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DANSK PEARYLAND EKSPEDITION 1947-50

LEADER: EIGIL KNUTH

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THE VASCULAR PLANTS OF PEARY LAND,  
NORTH GREENLAND

A LIST OF THE SPECIES FOUND  
BETWEEN VICTORIA FJORD AND DANMARK FJORD

BY

KJELD HOLMEN

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WITH 42 FIGURES IN THE TEXT

KØBENHAVN

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BIANCO LUNOS BOGTRYKKERI A/S

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## CONTENTS

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	Page
Introduction .....	5
Natural conditions .....	8
List of localities .....	15
List of species .....	39
Conclusions .....	137
Literature .....	146

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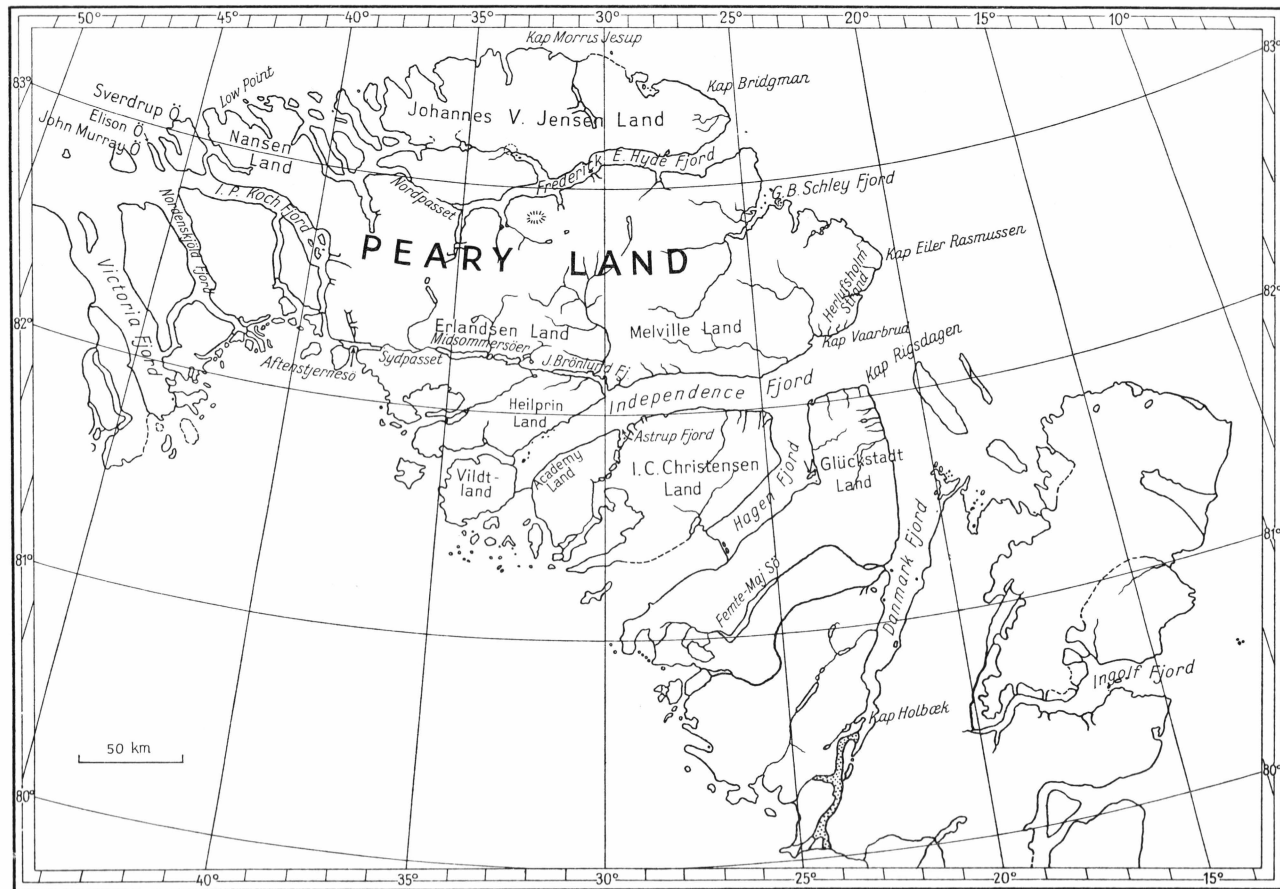


Fig. 1. Map of Peary Land.

## INTRODUCTION

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OSTENFELD (1926) divides Greenland into 14 botanical districts and includes the northernmost part in district "VIII (North)", a district comprising the area from Humboldt Bræen in the west to Nordost-rundingen in the east. The present work, which deals with the vascular flora in the eastern half of this area, especially Peary Land, appears as one of the various results gained by the expedition so successfully carried out under the leadership of EIGIL KNUTH, the "Dansk Pearyland Expedition 1947—50". The present treatise, however, comprises not only the botanical results from the said expedition, but also the, indeed not very large, collections gathered by earlier expeditions visiting this area.

Investigations of this northernmost country in the world do not date far back in time. Up to 1882, when members of the "Lady Franklin Bay Expedition" paid a casual visit, this area was altogether unknown to civilization, and, being rather inaccessible, it has had few visits since then. JOHNSEN (1953), in vol. 128, no. 6 pp 7—8 of "Meddelelser om Grønland", gives an account of all expeditions to Peary Land. Besides these only two more expeditions have visited the area treated in this work, both of them paying but a fleeting visit to the south-eastern part, i. e. the "Alabama Expedition" 1911 (cf. MIKKELSEN, 1922) and "Dansk Nordøst-Grønlands Expedition" 1938—39 (cf. KNUTH, 1942). From these two expeditions there is no botanical material. Nor did Peary from his repeated visits to the area bring home any botanical material.

Expeditions that have brought home botanical material, are, in chronological order:

"The Lady Franklin Bay Expedition" 1881—1884. Four specimens of flowering plants were collected on Lockwood Ø, by LOCKWOOD, during a sledge-journey to this island in 1882 (cf. GREELY, 1886). See further in the list of localities, loc. 1.

"The Danmark Expedition" 1906—08. AMDRUP (1913). Nine species of flowering plants were collected, together with some mosses, in Frederick

E. Hyde Fjord, by I. P. KOCH, during a sledge-journey in May 1907. Published in OSTENFELD & LUNDAGER (1910) a. o. Material in the Copenhagen Herbarium.

“The First Thule Expedition” 1912. RASMUSSEN (1915). A fine collection of flowering plants and a few mosses were collected by P. FREUCHEN in various places, in Peary Land as well as in the area at Danmark Fjord. The botanical results were published by OSTENFELD (1915), and give the first real information on the flora of the area. Material in the Copenhagen Herbarium.

“The Second Thule Expedition” 1916—18. RASMUSSEN (1927). On this expedition Peary Land was visited for the first time by a botanist, THORILD WULFF, who gathered a large collection of plants in the NW part of Peary Land during a long and troublesome sledge-journey in 1917. THORILD WULFF never returned from this sledge-journey; shortly before the return of the expedition he died from exhaustion while carrying out his scientific work. All his valuable collections, however, were brought home safely, and the results were published by OSTENFELD (1923b) and several others (Medd. om Grønland, vol. 64). All material in the Copenhagen Herbarium.

“The Danish Bicentary Jubilee Expedition North of Greenland” 1920—23. KOCH (1926). During this expedition Peary Land was visited in the spring of 1921. Only one plant was found, *Saxifraga oppositifolia*, from Kap Morris Jesup. Specimen in the Copenhagen Herbarium.

The “Dansk Pearyland Expedition 1947—50” was the next expedition to visit the country. A short account of this expedition was already given by WINTHER (1950), FRISTRUP (1949), and KNUTH (1950). The botanical work on the expedition was entrusted to the present author, who spent 4 summers and 1 winter in Peary Land, carrying out field work. The three periods spent here were: July 30, 1947—Aug. 15, 1947, July 30, 1948—Aug. 11, 1949, and July 28, 1950—Aug. 12, 1950. In addition to comprehensive investigations in the area around Jørgen Brønlund Fjord, many parts of the country were visited on sledge-journeys during the winter and spring. On these journeys large quantities of mosses, besides vascular plants in wintering condition, were collected. My own journeys were to Herlufsholm Strand, to the northern and southern coasts of Independence Fjord, and to the area around lake Midsommersø. From other parts of the country, where I did not have the opportunity of making collections, I was greatly helped by my comrades on the expedition, who brought me samples, often very fine specimens, of plants from their journeys. In this connection I wish to express my profound gratitude for their helpfulness. Very large and valuable collections were made, especially by B. FRISTRUP, P. JOHNSEN, E. KNUTH, and J. TROELSEN.

The present paper also includes a few later collections, made at the weather station "Nord", and some from Kap Holbæk in Danmark Fjord. These were gathered by E. KNUTH, in 1952, 1954, and 1955, and by M. WESTERGAARD, in 1953, both of whom I thank most cordially for entrusting me with these collections.

My heart-felt thanks also to Professor KNUD JESSEN, Ph. D., and to O. HAGERUP, Ph. D., for kind permission to utilise the valuable artic herbarium of the Botanical Museum of the University of Copenhagen during preparation of the material. And my cordial thanks to the Carlsberg Foundation for financial support during the work. I am especially indebted, too, to K. JAKOBSEN, M. Sc., and to Professor TH. SØRENSEN, Ph. D., for valuable discussions and advice.

Translated by M. SKINNER.

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## NATURAL CONDITIONS

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A detailed account of the geological conditions in Peary Land cannot be given here, as, so far, no exhaustive survey of the geology of the area exists. Various sections, however, have been treated by TROELSEN (1949 and 1952). Of conditions believed to influence vegetation, the most important are briefly pointed out in the following:

Nowhere in Peary Land is the bed-rock seen on the surface, being represented only by scattered, erratic blocks. Thus Peary Land is built up entirely from sedimentary rock, in certain areas frequently intersected by eruptives, especially by basalts. The latter, however, are nowhere so huge as to be of importance for the formation of soil, this owing not least to the fact that, compared to the sedimentary rocks, they decompose only to a slight degree. The southern part of the area consists almost exclusively of undisturbed layers of sandstone, limestone, dolomites, and slate from early paleozoic time. The landscape here consists of broad plateaus, as a rule reaching 800—1000 m above sea-level, and intersected criss-cross by wide valleys. In the northern part of the area, specially characterized by being folded, there are also layers of somewhat later paleozoic age. On the east coast of Peary Land, finally, mesozoic deposits have been found.

Best part of Peary Land plainly bears the stamp of having been glaciated in earlier times. Only a few minor sections of the area are still covered with an ice-cap. As pointed out by FRISTRUP (1949) this latter is, however, rapidly receding. To-day the snow-line is at a height of about 1100 m (FRISTRUP, 1949), the greater part of the Peary Land mountains, however, do not reach this height.

As early as 1921 LAUGE KOCH pointed out the fact that the eastern part of Peary Land, Herlufsholm Strand, is plainly separated from the rest of the country by a wide belt of moraines, reaching from Kap København and north to G. B. Schley Fjord, and indicating the easternmost boundary of the earlier ice-covering. The presence of these moraines,

however, does not rule out the possibility of a simultaneous local glaciation of Herlufsholm Strand (see TROELSEN, 1952). The supposition set forth by GELTING (1934) that during the last major glaciation of Greenland an ice-free area of low-lying land had been in existence here, serving as a refuge for plants, cannot, of course, be entirely repudiated. But it may not, indeed, be considered very probable, especially considering the fact that the greater part of the said area is a gigantic plain, rising to-day only about 25 m above sea-level, it was possibly sea-covered during the glacial period.

In most parts of the country there is plain evidence that a considerable elevation has taken place; thus we find, in many places, terraces of elevated sea-bottom, reaching a considerable height (see TROELSEN, 1952), and, at Jørgen Brønlund Fjord, forming an especially wide belt along the coasts, consisting mostly of clay and gravel.

Actually in this area soil of any considerable extent is only found where there is an elevated sea-bottom. There are, however, less extensive parts of different origin, formed mostly by deposits from rivers and from rather large-sized snow-drifts, and by drift-sand in dunes. This soil is chiefly mineral, the accumulation of organic material being very slight. The small annual amount of material produced by the plants, is for the greater part carried away by the melting snow in spring, or by the wind. Certain small areas in Peary Land, however, form an exception. They are the places where we find Cassiope-heaths. Here a more or less substantial accumulation of humus is constantly taking place. This is not so much owing to the Cassiope itself as to the very thick carpets of mosses that always go with it. In a few places, too, where *Vaccinium* is found, a fairly considerable layer of humus has developed. Then again, the occurrence of Cassiope- and *Vaccinium*-heaths is conditional on special climatic circumstances in the places in question.

