as to be constantly turned towards the sun.

Erigeron compositus PURSH.

PURSH, Fl. Am. septentr., 2, 1816, p. 535.

Former investigations:

VAAGE 1932, p. 52.

Localities:

Outer part: 5. S.W. of Robertson Isl. (V).

Middle part: 28. Cape Elisabeth (V).

I have not seen this species within the area, whence it is known from two localities only (VAAGE, l. c.). Curiously enough it seems to be commoner on the northern islands as well as in the Scoresby Sound district.

Erigeron Unalaschkensis (D C.) VIERH.

VIERHAPPER, Monogr. *Erig.*, Beih. z. Bot. Centralbl., 19, 2, 1906, p. 492.

Grows in damp, sunny places, mostly in quantity.

Snow-covered in the winter.

Ascends to about 600 m altitude.

Outer district: Common.

Middle district: Here and there.

Inner district: Here and there.

Former investigations:

KRUUSE 1905, p. 184 (sub nom. *E. uniflorus* L. β *pulchellus* FR. [ex pte.]). — SEIDENFADEN 1931, p. 19 (sub nom. *E. uniflorus* & *un-
alaskensis*). — VAAGE 1932, p. 52.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Middle part: 28. Cape Elisabeth (SEIDF.); 30. Cape Peterséns (V).

The species was observed in flower on Traill Island for the first time on June 14th.

On Ymer Island it had mature heads at the beginning of August.

Erigeron uniflorus L.

LINNÆUS, Sp. pl., 1753, p. 864.

Var. *eriocephala* (J. VAHL) VIERH.

VIERHAPPER, Monogr. *Erig.*, Beih. z. Bot. Centralbl., 19, 2, 1906, p. 512.

Outer district: One locality, Maanedalen, on a Devonian hill (sandstone) exposed to the wind, at 650 m altitude.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 47 (sub nom. *E. eriocephalus* J. VAHL). — KRUUSE 1905, p. 184 (sub nom. *E. uniflorus* L. β *pulchellus* FR. [ex pte.]). — VAAGE 1932, p. 52 (sub nom. *E. eriocephalus* J. VAHL).

Localities:

Outer part: 5. S.W. of Robertson Isl. (V); 8. 5 km W. of Husbugt (V); 12. Veganæs (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!).

In the only locality observed the species was represented by sparse but vigorous and flowering specimens on June 20th.

Matricaria inodora L.

LINNÆUS, Fl. Suec., 1745, p. 765.

Var. *grandiflora* (HOOK.) OSTF.

OSTENFELD, Vasc. pl. coll. in arct. N. Am. by the Gjøa-Exp. 1904—1906. (Vid. Selsk. Skr. 1. Math.-Nat. Kl. No. 8) Christiania 1910, p. 25.

Outer district: Not observed.

Middle district: Not observed.

Inner district: East side of Cape Hedlund, on old sea-weed behind the raised beach. Snow-covered in winter.

Former investigations:

DUSÉN 1901, p. 46 (sub nom. *M. inodora* L. var. *phaeocephala* RUPR.).

— VAAGE 1932, p. 53 (sub nom. *M. inodora* L.).

Localities:

Inner part: 34. Kjerulf Fjord (D, V).

About the middle of September the heads were filled with mature seeds. By the middle of July, 1932, it was partly in flower and partly out of flower.

The species seems generally to be hapaxanthic, still I have observed flowering individuals with withered stems from the preceding year. The rosette stage evidently extends over more than one growth period.

In the locality there were a couple of Eskimo ruins, indicating, however, a habitation of only short duration. Thus there is a possibility that the plant has been introduced by the Eskimos of an earlier period.

Within East Greenland the species is only known from the Franz Joseph Fjord area.

Taraxacum arcticum (TRAUTV.) DAHLST.

H. DAHLSTEDT, Arkiv f. Botanik, Stockholm, IV, No. 8, 1905, p. 8.

Most frequent in not too wet, moderate snow-covering.

Snow-covered in the winter.

Outer district: Rather common up to 600 m altitude.

Middle district: Cannot be recorded with certainty from this district. Some withered specimens, probably belonging to this species, collected on September 2nd, 1931, on Ymer Island, Røda Berget, at 800 m, have been lost.

Inner district: One locality at 600 m altitude.

Former investigations:

DUSÉN 1901, p. 45 (sub nom. *T. phymatocarpum* J. VAHL v. *albiflorum* KJELLM.). — KRUUSE 1905, p. 182 (sub nom. *T. phymatocarpum* J. VAHL [ex pte.]). — VAAGE 1932, p. 53.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 10. Gaaseø (V); 11. Scott Keltie Isl. (D).

Middle part: 25. Ruth Isl. (D)?

I have only seen the white-flowered form, forma *albiflora* KJELLMAN (*T. phymatocarpum* J. VAHL f. *albiflora*, Vega Exp. vet. iakt., Stockholm, I, 1882, p. 505). If the principal form occurs at all within the

area, it is, at any rate, far from common. Even if I have not observed the yellow-flowered *T. arcticum*, I consider it improbable that it should be confounded in nature with *T. phymatocarpum*. The expanded flower-heads of this species are nearly infundibular and not flatly expanded as in *T. arcticum* (f. *albiflora*).

The species was found in incipient flowering on Traill Island at 450 m altitude on June 8th. As early as June 29th the first mature heads were observed. However, in places where it is exposed to a prolonged snow-covering, it flowers much later. Thus it had not even began to flower on July 15th at Cape Hedlund at 600 m altitude.

Taraxacum brachyceras DAHLST.

H. DAHLSTEDT, Arkiv f. Botanik, Stockholm, V, No. 9, 1906, p. 19.

On sunny slopes with a herbaceous vegetation.

Snow-covered in the winter.

Outer district: Here and there from 175 to 500 m altitude.

Middle district: Ymer Island, several localities from 300 to 500 m altitude.

Inner district: Not observed.

Former investigations:

? KRUUSE 1905, p. 183 (sub nom. *T. croceum* DAHLST.). — VAAGE 1932, p. 53.

Localities:

Outer part: 7. Husbugt (V); 9. 15 km W. of Husbugt (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K)?

The species flowers much later than the two other *Taraxacum* species, despite the fact that it only occurs on slopes with a favourable southern exposure. The first expanded flower-head was observed on June 23rd.

A species which is here near its northern limit.

Taraxacum phymatocarpum J. VAHL.

J. VAHL, Fl. dan., XIII, fasc. 39, 1840, p. 6, tab. 2298.

Grows in dry places exposed to the wind, also where solifluction takes place.

Often free of snow in the winter.

Outer district: Rather rare.

Middle district: Here and there, especially at high levels. Found up to 1000 m altitude.

Inner district: One locality, with solifluction, near the outermost point of Cape Hedlund, at 50 m altitude.

Former investigations:

BUCHENAU & FOCKE 1874, p. 43. — DUSÉN 1901, p. 44 (excl. var. *albiflorum* KJELLM.). — ?KRUUSE 1905, p. 182 [ex pte.]. — VAAGE 1932, p. 54.

Localities:

Outer part: 19. Pingel Valley (H & K)?

Middle part: 28. Cape Elisabeth (V).

Found in incipient flowering on Traill Island at 500 m altitude on June 8th. On Ymer Island it was found flowering as well as with mature seeds at the beginning of August. Shows far greater tendency to forming many-headed tufts than the other two *Taraxacum* species. During the florescence the heads of *T. phymatocarpum* are infundibular, not flatly expanded, and of a different, more sordid-yellow colour than in *T. brachyceras*.

*Empetraceae.**Empetrum nigrum* L.

LINNÆUS, Sp. pl., 1753, p. 1022.

Var. *hermaphrodita* (LGE.).

Empetrum nigrum L. forma *hermaphrodita*, LANGE, Consp. Fl. Groenl., 1880, p. 18.

Grows mostly in damp soil, generally in company with *Cassiope tetragona*.

Snow-covered in the winter.

Found up to 500 m altitude.

Outer district: Rare; only a couple of localities, near Vega Sound and in the lower part of Maanedalen, at about 100—200 m.

Middle district: Here and there.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 16. — KRUUSE 1905, p. 153. — SEIDENFADEN 1930, p. 380 (sub nom. *E. nigrum hermaphroditum*). — VAAGE 1932, p. 47 (sub nom. *E. hermaphroditum* (LGE.) HAGERUP).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Vaganæs (V); 13. Cape Parry (D); 14. Cape Simpson (V); 16. Mt. Steenstrup (NOE-NYGAARD, 1932); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K).

Middle part: 24. Blomsterbugt (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 40. Röhss Fjord, south

coast (V); 41. Cape Hedlund (SEIDF.!); 42. Polhem Valley (H & K) 43. Forsblad Fjord (H & K!).

This bisexual *Empetrum* form has been subjected to a careful examination by HAGERUP (Dansk Botanisk Arkiv, 5, 2, 1927) both as regards the cytological and morphological conditions and its geographical distribution. He concludes his investigations by erecting it as a separate species parallel with *Empetrum nigrum* (*E. hermaphroditum* (LGE.) HAGERUP), since it seems to differ in the number of chromosomes as well as in certain morphological characters from the unisexual form.

For the present, however, I think it more practical to regard the Arctic bisexual form as a variety of *E. nigrum*, all the more so because within other form complexes it is often impossible to maintain a rational differentiation of the species on the basis of the number of chromosomes.

The particular morphological characters in the vegetative parts of this plant, as pointed out by HAGERUP, are not always equally easy to discover, and he admits himself (l. c. p. 13) that "it is thus not always possible to determine the species of a given sterile plant. The sex is the most important character for purposes of distinction". Further, regarding the constancy of this character he writes (l. c. p. 3): "Among the monoecious individuals, male and female flowers may be found sometimes on separate shoots, sometimes on the same, the male being either uppermost or below, or the two sexes may be mixed without any definite order. This I have only observed in West Greenland. — In specimens with normally bisexual flowers there are at times isolated flowers in which one sex is suppressed; thus we may often find some male flowers at the top of the shoots of *E. hermaphroditum* in the Færoes. And the above-mentioned monoecious specimens from West Greenland seem from vegetative indications most like reduced forms of *E. hermaphroditum*."

Another feature which in my opinion speaks against the conception of the two forms as separate species, is that, likewise according to HAGERUP, they are not ecologically distinct (l. c. p. 12): "In comparing the two closely related *Empetrum* species the material employed should preferably be from the same locality. I have only been able to examine really large quantities of both from the Færoes, where the two species are almost equally common, growing together, though without restriction to definite facies, right from the edge of the sea to the highest peaks of the hills."

From my area I have only seen specimens with bisexual flowers. The species was often abundantly fructifying. The drupes, however, were often strikingly small. They did not ripen till August.

Ericaceae.

Arctostaphylos alpina (L.) SPRENG.

SPRENGEL, Linn. Syst. veg. Edit. 16, 2, 1825, p. 287.

Most frequent on dry, sunny slopes.

Sometimes free of snow in the winter, always free of snow early in the spring.

Found up to 700—800 m altitude.

Outer district: Rare; Maanedalen.

Middle district: Very common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 44. — DUSÉN 1901, p. 41. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 45.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Veganæs (V); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!), 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!), 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.!), 36. Mineralbugt (SEIDF.!), 37. Dickson Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K).

In the autumn the foliage of this species assumes a lively red colour, and remains on the plant throughout the winter; on the whole the species is not actually deciduous. It flowers very early, the first flowers were seen on Ella Island on May 28th. Richly fructifying. The succulent and rather tasty fruits ripen in August. The "berries" remain on the plant through the winter and keep juicy till some time into the next growth period. They are eaten by the ptarmigans, whose craws may be found to contain the hard stones.

Bryanthus coeruleus (L.) DIPP.

DIPPEL, Handb. Laubholz., 1, 1889, p. 385.

Former investigations:

VAAGE 1932, p. 46.

Localities:

Outer part: 16. Mt. Steenstrup (NOE-NYGAARD, 1932!); 17. Antarctic Hbr. (V).

I have not found this plant myself, but it was collected by the

geologist of the Ella Island station, A. NOE-NYGAARD, on Mt. Steenstrup in the southern part of Traill Island (lat. c. 72°10' N.) on August 18th. The specimens bear nearly mature capsules. According to information from the collector it grew on a slope with a southward exposure at a height of 500 m in company with *Empetrum*. This locality is the northernmost known in East Greenland, the species having only been found once before within the area, viz. by the Norwegian botanist VAAGE at Antarctic Harbour just opposite, on the other side of Davy Sound.

Cassiope hypnoides (L.) DON.

D. DON, Edinb. N. Phil. Journ., 17, 1834, p. 158.

Outer district: One locality, Maanedalen, where it grew in damp soil at the foot of a small slope with a southern exposure, at 350 m altitude.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 46.

Localities:

Outer part: 8.5 km W. of Husbugt (V).

The species was richly flowering on June 20th. Thus the flowering of this species is nearly contemporary with that of *Cassiope tetragona*. In the only locality in which it was observed, it formed beautiful carpets of varying size. Is doubtless snow-covered in the winter.

Cassiope tetragona (L.) DON.

D. DON, Edinb. N. Phil. Journ., 17, 1834, p. 158.

Forms the main constituent of the "heaths" proper, but also occurs in bogs.

Characteristically snow-covered in winter.

Ascends to 700—800 m altitude.

Outer district: Very common, forming dense growths, often physiognomically dominant in patches.

Middle district: Very common, forming dense growths, often physiognomically dominating.

Inner district: Very common, forming dense growths, often physiognomically dominating.

Former investigations:

BUCHENAU & FOCKE 1874, p. 44 (sub nom. *Andromeda tetragona* L.). — DUSÉN 1901, p. 42. — KRUUSE 1905, p. 179. — SEIDENFADEN 1930, p. 381; 1931, p. 19. — VAAGE 1932, p. 46.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 13. Cape Parry (D); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!). 42. Polhem Valley (H & K); 43. Forsblad Fjord (D).

The species flowers with remarkable simultaneity over wide areas, e. g. in contrast to *Dryas*, whose florescence extends over a longer period. This evidently has some connection with the fact that *Cassiope* is far more closely associated with a certain interval in the snow-covering scale than *Dryas*. On Traill Island it became free of snow in the low-lying parts about June 10th—15th, and was in incipient flowering at 300—500 m altitude on June 18th—20th, near sea-level about 5 days later. The species was so richly flowering that the dark-brown "*Cassiope* heaths" looked white from a distance, but later, on the withering of the flowers, light-brownish.

Rhododendron lapponicum (L.) WAHLENB.

WAHLENBERG, Fl. Suec., 1824, p. 249.

Grows in dwarf-shrub heaths and among grass.

Often free of snow in the winter, always free of snow very early in the spring.

Ascends to about 500 m altitude.

Outer district: Rather common.

Middle district: Common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 45. — DUSÉN 1901, p. 42. — KRUISE 1905, p. 180. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 46.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D);

12. Vëganæs (V); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 20. Cape Brown (H & K!).

Middle part: 24. Blomsterbugt (V); 25. Ruth Isl. (D); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 30. Cape Peterséns (V).

Inner part: 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

On Traill Island it was in incipient flowering on June 7th. It was generally richly fructifying.

Vaccinium uliginosum L.

LINNÆUS, Sp. pl., 1753, p. 350.

Var. *microphylla* (LGE.) NATHORST.

NATHORST, Kongl. Sv. Vet.-Akad. Förhandl. Öfvers. 41. Årg., 1884, p. 22.

Occurs on fairly dry as well as in wet soil, frequently in bogs. Physiologically dominant in patches.

Often free of snow in the winter.

Ascends to 600—700 m altitude.

Outer district: Very common, mostly in dry soil.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 44 (sub nom. *V. uliginosum* L.). — DUSÉN 1901, p. 43. — KRUUSE 1905, p. 199. — SEIDENFADEN 1930, p. 381 (sub nom. *V. uliginosum alpinum*); — VAAGE 1932, p. 47.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vëganæs (V); 13. Cape Parry (D); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K!); 20. Cape Brown (H & K); 21. Cape Fletcher (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (D, V); 35. Nanortalik (SEIDF.!); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

The withered or half-withered foliage remains on the branches throughout the winter and often during the whole succeeding growth period.

The florescence of this species depends to a great extent on the exposition and snow-covering of the habitat. It was found in flower on Traill Island on June 7th. A full month later, however, growths at the same stage of development might be met with. The first actually ripe berries were picked in the Cape Hedlund district on July 11th. The species seems to fructify far more abundantly at the inner fjord ramifications than nearer to the outer coast. The berries of the various populations vary considerably as to shape and size.

Gentianaceae.

Gentiana nivalis L.

LINNEUS, Sp. pl., 1753, p. 229.

Outer district: One locality, Maanedalen, on a slope with a southern exposure, at 175 m.

Middle district: Not observed.

Inner district: Not observed.

Found in incipient flowering on July 6th. Seedlings occurred among the flowering individuals. The plant is no doubt biennial like *G. tenella*.

The species has not been found before within the area, and the locality on Traill Island is the northernmost known in Greenland.

Gentiana serrata GUNN.

GUNNERUS, Fl. Norveg., 2, 1772, p. 101.

Outer district: Not observed.

Middle district: Ella Island, Ulvedalen (behind Cape Oswald) at about 100 m altitude.

Inner district: Not observed.

In the spring of 1932 three patches grown with this species were observed on Ella Island in the neighbourhood of the wintering station. The individual plants were well developed, up to 30 cm high, with open, empty capsules from the preceding summer.

The species must be assumed to be biennial like the other two *Gentiana* species. I failed, however, to find any young plants from the preceding summer, nor did any new plants appear in the summer of 1932, which was not to be expected either when the condition of the soil was taken into consideration. For in these localities the surface of the ground was dusty dry from the early spring, not having been covered with snow in the winter.

In the summer of 1932 only one single, poorly developed, living

plant was found. Thus the species does not seem to flower, nor even to live, every year.

Evidently the species is only able to germinate in summers with an especially favourable precipitation. This supposition is supported by the fact that the summer of 1930, according to members of the Danish expedition, was exceptionally humid compared with normal years, when practically no rain falls in the summer months. If the plant, as mentioned above, is assumed to be biennial, my withered plants, which flowered in 1931, imply that the seeds have germinated and developed small rosette-bearing plants the preceding summer.

Within Greenland the species was formerly only known from two limited areas in the south and west, viz. Julianehaab (61° N. lat.) and Itivdleik Fjord, Kingua (66.5° N. lat.) respectively, in both places from the inner ramifications of the fjords only.

Gentiana tenella ROTTB.

ROTTBØLL, Kjöbenh. Selsk. Skrifter, 10, 1770, p. 436.

Outer district: Two localities in Maanedalen, on slopes with a southward exposure, at 175 and 475 m altitude.

Middle district: Not observed.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 49. — MENZIES 1932, p. 560.

Localities:

Outer part: 8. 5 km W. of Husbugt (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (MENZIES).

Found on June 24th, not yet in flower. In the second locality it was in flower on July 6th.

The species is indubitably biennial. Seedlings with but few rosette leaves occurred among the flowering individuals, whose cotyledons and lowermost rosette leaves had evidently survived from the preceding year.

In West Greenland the species is known from two places only, viz. from Sdr. Strømfjord (c. 66.5° N. lat.) and Kingua, Orpiksuit (c. 68.5° N. lat.). In Northeast Greenland it has been found both north and south of the area here treated.

Lentibulariaceae.

Pinguicula vulgaris L.

LINNÆUS, Sp. pl., 1753, p. 17.

Former investigations:

MENZIES 1932, p. 559.

Locality:

Inner part: 33. Head of Franz Joseph Fjord (MENZIES).

The species was found by MENZIES in 1931 at the head of Franz Joseph Fjord "upon a boggy table-land some sixty feet above the beach, . . . in moist ground". It was not formerly known from East Greenland north of Scoresby Sound.

Plumbaginaceae.

Armeria vulgaris WILLD.

WILLDENOW, Enum. plant. Hort. Berol., 1809, p. 333.

Var. *sibirica* (TURCZ.) ROSENV.

ROSENVINGE, Andet Till. t. Grønl. Fanerog. og Karkryptog., Medd. om Grønl., 3,3, 1892, p. 683.

In not too dry grass and dwarf-shrub vegetations.

Free of snow as well as snow-covered in the winter.

Outer district: Rare; near Vega Sound.

Middle district: Rather common up to 200—300 m altitude.

Inner district: Not observed.

Former investigations:

DUSÉN 1901, p. 38. — KRUSE 1905, p. 174. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 44 (sub nom. *A. sibirica* TURCZ.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Voganæs (V); 17. Antarctic Hbr. (D, V).

Middle part: 24. Blomsterbugt (SEIDF., V); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 43. Forsblad Fjord (H & K!).

While this species often forms large tufts, e. g. on Iceland, and thus occurs as a pulvinate chamaephyte, it is a hemichryptophyte in East Greenland, since the caudex rarely ramifies to any great extent. It mostly occurs as isolated leaf-rosettes with but few flower-bearing scapes.

On Ella Island the species was out of flower by the middle of July.

Primulaceae.

Primula stricta HORN.

HORNEMANN, Fl. Dan. fasc. 24, 1810, p. 1, tab. 1385.

Former investigations:

VAAGE 1932, p. 45.

Locality:

Outer part: 7. Husbugt (V).

In East Greenland this species is unknown outside the Franz Joseph Fjord area, where it has only been found in two localities, viz. at (7) Husbugt, collected by VAAGE in 1930, and immediately north of my area, viz. in Geologfjord, in 73°47' N. lat., by SEIDENFADEN in 1929.

Specimens collected on August 18th on herb-slopes with a southward exposure have mature capsules.

Pyrolaceae.

Pyrola rotundifolia L.

LINNEUS, Sp. pl., 1753, p. 396.

Var. *grandiflora* (RAD.) D C.

DE CANDOLLE, Prodr., VII, 1840, p. 773.

Occurs in dwarf-shrub vegetations.

Mostly snow-covered in the winter.

Found up to 700 m altitude.

Outer district: Here and there.

Middle district: Common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 45 (sub nom. *P. rotundifolia* L. var. *arenaria* KOCH). — DUSÉN 1901, p. 41 (sub nom. *P. grandiflora* RAD.). — KRUUSE 1905, p. 178. — SEIDENFADEN 1930, p. 381 (sub nom. *P. grandiflora*). — VAAGE 1932, p. 45 (sub nom. *P. grandiflora* (D C.) RAD.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Voganæs (V); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!).; 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!.); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.!.); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!).

The species occurs in colonies, propagating vegetatively by means of subterranean, frequently very long, runners. It flowers abundantly, but late; the first expanded flowers were observed on Traill Island on June 26th.

Scrophulariaceae.

Euphrasia latifolia PURSH.

PURSH, Fl. Am. septentr., 2, 1816, p. 430.

Mostly occurring in grassy slopes free of snow in the winter.

Found up to 700 m altitude.

Outer district: Here and there, especially from 200 to 500 m altitude.

Middle district: Common.

Inner district: Rather common.

Former investigations:

DUSÉN 1901, p. 40. — KRUUSE 1905, p. 176. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 48.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V).

Inner part: 31. Junction Valley (SEIDF.); 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.); 34. Kjerulf Fjord (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D!).

The species is decidedly summer-annual. Seedlings were observed on Ella Island on May 29th on a slope with a southward exposure. On Traill Island, however, seedlings were met with much later. Here the first flowering individuals were observed on June 29th.

The species is richly fructifying, and always occurs in great number. The plants are, however, generally small, and often bear only one or a few capsules. Specimens of up to 10 cm height are only exceptionally met with.

Pedicularis flammea L.

LINNEUS, Sp. pl., 1753, p. 609.

Most frequent in damp, grassy places.

Both free of snow and snow-covered in the winter, but always free of snow early in the spring.

Found up to 800 m altitude.

Outer district: Here and there.

Middle district: Very common.

Inner district: Rather common.

Former investigations:

DUSÉN 1901, p. 39. — KRUUSE 1905, p. 176. — VAAGE 1932, p. 48.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of

Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (V); 20. Cape Brown (H & K!); 21. Cape Fletcher (H & K).

Middle part: 24. Blomsterbugt (V); 25. Ruth Isl. (V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D).

The species was found in flower on Traill Island on June 17th. The various populations of this species flower almost simultaneously. The postfloral growth of the flower-bearing stems, which is typical of the majority of the herbaceous arctic plants, is particularly conspicuous in this species, in that the stem in the period of postfloration in addition to increasing in length also increases rather considerably in thickness so that at the maturity of the capsules it often attains a thickness of 1 cm or even more.

The plant seems rather often to be hapaxanthic, the innovation buds not always being developed at the base of the old stems. The vegetative stage extends through several years.

Pedicularis hirsuta L.

LINNÆUS, Sp. pl., 1753, p. 609.

Grows in any kind of soil except the driest.

Generally snow-covered in winter.

Common up to 600 m altitude, and no doubt ascends to much greater altitudes.

Outer district: Very common.