In most places in Peary Land the soil is calcareous, with pH-values between 6 and 8. Soil actually acid is not found, not even in places where peat is forming, as here the humus is strongly mixed with mineral soil. Formation of salt-crusts on the surface is, like in other very continental regions, a frequent phenomenon also in Peary Land, but does not seem to be influencing the vegetation very much.

*Solifluction phenomena* do not seem to play any great part, owing no doubt to the very limited precipitation. Where solifluction glaciers do appear, the movement in them is extremely slow. In places with heavy winter-snow covering, the surface is often knolly, rarely divided into polygons. We must, however, point out that on the Blomsterstranden along Independence Fjord we find in several places stone polygons metres wide. These latter, of course, are very old, as now-a-days solifluctions seem to have ceased entirely.

Table 1.

Month	Temperature mean in C°			Temperature mean max.			Temperature mean minim.			Precipitation in mm.			Relative humidity %		
	1948	1949	1950	1948	1949	1950	1948	1949	1950	1948	1949	1950	1948	1949	1950
May...	..	-8.6	-6.9	..	-6.4	-3.7	..	-11.3	-9.9	..	0.2	0.2	..	78	54
June ..	..	2.5	2.7	..	5.2	4.7	..	0.4	0.1	..	6.8	4.4	..	76	70
July...	..	6.0	6.4	..	9.0	8.8	..	3.7	4.0	..	2.3	6.7	..	61	69
Aug. ..	3.7	3.7	..	6.0	5.9	..	1.6	1.0	..	12.0	+	..	73	66	..
Sept. ..	-5.1	-5.7	..	-2.3	-3.6	..	-7.6	-7.4	..	27.8	0.1	..	74	..	..

Table 2.

		1948	1949	1950
Days without negative temperatures	{ before July 1.....	..	9	16
	{ after July 1.....	(47)	50	> 44
Days with both positive and negative temperatures	{ before July 1.....	..	25	30
	{ after July 1.....	22	17	..
Days without positive temperatures	{ before July 1.....	..	147	132
	{ after July 1.....	114	117	..

During the entire course of the expedition weather conditions were registered by observations every 3 hours. The results of these observations are rendered in extenso by FRISTRUP (1952). On the basis of this colossal material of figures we have in tables 1 and 2 given the conditions considered most important for the vegetation. The figures for the hard winter months, October—April, are, however, omitted, as in most respects they have little direct influence. Climatically these months show great uniformity. Temperatures range between 20 and 40 centigrades below zero, and periods of violent gales replace periods of calm weather. The rather small amount of precipitation falling in this period, is concentrated during the gales in few, but rather large, snow-drifts. Was it not for this concentration of the precipitation, Peary Land would no doubt be entirely without vegetation; as the summer precipitation is too slight to be of any importance, there is only the snow, saved up through the winter, to give the plants, when it melts, a chance of covering their requirements of water. Had the winter snow been evenly distributed on the ground, it would hardly have been of any

use, as it would have disappeared through evaporation before the positive temperatures of spring. Thus the strong, one-way winds in the winter become, indirectly, of vital importance for the existing vegetation. At Jørgen Brønlund Fjord the winds are chiefly westerly, and the vegetation quite plainly amassed on the east facing hill-sides.

These very same wintery winds from the west present, on the other hand, also a danger to the plants. These winds are mostly foehns, and therefore very dry. On plants not protected by a cover of snow, these winds may, through a long winter, have a killing effect.

It appears from table 2 that Peary Land (at least the area around Jørgen Brønlund Fjord) seems to have a period of about 60 days a year free of frost, beginning in the second half of June. The daily temperature mean has, however, become positive about a fortnight earlier, and at the same time as this happens, the plants begin their activity. If it were a matter of the temperature only in the milieu of the plants, this activity might well occur earlier. Thus at the end of May with a daily mean of about  $-10^{\circ}\text{C}$ , maximum temperatures of  $14^{\circ}$ — $17^{\circ}$  were measured in a tuft of *Saxifraga oppositifolia* in a flat, open field. When the plant does not become active until about a fortnight later, it is probably due to want of water; this latter is not available until the melting of the snow begins, which again does not happen until the daily mean becomes positive.

When negative temperatures begin to appear towards the end of August, the activity of the plants is not stopped appreciably; this does not happen until constant frost sets in, in the beginning of September. These conditions, however, must also be considered in connection with the fact that in these northern regions there is no constant variation in the way temperature changes during the day; because of the very low orbit of the sun the amplitude of the day-temperature becomes very small, so small that it is altogether negligible compared with the effects of the changing wind conditions and varying cloud.

In the milieu where the plants grow temperature conditions in summer may vary considerably from one place to another, much more than do the temperatures of the "weather". On south facing sides of cliffs and rocks temperature may, on sunny days, easily reach as high as  $+25^{\circ}\text{C}$  in the day hours, and fall rather low in the night. Contrary to this, plants growing in wet soil are exposed to only very slight changes of temperature in the course of the summer and that of the day; they will grow at a temperature fairly fixed between  $6^{\circ}$  and  $10^{\circ}$ .

Precipitation in the 3 summer months, June, July, and August, is slight, falling partly as snow, partly as light rain, but never so much at a time as to penetrate more than 1 cm into the soil. Owing to the rather insignificant humidity of the air, and the frequent winds, it soon

evaporates, and never succeeds in being of much use to the higher plants.

Measuring of precipitation, in the case of snow, was much hampered in Peary Land by the wind conditions, and measurements consequently unreliable, as also pointed out by FRISTRUP (1952). According to FRISTRUP the total precipitation for the whole of 1949 amounted to 16.5 mm, while the figure for the last 5 months of 1948 was 72.5 mm. Even though precipitation no doubt was heavier in the winter 1948—49 than in the following winter, a difference like that would, however, most likely be owing to a failing measuring technique. Roughly, the normal annual precipitation may be estimated at about 25 mm, if anything, less.

The relative dampness of the air is, especially in winter, rather important for the water-ecology of the plants. It was established that the mean for the different months, in Peary Land, varied between 54 and 88 %, figures which per se do not indicate a particularly droughty climate. But as mentioned it is in the winter period that the strongly drying foehn winds appear with special force, and during this season the unprotected plants have no means of replacing the amount of water thus given off.

During the period of vegetation light-conditions must be said to be the best possible, as the whole of this period falls within the space of the midnight-sun. The figures for hours of sunshine, indeed, proved rather high.

Permafrost conditions in Peary Land were not made an object of special investigation. The depth of the thawed layers in summer is of course dependent on the structure of the soil, its contents of water, and exposition. In a certain area which during the summer was constantly humid, and in winter free of snow, the thawed layers finally reached as far down as about 70 cm. This depth was reached comparatively quickly after the thaw had begun, after which it kept almost unaltered until frost set in again. On dry soil, of course, the thawed layer will go deeper in the course of the summer. Summing up briefly we may say that when Peary Land to this day is a high-arctic desert, where only a few per cent of the area are covered with vegetation, it is owing to the extremely slight precipitation, and the, periodically very strong, wintery gales. The length of the vegetation period, temperature conditions, light-conditions, and the condition of the soil are, with a few exceptions, not in the least limiting vegetation.

The above mentioned climatic facts are, as stated, based on measurements made at the station at Jørgen Brønlund Fjord. Although it may be maintained in fairness that the measurements here are reflecting a climate of a somewhat local character, it is, nevertheless, the author's impression, from observations of vegetation and snow conditions when

journeying about Peary Land, that the climate at Jørgen Brønlund Fjord, with slight deviations only, is representative of most of the area. A number of minor areas, however, did show fairly great deviations with regard to vegetation, namely the so-called "Cassiope-areas". These latter are definitely conditional on the climate (see also p. 138).

In 1952, on Prinsesse Ingeborg Halvø south of Peary Land, a permanent weather station was established, situated on the boundary of the area dealt with here. A couple of years' observations from this station decidedly indicate that the surrounding area has a very special climate with a very local character. The summer temperature is very low, and precipitation comparatively large. The present writer did not visit the place, but according to reports by comrades in the Dansk Pearyland Expedition, who actually were there, vegetation in this place is far poorer than in other parts of the area. This fact is doubtless due to the low summer temperatures.

Based on measurements and vegetation analyses, a forthcoming treatise will give a more precise account of vegetation conditions in Peary Land, seen in relation to climate and edaphic conditions. Meanwhile here are a few lines on the most important types of vegetation. As stated, the country has a desert-like character, where actual vegetation is immediately bound up with water streams, snow-patches, or places below these and receiving water from the melting snow-drifts. Everywhere else there is practically no vegetation.

With a few exceptions the streams are rather small and may easily be crossed on foot. The following plant-communities are directly bound to streams: 1) stony-sandy bed has an open vegetation, rich in species; most characteristic are *Colpodium vahlium*, *Braya purpurascens*, *Draba bellii*, and *Alopecurus alpinus*. 2) swamps by the rivers: *Cerastium regelii*, and *Pleuropogon sabinei* in a thick carpet of mosses. 3) hollows, flooded by rivers: meadows, dominated by either *Carex stans* or *Eriophorum scheuchzeri*.

Bound directly to the winter's accumulation of snow is a rich variety of different types of vegetation. In dry soil, from snow-free ground to ground covered with a thick layer of snow, we find: 1) *Lesquerella artica*, *Poa abbreviata*, *Melandrium triflorum*, *Draba cinerea*. 2) *Dryas integrifolia*, *Kobresia myosuroides*. 3) *Dryas chamissonis*, *Carex nardina*. 4) *Salix arctica*. In moist soil correspondingly: 1) *Saxifraga flagellaris*, *Braya purpurascens*. 2) *Carex misandra*, *Oxyria digyna*, moss. 3) *Taraxacum pumilum*, *Braya thorild-wulfii*. 4) *Ranunculus sulphureus*, *Draba lactea*, *D. oblongata*. 5) *Phippsia algida*. In wet soil: 1) *Eriophorum triste* and moss. 2) *Luzula arctica*, *Polytrichum alpinum*.

Types of vegetation characteristic of the "Cassiope-areas" are: 1) *Luzula confusa*, *Potentilla hyparctica*, *Orthotrichum killiasii*, *Cetraria*

*nivalis* in dry, gravelly soil, free of winter snow. 2) *Vaccinium microphyllum*-heath in moist, peaty soil, rich in mosses, and *Carex rupestris*-heath in moist mineral soil. Neither of these two types of vegetation has any considerable winter snow covering. 3) In moist soil with heavier snow covering and peat formation, we find *Cassiope tetragona*, *Poa arctica*, *Aulacomnium turgidum*.

The above enumeration of vegetational types is of course far from exhaustive, though, nevertheless, gives the most important. The species mentioned of each type are the most characteristic ones. They are not necessarily the dominating species. Thus for instance *Saxifraga oppositifolia* may in many communities well be one of the most dominating species without being characteristic of any of these communities, and likewise may for instance species from communities with very heavy snow covering very well be found growing in communities with slight snow covering. Besides, it holds good of many of the species in the area that they may be found in extreme snow-patches as well as in localities entirely snow-free.

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## LIST OF LOCALITIES

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The following register of species found in the area examined (between Victoria Fjord and Danmark Fjord) is based on the very thorough collections in the area around Jørgen Brønlund Fjord, supplemented with more casual collections from altogether 97 different localities, scattered across the area. A long series of these localities have only been visited on sledge-journeys, often by non-botanists, and it will be understood that in such circumstances the collections of vascular plants cannot be entirely adequate. Consequently we may not draw far-going conclusions in cases where there are no finds of some species or other in certain parts of the area. When in the following the country, nevertheless, is divided into a sort of phytogeographical districts, it is a division based to a high degree on the appearance of the Peary Land species of mosses, of which it was possible to make good collections on a large scale, also during the winter-time.

In the list of localities is given, for each locality, the latitude and longitude of the place. These co-ordinates, found by measurements on the best maps available, may possibly in a number of cases be subject to minor inaccuracies, as up to now there has been no geodetic survey of the area. We must, however, point out that inaccuracies in the statements of longitude are of little actual importance, in as much as one minute longitude in these northern parts equals only about 250 m. Besides a short description of each locality (and in case of the most important with the addition of the main types of vegetation) is mentioned the person who made the botanical collection on the spot, and when it was made. Finally a short characterization is given of the individual main districts, except W. O. Distr., which I did not visit.