Middle district: Common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 46. — DUSÉN 1901, p. 39. — KRUUSE 1905, p. 176. — SEIDENFADEN 1930, p. 381; 1931, p. 20. — VAAGE 1932, p. 49.

Localities:

Outer part: 1. Bontekoe Isl. (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); Cape Parry (D); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D);

26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); Forsblad Fjord (D).

The species was found flowering at 450 m altitude on Traill Island on June 7th. It may, however, be encountered in flower even till the setting in of the winter, but the individual plants flower only very few days. This peculiarity agrees closely with the conditions under which the species occurs, notably its independence of the duration of the snow-covering; the same applies to some few other species whose florescence extends over long periods. In the willow heaths on Traill Island, where the species was especially common, it proved to be a rather convenient indicator of the snow-covering, since the degree of its seasonal development was recognisable even at a distance. Thus in willow flats otherwise of a rather uniform appearance, it was possible at the same time to distinguish zones in which *P. hirsuta* had not yet begun to flower, zones in which it was in flower, and various transitions to the nearly mature and withering stage.

The species is evidently very frequently hapaxanthic, and the greater number of the individual plants do not survive even a small number of flowerings. The vegetative stage normally extends through a series of years.

Pedicularis lapponica L.

LINNÆUS, Sp. pl., 1753, p. 609.

Mostly in damp soil, nearly always in places in which raw humus will form.

Snow-covered in winter.

Found up to 300—400 m altitude.

Outer district: Rare, only found in a few places from 100 to 200 m altitude; lower part of Maanedalen.

Middle district: Common.

Inner district: Rather common.

Former investigations:

DUSÉN 1901, p. 39. — KRUSE 1905, p. 175. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 49.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V).

Middle part: 24. Blomsterbugt (SEIDF., V); 26. Marie Isl. (V).

Inner part: 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V);

38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

Owing to the vegetative propagation by means of thin subterranean rhizomes the species shows a gregarious habit. It seems, however, to have a normal and abundant fructification.

The species was in incipient flowering on Traill Island on June 24th. The florescence was very short, which agrees well with its small ecological amplitude as to snow-covering. — Its postfloral growth of the stem is quite inconsiderable.

Veronica alpina L.

LINNEUS, Sp. pl., 1753, p. 11.

Former investigations:

KRUUSE 1905, p. 175. — VAAGE 1932, p. 48.

Localities:

Outer part: 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K).

I have not seen this species. Evidently it has its northern limit in the southern part of the area investigated by me, having not been found north of Davy Sound.

VAAGE records it from 400 m altitude (Antarctic Harbour).

Monocotyledones.

Cyperaceae.

Carex alpina Sw.

SWARTZ in LILJEBLAD, Svensk Fl., ed. 2, 1789, p. 26.

Grows in damp grass- and dwarf-shrub vegetations, always scarce.

Outer district: Not observed.

Middle district: Ymer Island. Only found in a few places between 50 and 100 m altitude.

Inner district: Rare. Not found above 50 m.

The species was further found in Röhss Fjord, at the current hole at the south side of the fjord (c).

Former investigations:

VAAGE 1932, p. 58 (sub nom. *C. Halleri* GUNN.).

Locality:

Outer part: 9. 15 km W. of Husbugt (V).

The species was found with nearly ripe fruits at the inner fjord ramifications at the end of July and on Ymer Island at the beginning of August.

Carex atro-fusca SCHK.

SCHKUHR, Beschreib. u. Abb. Riedgr., 1801, p. 106.

In grass moors, swamps, and at the banks of lakes, mostly on mineral ground.

Mostly snow-covered in the winter.

Found up to 800 m altitude.

Outer district: Rather rare.

Middle district: Common.

Inner district: Here and there.

Former investigations:

SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 57.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 8. 5 km W. of Husbugt (V).

Middle part: 24. Blomsterbugt (SEIDF., V); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 30. Cape Peterséns (V).

Inner part: 37. Dickson Fjord (V).

The species flowered on Traill Island by the middle of June. On Ella Island and Ymer Island it bore ripe fruits about August 1st.

One of the most beautiful and stately *Carices* occurring within the area, whose culms may be 30 cm tall or even more. It forms loose tufts of a bluish-grey colour. On Ymer Island, in particular, I often saw the plant with the lowermost female spikelet issuing from the base of the culm and with a filiform erect stalk of the length of the culm. In certain populations this form was almost the predominant constituent.

Carex bicolor ALL.

ALLIONI, Fl. Pedemont., 2, 1785, p. 267.

In damp sand, mostly on lake and river banks.

Snow-covered in the winter.

Outer district: Not observed.

Middle district: Rather rare, not observed above 250 m altitude.

Inner district: Not observed.

At the shores of lakes the culm often attained a length of a few centimetres only; on account of their tufted growth and white utricles such specimens often bear some resemblance to *C. ursina*. However, both on Ymer Island and on Ella Island I have frequently observed specimens with culms up to 20 cm long, arching in all directions. In places with a comparatively rich cover of vegetation it forms only small tufts, or is not actually caespitose. The fruit ripens in the first half of August.

The species has not formerly been observed within the area, but was found farther north by VAAGE, in Vassdalen at Musk-ox Fjord in 1929.

Carex capillaris L.

LINNEÆUS, Sp. pl., 1753, p. 977.

Occurs preferably in the most luxuriant grass and dwarf-shrub vegetations.

Mostly snow-covered in the winter.

Ascends to about 700 m altitude.

Outer district: Common.

Middle district: Rather common.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 57. — SEIDENFADEN 1930, p. 381. — VAAGE 1932, p. 58.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (D); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V).

The fruit ripened in July—August.

In damp sand at river-beds the species sometimes attained a height of 25 cm. In closed grass vegetations it hardly exceeds 10—15 cm.

Carex capitata L.

LINNÆUS, Syst. nat., ed. 10, 1759, p. 1261.

Outer district: Not observed.

Middle district: Not observed.

Inner district: A population in a "caldera" on a rocky slope with a southward exposure, at about 60 m altitude; the uttermost point of Cape Hedlund.

In the only locality met with it had unripe fruits on July 18th. It did not, however, fructify very abundantly, and most of the culms did not exceed a height of 10 cm.

The species has not formerly been recorded from East Greenland north of the Ammagssalik area (Lilleø, 66°58' N. lat.).

Carex glareosa WAHLENB.

WAHLENBERG, Vet.-Akad. Handl. Stockholm, 24, 1803, p. 146.

Outer district: Not observed.

Middle district: Not observed.

Inner district: At the current hole in Röhss Fjord, south side (c), on a clayey shore above the high-water mark.

Former investigations:

VAAGE 1932, p. 58.

Locality:

Inner part: 39. Head of Röhss Fjord (V).

In the only locality observed the species had nearly ripe fruits on July 29th. It fructified rather sparsely.

(See further *C. Lachenalii* SCHK.)

Carex incurva LIGHTF.

LIGHTFOOT, Fl. Scot., 2, 1777, p. 544.

Mostly in damp sand and in shallow swamps on sandy soil.

Generally snow-covered in the winter.

Ascends to great altitudes (1000 m).

Outer district: Rather rare.

Middle district: Rather common.

Inner district: Here and there.

Former investigations:

DUSÉN 1901, p. 55. — VAAGE 1932, p. 59.

Localities:

Outer part: 1. Bontekoe (D); 2. Cape Graah (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K).

Middle part: 24. Blomsterbugt (V); 28. Cape Elisabeth (V); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 40. Röhss Fjord, south coast (V).

The species varies considerably according to the locality. In desiccated "calderas" on rocky ground on Ella Island I found a form, f. *erecta* O. F. LANG, LINNÆA, 24, 1851, p. 507, habitually most resembling *Heleocharis palustris*. Both leaves and culms are longer than usual, and rigidly erect. The spike, which is not always composite, is narrow and oblong. The stolons are very short, so that the plant has almost a caespitose growth. The utricles, however, are of a normal aspect, and hence the deviating forms should presumably be regarded as modifications due to locality. In similar localities there occur forms which are more like the normal ones. These variants must not, however, be confounded with abnormal forms, due to the attacks of parasitic fungi (probably an Ustilaginé), which frequently causes a similar hypertrophic development of the plant. However, in such cases hypertrophic and sound individuals nearly always occur side by side.

The species was observed in incipient flowering on Traill Island on June 20th. It mostly fructifies abundantly, even when it occurs at great altitudes. Mature fruits in August.

Subsp. *arctica* (DEINB.) HARTM.

HARTMAN, Håndb. Skand. Fl., ed. 6, Stockholm 1854, p. 302.

Syn.: *Carex dioica* × *incurva* ALMQ. Mss. in herbario Vet.-Akad. Stockholm, KÜKENTHAL, ENGLER'S Pflanzenreich IV, 20, 1909, p. 240, ubi syn. — (Pl. XIII).

A form of *Carex*, which should probably be referred to this subspecies, was found, physiognomically dominant, in a boggy swamp on Ella Island, at Cape Oswald, c. 30 m above sea-level.

In recent times this plant is regarded as a hybrid between *C. dioica* and *C. incurva* (BLYTT, Haandb. Norges Fl., ed. by OVE DAHL, 1906, p. 133; KÜKENTHAL, l. c.). Whether my East Greenland specimens represent the hybrid between *C. incurva* and the local representative of *C. dioica*, viz. *C. parallela*, remains an open question. *C. parallela* occurred in the immediate neighbourhood of the locality, while *C. incurva* was found at a distance of 0.5—1 km. Habitually the plant resembles *C. parallela* by its slender growth and the arcuate, ascending culms. The spike is oval, often incomposite, male at the apex, generally, however, with 1—3 small, not very conspicuous, female spikelets (sometimes male at the apex) at the base. The plant fructifies normally. The utricles are more slender than in *incurva*, distinctly ribbed, with the apex tapering into a short beak, whose edges are scabrous or finely toothed. (In *C. parallela* the utricles are glabrous). Scales of the length of the utricle, narrower than in *incurva*. Utricles suberect at maturation.

My plant, however, does not agree entirely in habit with DEINBOLL'S specimens from the Finmark, samples of which are found in our Botanical Museum. These seem to be more closely related to *incurva* by their stouter growth and their broader, more richly flowering spike, composed of numerous spikelets. In these specimens, however, the beak of the utricle is more distinctly toothed than in my plants.

In habit the plants collected by me resemble *C. dioica* β *gynocrates* (WORMSK.) OSTENFELD (Fl. arct. I, Copenhagen 1902, p. 60) from West Greenland. By their distinctly scabrous leaf-margins, however, they are more like *C. incurva*.

The abundant fructification certainly speaks against the supposition of a hybridogenous origin. Specimens collected by the middle of August bore mature fruits. KÜKENTHAL, who has presumably examined all the material collected, does not seem to have noticed fructification in this plant. His description of the utricles runs as follows (l. c. p. 240): "Utricoli ovati compressi pallidi obsoletissime nervosi basi rotundata breviter stipitati marginibus e medio scabri brevirostrati steriles¹⁾". Thus it is questionable whether my Greenland plants should, on the whole, be placed under the name here employed, all the more so since specifically *C. parallela* also differs distinctly from *C. dioica*.

¹⁾ Spaced by us.

Carex incurva subsp. *arctica* has not previously been recorded from Greenland. In the Arctic Herbarium of the Botanical Museum of Copenhagen, I have, however, found some specimens labelled "*Carex gynocrates* WORMSKJ. *feminea*!", Vest Grønland, S. Disco, near Arktisk Station 69°15' N., Aug. 1929. R. T. PORSILD", which should indubitably with the same right as my plants be referred to this species. In these specimens, however, the utricles are but slightly scabrous. It is not clear to what the designation "*feminea*!" refers, the terminal spikelet, at any rate, bearing anthers at the apex.

Carex Lachenalii SCHK.

SCHKUHR, Beschr. u. Abbild. Riedgr., 1801, p. 51.

In wet snow-patches, at the shores of lakes, and in swamps.

Snow-covered in the winter.

Outer district: Rather common. Mostly in snow-patches at 200—400 m altitude.

Middle district: Here and there in the lowland.

Inner district: Here and there up to 400—500 m altitude.

Former investigations:

DUSÉN 1901, p. 56 (sub nom. *C. lagopina* WAHLENB.). — KRUISE 1905, p. 193 (sub nom. *C. lagopina* WBG.). — VAAGE 1932, p. 59.

Localities:

Outer part: 2. Cape Graah (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Veganæs (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!).

Middle part: 28. Cape Elisabeth (V); 29. Holmsvig (V).

Before I came to East Greenland I had only observed *C. Lachenalii* and *C. glareosa* on Iceland, where the two species seemed to be so well separated that they could hardly be confounded. There I had observed *C. glareosa* even at a great distance from the coast.

Starting from my previous knowledge of these species, I thought I could, without a closer investigation of the plants in the field, ascertain that only *C. Lachenalii* is of common occurrence within the area, where it is often found even in swamps and grassy growths in wet soil, though it is characteristically associated with snow-patches.

The typical *glareosa* with the exceedingly thin culms, nearly prostrate at fructification, and narrow leaves I have only observed in Röhss Fjord growing on the shore in company with *Carex ursina*, *Puccinellia phryganodes*, and *Stellaria humifusa*; it was, however, best developed in a zone above the most luxuriant growths of these three species.

As regards the distinction between the two species, on the basis

of LINDMAN'S (Svensk Fanerogamflora, 2. uppl., Stockholm 1926, p. 132) key of determination, I give, in translation, the following characters as the most essential.

C. Lachenalii: Leaves flat, utricles indistinctly nerved, scales obtuse.

C. glareosa: Leaves nearly capillary, plicate; utricles elevatedly nerved; scales acute.

However, a close examination of the *Lachenalii* material brought back reveals an extremely great variability in the characters of the utricles and the scales, the utricles sometimes being nearly beak-less, in other cases tapering into a distinct beak, and generally distinctly nerved. The scales vary from nearly orbicular to rather acute. Spikelets usually few and club-shaped.

The material collected by me, however, is insufficient for a close study of the ecological conditions of the various forms, the majority of the specimens with well developed utricles being derived from lowland swamps on Ella Island and Ymer Island, not from characteristic snow-patches, and thus they presumably belong to the least typical *Lachenalii*. Judging from the nervation of the utricles, no inconsiderable part should be referred to *C. glareosa*. As, however, these plants agree most closely in habit with *Lachenalii* on account of their rigid, obliquely ascending culms and flat but rather narrow leaves, I think it best to refer all these to *C. Lachenalii*. In this way, it is true, *C. glareosa* will be very deficiently characterised compared with *C. Lachenalii*, but still habitually recognisable. Ecologically, too, it differs from *C. Lachenalii*, which hardly occurs as a strand plant.

In the definition of the species which is maintained here, I presumably agree with VAAGE, who also states *C. glareosa* to be associated with the shore and to be of rare occurrence.

Judging from the available herbarium material from the southern parts of East Greenland, there, too, the two species seem to be difficult to keep distinct. There is hardly any doubt that several of the localities of *C. glareosa* recorded from these regions have reference to *Lachenalii* forms of the same type as my specimens and with distinctly nerved utricles. A certain identification of such forms on the basis of more or less defective herbarium specimens is practically impossible.

An investigation of the mutual relation of the two species is, at any rate, highly desirable.

The first flowering snow-patch specimens were observed on Traill Island at the end of June. In swamps which become free of snow early in the spring, it probably flowers much earlier.

Carex microglochin WAHLENB.

WAHLENBERG, Kungl. Sv. Vet.-Akad. Handl., 24, 1803, p. 140.

Occurs on shores of lakes and in damp grassy spots.

Mostly on mineral ground, but also in peat.

Outer district: Not observed.

Middle district: Both on Ella Island and Ymer Island. Here and there up to about 400 m altitude.

Inner district: One locality: on the shore of a lake at about 275 m altitude.

The species was richly fructifying, and the fruits usually ripened at the end of July and the first half of August. The culms were as a rule rather low, hardly exceeding 10 cm. In one locality, Cape Oswald, Ella Island where it grew at the edge of a shallow-watered lake together with *Carex subspathacea*, the fully developed culms hardly exceeded a height of 2 cm.

The species is not formerly observed within the area, and the localities mentioned are the northernmost known in Greenland.

Carex misandra R. BR.

ROB. BROWN, App. PARRY, Voy. disc. (Chlor. Melv.), 1823, p. 283.

Grows everywhere except on the driest and most swampy places. Is most luxuriant on mineral soil.

May be both free of snow and snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 52 (sub nom. *C. fuliginosa* STERNB. & HOPPE). — DUSÉN 1901, p. 56. — SEIDENFADEN 1930, p. 328; 1931, p. 20. — VAAGE 1932, p. 60.

Localities:

Outer part: 1. Bontekoe (D); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Viganæs (V); 17. Antarctic Hbr. (D, V); 20. Cape Brown (H & K!).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!). 32. Renbugt (V); 34. Kjerulf Fjord (V); 36. Mineralbugt (SEIDF.!). 37. Dickson Fjord (V);

38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 41. Cape Hedlund (SEIDF.!); 43. Forsblad Fjord (D).

Found in flower on Traill Island — also in the lower-lying parts — on June 7th. The postfloral growth of the culm, which is characteristic of most monoecious *Carex* species, is especially conspicuous in this species. During the florescence the spikes are practically situated in the centre of the leaf rosette, whose leaves are curved much outwards. At maturation of the fruits the species is one of the tallest gramineous plants, the slender, slightly arched culms often attaining heights of 30 cm or more.

The basal leaves of this species, at any rate the basal parts of them, remain fresh green throughout the winter. On account of this quality it evidently occupies an exceptional position within the gramineous plants of the area, the above-ground parts of which usually wither more or less entirely.

Carex nardina FR.

E. FRIES, Nov. Mant., 2. 1839, p. 55.

Var. *Hepburnii* (BOOTT) KÜKENTH.

KÜKENTHAL, ENGLER'S Pflanzenreich, IV, 20, 1909, p. 70.

Occurs especially in dry places exposed to the wind, but also forms part of various plant associations with a closed vegetation. Mostly on mineral soil.

Generally free of snow in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Very common, sometimes dominating physiognomically over large areas.

Inner district: Very common.

Former investigations:

DUSÉN 1901, p. 55 (sub nom. *C. nardina* FR.). — KRUUSE 1905, p. 191 (sub nom. *C. nardina* FR.). — SEIDENFADEN 1930, p. 382; 1931, p. 20. — VAAGE 1932, p. 59 (sub nom. *C. Hepburnii* BOOTT).

Localities:

Outer part: 1. Bontekoe (D); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!); 21. Cape Fletcher (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 2. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF.!, V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K).

Found in flower on Traill Island on June 8th at 500 m altitude. It is noteworthy that during the flowering the spike is completely hidden in the old leaf sheaths, and hence it may be supposed that self-pollination often takes place. When the spike becomes visible between the leaves, the fruits are always in an advanced state of development.

The maturation of the fruits takes place at the end of July and the beginning of August.

Carex parallela (LÆSTAD.) SOMMERF.

SOMMERFELT, Suppl. Fl. Lappon., 1826, p. 39.

Occurs in knolly bogs.

Snow-covered in the winter.

Found up to about 600 m altitude.

Outer district: Rather rare; near Vega Sound and Maanedalen, at about 600 m.

Middle district: Very common in the lowland up to about 300 m altitude. Rare at greater altitudes.

Inner district: Rather common in the lowland.

Former investigations:

(not DUSÉN 1901, p. 54, cf. KRUUSE 1905, p. 191.) — VAAGE 1932, p. 60.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 6. Sanddal (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V); 20. Cape Brown (H & K).

Middle part: 26. Marie Isl. (V); 28. Cape Elisabeth (V).

Inner part: 37. Dickson Fjord (V).

This species seems to be exceedingly well separated from *C. dioica* by its long narrow female spike with remote suberect utricles and by its arch-like ascending culms. It has hardly actual stolons. Only on peaty soil and among moss do the individual plants spread and form dense growths. In less loose soil it forms flat tufts, but always with characteristically arch-like ascending culms.

The species was found flowering on Traill Island on June 19th. In the inner fjord regions the fruit ripened at the end of July and the beginning of August.

Carex pedata WAHLENB.

WAHLENBERG, Fl. Lappon., 1812, p. 239.

In highly desiccating solifluction soil.

Generally free of snow in the winter.

Ascends to great altitudes (1000 m).

Outer district: Rare. Only found in a couple of places, near sea-level and at about 500 m altitude.

Middle district: Common.

Inner district: Not observed.

One of the earliest flowering *Carex* species. Thus it was observed in flower on Ella Island as early as May 29th. From the middle of July most of the plants bore ripe fruits, and in the first half of August the majority of the utricles had fallen off.

The species has not formerly been noticed within the area, but was found farther north by the Norwegian botanist SCHOLANDER, viz. at Cape Stosch in 74° N. lat.

Carex rariflora (WAHLENB.) SM.

SMITH, Comp. Engl. Fl., 4, 1829, p. 100.

In swamps and at lake and river banks, more rarely in bogs.

Snow-covered in the winter.

Found up to 400 m altitude.

Outer district: Rare; Maanedalen.

Middle district: Rather common.

Inner district: Rather common.

Former investigations:

VAAGE 1932, p. 60.

Localities:

Outer part: 2. Cape Graah (V); 6. Sanddal (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V).

The species seems to vary somewhat, the lowermost bract sometimes developing a leafy blade, which, however, does not reach the apex of the terminal male spikelet. In such cases the female spikelets are often more or less erect.

Populations in which the species fructified but sparsely, were occasionally met with; in weak individuals often only the terminal male spikelet is developed. Generally, however, it is richly fructifying. Maturation of fruits in August.

Carex rariflora (WAHLENB.) SM. $\times$ *subspathacea* WORMSK.

(Pl. XIV).

In the lowland on Ymer Island, at an altitude of about 100 m, I found a growth of this *Carex* in damp, somewhat peaty sand. It was dominant over a small area (c. 15 $\times$ 30 m).

First I thought I was confronted by a new species, since on a superficial inspection it bore no particular resemblance to any of the presumed parent species (cfr. Pl. XV). Habitually it was more like *C. rigida* than any other *Carex* species in these regions, from which latter it differs, however, i.a. by the ovary bearing three stigmas. Apparently it was abundantly fructifying, but on close inspection the well-developed utricles proved to be empty. Female spikelets on culms from the preceding year were especially well-preserved, since the utricles do not loosen; all these were, however, infructuose.

In one side of the growth the plant grew in company with *C. rariflora*, the hybrid, however, being dominant throughout. *C. subspathacea* was not found within its area, but at an inconsiderable distance from it. A fact speaking against the possibility that *C. rigida* should be one of the parent species, is that it does not seem to occur within a distance of several kilometres; on the whole it was rare on Ymer Island within the area investigated by me.

I subjoin a description of the plant.

A heterostachous *Carex*, with relatively short stolons, almost as in *C. rariflora*. Culms stout, erect, 5—12 cm high, obtusely trigonous, glabrous. Leaves 2—3 mm broad, flat, shorter than the culm, yellowish-green to glaucous, at the apex keeled, triangular, and rough. One terminal male spikelet, (1—)2—3 cylindrical, dense-flowered, stalked, rigidly erect female spikelets. Bracts broad, leafy, the lowermost bract often short-sheathing, reaching the apex of the terminal male spikelet (sometimes slightly shorter or longer) usually concealing the appurtenant female spikelet, bending towards the culm at the apex. Female scales broad, shorter than the utricles, which they embrace below, deep rusty-brown with a lighter-coloured central part, bounded by two sideribs, often slightly mucronate. The male scales are narrower, and often of a somewhat lighter colour. Utricles flat (empty), ovate, with very short, obtuse beak, without distinct nervation, whitish, finely punctuately papillose. Stigmas: three. Roots with rusty-brown tomentum as in *C. rariflora*, though in a less marked degree.

I have made no close comparative anatomical examination of the plant and the presumed parent species, having only subjected some few characters of the leaf-anatomy to a preliminary investigation.

Carex rariflora. Under side of leaf: big papillae; epidermal cells big, relatively long, many stomata, stomata longer than broad. Upper side of leaf: No papillae; long epidermal cells; no stomata.

Carex subspathacea. Under side of leaf: papillae absent; epidermal cells small, relatively broad; stomata few, stomata roundish square. Upper side of leaf: densely papillose; stomata present.

Carex rariflora × *subspathacea*. Under side of leaf: papillae small;

epidermal cells rather small, relatively broad; stomata of intermediate number; stomata generally broader than long. Upper side of leaf: papillae and stomata.

As regards the characters investigated, the hybrid thus seems to be fairly intermediate between the two parent species.

It seems to me to be of some interest that a plant like the present, which is thus in all probability of hybridogenous origin, has become so well adapted to the prevalent conditions that it has even been able to oust the pure species, having spread over a comparatively large area, probably solely by vegetative propagation from one single seed plant, the origin of which by a casual hybridisation, judging from the slight annual increase of the arctic plants, evidently dates back several centuries.

Carex rigida GOOD.

GOODENOUGH, Trans. Linn. Soc., 2, 1794, p. 193.

Mostly in damp soil, also in bogs.

May be both free of snow and snow-covered in the winter.

Found up to 700 m altitude.

Outer district: Very common.

Middle district: Rare. On Ella Island: one locality near Cape Oswald, at 200 m altitude. On Ymer Island: two localities, at 100 and 400 m respectively.

Inner district: Very common.

Former investigations:

KRUSE 1905, p. 195. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 61.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!).

The species was found in incipient flowering on Traill Island on June 7th at 500 m altitude. In places that are covered with snow in the spring it appears much later in the summer. Fructification not rarely rather deficient.

At Cape Hedlund a particularly slender and narrow-leaved form occurred, forming immense tufts in swamps. A similar tall, but more

robust form grew principally on sunny, dry, grass slopes. Both these forms have but short stolons and nearly caespitose growth. Both of them are presumably referable to var. *concolor* (R. BR.) KÜKENTHAL, ENGIER's Pflanzenreich IV, 20, 1909, p. 301 (syn. f. *Bigelovii* (TORR.) BAILEY). At Cape Hedlund there likewise occurred forms, the terminal spikelet of which was entirely female or only so at the base.

Carex rupestris ALL.

ALLIONI, Fl. Pedemont., 2, 1785, p. 264.

From the driest to rather damp soil, also in bogs.

Generally free of snow in the winter.

Ascends to great altitudes (1000 m).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

DUSÉN 1901, p. 55. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 61.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Veganæs (V).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!), 34. Kjerulf Fjord (V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

Was first observed in flower on Ella Island on May 25th on a slope with a southward exposure. Maturation of fruit in July.

The species has an astounding power of thriving under the most diverse conditions as to watering, and hence it is the commonest gramineous plant, at any rate in the inner fjord areas. Habitually it is rather variable, and to a great extent assumes the habit of the *Carex* species in company with which it grows. On dry, grassy slopes, where it constitutes an essential part of the plant covering, it appears in the usual form with the fairly soft leaves characteristically incurvate towards the apex of the culm. In wet soil it assumes the *rigida* habitus, the leaves becoming shorter and much outward-curved. In extremely dry places exposed to the wind it forms small tufts with narrow and rigid, nearly erect, leaves bent slightly outwards, i.e. it assumes a *supina* stature, so that in a vegetative state the two species are almost ex-

clusively distinguishable by the colour of their basal leaf sheaths, which in *supina* are of a deep red, in *rupestris* of a greyish-brown colour.

Carex saxatilis L.

LINNÆUS, Sp. pl., 1753, p. 976.

Most frequent on the banks of lakes and drying pools, also often in bogs.

Often free of snow in the winter.

Found up to 800 m altitude.

Outer district: Common.

Middle district: Very common.

Inner district: Common.

Former investigations:

DUSÉN 1905, p. 57 (sub nom. *C. pulla* GOOD.). — KRUUSE 1905, p. 196 (sub nom. *C. pulla* GOOD.). — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 62.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Vega-næs (V); 18. Cape Seaforth (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 37. Dickson Fjord (V); 43. Forsblad Fjord (D, H & K!).

The species varies somewhat according to the habitat. Especially the tall, nearly caespitose forms, frequently found on the banks of lakes and in the margins of drying shallow-watered tarns, are hardly distinguishable from *C. rotundata* WAHLENB., from which species *C. saxatilis* is not sharply distinguished in more southerly regions either. I shall, however, adopt the practice followed by earlier authors and refer all the specimens to *C. saxatilis* L.

The species flowers early, and even in July and August it bears ripe fruits.

Carex scirpoidea MICHX.

MICHAUX, Fl. Bor. Am., 2, 1803, p. 171.

In grass and dwarf-shrub vegetations.

Mostly snow-covered in the winter.

Ascends to 600—700 m altitude.

Outer district: Common.

Middle district: Very common.

Inner district: Rather common.

Former investigations:

KRUUSE 1905, p. 192. — VAAGE 1932, p. 62.

Localities:

Outer part: 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V).

The species was found in incipient flowering on Traill Island on June 7th at 500 m altitude. The actual flowering occurred by the middle of June. In reality this species is the only *Carex* (possibly with the exception of the likewise dioecious *C. parallela*) which can be seen to flower from a distance, since, in contrast to most other (monoecious) species, its culm is well developed at the time the anthers ripen and open.

Maturation of the fruits in August. On vigorous culms a minor female spikelet may sometimes be found to develop at the base of the main spike.

Carex subspathacea WORMSKJ.

WORMSKJOLD, Fl. dan. fasc. 26, 1816, p. 4, tab. 1530.

Mostly found on sandy and clayey banks of lakes, but rarely at the sea-shore proper.

Outer district: Not observed.

Middle district: Ella Island: One locality, Cape Oswald, at the shore of Langesø, at 30 m altitude. — Ymer Island: Several places on shores of lakes and along ditches among dunes. Found up to 75 m altitude.

Inner district: Not observed in the area round Cape Hedlund, but at the current hole in Röhss Fjord (c).

Former investigations:

BUCHENAU & FOCKE 1874, p. 52. — DUSÉN 1901, p. 56 (sub nom. *C. subspathacea* WORMSK. var. *curvata* DREJ.). — KRUUSE 1905, p. 194 (sub nom. *C. salina* WBG. f. *subspathacea* (WORMSK.)). — VAAGE 1932, p. 62.

Localities:

Outer part: 3. Cape Humboldt (V); 7. Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!).

Inner part: 39. Head of Röhss Fjord (V).

This plant is not very conspicuous, attaining a height of a few centimetres only. In peculiar contrast to the low and rather delicate above-ground parts are the long and especially vigorous subterranean

rhizomes, which ramify characteristically at right angles. By far the greater part of the plant is in reality subterranean.

The species flowers relatively very late, and the fructification is probably often deficient. Thus by the middle of August the fruits were far from developed.

On Ymer Island the species was frequently attacked by an *Ustilaginé*, which causes scattered utricles to swell and grow to the size of a pea. At a distance these utricles look quite like the mature berries of *Vaccinium uliginosum*.

(For *Carex rariflora* × *subspathacea*, see *C. rariflora*).

Carex supina WAHLENB.

WAHLENBERG, Kungl. Sv. Vet.-Akad. Handl., 24, 1803, p. 158.

In dry places open to the wind, growing in coarse, loose sand.

Free of snow in the winter.

Found up to 700 m, but presumably ascends to still greater altitudes.

Outer district: Here and there, especially at 200—600 m altitude.

Middle district: Ella Island: Only found in a few places in the Cape Oswald area.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 57. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 63.

Localities:

Outer part: 3. Cape Humboldt (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V).

Inner part: 33. Head of Franz Joseph Fjord (SEIDF.); 34. Kjerulf Fjord (D); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V).

Found flowering on Traill Island on June 7th at 500 m altitude. As a rule it fructified abundantly. Fructification at the end of July.

Biologically this species is distinguished from the other stoloniferous *Carices* of the area in that the shoot-generations do not die off behind after the flowering and fructification of the "individuals". In this species the "individuals" become many years old, and fructify year after year, being rejuvenated by buds issuing from the base, and thus gradually form small tufts, from which issue new, particularly long stolons. The tufts, however, are not persistent to the same degree as in the actual caespitose species, and die down after a number of years.

I have only found the species on basaltic and crystalline soil, and it seems to be widely absent on the sedimentary rocks.

Within the flora of the area *Carex supina* is evidently the gramineous plant that is most resistant to drought.

Carex ursina DEW.

DEWEY, Am. Journ. of Sc. a. Arts, 27, 1835, p. 240.

Grows on clayey shores.

Outer district: Not observed.

Middle district: Ymer Island, Carl Jacobsen Bay.

Inner district: At the current hole in Röhss Fjord, south side (c).

Former investigations:

DUSÉN 1901, p. 55. — VAAGE 1932, p. 63.

Localities:

Outer part: 7. Husbugt (V); 8. 5 km W. of Husbugt (V).

Middle part: 28. Cape Elisabeth (V).

Inner part: 38. Röhss Fjord, north coast (D).

Forms dense and low tufts, the culms hardly extend beyond the basal leaves. By Röhss Fjord the species was richly fructifying, and the fruits were nearly ripe on July 29th. On Ymer Island it was less richly fructifying, which is possibly essentially due to the grazing of geese and other sea-birds. About the middle of August the species bore ripe fruits.

Cobresia bipartita (ALL.) DALLA TORRE.

DALLA TORRE, Anleit. Beobact. u. Best. d. Alpenpfl., 1882, p. 330.

Grows in not too dry, grassy places, mostly on mineral ground.

Free of snow as well as snow-covered in the winter.

Ascends to great altitudes (1000 m).

Outer district: Here and there.

Middle district: Very common.

Inner district: Here and there.

Former investigations:

BUCHENAU & FOCKE 1874, p. 53 (sub nom. *Kobresia caricina* WILLD.).
— SEIDENFADEN 1930, p. 382; 1931, p. 20. — VAAGE 1932, p. 63 (sub nom. *Cobresia caricina* WILLD.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V).

The species fructified abundantly, and bore ripe fruits in the inner fjords at the beginning of August.

Elyna Bellardii (ALL.) KOCH.

K. KOCH, *Linnaea*, 21, 1848, p. 616.

In dry places exposed to the wind.

Characteristically free of snow in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common, sometimes physiognomically dominant.

Former investigations:

DUSÉN 1901, p. 54 (sub nom. *Carex parallela* SOMMERF.). — KRUISE 1905, p. 191. — SEIDENFADEN 1930, p. 382 (sub nom. *Cobresia Bellardi*). — VAAGE 1932, p. 63 (sub nom. *Cobresia scirpina* WILLD.).

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 14. Cape Simpson (V).

Middle part: 24. Blomsterbugt (SEIDF.!); 26. Marie Isl. (V); 28. Cape Elisabeth (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (D, SEIDF.!); 34. Kjerulf Fjord (V); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

On Traill Island the species began to flower by the middle of June. During the flowering the spike is, as a rule, included between the leaf-sheaths.

On Ella Island it had ripe fruits from the end of July.

Eriophorum callitrix CHAM.

CHAMISSE in C. A. MEYER, *Mem. Sav. Etrang. Pétersb.*, 1, 1831, p. 203.

Mostly in bogs and grass swamps on a substratum of solifluction soil.

Generally snow-covered in the winter.

Found up to 500 m altitude.

Outer district: Not observed.

Middle district: Common.

Inner district: Here and there.

Former investigations:

SEIDENFADEN 1930, p. 382; 1931, p. 20. — VAAGE 1932, p. 64 (sub nom. *E. opacum* (BJÖRNSTR.) FERNALD). — SEIDENFADEN & SØRENSEN 1933.

Localities:

Outer part: 5. S.W. of Robertson Isl. (V!); 6. Sanddal (V!); 8. 5 km W. of Husbugt (V!); 9. 15 km W. of Husbugt (V!).

Middle part: 24. Blomsterbugt (SEIDF.!); 26. Marie Isl. (V!); 28. Cape Elisabeth (SEIDF., V!); 30. Cape Peterséns (V!).

Inner part: 37. Dickson Fjord (V!).

The species was found in flower on Ella Island on May 29th. In places where it occurs in company with *E. polystachyum*, it flowers earlier than the latter species. The fruits ripened as early as the middle of July, and after August 1st it could hardly be found with bristles, since the caryopses very easily loosen.

The species was first observed in these regions in 1929 by SEIDENFADEN and VAAGE. That it has so long escaped the attention of botanists is no doubt due to the fact that it develops so early in the summer that it has already shed the bristles at the time the summer expeditions arrive at the country. Further its heads are usually smaller than those of the two other species. Not very well-trained botanists have of course carefully selected the largest and most handsome heads.

From Greenland the species is only known from the regions north of Scoresby Sound. (Cf. map of distribution in SEIDENFADEN & SØRENSEN, Medd. om Grøn. 101. 1, 1933).

Eriophorum polystachyum L.

LINNEUS, Sp. pl., 1753, p. 52.

Var. *tristis* TH. FR.

TH. M. FRIES, Öfvers. Kongl. Vet.-Akad. Förhandl. 26. Årg., 1869 (Stockholm 1870), p. 135.

(Pl. XVII, figs. 1—4).

In bogs and in more or less damp grassy places.

May be both free of snow and snow-covered in the winter.

Ascends to great altitudes (1000 m).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 53. — DUSÉN 1901, p. 54 (sub nom. *E. angustifolium* ROTH.). — KRUSE 1905, p. 191. — SEIDENFADEN 1930, p. 382; 1931, p. 20. — VAAGE 1932, p. 64.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km

W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 17. Antarctic Hbr. (D, V).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (SEIDF., V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!), 32. Renbugt (V); 36. Mineralbugt (SEIDF.!), 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D, H & K!).

In his paper on the genus *Eriophorum* (Rhodora, 7, 1905) FERNALD i. a. writes as follows under *Eriophorum polystachyum* L. (p. 89):

"Var. *elegans* BABINGTON (Manual of British Botany ed. 1, 1843, p. 333) slender, 0.5—2.5 dm high: spikelets 1 to 3, sessile or subsessile: longest bract of the dark involucre 0.5—1.5 cm long."

From this brief description I was inclined to think that our East Greenland plants should be referred to this variety, all the more so since FERNALD states it to be "an extreme dwarf form of arctic and high-arctic regions." To get some idea of what was concealed behind this name in FERNALD's paper, I studied some of the original descriptions found under the numerous synonyms mentioned by FERNALD, and I soon became aware that our East Greenland plants do not belong to this variety.

In TH. M. FRIES (Tillägg till Spetsbergens Fanerogam-Flora, Öfvers. Kgl. Vet. Akad. Förhandl. 26. Årg. 1869, Stockholm 1870, p. 135) we find the following statement:

"*Eriophorum angustifolium* ROTH. β *triste* TH. FR.: capitulis brevioribus subglobosis, squamis vulgo totis nigris vel nigricantibus."

"Of smaller growth than the main species, even if specimens from the Nordfjord attain a height of up to 15 cm, with 2—4 heads. Those from Kingsbay, however, are always of low growth (3—11 cm) and always have but one head (forma *uniceps*). On account of its dark scales this arctic variety has quite a foreign and peculiar aspect."

I have seen several specimens of this Spitsbergen plant, and it proves that our Greenland plant is exactly the same. It is distinguished by its low, rather slender culms, the black membranous bracts, which are without or only with suggestions of blades, the peduncles densely pubescent and the relatively broad (3—4 mm) basal leaves, squarrosely curvate. The flower-bearing culms have no fresh green foliage leaves from the present growth period. Forma *uniceps* is a depauperate form, occurring especially at the edges of snow-patches.

Unfortunately this variety is not mentioned in FERNALD's list of synonyms, so we do not know where he has thought of placing it. But since var. *elegans* is recorded from Grinnell Land, it must be assumed

that var. *elegans* also includes var. *tristis* TH. M. FR., and OSTENFELD likewise refers the East Greenland plants to "f. *elegans* BAB." (OSTENFELD & LUNDAGER, List of Vascular Plants etc., Medd. om Grøn. Bd. 43, 1, 1910, p. 9). Var. *elegans* BAB. in FERNALD's definition thus seems to form a somewhat heterogeneous group.

I have not seen the specimens mentioned from Grinnell Land (leg. A. W. GREELY). SIMMONS's specimens from Ellesmere Land are, however, typical var. *tristis*. From such westerly regions as Melville Island (c. 76° N. lat., c. 110° W. long.) I have seen specimens corresponding precisely to the Spitsbergen—East Greenland specimens.

The Novaya Zemlya plants are referred by LYNGE (Rep. Sc. Res. Norw. Exp. to Novaya Zemlya 1921. Botany, Oslo 1928, p. 99) to this variety; they seem to me, however, to represent a somewhat different plant more closely related to the usual southern forms than the true var. *tristis*. I. a. it has perfectly glabrous peduncles and more or less leafy bracts.

The distribution of *E. polystachyum* in Greenland is peculiar in that the species is absent over wide areas of East Greenland, viz. from the Scoresby Sound area to the extreme southernmost parts of Greenland (cf. SEIDENFADEN, Medd. om Grøn. Bd. 106, Nr. 3, 1933, where its distribution within Greenland is mapped). All the *Eriophorum polystachyum* plants north of this gap belong to var. *tristis*, whereas the South Greenland plants belong to a more southern form. The areas of the two forms meet, however, in West Greenland, the transitional area occurring near Umanak Fjord, in 70°—71° N. lat. Transitional forms may, however, be met with, and occasional specimens from more northerly regions have less hairy peduncles.

E. polystachyum var. *tristis* thus belongs to the plants that are characteristic by their high-arctic area of distribution. It seems on the whole to be a form generally growing in far drier soil than the related forms in more southerly tracts.

The species was found in flower on Ella Island on May 28th. On Traill Island patches of it occurred at 500 m altitude, with long-haired heads, as early as June 8th. Ripe fruits were observed from the end of July.

The flowering shoots bear no fresh leaves. As early as July the culms of next year with spikes in a rather advanced stage of development may be observed at the level of the ground or 1 or 2 cm above, ready to break out the succeeding spring.

Eriophorum polystachyum L. var. *tristis* TH. M. FRIES $\times$ *Scheuchzeri* HOPPE(?).
(Pl. XVI).

On June 24th I found in damp sand in Maanedalen on Traill Island at a height of about 350 m a growth of an *Eriophorum* which provisionally, though with some doubt, I consider as a hybrid between *E. polystachyum* and *E. Scheuchzeri*, both of which occurred, mostly in isolated patches, on the damp sand flats in the neighbourhood.

The plant grew over a fairly large area, not mixed with other *Eriophorum* species. The remaining vegetation consisted mainly of *Equisetum variegatum* and *arvense*, *Salix arctica*, and *Polygonum viviparum*.

The plant, which was collected at a stage when the wool was not yet fully developed, may be described as follows:

Rhizome creeping, culms solitary, 10—20 cm high, terete, glabrous. Stem-leaves usually two in number, with somewhat inflated sheaths, the lowermost with long, the uppermost with short or quite diminutive, subulate blades with rough margins. Basal leaves 1.5—2.5 mm broad, keeled, triangular at the apex, at the base rough at the margins, smooth or nearly smooth at the apex and the keel, rigid, erect or suberect. One terminal ovoid spike. Bracts usually two in number, ovate, bladeless, membranaceous, black or lead-coloured. The lowermost bract sometimes supports a small, relatively long-stalked side-spike, whose peduncle is covered with dense pubescence. Scales uniformly lead-coloured, narrowly linear-lanceolate, long-pointed. Anthers 1.5—2 mm long, i.e. many times shorter than the filaments. Bristles pure white, somewhat crisped. Fruit not known.

The plant in so many respects occupies an intermediate position between *E. polystachyum* and *E. Scheuchzeri* that I regard it as very probable that it represents the hybrid between the two species. Unfortunately it was impossible at the stage at which the plant was collected to see whether or not the fructification was normal. The pollen seems to develop in comparatively slight quantity, and several of the anthers hardly open.

The principal points of difference and similarity between the presumed hybrid and the primitive species are enumerated in the list below. (See page 131).

(Pl. XVII serves as a further illustration of the points of difference and similarity. Unfortunately I did not collect the two species in the same stage of development as the hybrid, and I have therefore taken out some specimens from the Arctic Herbarium of the Botanical Museum of Copenhagen from other localities, which were at an earlier stage of development and could be employed with advantage for comparison with my plants. That the specimens are not derived from the same

E. polystachyum var. *tristis*.

(Pl. XVII, figs. 1—4).

The plant not succulent.

Culms slender, often somewhat arching.

Basal leaves flat, keeled, 3—4 mm broad, curved much outwards, margins in the whole length of the leaf and the keel towards the apex rough.

Sheath of uppermost stem-leaf not distinctly inflated, infundibular, with long and vigorous rough blade.

Mostly several spikes. In the depauperate forms only a single spike.

Outermost bract especially vigorous, ovate-lanceolate, with nerves confluent at the apex, tending to form a blade, stiffly erect, which makes it appear as if it was situated at the apex of the culm, and thus forces the aggregation of spikelets to move slightly to the side. Even in f. *uniceps* this position of the spike is distinct.Scales ovate-lanceolate, short-pointed,
9* blackish or lead-coloured.

Anthers 2—3 mm long.

E. polyst. var. *tristis* × *Scheuchzeri*.

(Pl. XVI).

The plant somewhat succulent.

Culms rigidly erect.

Basal leaves convolute, keeled, 1.5—2.5 mm broad, erect or suberect, margins rough towards the base, smooth at the apex.

Sheath of uppermost stem-leaf distinctly inflated, with short, subulate rough blade.

Mostly one terminal spike, sometimes also a side-spike.

The two bracts membranous, of nearly the same form and size, ovate, relatively large, conspicuous.

Scales linear-lanceolate long-pointed, uniformly lead-coloured.

Anthers 1.5—2 mm long.

E. Scheuchzeri.

(Pl. XVII, figs. 5—6),

The plant distinctly succulent.

Culms stout, rigidly erect.

Basal leaves linear, channelled, 1-2 mm broad, erect, glabrous.

Sheath of uppermost stem-leaf distinctly inflated, bladeless or with very short, subulate, glabrous blade.

One terminal spike.

Bracts membranous, of about the same shape and size, ovate-lanceolate — lanceolate, small and not very conspicuous.

Scales linear-lanceolate, long-pointed, lead-coloured or brownish, with narrow paler margins.

Anthers about 1 mm long.

locality, is of less importance in this connection, since *E. Scheuchzeri* seems only to vary within very narrow limits, and the specimens of *E. polystachyum* from Danmarkshavn are of exactly the same appearance as the plants collected within my area.)

It does not seem probable that such distantly related species as *E. polystachyum* and *E. Scheuchzeri* should frequently hybridise. Nor have I found the said hybrid mentioned in the literature. On looking through the *Eriophorum* material of our Arctic Herbarium I found no specimens from Greenland which could be referred with certainty to the hybrid. It has, however, been collected in Spitsbergen. To a sheet labelled "Plantae in Spitsbergen anno 1908 lectae. *Eriophorum angustifolium* ROTH. f. *triste* TH. FR. leg. HANNA RESVOLL-DIESET"¹⁾, four culms are attached which doubtless belong to the same hybrid as my Greenland specimens, together with two culms belonging to var. *triste* f. *uniceps* TH. FR. These plants are in a still earlier stage of development than my specimens, so it cannot be decided whether the plant is able to produce fruits.

Thus it would seem that this presumed hybrid — even if rare — has formerly been overlooked, having been confounded with f. *uniceps* of *E. polystachyum* var. *tristis*. By far the greater part of the culms in the population observed by me had also only one terminal spike.

Eriophorum Scheuchzeri HOPPE.

HOPPE, Bot. Taschenb., 1800, p. 104.

At the shores of lakes and in swamps and wet grass bogs.

Mostly snow-covered in the winter.

Ascends to great altitudes (1000 m).

Outer district: Common.

Middle district: Common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 53. — DUSÉN p. 54. — KRUSE 1905, p. 190. — VAAGE 1932, p. 64.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Vegaenæs (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K!); 21. Cape Seaforth (H & K!).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V).

¹⁾ A more precise indication of the locality is lacking.

Inner part: 38. Röhss Fjord, north coast (D); 40. Röhss Fjord, south coast (V).

The species flowers early, almost simultaneously with *E. polystachyum*. From the end of July it bore ripe fruits. These are evidently blown off by the wind more quickly in this species than in *E. polystachyum*.

(For *E. polystachyum* × *Scheuchzeri*, see *E. polystachyum*).

Gramineae.

Agropyrum violaceum (HORNEB.) LGE.

LANGE, Consp. Fl. Groenl., 1880, p. 155.

Var. *latiglumis* SCRIBN. & SMITH.

Agropyron violaceum latiglume, SCRIBNER and SMITH, Bull. U. S. Departm. of Agricult. Div. Agrost., 4, Washington 1897, p. 30.

Outer district: Not observed.

Middle district: One locality, Ymer Island, Botanikerbugt. Wind-swept hill on hard, dry solifluction soil, at about 200 m.

Inner district: Not observed.

The plant formed small tufts, whose culms measured up to 30—35 cm. The culm and the leaf-sheaths are glabrous, blades and spikelets very hairy. None of the specimens found in our Arctic Herbarium is approximately as hairy as my plants. Otherwise the specimens are distinguished by their slender culms and narrow convolute leaves.

In the only locality observed it had nearly ripe fruits at the beginning of August.

The species has not formerly been recorded from East Greenland. During the expedition it was also collected north of my area.

Alopecurus alpinus SM.

SMITH, Fl. Brit., 3, 1829, p. 1386.

Outer district: Rare. Grass-covered solifluction soil below 200 m.

Middle district: Only one locality: Ymer Island, at Carl Jacobsen Bay in grass bogs at 800 m altitude.

Inner district: Not observed.

Former investigations:

BUCHENAU & FOCKE 1874, p. 53. — DUSÉN 1901, p. 57. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 65.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 3. Cape Humboldt (V); 7. Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (V); 35. Nanortalik (SEIDF.!).