### I. Western Outer District.

1. Lockwood Ø (83°24' lat. N., 39° long. W.). The first collection of plants from Peary Land was made in this locality by Lockwood on a sledge-journey during the Greely expedition, operating from

Ellesmere. The place was visited in May 1883, and only four species were collected. Of the plants enumerated in the present list these four are the only ones not kept in the Botanical Museum of Copenhagen. The present writer has not studied these plants, which are probably in an American herbarium (cf. SIMMONS, 1909).

2. Jewell Fjord ( $83^{\circ}06'$  lat. N.,  $42^{\circ}30'$  long. W.), Nansen Land. Collections made near the head of the fjord by Ellitsgaard Rasmussen during a sledge-journey in April 1950.

3. Low Point ( $83^{\circ}09'$  lat. N.,  $44^{\circ}$  long. W.), north coast of Nansen Land. A very rich collection was made by Thorild Wulff during the 2nd Thule Expedition. Visited June 10—12, 1917 (cf. OSTENFELD, 1925b). In the case of this and other stations of the 2nd Thule Expedition it has been necessary to alter the figures of the latitudes. According to recent maps the figures given by OSTENFELD (1923b) and others are not quite correct.

4. Kap Benet ( $83^{\circ}05'$  lat. N.,  $45^{\circ}20'$  long. W.), north coast of Sverdrup Ø. Visited by Thorild Wulff, June 4—5, 1917 (cf. OSTENFELD, 1923b).

5. Black Cape ( $83^{\circ}03'$  lat. N.,  $46^{\circ}00'$  long. W.), north coast of Sverdrup Ø, just west of Kap Benet. Visited by Thorild Wulff, June 3—4, 1917 (cf. OSTENFELD, 1923 b).

6. Lemming Fjord ( $82^{\circ}55'$  lat. N.,  $45^{\circ}20'$  long. W.), Sverdrup Ø. The locality visited by Thorild Wulff on June 16, 1917, is probably situated at the head of the fjord, where the expedition had a camping place (cf. OSTENFELD, 1923b).

7. Mascart Inlet ( $83^{\circ}00'$  lat. N.,  $45^{\circ}$  long. W.). From a locality on Sverdrup Ø, Ellitsgaard Rasmussen collected a few plants on April 17, 1950, during a sledge-journey.

8. Mascart Inlet ( $82^{\circ}55'$  lat. N.,  $44^{\circ}30'$  long. W.). Collections made by Ellitsgaard Rasmussen, April 28, 1950, on Sverdrup Ø.

9. Strømstedet ( $82^{\circ}51'$  lat. N.,  $44^{\circ}00'$  long. W.). The eastern corner of I. P. Koch Fjord and Mascart Inlet, Nansen Land. Visited by Thorild Wulff, who made a large collection of plants from this place. June 19—21, 1917 (cf. OSTENFELD, 1923b).

10. Kap Salor ( $82^{\circ}55'$  lat. N.,  $46^{\circ}30'$  long. W.), the northern cape of Elison Ø. Visited by Thorild Wulff, June 27—29, 1917 (cf. OSTENFELD, 1923b).

11. John Murray Ø ( $82^{\circ}47'$  lat. N.,  $47^{\circ}00'$  long. W.). Rather rich collections were made on the south-eastern coast of the island, by Thorild Wulff, July 2—3, 1917 (cf. OSTENFELD, 1923b).

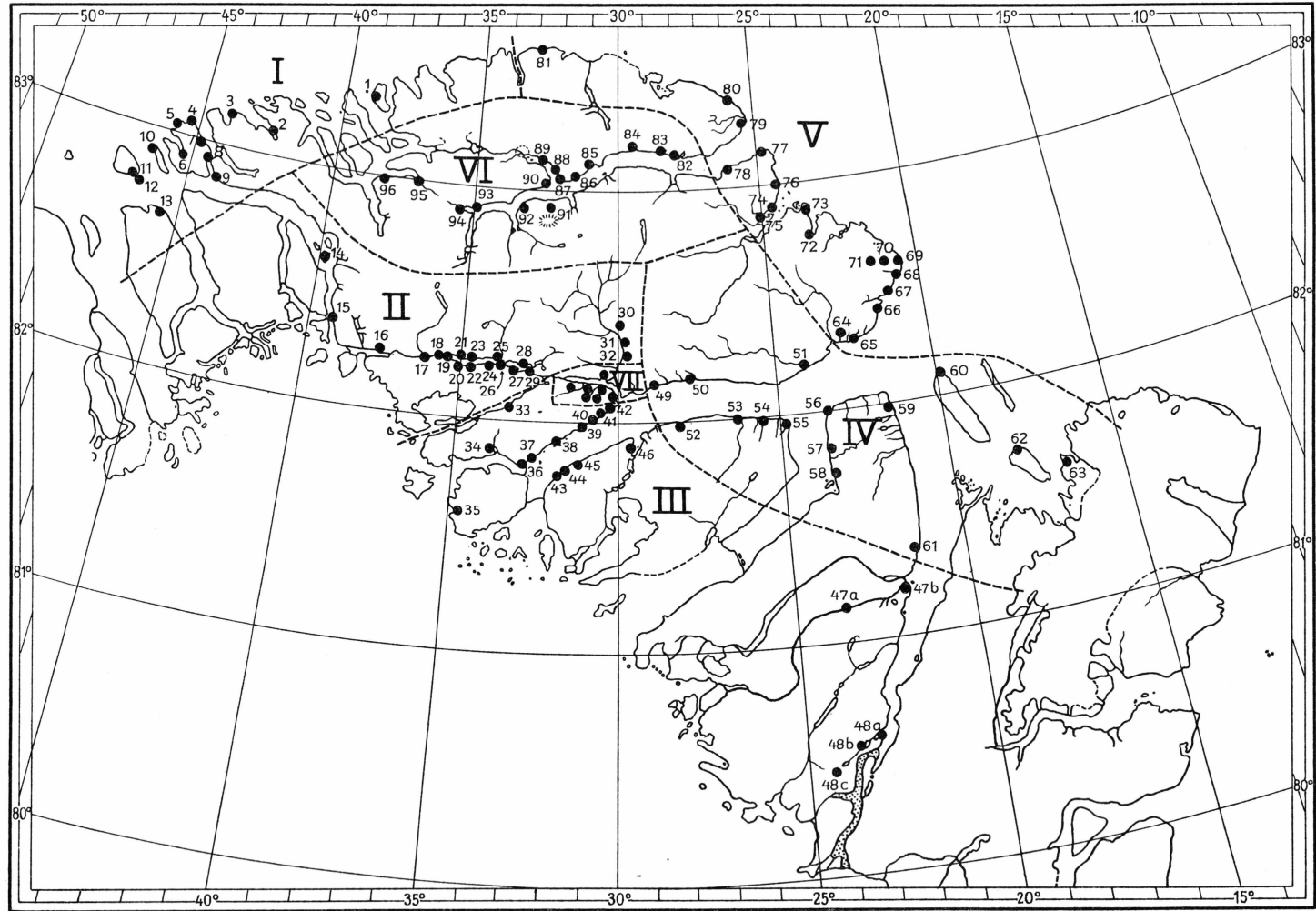


Fig. 2. Map of Peary Land, showing positions of the botanical localities and the estimated limits of the flora districts.

12. Centrum Ø (82°46' lat. N., 47°00' long. W.), a small island just south-east of John Murray Ø. The westernmost locality of the area treated here. Visited by Thorild Wulff, June 2—3, 1917 (cf. OSTENFELD, 1923b).

13. Nordenskiöld Fjord (about 82°38' lat. N., 45°30' long. W.). The situation of this locality is uncertain, but is probably in Nares Land. The place was visited by the 2nd Thule Expedition, though, judging from the routes of this expedition, hardly by Thorild Wulff, as stated by OSTENFELD (1923b), more likely by Lauge Koch or some other member of the expedition.

## II. Western Inner District.

This district includes localities nos. 14—32, all of which show a vegetation dominated by extremely continental plant-communities, such as *Dryas*-heaths and *Kobresia myosuroides*-heaths.

14. Merqujoq (82°38' lat. N., 39°30' long. W.), an island in I. P. Koch Fjord. Collections made by P. Johnsen on March 31, 1949, on walls of rock.

15. Head of I. P. Koch Fjord (82°22' lat. N., 39°00' long. W.). Collections from walls of rock and stony slopes, by P. Johnsen and J. Troelsen on April 2, 1949.

16. Aftenstjernesø (82°17' lat. N., 37°30' long. W.), a lake in Sydpasset, western end of Wandel Dal. Large collections of plants were made from meadows, snow-patches, and slopes. Visited by P. Johnsen and J. Troelsen on March 22, 1949. Of special interest was the occurrence of *Erysimum pallasii*, after which plant the lake was named.

17. Sydpasset (82°17' lat. N., 36°30' long. W.) in Wandel Dal about 10 km west of lake Midsommersø. Collections were made by P. Johnsen, October 16, 1948, and March 21, 1949, from mossy meadows and clayey and gravelly slopes near the large water-fall of Sydpasselven.

18. Sydpasset (82°17' lat. N., 36°00' long. W.). Wandel Dal, a few km from the west end of lake Midsommersø. Collections, chiefly consisting of mosses from a moist meadow, made by P. Johnsen, on October 16, 1948.

19. Baggården (82°16' lat. N., 35°45' long. W.), western end of lake Midsommersø. Visited by Johnsen on October 17, 1948, and by the present author on May 28, 1949. Collections from the delta of Sydpasselven and from dry, sandy hills.

20. Baggården (82°15' lat. N., 35°15' long. W.) at the corner on the south side of the lake, between Baggården and Øvre Midsommersø,

Walcott Land. Visited by P. Johnsen on April 9, 1949. Collections from stony slopes 100 m above sea-level.

21. Baggården (82°15' lat. N., 35°10' long. W.), corner at the north side of the lake, right opposite the preceding locality. Collections made by P. Johnsen on April 6, 1949, from sandy and gravelly places, by J. Troelsen on April 9, 1949, from steep, stony slopes 800 m above sea-level, and finally by the present writer on May 28, 1949, from a steep S-exposed wall of basalt and from the scree below. Here the extremely continental flora was luxuriantly developed, with *Calamagrostis purpurascens*, *Erigeron compositus*, *Lesquerella arctica*, *Dryas*, *Kobresia myosuroides*, and *Poa hartzii* as the most conspicuous species.

22. Øvre Midsommersø (82°14' lat. N., 34°45' long. W.) at a small bay on the south coast of the lake, Walcott Land. Visited by the present author on May 27, 1949. Collections were made on the narrow foreland below the high and steep N-exposed mountain side, in meadows and screes.

23. Øvre Midsommersø (82°14' lat. N., 34°40' long. W.), a small island in the lake with low rocks of basalt. From this locality only bryophytes were collected, especially some growing near the nests of sea-gulls. Visited by the present author on May 27, 1949.

24. Øvre Midsommersø (82°14' lat. N., 34°05' long. W.), a low point on the south coast of the lake, Walcott Land. Collections from dry, rocky projections and stony fields (basalt). Here vegetation was dominated by continental species, the abundance of *Calamagrostis purpurascens*, *Kobresia myosuroides*, *Melandrium triflorum*, and *Torularia humilis*, may be specially mentioned. Visited by the author on May 27, 1949.

25. Øvre Midsommersø (82°15' lat. N., 33°55' long. W.). The locality is situated on a large ness on the north side of the lake, in Erlandsen Land. Collections from a very dry, stony plain and from low hills. Visited by J. Troelsen on October 18, 1948, and by the author on May 29, 1949.

26. Slusen (82°15' lat. N., 33°45' long. W.), the stream connecting the two main parts of the lake. A few collections of mosses from the bottom of the stream. Visited by the author on May 29, 1949.

27. Mågeklippe (82°14' lat. N., 33°20' long. W.), a large ness on the south side of Nedre Midsommersø, Walcott Land. Collections were made by the author on May 27 and 29, 1949, from stony slopes and from steep N-exposed walls of basalt, where numerous gulls had their nests. A rich, coprophilous flora of mosses had developed in rocky crevices and on rocky shelves; among the species may be mentioned *Timmia bavarica*, *Pottia heimii*, *Tortula mucronifolia*, and *Tetraplodon mnioides*.