In specimens which I observed on Traill Island at the end of June the heads had just appeared. In the Ymer Island locality at 800 m altitude only some few culms with heads and otherwise only vegetative shoots occurred in a rather extensive growth. Here the species evidently spreads chiefly by means of vegetative propagation.

In a vegetative stage it may present a great habitual resemblance to *Arctagrostis latifolia*. The blade, however, is usually more horizontally squarrose in *Alopecurus alpinus* than in the latter species. Another good mark of distinction is the great tendency of the rhizomes to ramify cross-wise at right angles.

Arctagrostis latifolia (R. BR.) GRISEB.

GRISEBACH in LEDEB., Fl. Ross., 4, 1853, p. 434.

In swamps, grass moors, and bogs on a substratum of solifluction soil.

Both free of snow and snow-covered in the winter.

Ascends to about 500 m altitude.

Outer district: Common.

Middle district: Very common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 54 (sub nom. *Catabrosa* (*Colpodium*) *latifolia* (R. BR.) FRIES). — DUSÉN 1901, p. 59 (sub nom. *Colpodium latifolium* R. BR.). — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 65.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Vega-næs (V); 21. Cape Seaforth (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 36. Mineralbugt (SEIDF.!). 39. Head of Röhss Fjord (V).

This species flowered very late, not till about August 1st, as was easily seen because the panicle, which is otherwise densely compressed, expands. The plant does not seem to fructify, which is all the more remarkable since even in the area here treated it must be considered a northern species which has its southern limit as far north as the Scoresby Sound area. I suppose, however, that it may occasionally be able to fructify.

Considering the exceedingly poor fructification I found it noteworthy that the plant was of such universal distribution in these regions, even if it often was of sporadic occurrence. It is true that it has a lively vegetative propagation, yet it seems to have no means of spreading over great distances.

In this connection it is possibly worth while to notice the enormous hardness of the plant, which contributes to maintain the species in any locality in which it has in some way or other established itself. Though it is characteristic of swampy places, even if these are desiccated later in the summer, it endures drought to an astonishing degree. *Arctagrostis latifolia* may be found growing on solifluction soil which flows down over a steep slope and thus becomes exposed to effective desiccation. At the top of the slope the earth will form deep cracks as it rounds the crest, which will generally prove fatal to the vegetation; yet *Arctagrostis latifolia* is often the last plant that remains. The above-mentioned phenomenon of solifluction being very common, I think it highly probable that the plant may spread by means of fragments of rhizomes denuded by the cracking of the earth's crust in connection with the effects of the foehn wind, and carried away by the wind.

Unfortunately I did not till it was too late become aware of the deficient fructification of the plant, and am therefore unable to furnish any proofs of this theory of the spreading of the plant.

Calamagrostis arundinacea (L.) ROTH.

ROTH, Tent. Fl. German., 1, 1788, p. 33.

Var. *purpurascens* (R. BR.) GELERT.

GELERT, in OSTENFELD, Fl. arct., 1, 1902, p. 103.

Occurs on dry, windswept slopes and hills.

Free of snow in the winter.

Found up to 1000 m altitude.

Outer district: Here and there, especially at 200—600 m altitude.

Middle district: Here and there up to 1000 m.

Inner district: Common up to 700 m.

Former investigations:

BUCHENAU & FOCKE 1774, p. 53 (sub nom. *C. arundinacea* R. BR.). — DUSÉN 1901, p. 58 (sub nom. *C. purpurascens* R. BR.). — KRUISE 1905, p. 198 (sub nom. *C. arundinacea* (L.) ROTH.). — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 66 (sub nom. *C. purpurascens* R. BR.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V);

9. 15 km W. of Husbugt (V); 17. Antarctic Hbr. (V); 23. Cape Greg (H & K).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 28. Cape Elisabeth (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K).

On Traill Island the panicles were seen to break through the sheaths at the end of June. The fruits ripen rather late.

Calamagrostis neglecta (EHRH.) GÄRTN., MEY. & SCHERB.

GÄRTNER, MEYER UND SCHERBIUS, Oekon.-techn. Fl. d. Wetterau, 1, 1799, p. 94.

Form dense growths at the margins of shallow-watered lakes and lagoons drying up in the summer. It also occurs on moist sand.

Outer district: Not observed.

Middle district: Here and there on Ella Island (the Cape Oswald region) and Ymer Island up to 200 m altitude.

Inner district: Not observed.

Former investigations: DUSÉN 1901, p. 58 (sub nom. *C. stricta* (TIMM.) HARTM. v. *borealis* LÆST.). — KRUUSE 1905, p. 198. — VAAGE 1932, p. 66.

Localities:

Outer part: 17. Antarctic Hbr. (D); 18. Cape Seaforth (H & K).

Middle part: 29. Holmsvig (V).

The species is gregarious and has well developed culms and panicles. Evidently it fructifies poorly; specimens collected about August 1st showed no traces of an incipient development of fruits.

Within my area the species has formerly only been found at Davy Sound and has not been found north thereof.

Festuca ovina L.

LINNEUS, Sp. pl., 1753, p. 73.

(Pl. XVIII and XIX).

Mostly in dry, but also in damp soil (not bogs).

Free of snow as well as snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Rather common.

Middle district: Rather common, especially at great altitudes.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 62 (sub nom. *F. ovina* L. var. *alpina* KOCH et *F. ovina* L. subsp. *brevifolia* (R. BR.)). — KRUUSE 1905, p. 204. — SEIDENFADEN 1931, p. 20 (sub nom. *F. ovina* v. *brevifolia*). — VAAGE 1932, p. 67 (sub nom. *F. ovina* L. et *F. vivipara* L.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 17. Antarctic Hbr. (V); 20. Cape Brown (H & K!); 21. Cape Fletcher (H & K).

F. vivipara: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V).

Middle part: 24. Blomsterbugt (V); 25. Ruth Isl. (D); 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V); 30. Cape Peterséns (V).

F. vivipara: 26. Marie Isl. (V); 28. Cape Elisabeth (SEIDF.); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (H & K!).

Various forms of this species occur within the area. However, it was not till late in the summer when the plants were fully developed that I realised how well distinguished certain of these forms may really be. My investigations on the occurrence of the individual forms are therefore not so thorough as might be desirable, since to begin with I only noticed the difference between normally fructifying and viviparous plants.

Var. *brevifolia* (R. BR.) HART, Journ. of Bot. vol. 18 (New Ser. Vol. 9), 1880, p. 305 (subsp. *brevifolia* (R. BR.) HACKEL, l. c. p. 117) and var. *supina* (SCHUR) HACKEL, Monogr. Festuc. europ. 1882, p. 88, have evidently often been regarded as synonyms, judging from our Arctic Herbarium and various authors. SIMMONS (Rep. sec. Norw. exped. "Fram" 1898—1902, Kristiania 1906, p. 154), however, distinguishes between these varieties, but admits that intermediate forms are not absent.

On Ymer Island I observed the two varieties growing together in several places without the presence of any intermediate forms. Even from a distance the individual tufts were referable to one or the other variety. However, while *brevifolia* here occurred right down to sea-level, *supina* did not appear until at nearly 1000 m altitude.

The two varieties are distinguished by the following characters:

Var. *brevifolia*.
(Pl. XVIII).

Big and dense tufts.

Rigidly erect culms.

The plant of a fresh green colour, the panicle deep reddish-purple, shining.

Basal leaves mostly erect.

Sheath of uppermost stem-leaf short in proportion to the length of the culm, hidden among the basal leaves, not noticeably inflated. The blade short, ligule exceedingly short, and like the auricles, entire.

The culm relatively stout, mostly densely pubescent towards the apex.

Glumes ovate-lanceolate, like the pales distinctly scarious at the margin.

Var. *supina*.
(Pl. XIX).

Small and loose tufts.

Culms spreading in all directions, prostrate or geniculate, the midmost, however, often erect.

The plant glaucous, pruinous, the panicle glaucous to bluish-purple, pruinous, opaque.

Basal leaves mostly recurved, bent outwards.

Sheath of uppermost stem-leaf long in proportion to the length of the culm, rising far above the basal leaves, distinctly inflated. Its blade is very short, often quite diminutive, ligule long, erose-ciliate like the auricles.

The culm slender, glabrous.

Glumes lanceolate, like the pales herbaceous (not scarious).

Both of these two varieties seem to be high-arctic representatives of the species; at any rate they ascend to very great altitudes. These forms are not, or but rarely, viviparous within the area. The viviparous *F. ovina* (*F. vivipara* L.) mainly occurs at inconsiderable altitudes and generally in company with normally fructifying forms, which are evidently more closely related to forms intermediate between both of the above-mentioned varieties than these latter mutually. — On dry slopes there occur big forms with rigid culms and densely contracted, often shining, panicles (transition to var. *brevifolia*?), in the Herbarium usually designated var. *alpina* (GAUD.) KOCH, while in damper, particularly favourable places there occur plants with softer culms, greatly reminiscent of the usual forms from more southerly regions. They are often viviparous; VAAGE has not noticed the viviparous form (*F. vivipara* L.) in the regions of the inner fjords. It was, however, of common occurrence in my Cape Hedlund district.

As stated above, my attention had not earlier in the summer been sufficiently directed towards these varieties and forms, but still I think I am safe in stating that var. *supina* is especially common in the outer coast area. On Ymer Island it occurs at about 1000 m altitude, where it grows characteristically in company with *Poa abbreviata*. Var. *brevifolia* occurs on Ymer Island, though it is not common, from sea-level to 1200—1300 m altitude. Whether these two varieties occur in the inner fjord regions, I cannot state with certainty.

The bigger forms, including the viviparous form, were observed in all my three districts. They seemed to be most common at small altitudes.

The species began its flowering on Traill Island about June 20th, at which date, however, the inflorescences of most individuals did not yet project from the leaf-sheaths.

Festuca rubra L.

LINNEUS, Sp. pl., 1753, p. 74.

Var. *arenaria* (OSBECK) FR.

ELIAS FRIES, Fl. Hall., 1818, p. 28.

Grows on sandy, not very dry, warm slopes.

Snow-covered in winter.

Found up to 700 m altitude. Recorded by VAAGE from 1000 m altitude (Cape Humboldt).

Outer district: Common.

Middle district: Here and there.

Inner district: Rather rare.

Former investigations:

DUSÉN 1901, p. 62. — KRUSE 1905, p. 205. — VAAGE 1932, p. 66 (sub nom. *F. arenaria* OSB.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!).

Middle part: 29. Holmsvig (V).

Inner part: 34. Kjerulf Fjord (D, V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D).

Single individuals in flower first observed on Traill Island on June 22nd. The actual florescence occurs somewhat later. On September 2nd, 1931, it was observed with ripe fruits on Ymer Island.

Hierochloë alpina (LILJEBL.) ROEM. & SCHULT.

ROEMER & SCHULTES, Linn. Syst. veget., 2, 1817, p. 515.

In rather dry grass and dwarf-shrub vegetations.

Free of snow as well as snow-covered in the winter.

Outer district: Rare; only found near Vega Sound at low altitudes.

Middle district: Not observed.

Inner district: Very common up to 700 m altitude.

Former investigations:

DUSÉN 1901, p. 58. — KRUUSE 1905, p. 197. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 67.

Localities:

Outer part: 3. Cape Humboldt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 13. Cape Parry (D); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 38. Röhss Fjord (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!); 42. Polhem Valley (H & K); 43. Forsblad Fjord (D, H & K!).

The species was observed in flower on Traill Island on June 26th but since it is of rare occurrence here, the beginning of the florescence cannot be definitely given.

The species seems to be abundantly fructifying. At Cape Hedlund the fruits were distinctly developed by the middle of July.

Phippsia algida (SOLAND.) R. BR.

ROB. BROWN, App. PARRY Voy. disc. (Chlor. Melv.), 1823, p. 285.

In snow-patches.

Ascends to great altitudes (1000 m and more).

Outer district: Very common from sea-level to great altitudes.

Middle district: Rather common, especially at high levels.

Inner district: Common from sea-level and upwards, most frequent at great altitudes.

Former investigations:

KRUUSE 1905, p. 200. — VAAGE 1932, p. 68.

Localities:

Outer part: 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 12. Vega-næs (V); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K).

Middle part: 24. Blomsterbugt (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Found in flower and partially out of flower on Traill Island at 500 m altitude on June 14th. On Ymer Island it bore mature fruits at 1000 m altitude on August 12th. Here the largest and most vigorous specimens observed by me within the area occurred, with culms exceeding 10 cm in length. In this place it grew in company with *Puccinellia Vahlia*, to which it bore a striking habitual resemblance.

In dry snow-patches it only attained a small size, and often withered long before the fruits had developed.

Pleuropogon Sabinei R. BR.

ROB. BROWN, App. PARRY Voy. disc. (Chlor. Melv.), 1823, p. 289.

Former investigations:

VAAGE 1932, p. 68.

Localities:

Outer part: 7. Husbugt (V); 12. Vaganæs (V).

This species, which is reported to occur in small shallow-watered lakes and ponds, has been found within the area by VAAGE in the immediate neighbourhood of my Traill Island district. I have not seen this plant, but have practically never encountered stagnant fresh water lakes within this district either. The species seems to be absent from the numerous shallow-watered lakes on Ymer Island.

It is a high-arctic species, which has its southern limit in the Scoresby Sound area.

Poa abbreviata R. BR.

ROB. BROWN, App. PARRY Voy. disc. (Chlor. Melv.) 1823, p. 287.

In dry, gravelly, wind-swept places.

Evidently mostly free of snow in the winter.

Ascends to very great altitudes, not found below 650 m.

Outer district: Only two localities, at 650 and 700 m altitude.

Middle district: Ymer Island: here and there from 800 to 1300 m.

Inner district: Not observed.

Former investigations:

BUCHENAU & FOCKE 1874, p. 54. — VAAGE 1932, p. 68.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 6. Sanddal (V).

Middle part: 28. Cape Elisabeth (V).

The species approaches its southern limit within the area, where it occurs at high levels only. Farther south, however, it has been found by HARTZ in Jameson Land near the shore.

The species flowers very early; thus on Traill Island it had rather well developed fruits on July 3rd, and on Ymer Island most of the plants

— at 1000 m altitude — only retained the glumes, while the ripe fruits had already fallen off.

Poa alpigena (FR.) LINDM.

LINDMAN, Svensk Fanerogamfl., 1918, p. 91.

In not too dry, luxuriant grass and dwarf-shrub vegetations.

Free of snow or mostly snow-covered in the winter.

Ascends to about 700 m altitude.

Outer district: Rather common.

Middle district: Common.

Inner district: Rather common.

Former investigations:

(Not *P. pratensis* L., KRUSE 1905, p. 204). — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 69.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl.; 6. Sanddal (V); 7. Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 17. Antarctic Hbr. (V).

Middle part: 26. Marie Isl. (V).

Inner part: 31. Junction Valley (SEIDF.); 32. Renbugt (V); 34. Kjerulf Fjord (V).

(VAAGE records *P. alpigena* × *P. alpina* from the following localities: 7. Husbugt; 17. Antarctic Hbr.; 29. Holmsvig.)

One of the most beautiful and stately grasses, conspicuous by its gregarious habit. Generally it attained a height of 30—40 cm, and I collected plants of a height of 80 cm in the Cape Hedlund district.

Flowered slightly later than *P. glauca* and *P. arctica*.

Poa alpina L.

LINNÆUS, Sp. pl., 1753, p. 67.

On the most favourable slopes that become free of snow relatively early. Mostly in small numbers.

Snow-covered in the winter.

Does not ascend to particularly great altitudes. Is recorded by VAAGE from 650 m altitude (Cape Humboldt).

Outer district: Rather common.

Middle district: Here and there.

Inner district: Not observed?

Former investigations:

DUSÉN 1901, p. 61. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 69.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V);

3. Cape Humboldt (V); 4. Mt. Celsius (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 34. Kjerulf Fjord (D).

(VAAGE records the hybrid *P. alpigena* × *P. alpina*; see *P. alpigena*).

The species flowers rather late, on Ymer Island several populations of it were still in flower at the beginning of August. Plants growing on sunny slopes, however, developed earlier.

Viviparous specimens were only observed a single time on Traill Island at 200 m altitude.

Poa arctica R. Br.

ROB. BROWN, App. PARRY Voy. disc. (Chlor. Melv.), 1823, p. 288.

In dwarf-shrub vegetations and moderate snow-covering.

Mostly snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Rather rare.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 55. — DUSÉN 1901, p. 61 (sub nom. *P. flexuosa* WAHLENB.). — KRUUSE 1905, p. 204 (sub nom. *P. cenisia* ALL. et *P. pratensis* L.). — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 70 (sub nom. *P. rigens* HARTM.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K); 20. Cape Brown (H & K!); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!); 43. Forsblad Fjord (D).

The species is but little variable. In this area it is especially well separated from *P. alpigena*, which seems to be the case to a far less extent in more southerly regions. Within my area the two species could

hardly be confused even in a vegetative state. But in a less developed stage it may occasionally be difficult to distinguish from *P. glauca*.

The dominant form has slender culms and thin, somewhat reflexed, flexuose panicle-branches.

Flowering from the end of June.

Poa glauca VAHL.

M. VAHL, Fl. dan., fasc. 17, 1790, p. 3, tab. 964.

In windswept, dry places.

Mostly free of snow in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Very common.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 56 (sub nom. *P. caesia* SM.). — DUSÉN 1901, p. 60. — KRUISE 1905, p. 203. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 69.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 17. Antarctic Hbr. (V); 20. Cape Brown (H & K!); 21. Cape Fletcher (H & K).

Middle part: 24. Blomsterbugt (SEIDF.!, V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 33. Head of Franz Joseph Fjord (SEIDF.!, ROSENKRANTZ, 1929!); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K).

The species varies rather considerably. The majority is probably referable to var. *elatior* ANDERSSON, Gram. Scand., 1852, p. 43.

Forms related to var. *atroviolacea* LANGE, Consp. Fl. Groenl., 1880, p. 173, were not observed.

Some luxuriant specimens with a deviating habit were collected by A. ROSENKRANTZ at the head of Franz Joseph Fjord east of the Nordenskiöld Glacier on August 27th, 1929. They are nearly 50 cm high, and have evidently grown in large tufts. The panicles are about 10 cm long, generally with five branches issuing from each node. The richly flowering panicle is cylindrically contracted, which lends to the

plant an external resemblance to *Calamagrostis*. The pales are scabrous everywhere owing to the dense covering of very short, stiff hairs.

On Traill Island the species began to flower at the end of June. Maturation of the fruits in August.

Poa Hartzii GDGR.; emend. nov.

M. GANDOGGER, Bull. Soc. Bot. de France, 66, 1919, p. 302.

Caespitosa, innovationibus extravaginalibus; culmis robustis, stricte erectis, glabris, 15—25 (10—30) cm altis, 1—2 foliatis, articulo superiore elongato; foliis rigidis, rectis, implicato-involutis, superne margineque scabris, apice cucullato-complicatis; ligula valida, 2—3(—4) mm longa, acuta, in margines membranaceas vaginae decurrente; folio supremo vagina elongata, lamina rigida erecta, foliis basalibus vaginis latis subinflatis, membranaceis, nitidis, persistentibus, externis sine lamina; panicula 3—5 cm longa, ante et post anthesin angusta, contracta, ramis erecto-adpressis, scabriusculis, ramis in verticillis 2, uno et 2—3(1—5) spiculis; spiculis ovato-lanceolatis, 5—7 mm longis, 3—4(2—5) floris; glumis subaequilongis, dimidiam vel $\frac{2}{3}$ paleae inferioris partem superantibus, ovatis — ovato-lanceolatis, uno (superiori interdum ternis) nervo indistincto; palea inf. nervo mediano indistincto et nervis lateralibus 2(—4) vix discernendis, basi (infernis tertiis) sericea, ad nervos magis pilosis; glumis et palea inf. coeruleo-violaceis-purpureis, nitidis, tertiis—dimidia superioribus membranaceis, lutescentibus, albescentibus aut rubescentibus.

f. *arenaria* (ROSENV.) laxe caespitosa, innovationibus elongatis suberectis.

Poa abbreviata R. BR. f. *arenaria* K. ROSENVINGE (l. c. pag. 734) quoad loc. Kardlunguak, Vajgattet, leg. N. HARTZ.

Icon. fig. 5, 2, 5; fig. 6, 7—12; tab. XX.

Former investigations on *Poa Hartzii* GDGR. in Greenland:

ROSENVINGE, Andet Tillæg til Grønlands Fanerogamer og Karsporeplanter, Medd. om Grønl., 3, 3, 1892, p. 733—734 (sub nom. *Poa abbreviata* R. BR. incl. forma *arenaria*). — HARTZ, Botanisk Rejseberetning fra Vestgrønland 1889—90, Medd. om Grønl. 15, 1, 1894, p. 46 (sub nom. *Poa abbreviata*). — M. P. PORSILD, List of Vascular Plants from the South Coast of the Nugsuaq Peninsula in West Greenland, Arbejder fra den Danske Arktiske Station paa Disko, Nr. 2, Medd. om Grønl. 47, 1910, p. 242 and 249 (sub nom. *Poa abbreviata* R. BR. et *Glyceria Vahlia* (LIEBM.) TH. FR. [? ex parte]). — OSTENFELD & LUNDAGER, List of Vascular Plants from North-east Greenland (N. of 76° N. lat.), Medd. om Grønl., 43, 1, p. 15 (sub nom. *Poa abbreviata* R. BR. [ex parte]). — M. P. PORSILD & A. E. PORSILD, The Flora of Disko Island and the adjacent Coast of West-Greenland from 66°—71° N. lat.,

Medd. om Grønl. 58, 1926, p. 41 and 42 (sub nom. *Poa abbreviata* R. BR. [ex parte] et *Puccinellia Vahlia* (LIEBM.) SCRIBN. & MERR. [ex parte]).
(List of Localities, see p. 153.)

In GANDOGER (l. c.) we find the following passage:

“Folia curvula culmis duplo breviora, spiculæ 3.5 mm longæ, glumæ concolores violaceæ subacutæ. — Spitzberg, ad Lommebay (MALMGREN!)..... *Poa Malmgrenii* GDGR.
Folia stricta culmos subæquantia, spiculæ 6 mm longæ, glumæ inferne violaceæ ad apicem auratæ cuspidatæ. — Groenland, ad Kordlunguak Vajgatsch (HARTZ!).. *Poa Hartzii* GDGR.
Ambæ formæ singulares *P. abbreviata* R. BR. Ligula scariosa duplo major in speciminibus groenlandicis quam in cæteris, folia etiam densius fasciculata.”

GANDOGER has evidently in some way or other obtained possession of the two herbarium sheets already determined as *Poa abbreviata* R. BR., and has simply copied the labels.

His “diagnosis” is applicable to nearly any arctic *Poa*. He remarks, however, that HARTZ’s specimen has a longer ligule than that of MALMGREN, but he has not, evidently, taken the trouble to find out whether any of the plants are identical with *Poa abbreviata*.

I have seen no specimens of MALMGREN’s plant, but some from other collections from the locality (Lommebay), and several other specimens from Spitsbergen, all of which must be considered good *abbreviata*, since none of them deviates so greatly from specimens from other regions (e. g. Novaya Zemlya, Greenland, and Ellesmere Land) that the total impression of the species is in any way disturbed. *Poa abbreviata* is in reality one of the best defined arctic *Poa* species, at any rate within the areas here treated. Thus *Poa Malmgrenii* GDGR. should presumably be regarded as synonymous with *Poa abbreviata* R. BR.

As regards HARTZ’s plant, GANDOGER must be said to have been more successful, since HARTZ, judging from the specimens found in our Arctic Herbarium, has not collected the real *P. abbreviata* from the said locality. Thus there is no doubt whatever as to the identity of *Poa Hartzii*; in spite of the vague description I shall here use GANDOGER’s name for the formerly neglected Greenland *Poa* species discussed here.

On the whole we can only be pleased that a plant growing in this area, for the botanical investigation of which HARTZ deserves such great credit, has been named after him.

Historical Remarks. Formerly our plant was generally confounded with *Poa abbreviata* R. BR. LANGE writes as follows under *Poa abbreviata* (l. c. p. 172): “Obs. Specimina Groenl. occid. fere spitha-

maea, foliis strictis, culmo subduplo brevioribus, dum specimina Groenl. orient. c. 2-pollicaria foliis valde curvatis, panicula capituliformi, vix ultra folia emergente differunt; inter has 2 formas specimina Spidsbergensia exacte medium tenent, quare membra singula hujus seriei intra speciem optime distinctam vix varietates dicendae." When I first read these remarks on the variability of the species, I believed that the only locality recorded from West Greenland, "Asuk paa Disco (Th. Fr.)!", referred to a find of *P. Hartzii*. However, an examination of specimens of our Arctic Herbarium proved that this was not the case. The specimen is a typical *P. abbreviata*, rather tall, it is true, with fairly rigid and straight leaves, and thus does not differ more from the East Greenland specimens mentioned than might be due to the different ecological conditions (tab. 2884, fig. 1, Fl. Dan. drawn after a specimen brought back from Northeast Greenland by the Second German Northpolar Expedition; figs. 2 and 3 represent specimens from Disco).