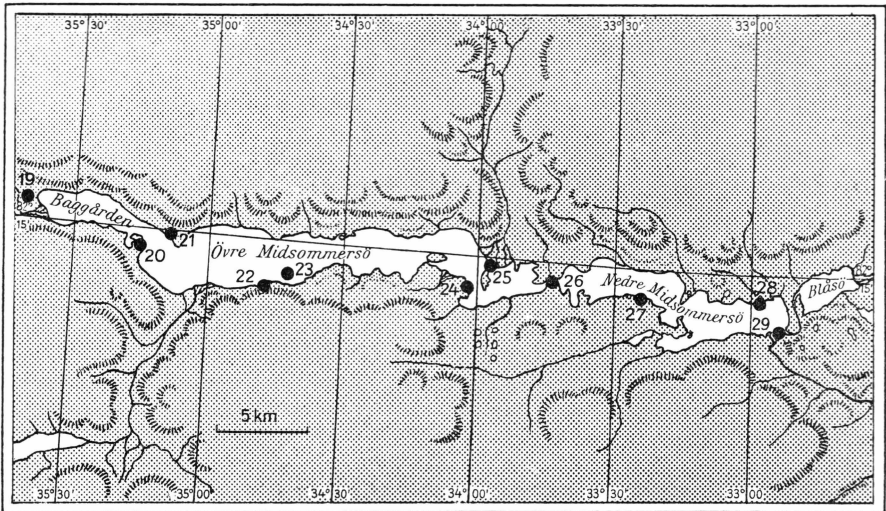


Fig. 3. Map of lake Midsommersø, with localities nos. 19—29. By E. KNUTH.

**28.** Telt næs ( $82^{\circ}14'$  lat. N.,  $33^{\circ}00'$  long. W.), a ness on the north side of Nedre Midsommersø, Erlandsen Land. Collections by P. Johnsen, from a stony terrace near the lake. February 23, 1949.

**29.** Søjren ( $82^{\circ}13'$  lat. N.,  $32^{\circ}40'$  long. W.), the camping-place at the eastern end of the lake, near its outlet. The place here is very stony, with terraces, slopes, and screes at the foot of the mountain sides, consisting of yellowish sandstones and dolomites. The soil is very dry. Besides the very poor stone-field vegetation, a community of *Carex misandra*-*Oxyria digyna*, rich in mosses, was the most prominent in this place. Collections by E. Knuth on September 5, 1948, by P. Johnsen on February 22, 1949, and by the present author on May 26, 1949.

**30.** Børglum Elv ( $82^{\circ}26'$  lat. N.,  $30^{\circ}00'$  long. W.), about 30 km north of Jørgen Brønlund Fjord. The locality is situated in Melville Land. Collections made by J. Troelsen on August 5, 1949, from slopes with luxuriant vegetation of e. g. *Erigeron compositus*, *Roegneria borealis*, *Poa hartzii*, *Melandrium triflorum*, *Calamagrostis purpurascens*, *Potentilla pulchella*, and other continental species.

**31.** Børglum Elv ( $82^{\circ}23'$  lat. N.,  $29^{\circ}30'$  long. W.), about 25 km north of Jørgen Brønlund Fjord, Melville Land. Collections made along a river, by T. Andersen on August 5, 1949.

**32.** Børglum Elv ( $82^{\circ}20'$  lat. N.,  $29^{\circ}30'$  long. W.), about 17 km north of Jørgen Brønlund Fjord, Melville Land. Collections were



Fig. 4. Loc. 29. Søjren. Eastern end of Midsommersø. Phot. ÅS. 23.7.1949.

made by J. Troelsen on August 2, 1949, from a sandy, dune-like vegetation along the river. From this community may be mentioned *Poa hartzii*, *Lesquerella arctica*, and *Potentilla pulchella*.

### III. Innermost District.

This district includes localities nos. 33—48. It is characterized by the presence of Cassiope-heaths and other plant-communities, the soil of which contain a fair amount of humus. The district has much in common with the outer districts.

**33.** Itukussuk Dal (82°05' lat. N., 33°00' long. W.), Heilprin Land. Visited by B. Fristrup, July 24—25, 1949. A very fine collection containing about 50 species of flowering plants, besides many mosses, was brought home from this locality, from various substrates and altitudes. Of vegetational types may be mentioned meadows dominated by *Carex stans*, *Eriophorum triste*, *Eriophorum scheuchzeri*, resp. A very rich river-bed vegetation with e. g. *Deschampsia brevifolia*, *Roegneria borealis*, *Armeria*, *Festuca baffinensis*, *Poa hartzii*, and *Arenaria pseudo-fragida* (found nowhere else in Peary Land), was found in the lowland.

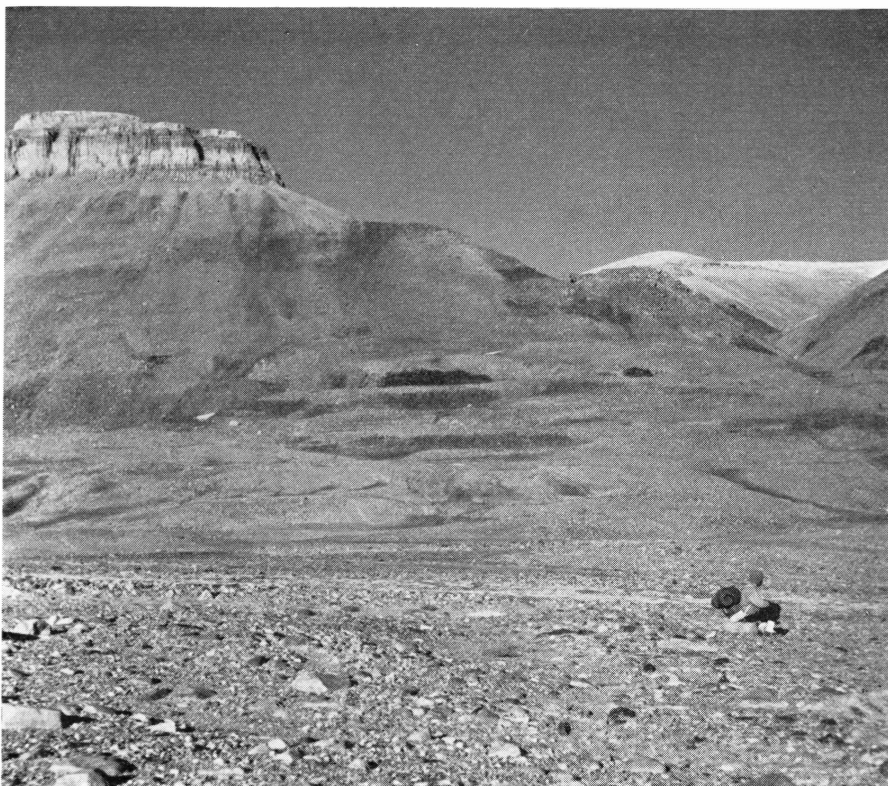


Fig. 5. Itukussuk Dal, looking eastwards to Heilprin Land. Here the rocks are built up of dolomites and sandstone of Eo-Cambrian age. July 25, 1949. Phot. B. FRISTRUP.

At higher altitudes numerous specimens of flowering *Erysimum pallasii* were found in screes, and *Cassiope*-heaths were frequently met with above 400 m above sea-level.

**34.** Valmuedal (81°54' lat. N., 34°00' long. W.), Adam Biering Land. This locality was visited by P. Freuchen on July 11, 1912, during the 1st Thule Expedition (cf. OSTENFELD, 1915). A rather rich collection of flowering plants (resembling Fristrup's collection from the preceding locality) was made in this place.

**35.** Vildt Land (about 81°37' lat. N., 34°30' long. W.), western part. Visited by P. Freuchen during the 1st Thule Expedition (cf. OSTENFELD, 1915). Collections from July 20, and August 3, 1912. The situation of this locality (-ies?) cannot be definitely determined, but judging from the report of the expedition (Medd. on Grønland, vol. 51) the collections were probably made near the Thule-cairn, starting point for the homeward journey across the inland ice.



Fig. 6. North coast of Independence Fjord, "Blomsterstranden", at Kap Ejnar Mikkelsen (loc. 38). The stone-field in the foreground only with single tufts of *Silene acaulis*. At the foot of the screes *Erysimum pallasii* was found. June 6, 1949. Phot. KH.

**36.** Kap Schmelck ( $81^{\circ}49'$  lat. N.,  $33^{\circ}00'$  long. W.), Heilprin Land at Marie Sophie Gletcher near the head of Independence Fjord. Visited by P. Freuchen on June 20, 1912 (cf. OSTENFELD, 1915).

**37.** "Sidste Næs" (about  $81^{\circ}52'$  lat. N.,  $32^{\circ}30'$  long. W.) on Blomsterstranden, Heilprin Land. Visited by P. Freuchen on June 18, 1912, during the 1st Thule Expedition (cf. OSTENFELD, 1915). The situation of this locality is somewhat uncertain, and apparently the name of the place has never been authorized. But according to the routes of the expedition it should be situated a few miles north east of Kap Schmelck.

**38.** Kap Ejnar Mikkelsen ( $81^{\circ}56'$  lat. N.,  $31^{\circ}45'$  long. W.), Blomsterstranden, Heilprin Land. Visited by the author on June 6, 1949. A rather interesting flora occurred on the flat terraces below the steep SW-exposed

mountain side; a vegetation with *Erysimum pallasii*, *Lesquerella arctica*, and *Poa abbreviata* was found on the dry, stony slopes. In a stony hollow, at a shallow pond, were communities dominated by *Carex stans* and by *Eriophorum triste*. *Cassiope*-heath was met with in small hollows, partly covered with snow (June 6), and very large cushions of *Silene acaulis* were found in a delta near the shore.

**39.** Diabasholme (82°00' lat. N., 31°00' long. W.), at Blomsterstranden, Heilprin Land. Collections made specially on shelves of SE-exposed basaltic wall. A very rich flora of rare species was found here, most conspicuous were *Campanula uniflora*, *Armeria scabra*, *Hierochloë alpina*, *Potentilla hyparctica*, and *Silene acaulis*. At the time of collecting the place was free of snow. Visited by the author on June 6, 1949.

**40.** Blomsterstranden (82°01' lat. N., 30°45' long. W.), Heilprin Land, north side of Independence Fjord, about 15 km SW of Kap Knud Rasmussen. Collections were made in the lowland from patches of *Cassiope*-heath, from a large stony polygon-field with *Chamaenerium latifolium*, *Silene*, *Poa glauca*, etc., and from a meadow dominated by *Carex maritima*. Visited by the author on June 8, 1949.

**41.** Diabasnæs (82°03' lat. N., 30°30' long. W.), Blomsterstranden, Heilprin Land. Visited by the author on June 9, 1949. Collections were made especially from the shelves and crevices of the low basaltic rocks that make up this ness. A very rich and interesting flora was found.

**42.** Blomsterstranden (82°04' lat. N., 30°15' long. W.), Heilprin Land, about 5 km SW of Kap Knud Rasmussen. Visited by the author on June 5, 1949. Collections made on the broad, very stony, foreland, in dried-up river-beds and polygon-fields. There were not many higher plants, but a rich flora of mosses had developed.

**43.** Kap Glacier (81°48' lat. N., 31°45' long. W.), Academy Land, south side of Independence Fjord, near the head of it. Visited by the author on October 29, 1948, and June 7, 1949. Collections were made in the neighbourhood of the cairn of Mylius-Erichsen. Along the almost 1000 m high mountain side there is a very narrow strip of lowland, consisting of screes and low, rounded, basaltic rocks, and very few spots with vegetation were found. At the shore were meadows, rich in various species of mosses (especially *Aulacomnium palustre* and *A. turgidum*) and with *Poa glauca*, *Potentilla hyparctica*, and *Luzula confusa*. On rocky shelves *Hierochloë alpina* was the most important species. The most interesting fact about this locality, however, was that it had a very large number of different species of mosses otherwise very rare in Peary Land.