Our plant was evidently collected for the first time on July 10th—12th, 1871, on the north coast of Disco by TH. M. FRIES, who must be said to have known the plant, in so far as he has not confused it with *P. abbreviata*, but determined it as *P. caesia* Sm. var. From herbarium specimens it proves that TH. FRIES has collected both *P. abbreviata* and our new species in the same place, viz. Asuk, Disco, and on the same date, July 12th, 1871. In his Conspectus (1880) LANGE refers TH. FRIES'S *P. caesia* to *P. glauca* M. VAHL. Later ROSENVINGE has written on the sheet: "*Poa abbreviata* R. BR.?, L. K. R., 1891." In ROSENVINGE'S Second Supplement etc. (1892), however, this locality is not mentioned, being identical with that mentioned by LANGE. *Poa abbreviata*, however, is recorded from "Disco, Igdlutjait¹) (Th. Fr.)". ROSENVINGE does not add a "!" although the specimen is found in our Arctic Herbarium, and thus he can hardly have been convinced of the correctness of the determination. This specimen has likewise been determined by the collector as *Poa caesia* Sm., and the sheet has further been furnished with the following inscription by LANGE: "*Poa abbreviata* forma elatior videtur, J. L. 1876". (The locality, however, is not mentioned in Conspectus 1880). This specimen likewise belongs to our species.

Further ROSENVINGE (l. c. p. 734) records a "forma arenaria, laxe caespitosa" from "Kardlunguak ved Vaigattet, i Klitsand (Hartz)!". (Kardlunguak by Vaigattet, in dune sand). This also is our plant.

According to the specimens found in our Arctic Herbarium the plant was next collected in 1898 on the east side of Disco, on the three-toothed mountain at Mudderbugten, by the leader of the Danish Arctic Station, M. PEDERSEN (later PORSILD), and determined by him as *P. abbreviata* (Nr. 917).

¹) Manuscript for Igdlutsiak.

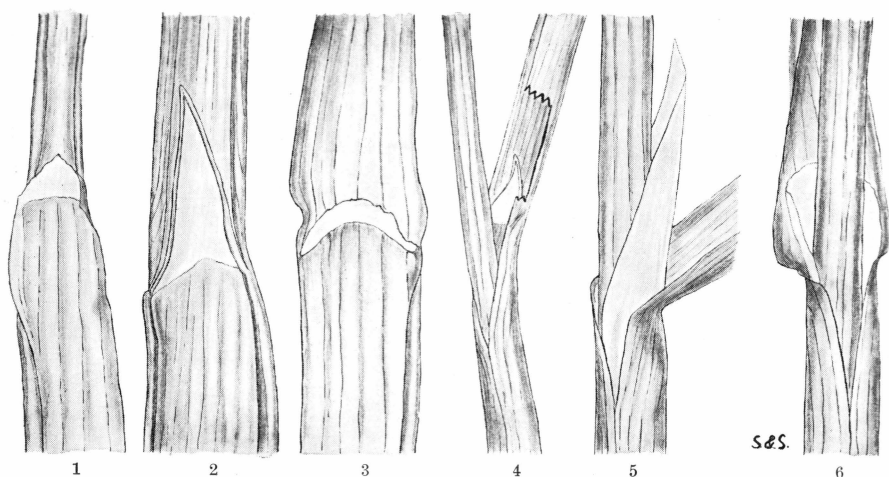


Fig. 5.

- 1—3: Basal leaf; ligule shown at the transition between sheath and blade. c. $\frac{8}{1}$.
1. *Poa abbreviata* R. BR., from Spitsbergen, Klaas Bille Bay, leg. HANNA RESVOLL-DIESET, 17.VII.1908.
 2. *Poa Hartzii* GDGR., from Danmarkshavn, (East Greenland), leg. A. LUNDAGER, July 1908.
 3. *Poa glauca* VAHL, from Vaigattet, Kingigtok (West Greenland), 70°08' N. lat., leg. N. HARTZ, August 1890.
- 4—6: The uppermost leaf of the culm; ligule shown at the transition between sheath and blade, c. $\frac{8}{1}$.
4. *Poa abbreviata* R. BR., from Disco Isl., Asuk, leg. TH. M. FRIES, 12.VII. 1871. (The blade bent backward to show the ligule).
 5. *Poa Hartzii* GDGR., from Disco Isl., Asuk, leg. TH. M. FRIES, 12.VII.1871. (The blade bent backward to show the ligule).
 6. *Poa glauca* VAHL, from Ymer Isl., Botanikerbugt, (growing in company with *P. Hartzii*), leg. TH. S., 8.VIII.1932.

MORTEN P. PORSILD again collected the species in 1902 on the Nugsuak Peninsula north of Disco (Nr. 221, *Glyceria Vahlia* (LIEBM.) TH. FR. f. *elata*!, affirm. HOLMBERG [1919]).

The next finding of the plant was by LUNDAGER at Danmarkshavn in Northeast Greenland. The collection has been determined by OSTENFELD as *Poa abbreviata*.

In 1928 it was brought home from Neria, Southwest Greenland, collected by J. EUGENIUS, a single specimen being found on a sheet among "(?) *Poa glauca* VAHL subsp. *conferta* (BL.) LINDM. var. *laxiuscula* (BL.) LINDM." It is only a single shoot, which evidently belongs to f. *arenaria*.

Finally the plant was collected by M. P. PORSILD & R. T. PORSILD in 1929 in TH. FRIES's former locality, Asuk, Disco. It is the HARTZ-ROSENVINGE sand-form f. *arenaria*, and was determined by the collectors as *P. abbreviata*.

Poa abbreviata.

(Figs. 5, 1, 4 and 6, 1—6).

Densely caespitose.

Innovations intravaginate. Prefolium of the length of the succeeding leaf-sheath. Basal leaves all with a blade, leaf-sheaths scarious, lustrous.

Culm slender, nearly capillary, glabrous, often arcuate.

Basal leaves involute, mostly curvate, blade of uppermost stem-leaf short, erect, complicate involute.

Ligule short, acute (equilaterally triangular), not continuing into the margins of the leaf-sheath.

Panicle short, oblong roundish; branches glabrous or slightly scabrous.

Spikelets 2—4-flowered, uppermost glume almost reaching the apex of the succeeding pale.

Pales ovate, sericeous in about two-thirds of their length, veins not particularly hairy.

Glumes and pales with broad membranous margins; spikelets with a glassy lustre.

Poa Hartzii.

(Figs. 5, 2, 5 and 6, 7—12).

More loosely caespitose.

Innovations extravaginate. Prefolium much shorter than the sheath of the lowermost leaf. Between the prefolium and the actual basal leaves one or several bladeless broad scarious sheaths, of a silky lustre like the actual leaf sheaths.

Culm relatively thick, glabrous, rigidly erect.

Basal leaves folded, involute, rigid and erect; blade of uppermost stem-leaf short, erect, complicate involute.

Ligule very long and vigorous, continuing into the membranous margins of the leaf-sheath.

Panicle long, linear- or linear-lanceolate, branches slightly scabrous.

Spikelets 3—5-flowered, uppermost glume reaching two-thirds, at the most, of the succeeding pale.

Pales ovate-lanceolate, sericeous in nearly one-third of their length, veins very hairy at the base.

Glumes and pales with very broad membranous margins; spikelets with a glassy lustre.

Poa glauca.

(Figs. 5, 3, 6 and 6, 13—16).

More loosely caespitose.

Innovations extravaginate. Prefolium much shorter than the sheath of the lowermost leaf. Bladeless sheaths, like the actual leaf-sheaths, little conspicuous, not lustrous, herbaceous, and early withering.

Culm moderately stout, generally scabrous, more or less rigid, erect.

Basal leaves mostly soft, flat; blade of uppermost stem-leaf generally more or less squarrose, flat or convolute.

Ligule short or long, abruptly cut off or blunt, not continuing into the margins of the leaf-sheath.

Panicle mostly lanceolate; branches scabrous.

Spikelets 3—5-flowered, uppermost glume not reaching the apex of the succeeding pale.

Pales ovate-lanceolate, only the veins hairy, between the veins sometimes very short, appressed hairs or traces of silky hairs.

Glumes and pales with rather narrow membranous margins; spikelets without any particular lustre.

In 1931—32 the plant was collected in East Greenland both by GELTING and myself.

Description: As will appear from the above diagnosis, *Poa Hartzii* in some degree unites characters of *Poa abbreviata* and *Poa glauca*. A general view of the essential points of difference and similarity is given above (see page 149).

Even if *Poa Hartzii* is thus intermediate in many respects between *P. abbreviata* and *P. glauca*, it hardly represents the hybrid between these two species. OSTENFELD (Medd. om Grønl. Bd. 64, 1923, p. 171, fig. 1) has described and figured a *Poa* which he takes to be *P. abbreviata* R. BR. $\times$ *glauca* M. VAHL. Further he is of opinion that it is identical with *P. laxa* from Arctic regions. I have seen the plant in our Arctic Herbarium, and I must admit there is every probability that OSTENFELD is right in his conjecture. This plant has but few features in common with *Poa Hartzii*.

The usual confusion of *P. Hartzii* with *P. abbreviata* is no doubt responsible for the impression of various authors that *P. abbreviata* is but poorly marked off from *P. glauca*. Thus GELERT writes (in OSTENFELD, Fl. Arct., 1902, p. 124) that it is "very nearly allied to *P. laxa* but also approaching *P. glauca*". In reality *P. abbreviata* is one of the best delimited *Poa* species, since, according to OSTENFELD, *P. laxa* in arctic regions should be considered a designation for (? different) hybrids, while the presumed transitional forms to *P. glauca* in reality represent a good species, *P. Hartzii*. The latter, at any rate, is especially well marked off from *P. abbreviata*, i. a. by its extravaginate innovations. It is hardly so well marked off from *P. glauca*, but still so well that earlier experienced botanists have referred it to *P. abbreviata* and not to *P. glauca*.

Occurrence. During my stay in East Greenland I did not, unfortunately, direct my attention sufficiently to the species, since it was only towards the end of the summer that I observed on Ymer Island the scattered dune form, f. *arenaria*, which attracted my attention because I was altogether unable to identify the plant with any of the species known to me. I had regarded the more densely caespitose specimens as highly deviating forms of the greatly variable *P. glauca*. Forma *arenaria* I only encountered in the dunes, whereas the caespitose form grew on dry hills exposed to the wind, in company with *Calamagrostis arundinacea* var. *purpurascens* and *Poa glauca*. The greatest altitude at which I collected the plant was 200 m; there it grew on dry and very hard solifluction soil in company with *Agropyrum violaceum* var. *latiglumis*, the only place in which I observed the latter species.

On Ymer Island *P. Hartzii* seems to be restricted to the lower

regions, though it is not improbable that it occurs at greater altitudes than 200 m. I can, however, state with certainty that the lowest limit of *P. abbreviata* within my Ymer Island district is 800 m, and not till about 1000 m is it of frequent occurrence. Here it sometimes grew in company with *P. glauca*, while *P. Hartzii* was absent at these altitudes. Whether the species may be found in the other districts investigated by me, I am at present unable to decide. Most likely, however, it is absent there. In the summer of 1931 I collected the plant, without knowing it, on Strindberg Peninsula, Nordfjord, on a clayey shore, where it grew in company with *Puccinellia angustata*.

The botanist of the northern wintering station, GELTING, has kindly allowed me to look through his *Poa* material, and it proves that GELTING, too, has collected the plant, i.e. together with *Puccinellia angustata*. Where the two species grow in company, they show an astounding habitual resemblance. GELTING has brought back the plant from three localities on Clavering Island and from the head of Granta Fjord. He is of opinion that it is of common occurrence on Clavering Island and the adjacent regions.

In contrast to *P. abbreviata*, *P. Hartzii* seems to be especially well adapted to grow in dune sand, since the sand-form, f. *arenaria*, is at hand from no less than five out of the thirteen known localities. *P. abbreviata* with its intravaginal innovation shoots is hardly able to develop similar dune-forms. On Ymer Island I repeatedly observed how the plant was regularly choked by being partially covered with sand or gravel from landslips and solifluction. It is unable to reach the surface of the ground by means of elongated rhizomatose subterranean shoots, whereas *P. glauca*, though rarely, may show similar forms induced by drifting sand (cf. HARTZ, Medd. om Grønl. Bd. 18, 1895, p. 350).

Judging from the available herbarium specimens and from GELTING's and my observations on the ecology of the plant, *Poa Hartzii* may be considered an arctic shore and dune plant. In localities at greater distances from the coast it occurs in places free of vegetation, somewhat like *Puccinellia angustata*, though evidently preferring drier localities than that species.

While on the east coast of Greenland the species makes its way far north of the southern limit of *P. abbreviata*, having been brought home from Danmarkshavn in 76°46' N. lat., the localities in which it has been found on the west coast lie in the region of Disco near the southern limit of *P. abbreviata*. Further it is of interest that it has been collected as far south as Neria in 61°33' N. lat. on the west coast of Greenland. Thus *Poa Hartzii* is doubtless a more southern species than *Poa abbreviata*.

As regards the frequency of the species in Greenland nothing definite

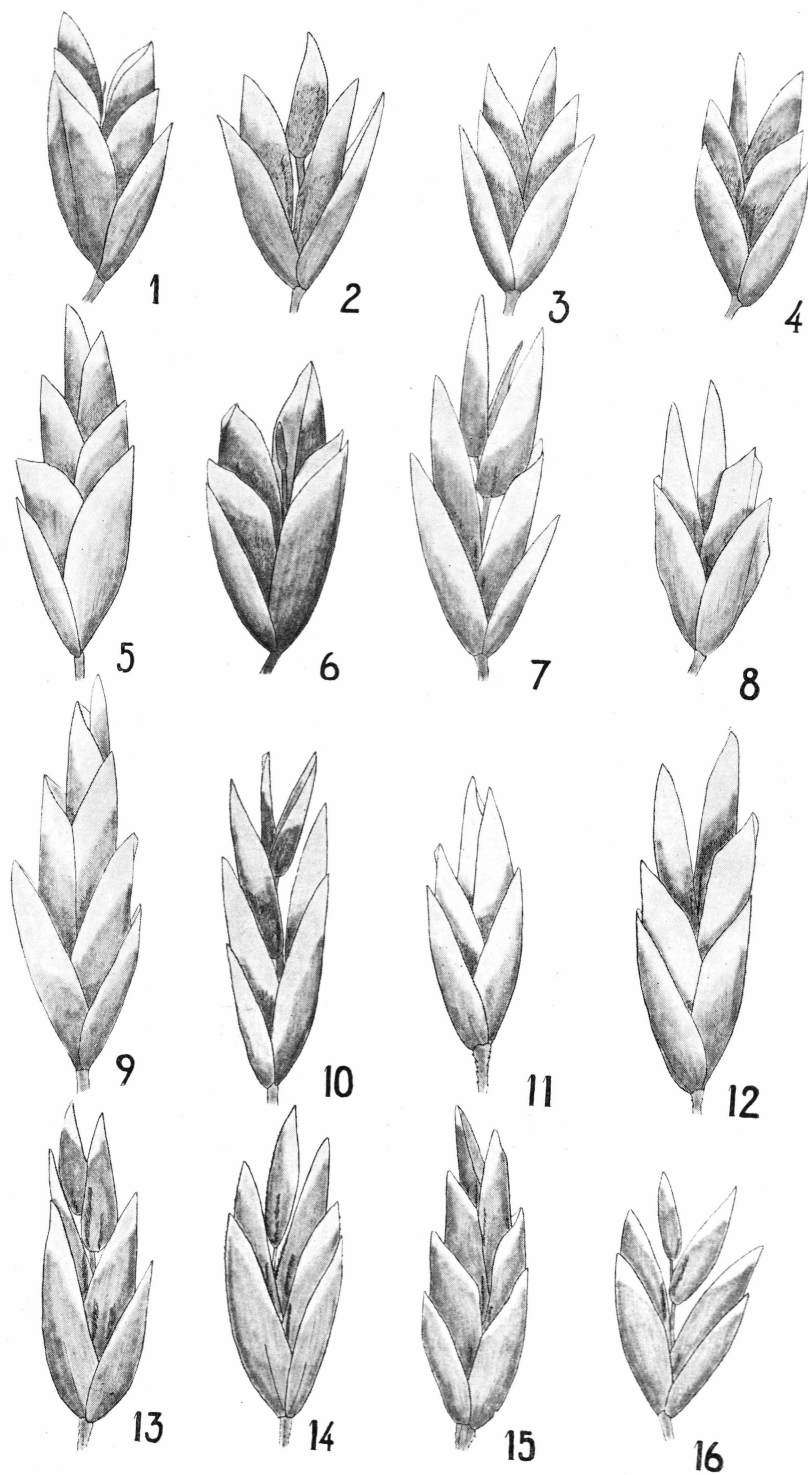


Fig. 6 (see next page).

can be stated. Generally, however, it hardly belongs to the very common plants. In our Arctic Herbarium I have not found specimens collected outside Greenland.

Localities of *Poa Hartzii* in Greenland (the numbers refer to the map in fig. 7):

West Greenland:

1. Nugsuak Peninsula, at the mouth of the great valley (Nr. 221, *Glyceria Vahlia* (LIEBN.) TH. FR., 17-VII-1902, leg. MORTEN P. PORSILD)..... 70°30' N. lat.
2. Disco Island, Igdlutsiak (10-VII-1871, leg. TH. M. FRIES) 70°15' N. lat.
3. Disco Island, Asuk (12-VII-1871, leg. TH. M. FRIES. — 4-VII-1929, R. T. PORSILD & M. P. PORSILD)... 70°11' N. lat.
4. Vajgattet, Kardlunguak (?-VIII-1890, leg. N. HARTZ) 70°04' N. lat.
5. Disco Island, the three-toothed mountain at Mudderbugten (Nr. 917, *Poa abbreviata* R. BR., 11-VII-1898, leg. MORTEN PEDERSEN)..... 69°45' N. lat.

Fig. 6.

Spikelets of *Poa abbreviata* R. BR., *Poa Hartzii* GDGR., and
Poa glauca VAHL. ⁸/₁.

- 1—6: *Poa abbreviata*.
 1. From Ellesmere Land, Bedford Pim Isl., 78°04' N. lat., 74°50' W. long., leg. H. G. SIMMONS, 31.VII.1899.
 2. From Disco Isl., Asuk, leg. TH. M. FRIES, 12.VII.1871.
 3. From Traill Isl., near Scott Keltie Island, leg. TH. S., 3.VII.1932.
 4. From Spitsbergen, Wijde Bay, leg. THORILD WULFF, 17.VII.1899.
 5. From Spitsbergen, Klaas Bille Bay, leg. HANNA RESVOLL-DIESET, 17.VII.1908.
 6. From Novaya Zemlya, the mainland east of Lichutin Isl., leg. B. LYNGE, 17.VIII.1921.
- 7—12: *Poa Hartzii*.
 7. From Disco Isl., Asuk, leg. TH. M. FRIES, 12.VII.1871.
 8. From Vajgattet, Kardlunguak, leg. N. HARTZ, August 1890.
 9. From Danmarkshavn, leg. A. LUNDAGER, July 1908.
 10. From Clavering Isl., Dry River, leg. P. GELTING, 7.VII.1932.
 11. From Ymer Isl., Botanikerbugt, leg. TH. S., 8.VIII.1932.
 12. From Strindberg Peninsula, east of Mt. Gunver, leg. TH. S., 13.VIII.1931.
- 13—16: *Poa glauca*.
 13. From Vajgattet, Kingigtok (West Greenland), 70°08' N. lat., leg. N. HARTZ, August 1890.
 14. From Suess Land, near Kempe Fjord, East of Cape Beijer, leg. TH. S., 28.VII.1932.
 15. From Ymer Isl., Botanikerbugt, leg. TH. S., 8.VIII.1932.
 16. From Cape Hold with Hope (East Greenland), about 73°50' N. lat., leg. N. HARTZ, 20.VII.1890.

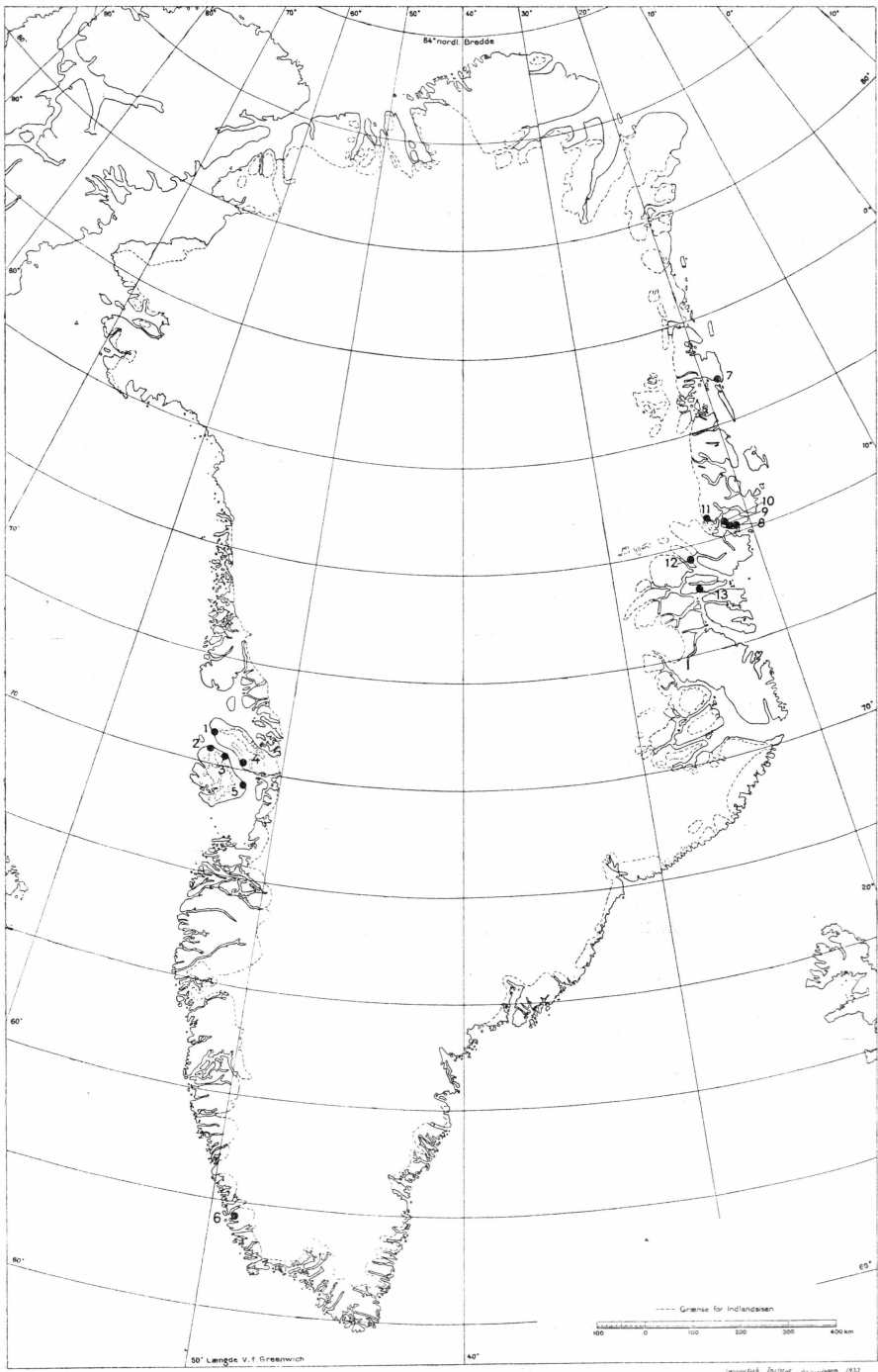


Fig. 7. The distribution within Greenland of *Poa Hartzii*.

6. Neria (22-VI-1928, leg. J. EUGENIUS)..... 61°33' N. lat.
East Greenland:
7. Germania Land, Danmarkshavn (?-VII-1908, leg.
A. LUNDAGER) 76°46' N. lat.
8. Clavering Island, Granat River (15-VIII-1931, leg.
P. GELTING) 74°10' N. lat.
9. Clavering Island, Eskimonæs (18-VIII-1932, leg.
P. GELTING) 74°07' N. lat.
10. Clavering Island, Dry River (7-VII-1932, leg. P. GEL-
TING) 74°20' N. lat.
11. Payer Land, Head of Granta Fjord (6-IX-1931, leg.
P. GELTING) 74°22' N. lat.
12. Strindberg Peninsula, East of Mt. Gunver, Nordfjord
(13-VIII-1931, leg. THORV. SØRENSEN) 73°45' N. lat.
13. Ymer Island, Botanikerbugt (31-VII—8-VIII-1932,
leg. THORV. SØRENSEN)..... 73°10' N. lat.

Puccinellia angustata (R. BR.) RAND & REDF.

RAND and REDFIELD, Fl. Mount Desert Isl. Maine, Cambridge (Mass.) 1894.

Occurs on shores, sometimes also on dry solifluction soil far from the coast.

Outer district: Not observed.

Middle district: On shores and up to 200 m altitude.

Inner district: On shores.

Former investigations:

DUSÉN 1901, p. 60 (sub nom. *Glyceria angustata* (R. BR.) FR.). —

KRUUSE 1905, p. 202 (sub nom. *Glyceria angustata* (R. BR.) FR.). —

SEIDENFADEN 1931, p. 20. — VAAGE 1932, p. 71.

Localities:

Outer part: 6. Sanddal (V).

Middle part: 28. Cape Elisabeth (SEIDF., V).

Inner part: 34. Kjerulf Fjord (D, V); 40. Röhss Fjord, south coast (V).

At Cape Hedlund I have only observed var. *effusa* ROSENV. (*Glyceria vaginata* LGE. var. *effusa*, ROSENVINGE, Andet Tillæg til Grønlands Fanerogamer og Karsporeplanter, Medd. om Grønl. 3, 3, 1892, p. 731), which differs conspicuously from the other forms on account of its culms spreading in all directions and the very long, spreading or reflexed panicle-branches. I also observed this variety on Ymer Island, where, however, forms with more or less erect growth and compressed panicle were dominant.

On Ymer Island it bore ripe fruits in the first half of August.

Puccinellia phryganodes (TRIN.) SCRIBN. & MERR.

SCRIBNER & MERRILL in Contrib. U. S. Nat. Herb. 13, 1910, p. 78.

Restricted to the shore, often inundated at high-water.

Outer district: Not observed.

Middle district: Sea-shores.

Inner district: Not observed at Cape Hedlund. Found at the current hole in Röhss Fjord (c).

Former investigations:

DUSÉN 1901, p. 60 (sub nom. *Glyceria vilfoidea* (AND.) TH. FR.). —
KRUUSE 1905, p. 201 (sub nom. *Glyceria maritima* (HUDS.) WBG. f. *vilfoidea* AND.). — VAAGE 1932, p. 71.

Localities:

Outer part: 6. Sanddal (V); 10. Gaaseø (V); 12. Veganæs (V);
17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K).

Middle part: 28. Cape Elisabeth (V); 29. Holmsvig (V).

Inner part: 39. Head of Röhss Fjord (V); 42. Polhem Valley
(H & K); 43. Forsblad Fjord (D).

By its vegetative propagation by means of long above-ground rooting stolons it forms dense growths, usually in places which are inundated at high-water. Only near the high-water mark does the plant become more or less caespitose and develop flowering culms. Evidently, however, it fructifies but sparsely.

Puccinellia Vahlia (LIEBM.) SCRIBN. & MERR.

SCRIBNER & MERRILL in Contrib. U. S. Nat. Herb. 13, 1910, p. 78.

Not an actual strand plant. Most frequent in damp places in rocky territory saturated with water or inundated in the spring.

Mostly snow-covered in the winter.

Found up to 1000 m altitude, and presumably ascends still higher.

Outer district: Two localities at 250 and 575 m altitude.

Middle district: Here and there.

Inner district: Not observed.

Former investigations:

VAAGE 1932, p. 71.

Localities:

Outer part: 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V).

Middle part: 28. Cape Elisabeth (V); 30. Cape Peterséns (V).

Both in its outer aspect and as to ecology this species shows many points of resemblance to the *Poa* species. Neither on Traill Island nor on Ymer Island did I find it in the immediate neighbourhood of the shore.

Maturation of the fruits in August.

Trisetum spicatum (L.) RICHT.

RICHTER, Pl. Europ. I. 1890, p. 59.

Grows in dry snow-patches.

Ascends to great altitudes (1000 m and more).

Outer district: Very common, especially at 200—500 m altitude.

Middle district: Common.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 59 (sub nom. *T. subspicatum* (L.) BEAUV.). —
KRUUSE 1905, p. 199 (sub nom. *T. subspicatum* (L.) BEAUV.). — VAAGE
1932, p. 71.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganæs (V); 17. Antarctic Hbr. (D, V); 19. Pingel Valley (H & K!); 21. Cape Seaforth (H & K!); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (V); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 42. Polhem Valley (H & K); 43. Forsblad Fjord (H & K!).

The species flowers rather late, the first flowering individuals being observed on Traill Island on June 21st. On Ymer Island the fruits were not yet ripe by the middle of August.

On September 2nd, 1931, I found specimens of a height of 12—15 cm with well developed panicles on Røda Berget, Ymer Island, at 1300 m altitude.

Juncaceae.

Juncus arcticus WILLD.

WILLDENOW, in LINN. Sp. pl. edit. 4, 2, 1799, p. 206.

Grows in damp sand and at the shores of shallow-watered lakes and small desiccating ponds.

Snow-covered in the winter.

Not observed above c. 300 m altitude.

Outer district: Rare; Maanedalen.

Middle district: Common.

Inner district: Several localities.

Former investigations:

DUSÉN 1901, p. 52. — KRUUSE 1905, p. 189. — SEIDENFADEN 1930, p. 382; 1931, p. 21. — VAAGE 1932, p. 55.

Localities:

Outer part: 2. Cape Graah (V); 6. Sanddal (V); 7. Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganes (V); 18. Cape Seaforth (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 28. Cape Elisabeth (SEIDF.).

Inner part: 32. Renbugt (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

On Ymer Island the species had nearly mature capsules at the beginning of August. Here regular juncaceous woods of 40—50 cm height were sometimes encountered at the shores of the shallow-watered lakes. I measured culms of up to 70 cm length.

Juncus biglumis L.

LINNEUS, Sp. pl., 1753, p. 328.

In damp soil, including bogs and snow-patches.

Mostly snow-covered in the winter.

Ascends to great altitudes (1000 m and presumably still higher).

Outer district: Very common.

Middle district: Very common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE, p. 51. — DUSÉN 1901, p. 52. — KRUISE 1905, p. 187. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 55.

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganes (V); 17. Antarctic Hbr. (V); 18. Cape Seaforth (H & K!); 19. Pingel Valley (H & K!).

Middle part: 24. Blomsterbugt (SEIDF., V); 25. Ruth Isl. (D); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D, H & K!).

The species flowers very early. On Traill Island individuals with well developed capsules were found at the end of June, and on Ymer Island dehiscent and empty capsules were often observed at the beginning of August.

In especially favourable places the species may form tufts with culms of a height of up to 18 cm.

Juncus castaneus SM.

SMITH, Comp. Brit. Fl., 1, 1829, p. 383.

In damp grassy places, in swamps and on sandy river banks.

Free of snow as well as snow-covered in the winter.

Found up to 550 m altitude.

Outer district: Rather rare.

Middle district: Rather common.

Inner district: Here and there.

Former investigations:

BUCHENAU & FOCKE 1874, p. 51. — DUSÉN 1901, p. 52. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 55.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V).

Middle part: 24. Blomsterbugt (V); 28. Cape Elisabeth (V).

Inner part: 32. Renbugt (V); 36. Mineralbugt (SEIDF.); 38. Röhss Fjord, north coast (D); 40. Röhss Fjord, south coast (V); 43. Forsblad Fjord (D).

On Ymer Island the species was observed with big, but not ripe, capsules at the beginning of August.

Juncus triglumis L.

LINNÆUS, Sp. pl., 1753, p. 328.

Var. *Copelandi* BUCHEN.

BUCHENAU in: BUCHENAU und FOCKE, Die zweite deutsche Polarfahrt, 2, Botanik, 1874, p. 51.

Syn.: *Juncus triglumis* L. var. *albescens* LGE. et var. *Copelandi* BUCHEN., LANGE, Consp. Fl. Groenl. 1880, p. 123. — *Juncus albescens* (LGE.) FERNALD, Rhodora 26, 1924, p. 202.

Grows on moist to wet, grassy slopes, especially where the ground-water is in motion.

Often free of snow in the winter.

Found luxuriantly developed up to 800 m altitude.

Outer district: Common.

Middle district: Very common.

Inner district: Common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 51 (*J. triglumis* L. var. *Copelandi* BUCHENAU). — DUSÉN 1901, p. 52 (sub nom. *J. triglumis* L.). — VAAGE 1932, p. 45 (sub nom. *J. triglumis* L.).

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 8.5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Veganæs (V).

Middle part: 24. Blomsterbugt (V); 25. Ruth Isl. (D); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 30. Cape Peterséns (V).

Inner part: 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 43. Forsblad Fjord (D).

From "Gletscherwälle am Kaiser-Franz-Josephs-Fjord" COPELAND and PANSCH brought back specimens of *J. triglumis* which have been described by BUCHENAU (l. c.) as follows: "*Juncus triglumis* L., var. *Copelandi* BUCHENAU. Eine sehr interessante zarte Form von *J. triglumis* L. mit viel schwächerem, hin- und hergebogenem Stengel und kleinern Blüten als der normale. Köpfchen vier- bis sechsblütig, nicht von dem untersten Deckblatte (welches nur wenig länger ist als seine Blüte) überragt; die unterste Blüte oft eine kleine Strecke weit von den übrigen entfernt. Die (unreife) stumpfe Kapsel überragt die Kelchblätter; sie hat einen kurzen Griffel. Die Blüten sind hell-kastanienbraun gefärbt, nicht schwarzbraun, wie bei *J. biglumis*".

In addition to this variety LANGE erects a var. *albescens*, which he describes as follows (l. c.): "Caulibus gracilioribus minusque rigidis, glomerule minore quam in forma typica, saepius bifloro, bracteis et perigonii foliis pallidis, capsula vix exserta".

According to the descriptions there is no great difference between the two varieties except that in var. *Copelandi* the capsules are a little longer and the inflorescences more abundantly flowering than in var. *albescens*. I am, however, unable to detect any difference between specimens referred by BUCHENAU to his variety and such as are referred by LANGE to his variety. The points of difference mentioned above concern characters which by comparison of a large number of specimens prove to be greatly variable. In BUCHENAU's plant the lowermost flower is stated to be at some distance from the other. Precisely the same character, however, may be recognised in big specimens of LANGE's var. *albescens*.

My impression is then briefly this: var. *Copelandi* is a vigorously developed var. *albescens*, and vice versa. I do not, therefore, hesitate to unite the two varieties. As BUCHENAU's name is older than that given by LANGE the name given by the former author should probably be maintained.

Recently FERNALD (l. c.) has subjected the *J. triglumis* forms to a careful examination, and has arrived at the result that LANGE's var. *albescens*, which is the sole form occurring in the Arctic-alpine area of North America, should be regarded as a separate species. FERNALD

especially attaches importance to the difference between the shape and length of the bracts in *J. triglumis* and *J. albescens*. In the former "the bracts of the inflorescence [are] usually obtuse or the lower mucronate, and ordinarily conspicuously shorter than the flowers", while in *J. albescens* "the lower bract is long-acuminate or long-awned and equal to or overtopping the lowest flower". The difference in the shape and size of the capsule is also pointed out: "In *J. triglumis* the mature capsule is 6—7 mm long, conspicuously exerted from the perianth, firm, castaneous and conic to rounded below the short beak. In the American plant [*J. albescens*] the thinner and usually paler capsule is included or barely exerted, 3—4 mm long, and rounded to subtruncate at summit". Further *J. triglumis* is stated to have bigger seeds than *J. albescens*.

On examination of a large number of specimens from various regions it turns out, however, that the above-mentioned characters vary within wide limits so that in reality all transitional forms are established. Nor are the two forms geographically distinct, since the material that has been at my disposal contains Scandinavian specimens which should indubitably be referred to FERNALD'S *J. albescens*, while some specimens from Colorado are indistinguishable from the usual Iceland-Scandinavian *J. triglumis*. I therefore prefer to maintain the Arctic-?American form as a variety of *J. triglumis*.

As also pointed out by FERNALD, our variety is distinguished from the ordinary *J. triglumis* by "the more delicate texture", which character I find one of the most striking. — Without having noted the other points of difference of the plant from the ordinary *J. triglumis*, I was surprised during my work in the field to ascertain that *J. triglumis* was on the whole notably smaller and more slender than *J. biglumis*, with nearly capillary, though rigid, erect culms, while on Iceland, where I had previously observed the two species, I received the opposite impression.

The species begin to flower almost simultaneously with *J. biglumis*, or perhaps a little later, but is far more rarely found in flower late in the summer, since it does not occur in places with a protracted snow-covering.

Luzula arcuata (WAHLENB.) SW.

SWARTZ, Summ, Syst. Veg. Scand., 1814, p. 13.

Var. *confusa* (LINDEB.) KJELLM.

KJELLMAN, Vegaexp. Vetensk. Iaktt., 1, Stockholm 1882, p. 277.

Grows nearly everywhere except in the driest places most exposed to the wind.

Free of snow as well as snow-covered in the winter.

Ascends to great altitudes (1000 m and more).

Outer district: Very common.

Middle district: Here and there.

Inner district: Very common.

Former investigations:

BUCHENAU & FOCKE 1874, p. 49 (sub nom. *L. hyperborea* R. BR.) — DUSÉN 1901, p. 53 (sub nom. *L. confusa* LINDEB.). — KRUISE 1905, p. 189. — SEIDENFADEN 1930, p. 382 (sub nom. *L. confusa*). — VAAGE 1932, p. 56 (sub nom. *L. confusa*).

Localities:

Outer part: 1. Bontekoe (D, SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 4. Mt. Celsius (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 10. Gaaseø (V); 11. Scott Keltie Isl. (D); 12. Veganaes (V); 13. Cape Parry (D); 14. Cape Simpson (V); 17. Antarctic Hbr. (D, V); 18. Cape Seaforth (H & K); 19. Pingel Valley (H & K); 20. Cape Brown (H & K!); 21. Cape Fletcher (H & K); 23. Cape Greg (H & K!).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 27. North of Mt. Swedenborg (D); 28. Cape Elisabeth (V); 29. Holmsvig (V); 30. Cape Peterséns (V).

Inner part: 31. Junction Valley (SEIDF.!); 32. Renbugt (V); 34. Kjerulf Fjord (D, V); 36. Mineralbugt (SEIDF.!); 37. Dickson Fjord (V); 38. Röhss Fjord, north coast (D); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!); 43. Forsblad Fjord (D, H & K!).

I find no reason to consider *L. arcuata* and *L. confusa* as two separate species, since we often encounter specimens which cannot with certainty be referred to either of these in no way sharply delimited units.

The specimens from my area more probably belong to *L. confusa*. Frequently, however, there occur forms with the clusters of the inflorescences on long, slender, arching branches, and the length of the perianth in proportion to the capsule here also seems to be of little systematic value. Generally, I suppose, forms with contracted and capitate inflorescences and rigid, erect culms are of most common occurrence within the area.

The species was found in incipient flowering on Traill Island at 500 m altitude on June 8th. In snow-patches it may be seen to flower rather late in the summer.

Abundant fructification.

Lazula nivalis (LÆST.) BEURL.

BEURLIN, Bot. Notiser, Lund 1853, p. 55.

In damp dwarf-shrub vegetations and in bogs.

Snow-covered in the winter.

Ascends to 600—700 m altitude.

Outer district: Very common.

Middle district: Rather common.

Inner district: Common.

Former investigations:

SEIDENFADEN 1930, p. 382; 1931, p. 21. — VAAGE 1932, p. 56.

Localities:

Outer part: 1. Bontekoe (SEIDF., 1932); 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 10. Gaaseø (V); 17. Antarctic Hbr. (V).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 28. Cape Elisabeth (SEIDF., V); 30. Cape Peterséns (V).

Inner part: 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.!).

The plant is peculiar and easily recognisable by its leaves shot with purple and steel-blue, which are relatively short and broad.

On Traill Island it was found in incipient flowering at 500 m altitude on June 8th. On Ymer Island it bore mature and often empty capsules about August 1st.

Luzula spicata (L.) D C.

DE CANDOLLE in A. P. DE CANDOLLE & J. B. DE LA MACK, Fl. France. Ed. 3, 3, 1815, p. 159.

On sunny slopes.

Snow-covered in the winter.

Found up to 500 m altitude.

Outer district: Here and there from 200 m to 500 m altitude.

Middle district: Ymer Island: a few localities at 300—400 m altitude.

Inner district: Two localities, at 50 m and 300 m.

Further, on the north side of Kempe Fjord east of Cape Beijer (b) and at the current hole in Röhss Fjord, south side (c).

Former investigations:

VAAGE 1932, p. 57.

Localities:

Outer part: 3. Cape Humboldt (V); 17. Antarctic Hbr. (V); 19. Pingel Valley (H & K!).

On Traill Island the species flowered from about June 20th. On Ymer Island it was found to bear mature capsules about August 1st.

This species has not been found north of the area here treated. Although it is thus presumably near its northern limit, in nearly all the localities in which I found it, it was well developed and the culms

of up to 30 m height, and usually abundantly fructifying. — In the interior of the fjords, in particular, it generally occurred in small numbers, and sometimes suffered notably from the drought.

Liliaceae.

Tofieldia coccinea RICHARDS.

J. RICHARDSON, App. FRANKLIN Journey, 1823, p. 736.

In grass and dwarf-shrub vegetations.

Mostly free of snow in the winter.

Found up to 500—600 m altitude. Probably it ascends still higher.

Outer district: Rather common.

Middle district: Ella Island: Cape Oswald, several localities.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 51. — KRUUSE 1905, p. 187. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 54.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 5. S.W. of Robertson Isl. (V); 6. Sanddal (V); 7. Husbugt (V); 8.5 km W. of Husbugt (V); 9.15 km W. of Husbugt (V); 12. Vaganæs (V).

Middle part: 29. Holmsvig (V).

Inner part: 31. Junction Valley (SEIDF.); 36. Mineralbugt (SEIDF.); 37. Dickson Fjord (V); 39. Head of Röhss Fjord (V); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.); 42. Polhem Valley (H & K); 43. Forsblad Fjord (H & K).

The species does not, like *T. palustris*, occur on peaty ground (raw humus) but the two species fairly often occur together. In a vegetative stage it is distinguishable from *T. palustris* in that the leaves are shot with brown and form a broader and more markedly expanded fan.

On Traill Island it was in incipient flowering on June 14th.

Tofieldia palustris HUDS.

HUDSON, Fl. Angl., Ed. 2, 1, 1788, p. 175.

In bogs and damp dwarf-shrub vegetations.

Mostly snow-covered in the winter.

Ascends to about 500 m altitude.

Outer district: Rare; Maanedalen.

Middle district: Very common.

Inner district: Common.

Former investigations:

DUSÉN 1901, p. 51. — KRUUSE 1905, p. 187. — SEIDENFADEN 1930, p. 382. — VAAGE 1932, p. 54.

Localities:

Outer part: 2. Cape Graah (V); 3. Cape Humboldt (V); 6. Sanddal (V); 7. Husbugt (V); 8. 5 km W. of Husbugt (V); 9. 15 km W. of Husbugt (V); 12. Véganæs (V); 17. Antarctic Hbr. (D, V).

Middle part: 24. Blomsterbugt (V); 26. Marie Isl. (V); 28. Cape Elisabeth (V); 29. Holmsvig (V).

Inner part: 31. Junction Valley (SEIDF.); 38. Röhss Fjord, north coast (D); 40. Röhss Fjord, south coast (V); 41. Cape Hedlund (SEIDF.); 43. Forsblad Fjord (H & K!).

A species with a more southern range than *T. coccinea*, and evidently flowering somewhat later than that species. On Ymer Island its capsules were not yet ripe by the middle of August.

Potamogetonaceae.

Potamogeton filiformis PERS.

PERSOON, Syn. pl. s. Enchir. bot., I, 1805, p. 127.

Occurs in shallow-watered lakes. Also in ponds drying up in the summer.

Found up to 200 m altitude.

Outer district: Not observed.

Middle district: Several localities both on Ella Island (Cape Oswald) and Ymer Island.

Inner district: Not observed.

Most of the populations I have seen were fructifying. Specimens collected on August 16th bear mature fruits.

The species always occurred in shallow water, hardly at depths exceeding 30—40 cm, and late in the summer its stems and leaves were often found to lie expanded on the wet mire, the water gradually drying away.

On Ella Island I observed the plant on soil dry as dust and without any snow-covering in the month of February in company with *Ranunculus trichophyllus*. It did not seem to have been damaged by having been subjected to temperatures of up to about 50° C. below zero in a completely desiccated state. At any rate it thrived excellently the succeeding summer in the same locality, which on the melting of the above-lying snow-drifts were transformed into a small shallow-watered tarn.

The species was not formerly known from East Greenland north of the Ammassalik area, and the localities mentioned are on the whole the northernmost known in Greenland.

*Scheuchzeriaceae.**Triglochin palustre* L.

LINNÆUS, Sp. pl., 1753, p. 338.

At shores of lakes and in wet grass vegetations.

Evidently generally snow-covered in the winter, but also met with free of snow.

Not observed above 300 m altitude.

Outer district: Not observed.

Middle district: Several localities both on Ymer Island and Ella Island.

Inner district: One locality at the shore of a lake, at 275 m altitude.

The individuals were generally well developed. The specimens collected at Cape Hedlund on July 11th measured up to 25 cm. As far as can be judged from the scapes from the preceding year with adherent fruit-axes, the fruits ripen excellently. As early as the middle of July big fruits had developed.

This species has not formerly been found in East Greenland north of the Ammagssalik area. It was, however, found still farther north by GELTING in 1931—32.

SOME CONCLUDING REMARKS

As the purpose of this paper has chiefly been to give a report on the floristic results gained during the first year of the expedition, it has been mainly attempted here to give an account of my observations in this respect during my stay in East Greenland. However, in order to connect up these observations, especially regarding the frequency and distribution of the species within the area, in some degree, at any rate, with former investigations, the records of the localities originating from these are enumerated under the individual species. The more theoretic questions, such as the floristic position of the area on the whole and the history of the immigration of the flora considered on the basis of the distribution of the species within as well as outside the area here treated compared with the distribution of the species in climatic and altitudinal zones, will be dealt with in a later paper.

Here, however, a quite summary and schematic survey will be taken of the distribution of the species within the area. As suggested in the Introduction, the distribution of the species, as far as can be judged, has mainly relation to the climatic belts, which are evidently determined by the distance from the outer coast, and to the condition of the soil, in that its content of lime, in particular, seems to play an essential part.

While the altitudinal limits, which, it is true, can claim no great exactness, are immediately accessible through the statements for the individual species, the various facts regarding the zonal distribution of the species and their relation to the soil is not immediately evident from the preceding part, and hence the peculiarities of these species are given here quite schematically.

In Table 1 all the species are enumerated which are more or less universally distributed within the area, even if not all of them are common.

For species that are most frequent in the regions nearest the outer coast and less frequent in the inner fjord regions, or, as regards the very common species, are less dominant here, an O is added (comparatively oceanic species within the area).

Species that are most frequent in the inner fjord regions and less frequent towards the outer coast — for the very common species less dominant — are marked with a C (species relatively continental for the area).

Species which are perceptibly favoured on limy soil with a strong basic reaction have a B added (basophilous species).

Species appreciably disfavoured on limy soil with a strong alkaline reaction are marked with an A (acidophilous or more or less basophobous species).

In cases when the character in question is peculiarly marked, the indicating letter is in heavy type.

(Since a distinctly calcareous substratum only occurs along restricted stretches within the area, the decidedly basophobous species, which are practically absent on calcareous soil, have been included in this list).

In Table 2 all the species are enumerated, which may be frequent locally, but whose distribution within the area is restricted to certain zones or regions.

a. Relatively oceanic species. Species most frequent in the regions near the outer coast, decreasing in frequency towards the interior, and entirely absent in the inner fjord regions.

(b. Continental species. Species which exclusively occur in the inner fjord regions are hardly found. If this group exists at all, examples must be sought in the next group.)

c. Basophilous species. Species whose distribution is practically restricted to regions with a calcareous substratum. (Pronounced calcareous soil was not observed in my outer district).

(d. Basophobous species. As to these species, see the notes to table 1.)

Table 3 comprises rare species, as to which the known localities within the area are so sparse that in the majority of cases they do not afford a basis for a more objective division according to their dependence on the external factors here treated.

Table 1. Universally distributed species (see further the text).