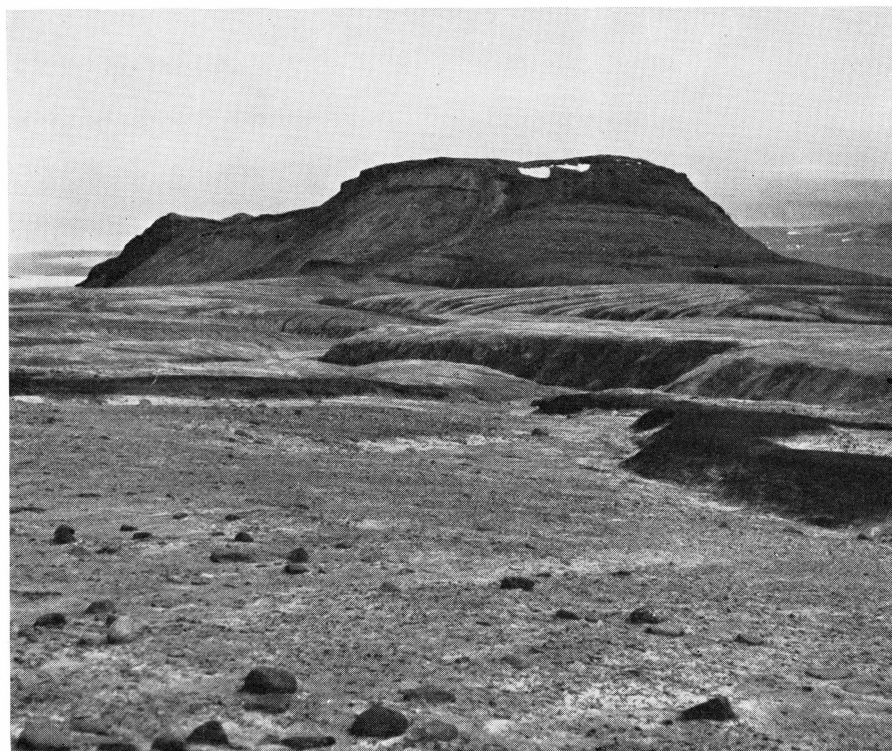


Fig. 7. Loc. 48a. Kap Holbæk, near the head of Danmark Fjord. The south-western slopes of the hill (below the snow in the picture) have heaths with *Vaccinium uliginosum microphyllum* and *Cassiope tetragona*. E. KNUTH. July 14, 1955.

44. NE of Kap Glacier ( $81^{\circ}49'$  lat. N.,  $31^{\circ}30'$  long. W.), Academy Land, a few km from the preceding locality. Visited on June 7, 1949, by the author. Collections made on a N-exposed basaltic wall, on the shelves of which mossy patches of *Cassiope*-heath were found.

45. Saxifragadal ( $81^{\circ}51'$  lat. N.,  $31^{\circ}15'$  long. W.), Academy Land, south side of Independence Fjord. This botanically very rich locality was discovered by Lauge Koch already on his expedition in 1921. In his book "Nord om Grønland" the luxuriant vegetation of this place is mentioned; however, no plants were collected by Lauge Koch. On October 29, 1948, and June 7—8, 1949, the present writer had the opportunity of visiting the place on a sledge-journey. The valley is rather narrow, running NE—SW, and with a small river at its bottom. The sides of the valley rise, terrace-like, to an altitude of about 1000 m. On these terraces the rich vegetation was found. Of vegetational types the *Vaccinium*-bog may be specially pointed out, a type rich in mosses, with *Tomenthypnum nitens*, *Meesia triquetra*, *Aulacomnium pa-*



Fig. 8. Loc. 48c, Campanuladal. A rather rich vegetation is seen in the foreground, which is sloping south-east. E. KNUTH, July 22, 1955.

*lustre*, and *Drepanocladus revolvens*, as the most frequent species. (These species are widely distributed within the Arctic, but are rare in Peary Land). Also *Cassiope*-heaths and *Rhacomitrium lanuginosum* stone-fields were found in this place.

46. Krognaes (81°55' lat. N., 29°30' long. W.), a ness on the western side of Astrup Fjord, Ubberrup Land. The place was visited by the author on October 27, 1948, and by P. Johnsen on June 7—8, 1949. The visit of the former took place during the dark period, and the results were accordingly not very great, but judging from the proofs collected by Johnsen, and especially from his find of *Vaccinium* in this place, this locality should be just as rich as the preceding. It was, however, not possible to visit it in the summer-time.

The terrain of Astrup Fjord is rocky, the locality very rich in basalts, besides the calcareous sediments and sandstone.

47a. Zig-Zag Dal (ab. 81°10' lat. N., 24° long. W.) on Sjællandslette, Mylius-Erichsen Land. Visited by P. Freuchen during the 1st Thule Expedition on May 18, 1912 (cf. OSTENFELD, 1915).

**47b.** Sjøællandsslette (ab.  $81^{\circ}41'$  lat. N.,  $22^{\circ}$  long. W.), Mylius-Erichsen Land. Visited by P. Freuchen on May 23, 1912 (cf. OSTENFELD, 1915). Just south of this place, on a little peninsula at the entrance to Zig-Zag Dal, E. Knuth collected a few samples of plants on June 11, 1955.

**48a.** Kap Holbæk ( $80^{\circ}41'$  lat. N.,  $23^{\circ}20'$  long. W.). This place was the station of E. Knuth during a stay at the head of Danmark Fjord in the summer of 1955. Some rather fine samples of plants were collected here. According to Knuth vegetation here and in the two following stations was rather vigorous. There were especially extensive heaths of *Dryas integrifolia*, *Cassiope tetragona*, and *Vaccinium uliginosum microphyllum*. The collections were made in the months of July and August that year. In the year before another collection from this place was made, also by E. Knuth.

**48b.** Lolland Sø ( $80^{\circ}38'$  lat. N.,  $23^{\circ}30'$  long. W.). Around this lake and at Skjoldungeelv collections were made by E. Knuth in the summer of 1955.

**48c.** Campanuladal ( $80^{\circ}33'$  lat. N.,  $24^{\circ}40'$  long. W.). Collection were made by E. Knuth in July 1955.

#### IV. Eastern Inner District.

Including localities nos. 49—63, and characterized by the presence of continental plant-communities, such as *Dryas*-heath and *Kobresia myosuroides*-heath, and evidently by lack of soil rich in humus.

**49.** Koralkysten ( $82^{\circ}10'$  lat. N.,  $29^{\circ}00'$  long. W.), north coast of Independence Fjord, Melville Land. The place was visited by the author on April 25, 1949. Collections made from a canyon and from vast gravelly, coastal plains with very poor vegetation.

**50.** Falkefjeld ( $82^{\circ}11'$  lat. N.,  $28^{\circ}00'$  long. W.), north coast of Independence Fjord, Melville Land. Visited by the author on April 26, 1949. Collections from S-exposed screes at the foot of the steep mountain sides. The place is extremely dry and very poor in vegetation. Only 6 species of higher plants and 8 species of cryptogams were found.

**51.** Graptolit Elv ( $82^{\circ}14'$  lat. N.,  $24^{\circ}00'$  long. W.), north side of Independence Fjord, Melville Land. From this locality collections were made on October 1, 1948, by J. Troelsen, on March 31, 1949, by K. Filemosen, and on May 1—2, 1949, by the author. The terrain is very flat here; as far as the eye could reach, north and east, only slightly undulating lowland was seen. Collections were made especially from the broad delta and from gravelly slopes; further collections of mosses were

made on the rocky sides of the canyon. Of plant-communities may be mentioned *Dryas-Carex nardina* heath.

**52.** Marius Fiil Fjord (82°00' lat. N., 28°00' long. W.), I.C. Christensen Land. A small fiord on the south coast of Independence Fjord. The place was visited by the author on May 20, 1949. Collections from very stony terraces and river-beds at the head of the fjord, which, surrounded by mountains, is continued in a short valley into which a glacier is descending. According to the flora the place is situated between districts III and IV.

**53.** Neergård Elv (82°00' lat. N., 26°00' long. W.), I.C. Christensen Land on the south coast of Independence Fjord. This place was visited several times by E. Knuth and Å. Sahlertz, who collected small samples of plants, and by the author on May 19, 1949. The area around the river consists of low hills, probably elevated marine terraces. Along the river carbonate rocks were visible here and there. Collections were made for instance from a slope with *Saxifraga setigera*-, *Luzula arctica*-, *Tortella fragilis*-vegetation, from delta and canyons, and from old Eskimo shelters.

**54.** Slebsager Elv (82°00' lat. N., 25°30' long. W.), I.C. Christensen Land. The terrain very much resembles that of preceding locality, with gravelly and stony hills, and with rocks visible only in the canyons. Of vegetational types a *Dryas-Carex nardina* and a *Carex misandra* moss vegetation may be specially mentioned. The place was visited on May 19, 1949, by the author.

**55.** Kap Peter Henrik (81°59' lat. N., 24°45' long. W.), I.C. Christensen Land, western corner of Independence Fjord and Hagen Fjord. Collections made by Å. Sahlertz, March 1949, and by E. Knuth in the spring of 1950.

**56.** Kap Ludovica (82°00' lat. N., 23°30' long. W.), Valdemar Glückstadt Land, eastern corner of Independence Fjord and Hagen Fjord. Visited by Å. Sahlertz 20—23 April, 1949. Collectings from old Eskimo sites.

**57.** Hagen Fjord (81°50' lat. N., 23°30' long. W.), east coast of the fjord, Valdemar Glückstadt Land. Visited by Å. Sahlertz on April 19, 1949.

**58.** Hagen Fjord (81°45' lat. N., 23°15' long. W.), east coast of the fjord, Valdemar Glückstadt Land, some kilometres south of the preceding loc. Visited by Å. Sahlertz April 1949.

**59.** Kap Rigsdagen (82°00' lat. N., 21°40' long. W.) at Danmark Fjord, Valdemar Glückstadt Land. Visited by Å. Sahlertz ultimo April 1949.

60. Prinsesse Thyra Ø (82°05' lat. N., 20°00' long. W.). Collectings from the northern end of the island on clayey plains. Visited by Å. Sahlert on May 1, 1949.

61. Kap Kronborg (81°21' lat. N., 21°20' long. W.), Valdemar Glückstadt Land at Danmark Fjord. Visited by P. Freuchen during the 1st Thule Expedition on June 3, 1912.

62. Prinsesse Dagmar Ø (81°42' lat. N., 18°00' long. W.). A few specimens collected by E. Knuth in the spring of 1952.

63. Nord (81°36' lat. N., ab. 17° long. W.), on Prinsesse Ingeborg Halvø. Plants from this locality were collected by E. Knuth in the summer of 1952, and by M. Westergård in the middle of August 1953. Westergård's collection is rather rich and probably almost complete in the case of the higher plants. The area around this locality is very desolate, consisting of gravelly fields and hills. Vegetation very scanty.

#### V. Eastern Outer District.

This district includes localities nos. 64—81. From this district apparently no *Dryas*-heath nor *Kobresia*- or *Carex nardina*-soc. could be demonstrated, while here and there *Cassiope*-heath and *Rhacomitrium lanuginosum* stone-field were met with. A rich occurrence of *Cerastium regelii* and *Saxifraga caespitosa* is also characteristic of this district.

64. Kjøveslette (82°20' lat. N., 23°00' long. W.), northern side of the mouth of Independence Fjord. Visited by the author on May 3, 1949. The terrain is very flat, with vast clayey and gravelly fields with no rocks. Vegetation very poor. Collectings, chiefly mosses, were made in hollows in the plain. At the time the area was covered with a smooth layer of wind-pressed snow.

65. Kap Vaarbrud (82°18' lat. N., 22°30' long. W.) in the easternmost part of Kjøveslette. Visited by the author on May 3—4, 1949. The terrain is very much like that of preceding locality, very flat with vast gravelly and clayey fields. The scanty vegetation was confined to hollows, in which mossy meadows were predominant. *Cerastium regelii*, *Deschampsia brevifolia*, *Alopecurus alpinus*, *Juncus biglumis*, and *Poa abbreviata* were some of the most frequent higher plants, and among the mosses *Ditrichum flexicaule* and *Cinclidium arcticum* were dominant.

66. Kap København (82°25' lat. N., 21°30' long. W.), Herluf Trolle Land. Visited by the author on May 5, 1949. The terrain consists of large hills, reaching an elevation of about 150 m above sea-level, and of old raised beach terraces with many mussels. The soil is gravelly and clayey, no rocks were seen. The higher part of the hills probably belongs

to a system of moraines stretching north, and separating Herlufsholm Strand from the main country. These moraines were discovered by Lauge Koch in 1921, and have often played an important part in discussions on the phytogeography of Greenland. Vegetation at Kap København was extremely poor, besides the ubiquitous species only *Cerastium regelii* was common.

67. Mudderbugten (82°29' lat. N., 21°00' long. W.) on the southern side of Herlufsholm Strand. The terrain very much resembles that of Kjøveslette, with flat, clayey and gravelly, fields. Vegetation poor. Of interest was a *Saxifraga setigera-Tortella fragilis*-soc. in clayey solifluction-soil. Visited by the author on May 6, 1949.

68. Herlufsholm Strand (82°35' lat. N., 20°30' long. W.), some km SW of Kap Eiler Rasmussen. Visited by the author on May 7, 1949. On the flat, clayey beach only few specimens of plants were found.

69. Kap Eiler Rasmussen (82°40' lat. N., 20°30' long. W.), eastern point of Peary Land, on Herlufsholm Strand. Visited by the author May 7—11, 1949. A place, very poor in vegetation, of flat, extensive, wind-swept gravel-fields. Noteworthy are the very large cushions of *Saxifraga oppositifolia*, and the frequency of small specimens of *Cochlearia*.

70. Herlufsholm Strand (82°40' lat. N., 21°00' long. W.), in the middle of this large plain, were, in moist hollows, found rather rich moss-meadows, dominated by *Tortula ruralis*, *Ditrichum flexicaule* and *Distichium capillaceum*; among the vascular plants *Alopecurus alpinus* and species of *Saxifraga* were the most prominent. In rather dry fields lichens were the dominant group. Characteristic of Herlufsholm Strand is further the abundance of large cushions of *Saxifraga caespitosa*; it seems as if this species, at any rate here, replaces *S. oppositifolia*, which is the dominant plant everywhere in the interior of Peary Land. Visited by the author on May 11, 1949.

71. Herlufsholm Strand (82°40' lat. N., 21°30' long. W.), western part of the plain at the foot of some low mountains, forming the western boundary of Herlufsholm Strand. Visited by the author May 12—14, 1949, a few collections were made by J. Troelsen on June 1, 1949. The terrain of the lowland is flat and very stony, mostly with dry soil, but here and there with moist meadows and shallow ponds. The vegetation is rather rich. The dry stone-fields are dominated by *Rhacomitrium lanuginosum* accompanied by *Dicranoweisia crispula*, species of *Cetraria*, *Alectoria* and *Usnea*, but only by few species of vascular plants, of which *Potentilla hyparctica* and *Luzula confusa* were far the commonest. Also in the meadows the mosses were the most dominant, frequent were

*Bryum obtusifolium*, *Meesia triquetra* and *Aulacomnium turgidum*, but numerous other species were found. From a pond may be specially mentioned *Cerastium regelii* and *Pleuropogon sabinei*. On the slopes of the mountains in the west several species were found, among these *Cassiope tetragona* in patches; collected by J. Troelsen.

72. Head of Hellefiskefjord (82°45' lat. N., 23°00' long. W.), Wyckoff Land. Collections were made by J. Troelsen below a snow-patch and on a steep wall of rock. Visited on May 28, 1949.

73. Mouth of Hellefiskefjord (82°52' lat. N., 23°00' long. W.), eastern corner. Collections made by J. Troelsen in a delta on May 27, 1949.

74. G. B. Schley Fjord (82°52' lat. N., 24°30' long. W.), the north side of the fjord just east of the mouth of Ormen, Hans Egede Land. Collection made by J. Troelsen on S-exposed terrace. Visited May, 22, 1949.

75. Ormen (82°50' lat. N., 25°00' long. W.), an inlet from the north side of G. B. Schley Fjord, Hans Egede Land. Collections made by E. Knuth on slopes near the shore. Visited on May 15, 1950.

76. G. B. Schley Fjord (83°00' lat. N., 24°30' long. W.), near the mouth of the fjord, south of Kap Isak Glückstadt, Hans Egede Land. Collections made by J. Troelsen in delta and on a plain 160 m above sea-level. Visited on May 23, 1949.

77. Kap John Flagler (83°10' lat. N., 25°00' long. W.), southern cape of the mouth of Frederick E. Hyde Fjord, situated in Hans Egede Land. Visited by E. Knuth on April 8, 1950.

78. Frederick E. Hyde Fjord (ab. 83°10' lat. N., 26°15' long. W.). The situation of this locality cannot be given with certainty. The few plants, which are kept in our herbarium, were collected by I. P. Koch in 1907 during the Danmark-Expedition, and the labels of the sheets give as loc. only "Hyde-Fjord". The dates on the labels are May 14 and May 18. However, I. P. Koch did not camp in Frederick E. Hyde Fjord on May 14, as he was passing the mouth of the fjord northwards to Kap Bridgman, where he camped on May 15. On the following day he went into Hyde Fjord, camping on the north side at about 30 km from its mouth. During the days May 17—20 he spent his whole time on the south coast of the fjord, and it is highly probable that he collected his nine species of higher plants, besides some mosses, in this one locality only, in Hans Egede Land. The date of collecting is probably May 18 in the case of all the specimens, and the date May 14 therefore is probably a slip of the pen. (See also OSTENFELD & LUNDAGER, 1910).

79. Kap Ole Chiewitz ( $83^{\circ}18'$  lat. N.,  $25^{\circ}30'$  long. W.), northern cape of the mouth of Frederick E. Hyde Fjord, Johs.V. Jensen Land. Visited by E. Knuth on May 11, 1950. Collection from a low, snow-free terrace near a delta.

80. Kap Bridgman ( $83^{\circ}25'$  lat. N.,  $26^{\circ}00'$  long. W.); the botanical loc. was situated a couple of km SE of the cape in Johs.V. Jensen Land. This, the northernmost station of Dansk Pearyland Expedition, was visited by E. Knuth on May 9, 1950. Collections from gravelly, coastal plain.

81. Kap Morris Jesup ( $83^{\circ}39'$  lat. N.,  $33^{\circ}00'$  long. W.), Johs.V. Jensen Land. The northernmost cape of the world. Visited by Lauge Koch during "The Bicentary Jubilee-Expedition to North Greenland" on May 13, 1921. One species only was brought home from this place, *Saxifraga oppositifolia*.

#### VI. Northern Inner District.

This district includes localities nos. 82—96, which were all visited by E. Knuth in the spring of 1950. The material from these localities is not very rich, but judging from the contents of the proofs and from verbal information by Knuth, the flora of this district is most closely related to that of districts II and IV; this means a poor vegetation, where communities with *Dryas*, *Salix*, *Carex misandra*, *Carex nardina* are the most important.

82. North side of Frederick E. Hyde Fjord ( $83^{\circ}12'$  lat. N.,  $28^{\circ}00'$  long. W.), Johs.V. Jensen Land west of Flammens Fjord. Visited by E. Knuth on April 11, 1950. Collection from gravelly terraces very poor in vegetation.

83. North side of Frederick E. Hyde Fjord ( $83^{\circ}13'$  lat. N.,  $28^{\circ}30'$  long. W.), Johs.V. Jensen Land, about 8—10 km west of Flammens Fjord. Visited by E. Knuth on April 12, 1950; collection from a slope near the beach.

84. North side of Frederick E. Hyde Fjord ( $83^{\circ}13'$  lat. N.,  $29^{\circ}30'$  long. W.), Johs.V. Jensen Land. Collections made by E. Knuth in rather luxuriant vegetation of *Salix arctica* on April 13, 1950.

85. North side of Frederick E. Hyde Fjord ( $83^{\circ}06'$  lat. N.,  $31^{\circ}00'$  long. W.), Johs.V. Jensen Land, just west of Midtkap. Collections made by E. Knuth on May 5, 1950, in a scree.

86. North side of Fredrick E. Hyde Fjord ( $83^{\circ}05'$  lat. N.,  $31^{\circ}30'$  long. W.), Johs.V. Jensen Land, about 10 km off Midtkap, between



Fig. 9. Loc. 91, Nordkroneli, about 600 m. In the background the highest mountain in Peary Land, "Nordkronen" (1950 m), seen from the north. April 19, 1950. Phot. E. KNUTH.

this cape and the mouth of Frigg Fjord. Visited by E. Knuth on May 5, 1950.

87. Kap Kraka (83°05' lat. N., 32°00' long. W.), eastern corner of Frigg Fjord and Frederick E. Hyde Fjord, Johs.V. Jensen Land. Visited by E. Knuth June 14—15, 1950.

88. Frigg Fjord (83°06' lat. N., 32°00' long. W.), west side of the fjord, Johs.V. Jensen Land, just north of the preceding loc. Collections made by E. Knuth on April 15, 1950, from gravelly, coastal plains.

89. Frigg Fjord (83°10' lat. N., 32°30' long. W.), west side of the fjord, Johs.V. Jensen Land. Visited by E. Knuth on April 15, 1950. Collections from delta.

90. Kap Regnar Lodbrog (83°02' lat. N., 32°30' long. W.), western corner of Frigg Fjord and Frederick E. Hyde Fjord, Johs.V. Jensen Land. Visited by E. Knuth on May 3, 1950. Collections from delta.

91. Nordkroneli ( $82^{\circ}56'$  lat. N.,  $32^{\circ}00'$  long. W.) on the southern side of Frederick E. Hyde Fjord. Collections made by E. Knuth on April 19, 1950, on a N-exposed slope about 450 m above sea-level.

92. Frederick E. Hyde Fjord ( $82^{\circ}56'$  lat. N.,  $33^{\circ}30'$  long. W.), on the south side of the fjord, east of the mouth of Thor Fjord. Visited by E. Knuth on April 20, 1950.

93. Harebugt ( $82^{\circ}55'$  lat. N.,  $35^{\circ}00'$  long. W.) at the head of Frederick E. Hyde Fjord, Johs.V. Jensen Land. Collectings from stony terraces and hollows. Visited by E. Knuth on April 24 and 30, 1950.

94. Nordpasset ( $82^{\circ}55'$  lat. N.,  $35^{\circ}30'$  long. W.), eastern end near the head of Frederick E. Hyde Fjord, Johs.V. Jensen Land. Visited by E. Knuth on April 24, 1950. Collection from delta.

95. Head of O. B. Bøggild Fjord ( $83^{\circ}00'$  lat. N.,  $37^{\circ}00'$  long. W.). Visited by E. Knuth on April 25, 1950. Collectings from delta.

96. Kap Bopa ( $83^{\circ}00'$  lat. N.,  $38^{\circ}00'$  long. W.), southern corner of the mouth of O. B. Bøggild Fjord. Visited by E. Knuth on April 16, 1950.

### VII. Jørgen Brønlund Fjord.

During the four years of the Dansk Pearyland Expedition the headquarters of the expedition was at the south side of Jørgen Brønlund Fjord. Of one winter and four summers spent by the present writer in Peary Land, the greater part by far was spent here, for this reason that the difficulties in visiting other parts of the country, especially during the summer-time, are very great, Jørgen Brønlund Fjord being the one and only fjord upon which it was possible to use a boat. So this area was very thoroughly investigated, and is by far the best known area within Peary Land. Therefore it seems most appropriate to treat it as a separate district, notwithstanding the fact that it does not form a phytogeographical unit.

The geological structure of the area around the fjord has been treated in a paper by TROELSEN (1949). The plateaus north and south of the fjord are formed by sandstones and dolomites of Eo-Cambrian and Cambrian age. On the north side of the fjord the slopes of the mountain "Buen" run steeply down to the fjord, while on the southern side there is a very broad foreland of raised sea-bottom, reaching an elevation of 65—70 m above present sea-level (cf. TROELSEN, 1952).

The Jørgen Brønlund Fjord district, as treated here, is situated between about  $82^{\circ}05'$ — $82^{\circ}12'$  lat. N. and between about  $30^{\circ}$ — $32^{\circ}$  long. W. It is divided into 7 areas, 6 of which are situated south of the fjord in Heilprin Land, and one (*D*) on the north side of the fjord in



Fig. 10. View at Jørgen Brønlund Fjord, showing the situation of the wintering station (in the centre). The clayey fields of raised sea-bottom in the foreground are completely sterile. Opposite the fjord: left the mountain Buen, centre the entrance of Børglum Elv valley, right Melville Land. Aug. 17, 1948. Phot. KH.