<i>Alopecurus alpinus</i>	<i>Campanula rotundifolia</i> A
<i>Arctagrostis latifolia</i>	<i>Campanula uniflora</i> A
<i>Arctostaphylos alpina</i> C	<i>Cardamine bellidifolia</i> O A
<i>Armeria vulgaris</i>	<i>Carex alpina</i>
<i>Arnica alpina</i> A	<i>Carex atro-fusca</i> B
<i>Betula nana</i> C	<i>Carex capillaris</i>
<i>Braya purpurascens</i> B	<i>Carex incurva</i>
<i>Calamagrostis arundinacea</i> C A	<i>Carex Lachenalii</i>

Carex misandra B
Carex nardina B
Carex parallela
Carex rariflora
Carex rigida A
Carex rupestris
Carex saxatilis B
Carex scirpoidea B
Carex subspathacea
Carex supina A
Carex ursina
Cassiope tetragona
Cerastium alpinum
Chamaenerium latifolium
Cobresia bipartita B
Cystopteris fragilis
Draba cinerea
Draba daurica
Draba fladnizensis-lactea O
Draba nivalis
Dryas octopetala B
Elyna Bellardii
Empetrum nigrum C A
Equisetum arcense A
Equisetum variegatum B
Erigeron Unalaschkensis O
Eriophorum callitrix B
Eriophorum polystachyum
Eriophorum Scheuchzeri
Euphrasia latifolia
Festuca ovina
Festuca rubra
Hierochloe alpina C A
Hippuris vulgaris B
Honckenya peploides
Juncus arcticus B
Juncus biglumis O
Juncus castaneus B
Juncus triglumis B
Koenigia islandica O
Lesquerella arctica C B
Luzula arcuata A

Luzula nivalis
Luzula spicata ?A
Lycopodium Selago O A
Melandryum triflorum
Minuartia biflora O A
Minuartia rubella
Minuartia stricta O
Oxyria digyna A
Papaver radiculatum A
Pedicularis flammea B
Pedicularis hirsuta O
Pedicularis lapponica C
Phippsia algida O A
Poa alpigena
Poa alpina O
Poa arctica A
Poa glauca
Polygonum viviparum
Potentilla emarginata O ?A
Potentilla nivea
Puccinellia angustata
Puccinellia phryganodes
Pyrola rotundifolia C
Ranunculus hyperboreus
Ranunculus pygmaeus O A
Ranunculus trichophyllus
Rhododendron lapponicum C
Rumex acetosella C A
Salix arctica
Salix herbacea A
Saxifraga aizoides B
Saxifraga caespitosa
Saxifraga cernua A
Saxifraga nivalis
Saxifraga oppositifolia
Saxifraga rivularis O A
Sedum roseum O
Silene acaulis
Stellaria humifusa
Stellaria longipes O A
Taraxacum arcticum O A
Taraxacum phymatocarpum

Tofieldia coccinea A
Tofieldia palustris B
Trisetum spicatum A

Vaccinium uliginosum
Woodsia glabella

Table 2. Species only frequent locally or in zones (see further the text).

a. Relatively oceanic species.

Antennaria alpina O
Arabis alpina O
Arenaria ciliata O
Cochlearia officinalis O
Draba alpina O
Draba micropetala-oblongata O
Draba subcapitata O
Erigeron uniflorus O
Melandryum apetalum O
Pleuropogon Sabinei O
Potentilla Crantzii O
Puccinellia Vahliaana O
Ranunculus glacialis O
Ranunculus nivalis O
Ranunculus sulphureus O
Sagina intermedia O

Saxifraga hieraciifolia O
Saxifraga Nathorsti O
Saxifraga stellaris O
Sibbaldia procumbens O
Taraxacum brachyceras O
Thalictrum alpinum O

c. Basophilous species.

Braya glabella B
Braya humilis B
Carex bicolor B
Carex microglochin B
Carex pedata B
Draba Bellii B
Eutrema Edwardsii B
Potamogeton filiformis B
Triglochin palustre B

Table 3. Rare species (see further the text).

Agropyrum violaceum
Arabis arenicola
Botrychium Lunaria
Bryanthus coeruleus
Calamagrostis neglecta
Callitriche verna
Cardamine pratensis
Carex capitata
Carex glareosa
Cassiope hypnoides
Cerastium Regelii
Cerastium trigynum
Draba crassifolia
Draba macrocarpa
Draba rupestris
Epilobium arcticum
Erigeron compositus
Gentiana nivalis

Gentiana serrata
Gentiana tenella
Lycopodium annotinum
Matricaria inodora
Minuartia Rossii
Pinguicula vulgaris
Poa abbreviata
Poa Hartzii
Potentilla pulchella
Potentilla rubricaulis
Primula stricta
Ranunculus affinis
Ranunculus auricomus
Saxifraga flagellaris
Saxifraga Hirculus
Saxifraga tricuspidata
Veronica alpina
Viscaria alpina

According to the delimitation of the species motived above under the individual species, 172 species have been enumerated here. It should, however, be pointed out that the number of good species of vascular plants ascertained with certainty within the area must be fixed at 170, the two *Draba* species, *D. macrocarpa* and *D. rupestris*, being evidently regarded by Mrs. EKMAN as doubtful.

Of these 170 species, 105 are universally distributed throughout the greater part of the area. It will be noted that the outer coast species (O) exceed the inner fjord plants (C) in number, similarly as the basophobic species (A) dominate in number over the basophilous species (B).

As regards the species enumerated in table 2, it is especially remarkable that no species are strictly limited to the inner fjords, while no less than 22 are characteristic of the regions nearer the outer coast. However, most of these are present in the middle part, but are absent from the innermost fjord ramifications.

Nine species seem to be more or less strictly limited to calcareous soil, since they rather frequently occur there, while they are practically absent from other soil. The recording of the presence of such basophilous species is based, in addition to the geological data, upon several pH determinations made on Ella Island. Here, for instance, pH values of c. 8 were found on Eleonore Bay Formation with a marked "lime" vegetation, and on apparently less calcareous soil with a different vegetation pH values about 7 were found. Soil with a really acid reaction was evidently of rare occurrence on Ella Island.

The occurrence of my calciphilous plants can hardly be illustrated by a comparison with the geological maps at disposal, since the distribution of the various kinds of soil may often be rather mosaic-like; thus at Cape Hedlund I observed small areas of calcareous soil in depressions in the gneiss rocks, the flora of which obviously deviated considerably from that usually met with within this district.

The question as to the more fundamental causes of the floristic peculiarity of the calcareous soil will not be dealt with here. It is merely pointed out that the physical character of the soil also differs from that of soil with a different composition, since during the physical disintegration, which here takes place at a fairly rapid rate, an exceedingly fine-grained material is formed, which in the spring is much exposed to the effects of solifluction and in the autumn becomes very compact and nearly stone-hard on account of the intense desiccation. In contrast to this, the gneiss weathers but slowly, and the basalt and the Devonian rocks usually form far more coarse-grained weathering products.

In table 3, 36 "rare" species are enumerated, judging by the few finds available. Even if it might be tempting to make a division of these

similar to that undertaken above for the commoner species, I shall refrain from this, as it will lack a really objective basis.

A few species, however, deserve a closer mention. *Cerastium Regelii*, *Saxifraga flagellaris*, and *Saxifraga Hirculus* in reality form a separate group, since the distribution and common occurrence of these species in the coastal regions north of my area characterise them as true arctic-oceanic species, strictly limited to the outer coast zone. However, a closer investigation of the outer regions within the area here treated has never been made, and it is very probable that here, as in the more northerly regions, this arctic-oceanic flora element in a narrower sense will further be represented by species such as *Dupontia Fisheri*, *Deschampsia arctica*, and *Deschampsia pumila*.

Another group within the rare species is formed by three other species, viz. *Minuartia Rossii*, *Poa abbreviata*, and *Ranunculus affinis*. These are northern species, which are here near their southern limit, and having this feature in common within the area that they are almost exclusively restricted to great altitudes, but are absent in the more low-lying tracts. Possibly these species are commoner than previously assumed, since they easily escape attention at the inaccessible altitudes.

Altogether it will be noticed that the number of species decreases from the outer coast towards the edge of the inland ice. Of probable causes of this distribution only two will be mentioned here. First the aridity of the air as well as of the soil, which increases from the outer coast towards the inland ice. Even though the whole area must be said to have a continental climate, the outer coast does not to the same extent as the inner fjords suffer from the pronounced desert climate of the summer. When I have designated the outer coast plants as oceanic, this should only be considered an expression of the contrasts that make themselves felt in climate and vegetation within the area. In reality nearly all the species of the area should possibly be regarded as more or less continental, even if not all of them are equally resistant to intense desiccation, i.e. they are not all of them able to make their way into the most markedly continental parts of the inner fjords.

Another essential cause of the said distribution of the species, and in particular the cause of the peculiar fact that the "inner fjord species" may always, though in a relatively small number of individuals, occasionally be met with nearer the outer coast also, is presumably to be sought in the almost constant direction of the winds, i.e. from the inland ice towards the outer coast. Even if easterly winds may now and then occur, chiefly in the spring, these are never of such a violent character as the westerly foehn winds, which no doubt every year sweep large masses of seeds and vegetative propagative organs from the inner fjords

towards the outer coasts. A corresponding sowing of the outer coast species in the inner fjords does not take place at all.

The fact that the inner fjord species are thus constantly carried towards the outer coast, while the species of the outer coast are impeded in their advance towards the interior, does not, of course, account for the distribution of the species within the area, but it seems to me to give a probable explanation of the conspicuous decline of the flora from the outer coast towards the inland ice.

The peculiarities in the distribution of the floral elements mentioned here will doubtless, if investigations are continued, prove in need of correction on various points, and the remarks concerning the dependence of this distribution on external factors should likewise be regarded as merely provisional and insufficient.

Thorough climatological investigations would be of great value for a final judgment of the plantgeographical position of the area, and a physico-chemical investigation of the various kinds of soil in arctic regions would likewise be highly desirable.

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PLATES

Plate I.

Melandryum triflorum (R. BR.) J. VAHL emend. REGEL & TILING. $\frac{1}{2}$.

Figs. 1—2: leg. TH. S., Cape Hedlund, near sea-level, 10.VII.1932. Seeds tuberculate, margins not winged.

Fig. 3: leg. TH. S., Ymer Island west of Carl Jacobsen Bay, c. 800 m above sea-level, 12.VIII.1932. Seeds with narrowly winged margins.

- 4: leg. TH. S., Ymer Island, Botanikerbugt, among dunes c. 50 m above sea-level, 2.VIII.1932. Seeds with broad-winged margins.

- 5: leg. TH. S., Traill Island, Basalt Plateau, near Scott Keltie Islands, c. 450 m above sea-level, 14.VI.1932. Seeds unknown.



Plate II.

Ranunculus auricomus L. var. *glabrata* LYNGE. $\frac{1}{2}$.

Leg. TH. S., Ymer Island, Botanikerbugt, c. 250 m above sea-level, 31.VII.1932.



Plate III.

Ranunculus affinis R. BR. subsp. *Wilanderi* NATH. and *Ranunculus auricomus* L. $\frac{1}{2}$.
Figs. 1—3: *Ranunculus affinis* R. BR. subsp. *Wilanderi* NATH., leg. E. JØRGENSEN,
Spitsbergen, Cape Thordsen, 9.VIII.1896.
— 4—7: *Ranunculus auricomus* L., leg. N. HARTZ, Gaaseland, Scoresby Sound,
7.VII.1892.

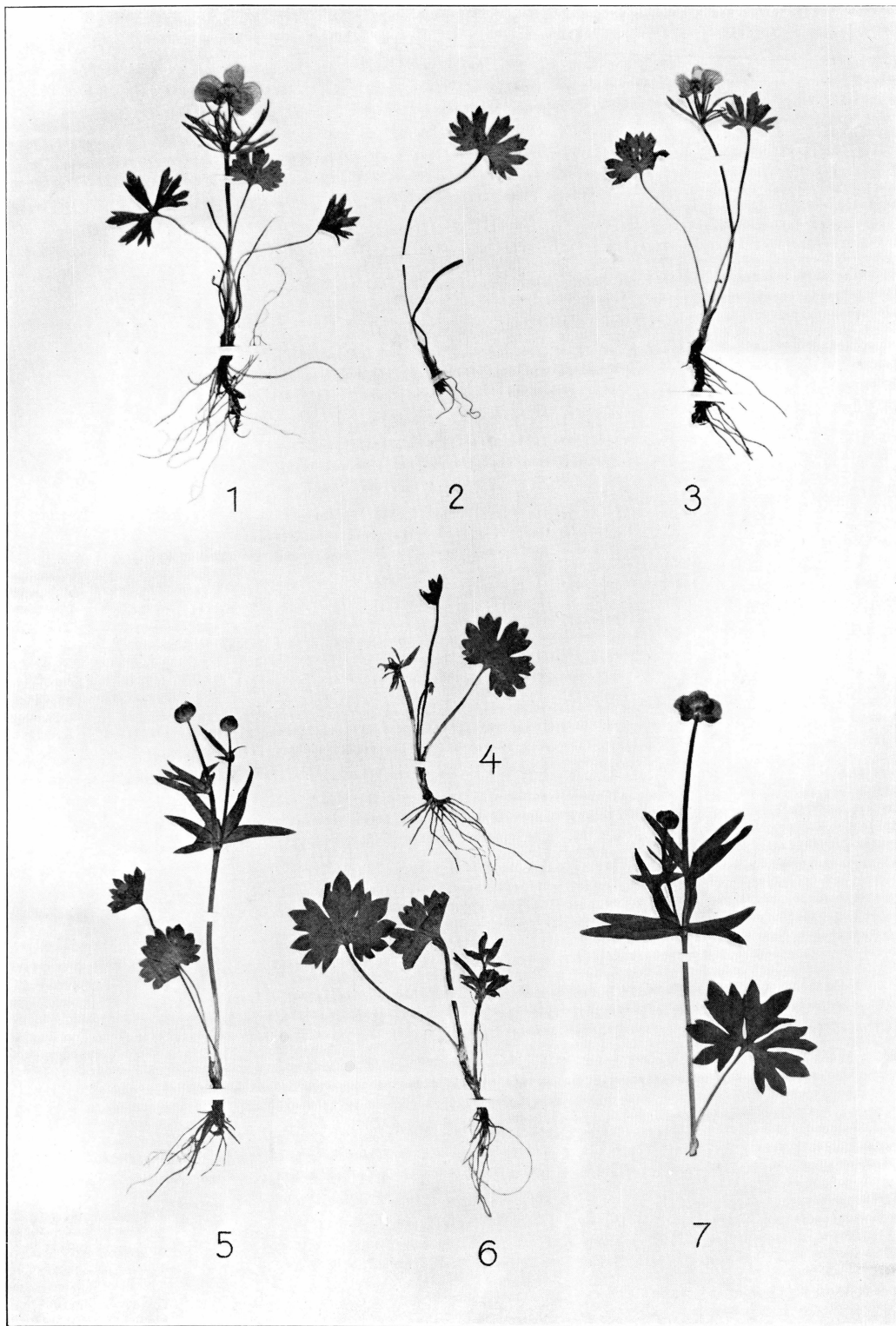


Plate IV.

Ranunculus affinis R. BR. $\frac{1}{2}$.

Figs. 1—3: leg. TH. S., Traill Island, Basalt Plateau, near Scott Keltie Islands,
c. 700 m above sea-level, 8.VI.1932.

4—7: leg. P. GELTING, Clavering Island, Eskimonæs, 21.VIII. 1932.



Plate V.

Potentilla nivea L. Type 1 (see the text). $\frac{1}{2}$.

- Fig. 1: leg. TH. S., Röhss Fjord, at the current hole, south side, 29.VII.1932.
- 2: leg. G. SEIDENFADEN, Strindberg Peninsula, Geologfjord, 18.VIII.1929.
 - 3: leg. TH. S., Strindberg Peninsula, east of Mt. Gunver, 13.VIII.1931.
 - 4: leg. TH. S., Ella Island, east side, 26.VII.1932.



Plate VI.

Potentilla nivea L. Type 2 (see the text). $\frac{1}{2}$.

Fig. 1: leg. TH. S., Ymer Island, west of Carl Jacobsen Bay, c. 700 m above sea-level, 11.VIII.1932.

- 2: leg. TH. S., Cape Hedlund, c. 50 m above sea-level, 15.VII.1932.
- 3: leg. TH. S., Cape Hedlund, c. 300 m above sea-level, 15.VII.1932.



Plate VII.

Potentilla nivea L. Type 3 (see the text).^{1/2}.

Fig. 1: leg. Th. S., Ymer Island, Botanikerbugt, c. 40 m above sea-level, 7.VIII. 1932.

- 2: leg. Th. S., Cape Hedlund, c. 50 m above sea-level, 18.VII.1932.

- 3: leg. G. SEIDENFADEN, Jordanhill, south coast, 27.VII.1930.

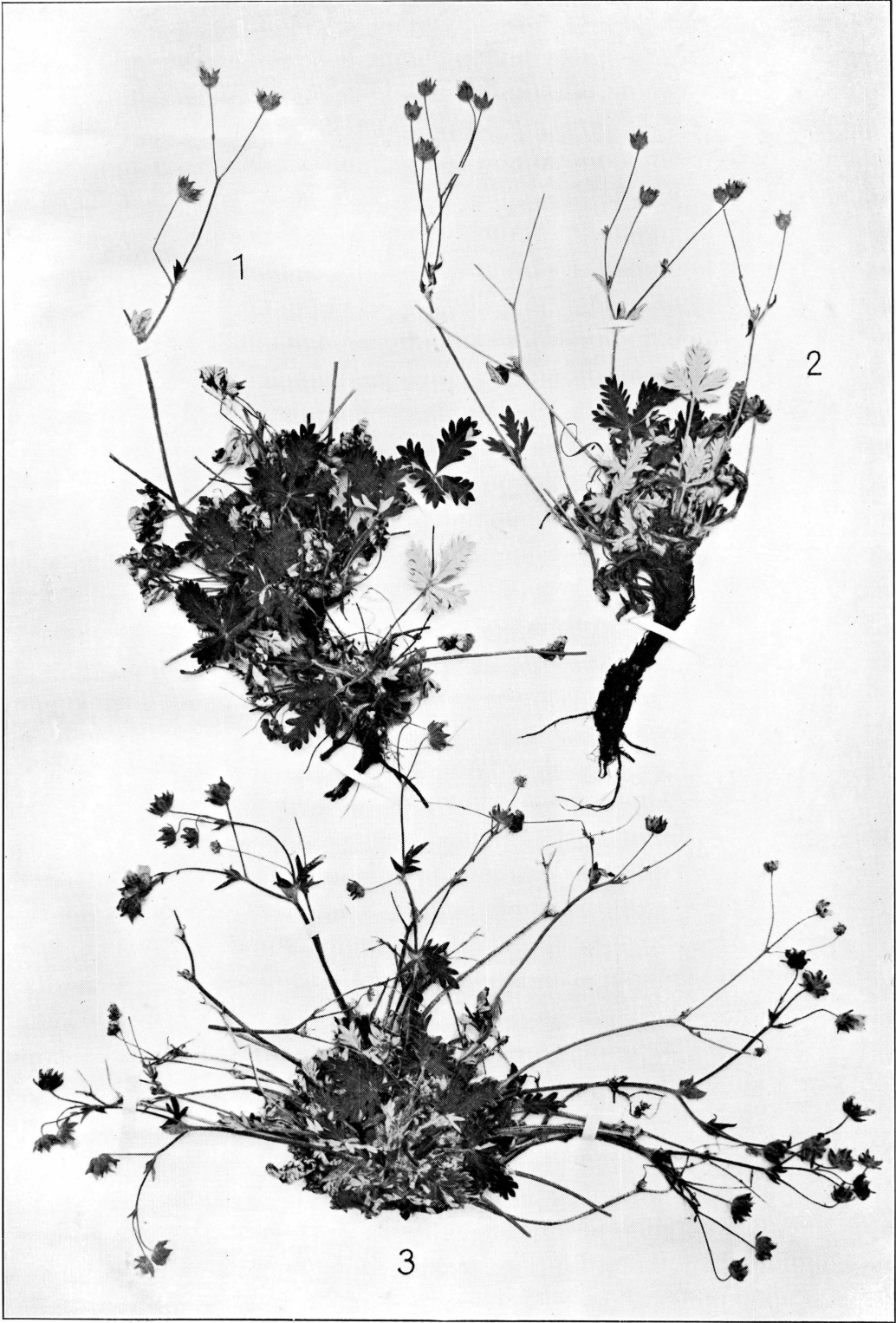


Plate VIII.

Potentilla nivea L. Type 4 (see the text). $\frac{1}{2}$.

Fig. 1: leg. TH. S., Traill Island, Basalt cliff near Scott Keltie Islands, c. 50 m above sea-level, 30.VI.1932.

- 2: leg. TH. S., Traill Island, Basalt cliff near Scott Keltie Islands, c. 100 m above sea-level, 27.VI.1932.
- 3: leg. TH. S., Traill Island, Basalt Plateau near Scott Keltie Islands, c. 450 m above sea-level, 8.VI.1932.
- 4: leg. P. GELTING, Clavering Island, Eskimonaes, 19.VI.1932.



Plate IX.

Potentilla nivea L. Type 5 (see the text). $\frac{1}{2}$.

- Fig. 1: leg. ALWIN PEDERSEN, Liverpool Land, 70°30' N. lat., c. 8 km from the coast, 30.VI.1928. (*P. nivea*, det. OSTENFELD).
- 2: leg. G. SEIDENFADEN, mouth of Moskusoksefjord, south side, 17.VIII.1929. (*P. nivea*, det. OSTENFELD).
 - 3: leg. G. SEIDENFADEN, Clavering Island, Elvsborg, 22.VII.1929. (*P. nivea*, det. OSTENFELD).
 - 4: leg. G. SEIDENFADEN, Clavering Island, HIRD's Fox-Farm south of Cape Mary, c. 300 m above sea-level, 2.VII.1929. (*P. nivea*, det. OSTENFELD).
 - 5: leg. P. GELTING, Clavering Island, Eskimonæs, 6.VII.1932.



Plate X.

Potentilla nivea L. Type 5 (see the text). $\frac{1}{2}$.

- Fig. 1: leg. A. LUNDAGER, Vester Elv, Danmarkshavn, c. 76°45' N. lat. 17.VII. 1907. (*P. Pedersenii*, det. OSTENFELD).
- 2: leg. A. LUNDAGER, Danmarkshavn, 76°46' N. lat., July 1907. (*P. Pedersenii*, det. OSTENFELD).
 - 3: leg. A. LUNDAGER, Lille Snenæs, Danmarkshavn, c. 76°45' N. lat., 11.VII. 1908. (*P. Pedersenii*, det. OSTENFELD).
 - 4: leg. G. SEIDENFADEN, Clavering Island, Grønnedal, 20.VII.1930. (*P. Pedersenii*, det. OSTENFELD).



Plate XI.

Potentilla rubricaulis LEHM.

Fig. 1: leg. TH. S., Ymer Island, Botanikerbugt, 7.VIII.1932.

- 2: leg. G. SEIDENFADEN, Ella Island, Cape Elisabeth, 17.VIII.1930.
- 3: leg. M. KØIE, Cape Stosch, 8.VIII.1932.
- 4: leg. J. VAAGE, Wollaston Foreland, Cape Herschel, 18.VII.1930.
- 5: leg. KNUD BALLE, Wolstenholme Sound (West Greenland), c. 76°30' N. lat.,
5—8.VIII.1905.
- 6: leg. E. LANGBERG and KNUD RASMUSSEN, Parker Snow Bay (West Greenland) c. 76°05' N. lat., 3.VIII.1927.



Plate XII.

Saxifraga oppositifolia L. and *Saxifraga Nathorsti* (DUSÉN) HAYEK. $\frac{1}{2}$.

Figs. 1—3: *Saxifraga oppositifolia* L.

Fig. 1: leg. J. VAAGE, Cape Stosch, 24.VII.1930.

- 2: leg. TH. M. FRIES, Svalbard, Beeren Island, July 1868.

- 3: leg. N. HARTZ, Scoresby Sound, Danmark Island, August 1891.

Figs. 4—9: *Saxifraga Nathorsti* (DUSÉN) HAYEK.

Fig. 4: leg. G. SEIDENFADEN, Mt. Sederholm, Muskusoksefjord, 9.VIII.1930.

- 5—6: leg. TH. S., Strindberg Peninsula, East of Mt. Gunver, 12.VIII.1931.

- 7: leg. A. G. NATHORST, Geographical Society Island, Sophia Sound, near the western mouth, 17.VIII.1899.

- 8: leg. N. HARTZ, Scoresby Land, Cape Seaforth, 10.VIII.1900.

- 9: leg. TH. S., Ymer Island, Carl Jacobsen Bay, 15.VIII.1932.