Erlandsen Land (see the map fig. 11). The broad lowland (from 0—100 m elevation) on the south side of the fjord is divided into three areas: *C*, *A* and *E*. *C* is the area between Botaniker Elv and the river emerging at Vandfaldsnæs. *A* is the area west of *C* and west to Kajakelv. And *E* the area from Kajakelv to Glaciologelv. The floras of these three areas show no considerable differences, which could not be expected either, as the edafic and climatic conditions here are almost identical. Vegetation is specially characterized by the fact that real soil (clay and sand) is present in large quantities. The most important plant-communities are *Carex stans*-meadows, *Eriophorum triste*-meadows, *Eriophorum scheuchzeri*-meadows in wet soil, *Carex misandra*-communities, *Salix arctica*-communities and *Saxifraga setigera*-*Luzula arctica*-communities in

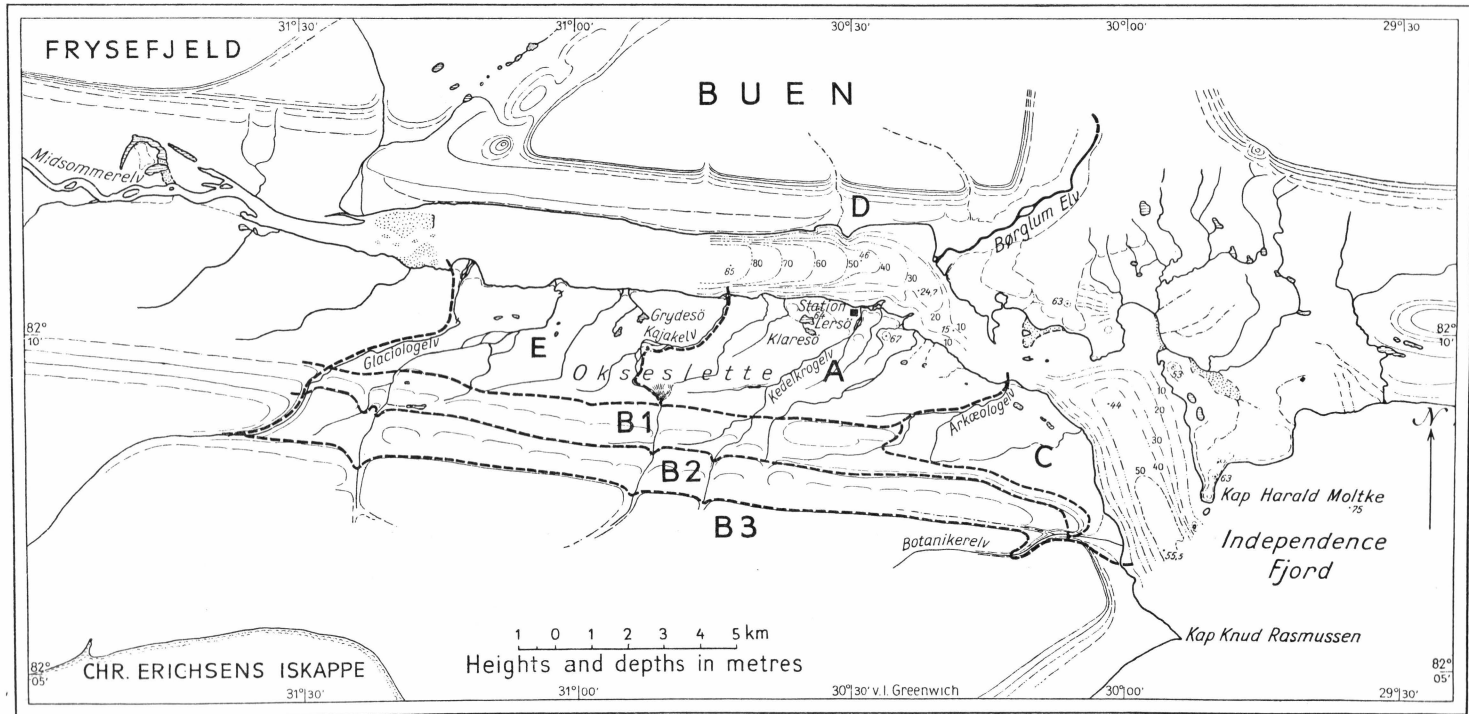


Fig. 11. Map of Jørgen Brønlund Fjord, showing the botanical localities of district VII (cf. the text). By T. NIELSEN.

moist soil, and *Dryas-Carex nardina*-heath and *Melandrium triflorum*-communities in dry soil. A vegetation closely related to that of districts II and IV, but nearest to IV.

South of these three areas, the plateau on which Chr. Erichsens Iskappe is situated (at about 1100 m above sea-level), is reached step by step along several terraces. Everywhere the ground is very stony, and places with sandy or clayey soil are rare. Consequently vegetation is not found to any considerable extent.

According to the altitude this area is divided into three parts.

**B 1**, terraces between 100—400 m above sea-level.

**B 2**, terraces between 400—700 m above sea-level.

**B 3**, terraces above 700 m, including the plateau of Heilprin Land.

The vegetation of **B 1** is closest related to that of the lowland, but it is so extremely poor that we may hardly speak of plant-communities. Only here and there small spots with *Dryas-Carex nardina*-heath and *Carex stans*-meadows are seen.

Contrary to this the vegetation of **B 2** is quite another and very different one from that of the lowland; it very much resembles that of district III and the one of the coasts of Peary Land, with *Cassiope*-heath, stone-fields with *Potentilla hyparctica*, *Poa glauca*, *Trisetum spicatum*, *Luzula confusa*, *Carex rupestris*, and a frequent occurrence of the mosses *Aulacomnium turgidum*, *Orthotrichum killiasii*, *Tomentypnum nitens*, and the lichen *Cetraria nivalis*. Some of the lowland communities are, however, still found at these altitudes, but always in small spots only (e. g. *Carex stans*- and *Eriophorum triste*-meadows, and *Dryas-Kobresia*-heath. The great differences between the vegetation of this area and that of the lowland will be discussed later on p. 137.

The area above 700 m, **B 3**, was not visited by the present writer, but several samples of plants were collected by B. Fristrup. Judging from his information and from the collections, vegetation is rather poor here, and only few species may be found; they were, however, all found even very close to the edge of the ice-cap covering the top of Heilprin Land (some 1100 m up). It may be noted that the main part of the species growing at these altitudes, are species which are widespread and common in Greenland, e. g. *Papaver radicum*, *Cerastium alpinum*, *Saxifraga oppositifolia*, *S. caespitosa*, *Cardamine bellidifolia* and *Polygonum viviparum*.

**D** is the area on the north side of Jørgen Brønlund Fjord, from Kap Harald Moltke westwards to the head of the fjord. It is clearly divided into two part, east and west of Børglum Elv. The former consists of the large accumulations from the river and of clayey fields of raised sea bottom. Vegetation here is extremely poor. The western part of the area is formed by the steep S-exposed slopes of the mountain



Fig. 12. Close to the rivulets vegetation is usually rather rich. Chiefly consisting of *Salix arctica*, *Draba bellii*, *Melandrium apetalum* and *Colpodium vahliianum*. Jørgen Brønlund Fjord, not far from the station. July 7, 1949. Phot. KH.

Buen and the foot of it. Vegetation in this part is found only from sea-level and up to about 200 m. The upper part of the mountain Buen consists of steep, sterile screes and rocky walls. Because of inclination and exposition no wet ground is found, and only *Dryas*-heath, *Kobresia myosuroides*-heath and *Carex misandra*-vegetation play a part here, besides the *Melandrium triflorum*-community of the clayey slopes near the beach. The vegetation of area *D* is closest related to that of district II.

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## LIST OF SPECIES

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Within the four main groups: *Pteridophyta*, *Dicotyledones gamopetalae*, *D. sympetalae* and *Monocotyledones*, the families, the genera and the species are arranged alphabetically. A more precise reference to the original description of the individual species is not made. On the other hand, reference is always made to the literature dealing with material previously collected in the area. Collector's name is given after name of locality, in brackets. The following abbreviations are used: TA = Torben Andersen, KF = Karl Filemosen, PF = Peter Freuchen, BF = Børge Frstrup, KH = Kjeld Holmen, PJ = Palle Johnsen, EK = Eigil Knuth, ER = K. Ellitsgård Rasmussen, ÅS = Åge Sahlertz, MW = Mogens Westergård, and TW = Thorild Wulff.

### **Pteridophyta.**

#### *Equisetum arvense* L.

##### Localities:

III: 33 Itukussuk Dal (BF), (noted in 45 Saxifragadal (KH)).  
48b Lolland Sø (EK).

VII: Jørgen Brønlund Fjord: A, B1, E. (KH).

Rather common in the lowland at Jørgen Brønlund Fjord, growing in moist or wet soil, often rich in mosses. Sometimes it was found growing in small pools of shallow water. During the winter it is covered only with thin layers of snow, or is completely free. *Strobili* is commonly met with. The strobili are found either at the apex of pale shoots, and this is the commonest, or at the top of green, branched shoots. The first type appears very early in spring, so that in Saxifragadal *strobili* with spores nearly ripe were seen as early as June 7, just as early as *Saxifraga oppositifolia* begins its flowering. The other, the so-called forma *campestris* (SCHULTZ) MILDE, has no ripe spores until much later. All collections were made below 150 m.

It may be said that *E. arvense* in Peary Land is very different from the same plant growing in temperate areas, and that consequently various arctic types of the species have been separated. Among these my material may probably be referred to var. *riparia* (FR.) MILDE (conf. BÖCHER 1938). HYLANDER (1953), however, maintains that a separation of taxa within this complex is not possible until intensive investigations, cultivations, and experimental studies have been completed.

From the list it appears that this species should be rare outside Brønlund Fjord. This need not necessarily be the case, as the species may have been overlooked during the sledge-journeys. The Greenland distribution of the species is "circumgreenlandic". Northernmost record is Alert on the north coast of Ellesmere Island (acc. to CALDER & BRUGGEMAN, 1953) 82°31' lat. N.

*Equisetum variegatum* SCHLEICH.

Localities:

II: 18 Sydpasset (PJ).

VII: Jørgen Brønlund Fjord: A, B1 (KH).

The species is rare in Peary Land, found in three localities only. It is growing on moist or wet soil, and always in places rich in mosses. In one place at Jørgen Brønlund Fjord it was found dominating the vegetation in a snow-patch where it was growing together with *Arctagrostis latifolia*, *Alopecurus alpinus*, *Draba lactea* and *Ranunculus sulphureus*. In another place it was found in a *Carex stans*-bog with a deep layer of mosses, especially the species *Cinclidium arcticum* and *Cirriphyllum cirrosum*. Here the snow-cover during the winter was only slight. The specimen from Sydpasset was collected in a moss-meadow. All finds were made below 180 m. Specimens forming *strobili* were not seen.

The finds of the species in Peary Land were made in the interior, very continental areas on calcareous soil. Its Greenland distribution is probably "circumgreenlandic" although it is known only from very few stations in the northern part. Northernmost record is Alert on the north coast of Ellesmere Island 82°31' lat. N. (acc. to CALDER & BRUGGEMAN, 1953).

*Cystopteris fragilis* (L.) BERNH.

OSTENFELD (1915, p. 37); LARSEN (1952, p. 39).

Localities:

III: 36 Kap Schmelck (PF), 40 Blomsterstranden (KH), 43 Kap Glacier (KH), 46 Krognæs (KH, PJ).

VII: Jørgen Brønlund Fjord: A, B2, D, E (KH).

Growing in rocky crevices and on the ground. In rocky crevices it is met with both in basalt and in dolomite. Here it seems independent



Fig. 13. *Cystopteris fragilis* from sun-exposed stony slope. Jørgen Brønlund Fjord, Aug. 1948. Phot. KH.

of the exposure; in sunny places it is low-growing and of a yellowish-brown colour, while in the shade it is green and more vigorous (up to 20 cm high). On the ground it is found on dry sun-exposed, gravelly slopes, often adpressed to stones and often growing together with *Erigeron compositus*, *Melandrium triflorum* and *Lesquerella arctica*. During the winter it is usually snow-covered, but the depth of the snow-covering varies much. Produces spores everywhere, which ripen rather late in summer. Ascends to 500 m.

The Greenland types of *C. fragilis* were recently studied by LARSEN (1952). On the basis of differences in the spores two forms were separated: *C. fragilis s. str.* and a *C.* "Dickieana-type". The occurrence of these in Greenland is given by LARSEN (l. c.) in figs. 1 and 2. From these figures appears that the "Dickieana-type", to which the Peary Land material may be referred, is northern with a southern limit near the Arctic Circle, while *C. fragilis s. str.* is a southern species. LARSEN,

however, does not discuss the taxonomic status of these two taxa. This is done by HYLANDER (1953), according to whom the Peary Land plants should bear the name *C. fragilis ssp. dickieana* (SIM.) HYL.