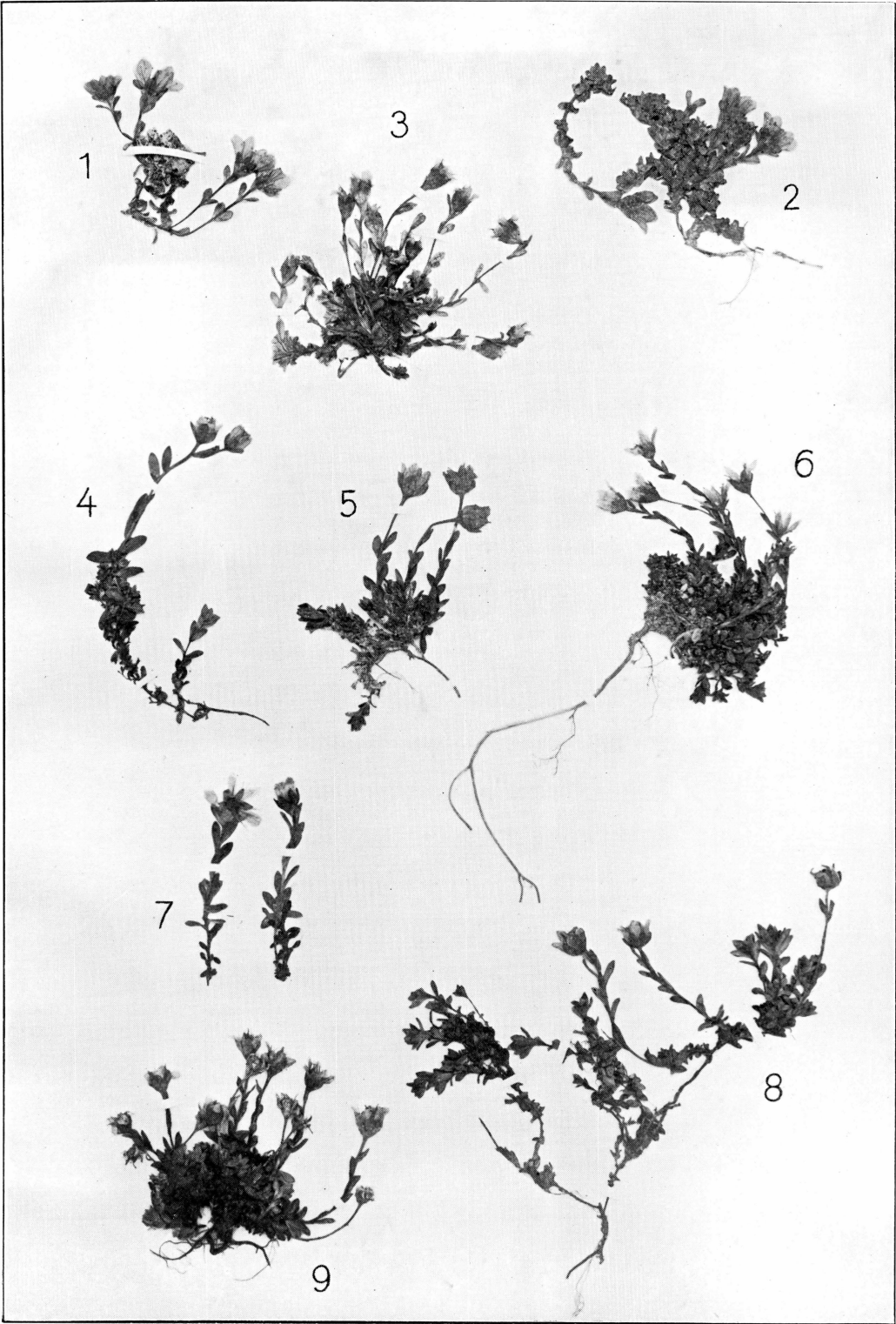


Plate XIII.

Carex incurva LIGHTF, subsp. *arctica* (DEINB.) HARTM. $\frac{1}{2}$.

Figs. 1—6: leg. TH. S., Ella Island, Cape Oswald, 22.VII.1932.

- 7—8: leg. TH. S., Ella Island, Cape Oswald, 22.VIII.1932.

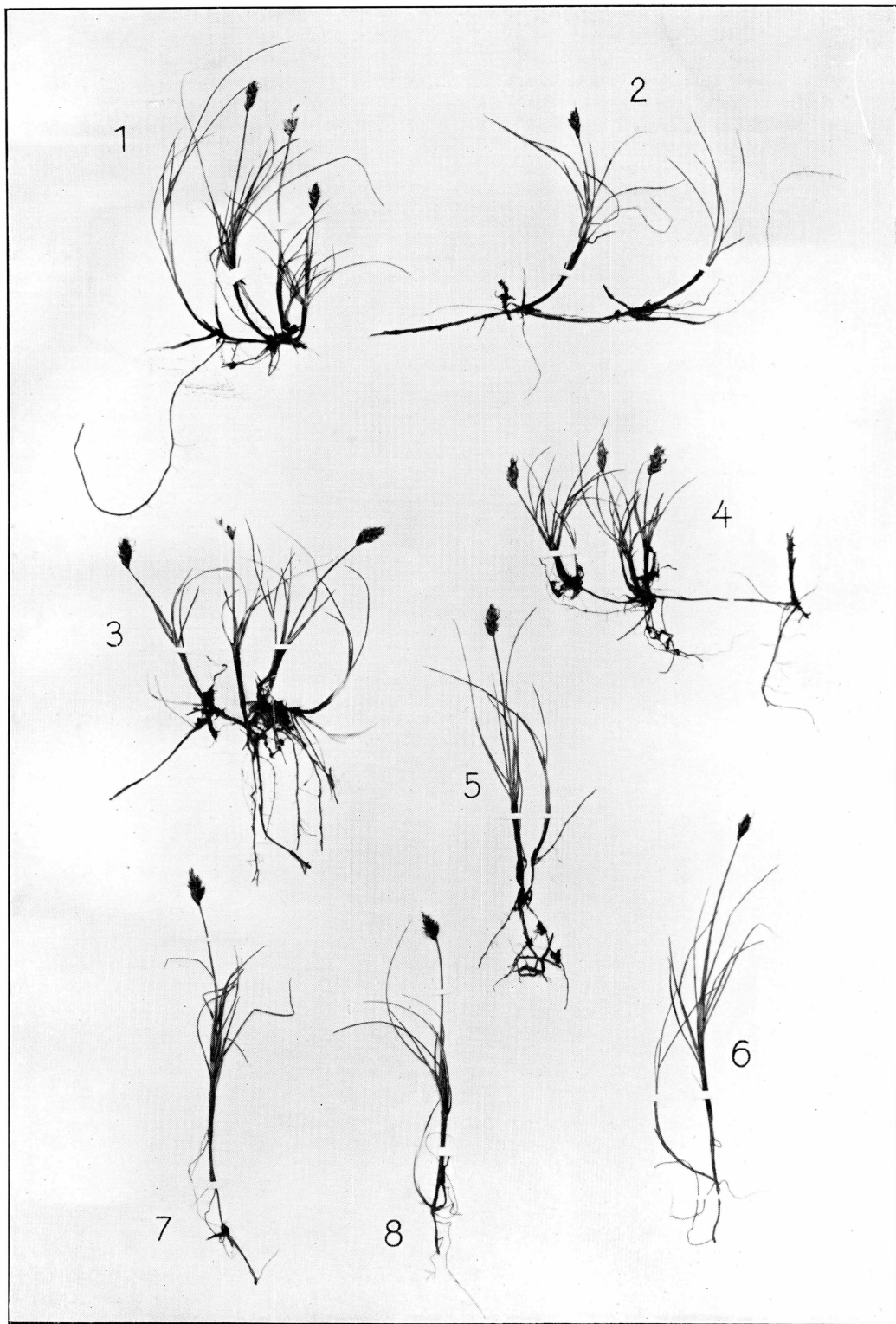


Plate XIV.

Carex rariflora (WAHLENB.) SM. $\times$ *subspathacea* WORMSKJ. $\frac{1}{2}$.
Leg. TH. S., Ymer Island, Botanikerbugt, 5.VIII.1932.

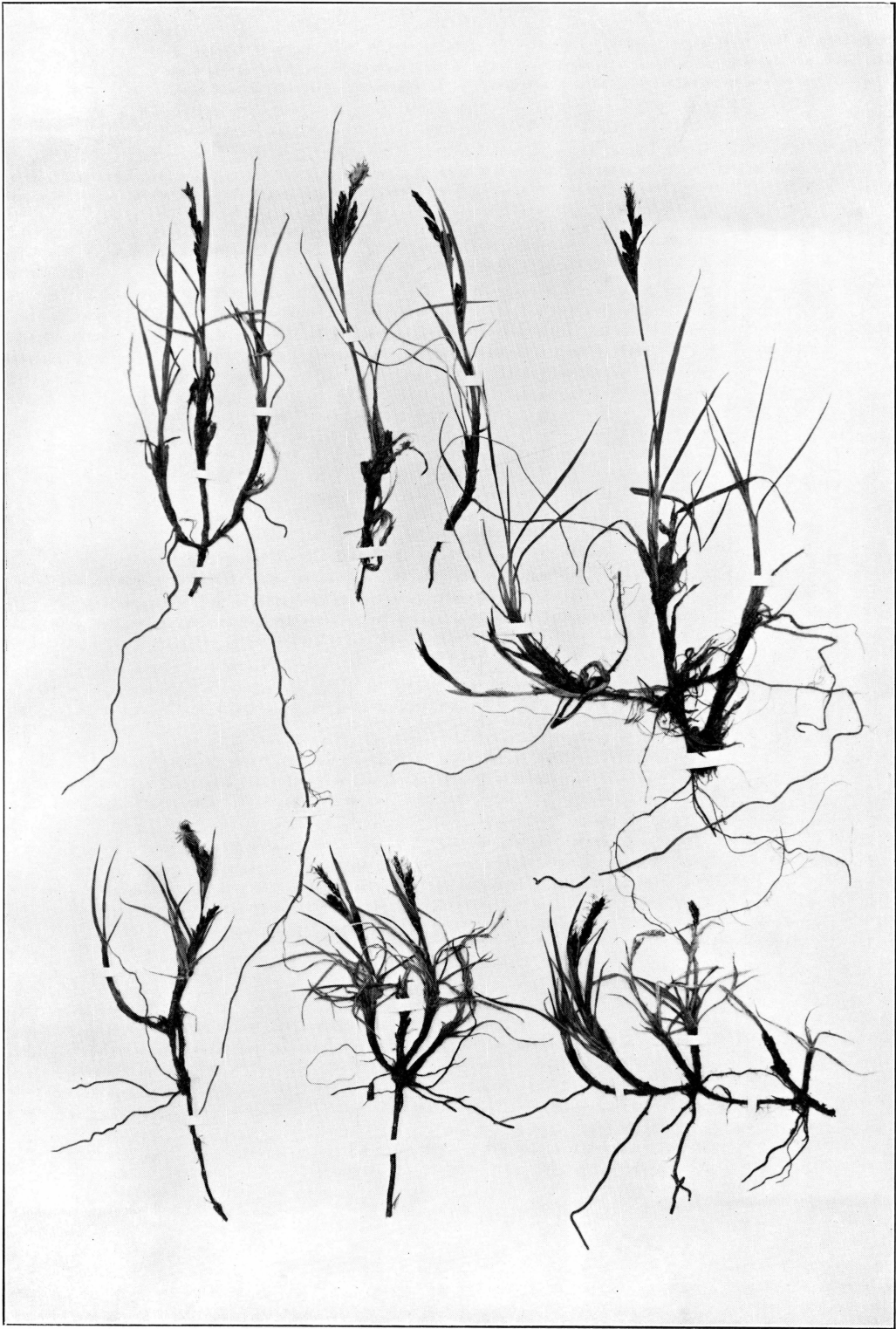


Plate XV.

Carex rariflora (WAHLENB.) SM. and *Carex subspathacea* WORMSKJ. $\frac{1}{2}$.

Figs. 1—3: *Carex rariflora*, leg. TH. S., Ymer Island, Botanikerbugt, 5.VIII.1932.

- 4—6: *Carex subspathacea*, leg. TH. S., Ymer Island, Botanikerbugt, 5.VIII.
1932.



Plate XVI.

Eriophorum polystachyum L. var. *tristis* TH. M. FRIES $\times$ *Scheuchzeri* HOPPE (?). $1/2$.
Leg. TH. S., Traill Island, Maanedalen, 24.VI.1932.



Plate XVII.

Eriophorum polystachyum L. var. *tristis* TH. M. FRIES and *Eriophorum Scheuchzeri*
HOPPE. $\frac{1}{2}$.

Figs. 1—4: *Eriophorum polystachyum* var. *tristis*.

- 1—3: leg. A. LUNDAGER, Danmarkshavn, 76°46' N. lat., 14.VII.1908.

Fig. 4: leg. A. LUNDAGER, Rypefjæld, Danmarkshavn, c. 76°45' N. lat., July
1908.

Figs. 5—6: *Eriophorum Scheuchzeri*.

Fig. 5: leg. C. KRUUSE, Ikerasausak (East Greenland), c. 65°56' N. lat., 1899.

- 6: leg. RYDER's Expedition, Umanak timilia (West Greenland), c. 74°05'
N. lat., 17.VII.1889.

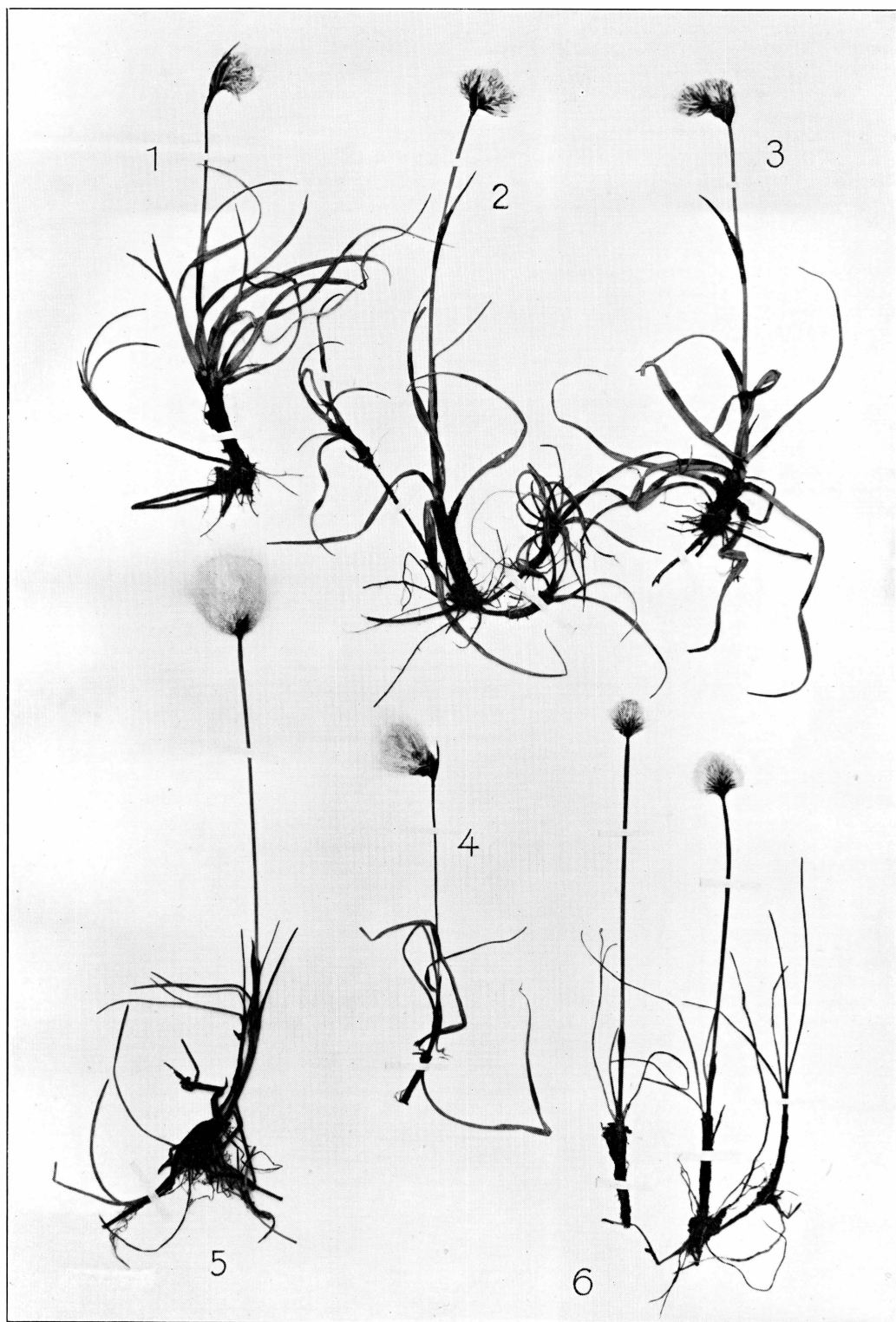


Plate XVIII.

Festuca ovina L. var. *brevifolia* (R. Br.) Hart. $\frac{1}{2}$.

Figs. 1—3: leg. Th. S., Ymer Island, west of Carl Jacobsen Bay, c. 1000 m above sea-level, 12.VIII.1932.

- 4: leg. Th. S., Ymer Island, Botanikerbugt, among dunes, c. 30 m above sea-level, 31.VII.1932.

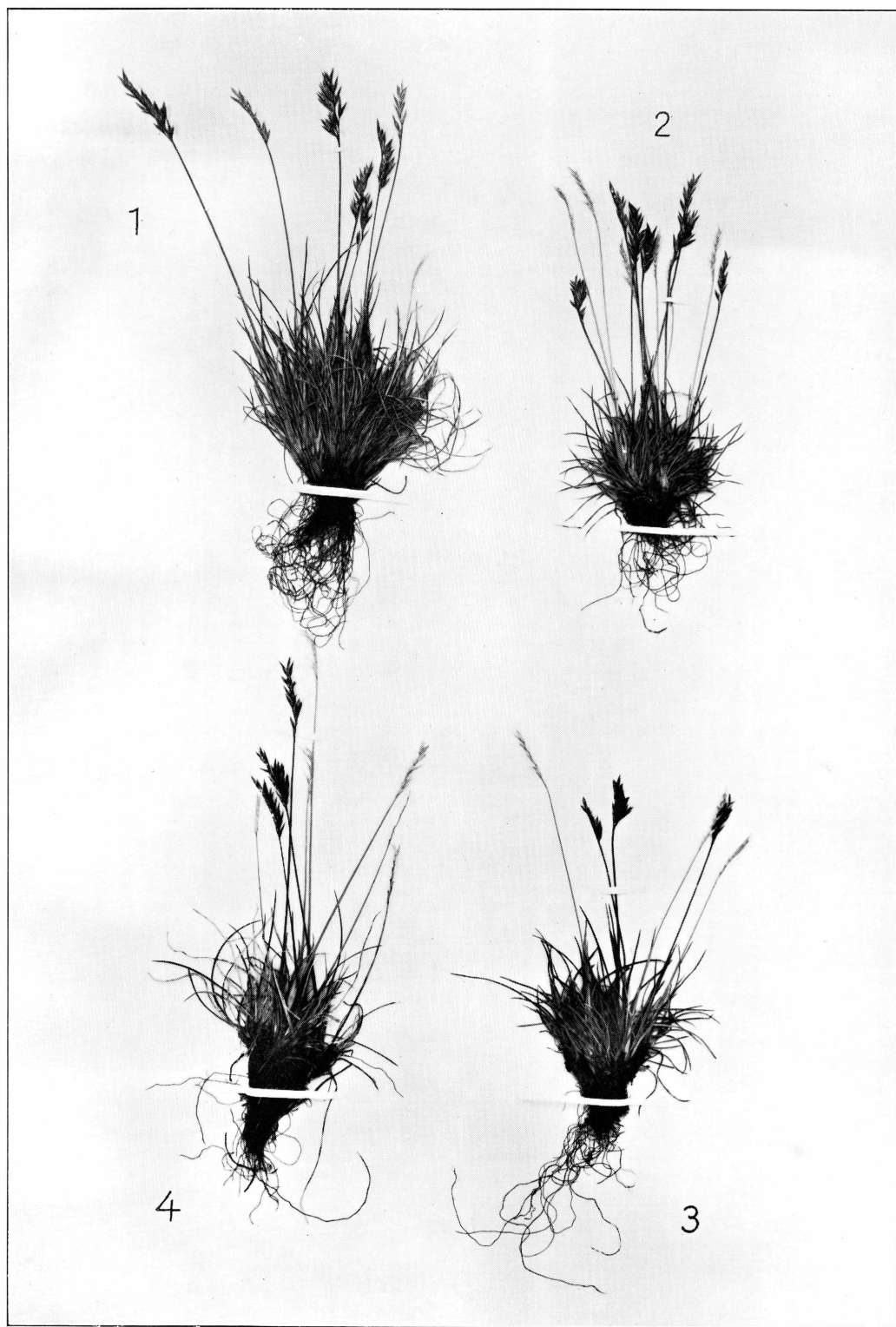


Plate XIX.

Festuca ovina L. var. *supina* (SCHUR) HACKEL. $\frac{1}{2}$.

Leg. TH. S., Ymer Island, west of Carl Jacobsen Bay, c. 1000 m above sea-level,
12.VIII.1932.

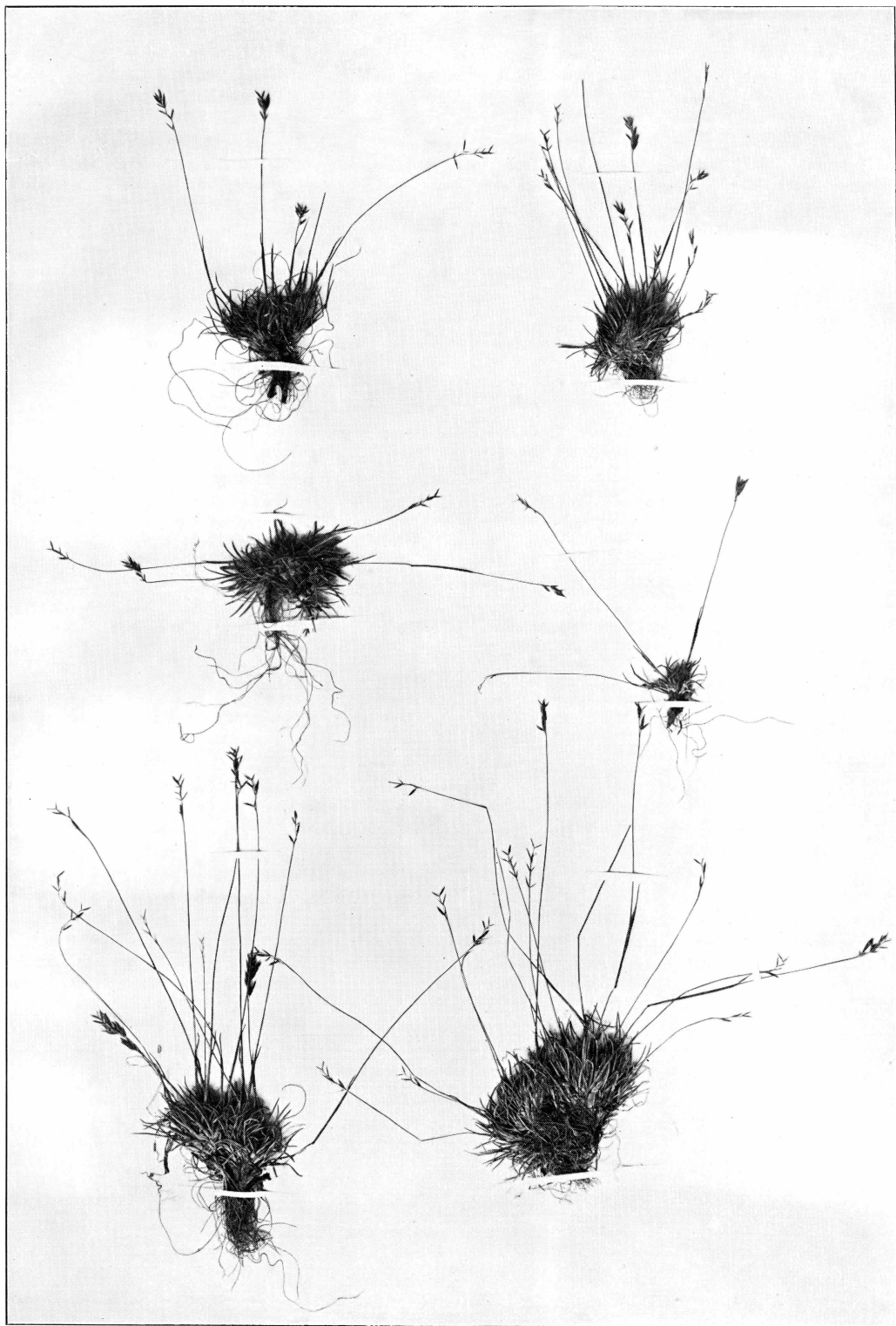


Plate XX.

Poa Hartzii GDGR. $\frac{1}{2}$.

- Fig. 1: leg. TH. M. FRIES, Disco Island, Igdlutsiak (West Greenland), 10.VII.1871.
- 2: leg. A. LUNDAGER, Danmarkshavn, July 1908.
- 3: leg. TH. S., Ymer Island, Botanikerbugt, c. 100 m above sea-level, 8.VIII.1932.
- 4: leg. P. GELTING, Clavering Island, Eskimonæs, 18.VIII.1932.