Just like *Woodsia* this species was found in Peary Land only in the areas around or near the head of Independence Fjord, but of the two *Cystopteris* is far the commonest. Northernmost record is from Grant Land, Ellesmere Island 82°30' lat. N. (acc. to POLUNIN, 1940).

*Woodsia glabella* R. BR.

OSTENFELD (1915, p. 375).

Localities:

III: 36 Kap Schmelck (PF), 39 Diabasholme (KH), 45 Saxifragadal (KH).

VII: Jørgen Brønlund Fjord: A, B1 (BF, KH).

Found only in few places, often growing in sunny, slightly moist rocky crevices, both on basalt and on dolomite. During the winter it is covered with thin layers of snow only, and is early free in spring, at Diabasholme as early as June 6. Owing to its growing-place it is rarely found together with plants other than mosses, among the latter often with *Timmia austriaca*. The species usually produces ripe spores late in summer. Not seen above 200 m.

The distribution in Peary Land is the same as that of the preceding species. The Greenland distribution was mapped by BÖCHER (1938). To this map may be added the find mentioned by SEIDENFADEN & SØRENSEN (1937) and those by BÖCHER (1952). It is mainly northern, on the west coast rare south of the Arctic Circle. On the east coast it is rare south of Scoresby Sund, but is found as far south as about 61°30' lat. N. Northernmost record is Jørgen Brønlund Fjord 82°10' lat. N. (KH).

**Caryophyllaceae.**

*Arenaria ciliata* L.

Localities:

III: 33 Itukussuk Dal (BF).

The species was found only in a single place. It was growing on moist, sandy soil near the river in Itukussuk Dal, about 150 m above sea-level. The find was made on July 27, at a time when the plant was still flowering. Besides the flowers many empty capsules from the preceding year were present, so the species produces ripe seeds. On the wintering conditions of the species nothing can be said.

The Peary Land specimen belongs to the ssp. *pseudofrigida* (OSTENF. & DAHL), the taxonomy and phytogeography of which have been specially treated by NORDHAGEN (1935), and by GELTING (1934). The distribution of this ssp. is mapped by the former in fig. 10; to this map some new stations may be added those of SEIDENFADEN & SØRENSEN (1937) and the single Peary Land status. These new finds, however, do not materially change the picture of the total area, although the area of the station in Peary Land extends about 450 km farther north. This is the northernmost as well as the westernmost station of the ssp. *pseudofrigida*, 82°05' lat. N., 33° long. W. (BF).

*Cerastium alpinum* L.

SIMMONS (1909, p. 79); OSTENFELD (1915, p. 376 and 1923b, p. 233).

Localities:

- I: 1 Lockwood Ø (Lockwood), 3 Low Point (TW), 11 Strømstedet (TW).
- II: 15 Head of I.P.Koch Fjord (PJ), 16 Aftenstjernesø (JT), 21 Baggården (KH), 27 Mågeklippe (KH), 29 Søjren (KH).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 47 a Zig-Zag Dal (PF), 48 a Kap Holbæk (EK).
- IV: 49 Koralkysten (KH), 53 Neergaard Elv (KH), 58 Hagen Fjord (ÅS), 62 Prinsesse Dagmar Ø (EK), 63 Nord (MW).
- V: 65 Kap Vaarbrud (KH), 67 Mudderbugten (KH), 69 Kap Eiler Rasmussen (KH), 70 and 71 Herlufsholm Strand (KH), 72 Hellefiskefjord (JT), 80 Kap Bridgman (EK).
- VI: 85 North coast of Frederick E. Hyde Fjord (EK).
- VII: Jørgen Brønlund Fjord: A, B2, B3, C, D (BF, KH).

Very common everywhere on moist or slightly moist ground and frequently met with in several plant-communities, e.g. in deltas, snow-patches, slopes and stone-fields. Is never found in wet or in completely dry places. During the winter it is often found without any snow-covering, but is on the other hand also found growing in snow-patches with several metres of snow-covering; in such places the species is not free of snow until the first days of August. The flowering begins rather early (in winter-snow-free places), first flowering species being observed on June 18. Produces ripe seeds everywhere. Ascends to 1100 m above sea-level, and is even common at these altitudes.

Like many of the other species in Greenland this too belongs to a complex of species rich in variation, of which an acceptable account is still wanting. The variation of the species within Peary Land is very

slight; all material belongs to a densely tufted and hairy form, with rather short and obtuse leaves.

Known in all parts of Peary Land, and having a total Greenland distribution, "circumgreenlandic". Northernmost record is Kap Bridgman 83°30' lat. N. (EK).

*Cerastium regelii* OSTENF.

OSTENFELD (1915, p. 376 and 1923b, p. 233); in both sub. nom. *C. alpinum* f. *pulvinatum* SIMM.

Localities:

- I: 3 Low Point (TW), 6 Lemming Fjord (TW), 11 John Murray Ø (TW).  
III: 37 Sidste Næs (PF).  
IV: 54 Slesbager Elv (KH), 63 St. Nord (MW).  
V: 65 Kap Vaarbrud (KH), Kap København (KH), 67 Mudderbugten (KH), 70 and 71 Herlufsholm Strand (KH).  
VII: Jørgen Brønlund Fjord: A (KH).

In Peary Land the species is common only in the outer coastal areas. On the eastern outer coast, where the present writer had the opportunity of studying it, it was frequently met with in hollows with meadow-like vegetation, rich in mosses. The specimens here were very small, and did not seem to have been flowering. The snow-covering during the winter was very slight, or lacking entirely; in most localities the species was free from snow in the first days of May. At Jørgen Brønlund Fjord the species was found in a few places in the lowland, growing on wet soil in mossy swamps or along rivers, forming large, dense, and arched cushions with a diameter of up to 20 cm. The largest of the tufts were usually flowering, but always very scantily. The flowering is late, first specimens with flowers seen on July 13. In spite of the late flowering specimens with ripe seeds were found here and there. However, the most important propagation of the plant is probably achieved by means of vegetative shoots, easily detached.

*C. regelii* was already described by OSTENFELD (1909), the diagnosis based upon American material. Later, nevertheless, in (1915) and (1923b), he referred all material of this species, collected during the 1st and 2nd Thule Expeditions, to *C. alpinum* f. *pulvinatum* SIMM. It seems as if OSTENFELD was not satisfied with his own species, which is rather remarkable, as the species, also in the field, is easily recognized by its fresh green, rather glabrous, and almost succulent leaves. Further the plant is very fragile, dropping off shoots, leaves and flowers very easily. For further information on the species in Greenland see treatise by GELTING (1934), in which a map of its Greenland distribution is



Fig. 14. *Melandrium apetalum*, growing in mossy swamp in delta. Jørgen Brønlund Fjord, Aug. 1948. Phot. KH.

found in fig. 7. It is in Greenland a north-eastern species, extending from Scoresby Sund on the east coast and northwards to the area west of Peary Land. As mentioned in SEIDENFADEN & SØRENSEN (1937), a record of the species from Disko on the west coast, is not correct. Northernmost find at Low Point 83°09' lat. N. (TW).

*Melandrium apetalum* (L.) FENZL.

OSTENFELD (1923b, p. 233).

Localities:

- I: 3 Low Point (TW), 9 Strømstedet (TW).
- II: 18 Sydpasset (PJ), 24 Øvre Midsommersø (KH).
- III: 33 Itukussuk Dal (BF), 40 and 42 Blomsterstranden (KH), 46 Krog-næs (PJ).
- V: 71 Herlufsholm Strand (JT).

VI: 90 Frederick E. Hyde Fjord (EK), 93 Harebugt (EK), 95 Head of O. B. Bøggild Fjord (EK).

VII: Jørgen Brønlund Fjord: A, B2, C, D, E (KH).

A species which, more so than others of the area, is confined to deltas and river-banks, growing in scattered tufts in a very open vegetation, often together with *Colpodium vahlianum*, *Draba bellii* and *Draba lactea*. Sometimes it is also found in more close vegetation; there are for example always small quantities in the moss-free *Carex stans*-meadows. Contrary to *M. triflorum*, this species is often found in wet ground. During the winter the species is usually free of snow, but is sometimes found in snow-patches early free from snow. Flowering specimens observed as early as June 26. Produces ripe seeds. At Jørgen Brønlund Fjord the species was common in the lowland, but found up to 500 m above sea-level.

The Peary Land material may be referred to ssp. *arcticum* (FR.) HULT. It seems to occur in all parts of the country, apparently unaffected by local climatic conditions. Its Greenland distribution is northern, the southern limit on the east coast at Kap Dalton, and on the west coast at about 69° lat. N. Northernmost record is at Low Point 83°09' lat. N. (TW).

*Melandrium triflorum* (R. BR.) J. VAHL.

OSTENFELD (1915, p. 377; sub. nom. *M. triflorum* and *M. affine* J. VAHL.

Localities:

II: 15 Aftenstjernesø (PJ), 18 Sydpasset (PJ), 19 Baggården (KH), 20 Baggården (PJ), 25 Øvre Midsommersø (KH), 26 Nedre Midsommersø (JT), 27 Mågeklippe (KH), 29 Sølejren (KH), 30 Børglum Elv (JT), 31 Børglum Elv (TA).

III: 33 Itukssuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 48a Kap Holbæk (EK).

IV: 49 Koralkysten (KH).

VI: 85 North side of Frederick E. Hyde Fjord (EK), 94 Nordpasset (EK).

VII: Jørgen Brønlund Fjord: A, B2, D, E (KH).

From an ecological point of view this species is sharply separated from the preceding one, and the two never grow together. It prefers dry ground, but is here found in two different biotopes, one of which grows in very dry, gravelly places, exposed to wind and sun, and with little or no protection of snow during the winter. Here it often grows together with *Lesquerella arctica*, *Erigeron compositus*, *Oxyria digyna*, *Dryas integrifolia*, *Poa abbreviata* a. o., forming a very open vegetation. The other biotope is growing on clayey slopes exposed S or SE, and



Fig. 15. Flowering specimen of *Melandrium triflorum* on dry, clayey slope at lake Klaresø, Heilprin Land. Aug. 9, 1947. Phot. KH.

with a very heavy (3—4 m) snow-covering during the winter. Owing to the exposition such places are, however, rather early free of snow in spring. Just after the melting of the snow the soil is wet to moist, but dries rather fast. The species is a prominent component in a fairly open moss-free plant-community with e. g. *Braya thorild-wulffii*, *Taraxacum pumilum*, *T. arctogenum*, *Oxyris digyna*, *Papaver radicum*, and *Salix arctica*. pH of this community was found to be rather high, always exceeding 7.

The specimens in the places free of winter snow are of course early flowering, first flowering plant seen on June 24. The colour of the petals is white or pink, the former just as common as the latter, but specimens with pink flowers are most frequently met with in the early part of the summer, as are the white-flowering specimens in the late part. The flowers were often seen being visited by humble-bees and flies. The species produces ripe seeds everywhere.

The origin, the cytological conditions, and the relationship to *M. furcatum* (*M. affine*), has recently been investigated by NYGREN (1951), and the cytology was furthermore examined by HOLMEN (1952) on material from this area, and it is mentioned that *M. furcatum* was being searched for in Peary Land, but with no result. A certain specimen,

however, from Kap Schmelck, picked by Peter Freuchen was in OSTENFELD (1915, p. 377) referred to *M. affine*, but after having seen the specimen I do not doubt that it really belongs within *M. triflorum*. It may, on the other hand, be mentioned that some of my own collections, gathered during the sledge-journeys, and thus in wintering condition and without flowers, could not with certainty be referred to *M. triflorum*, although undoubtedly they belong within this species.

The occurrence of the species in Peary Land is characteristically enough restricted to the innermost parts of the country, common especially in the lowland, but ascending to 500 m. Its Greenland distribution is northern, with southern limit on the east coast at Scoresby Sund, and on the west coast at the Arctic Circle. Northernmost record at the north side of Frederick E. Hyde Fjord 83°06' lat. N. (EK).

*Minuartia rubella* (WG.) HIERN.

OSTENFELD (1915, p. 377) sub. nom. *M. verna* (L.) HIERN. var. *rubella* WG; OSTENFELD (1923b, p. 234).

Localities:

- I: 3 Low Point (TW), 4 Kap Benet (TW), 9 Strømstedet (TW), 11 John Murray Ø (TW).
- II: 15 Head of I.P. Koch Fjord (PJ), 19 Baggården (KH), 20 Baggården (PJ), 21 Baggården (KH), 24 and 25 Øvre Midsommersø (KH), 29 Sølejren (KH, PJ), 31 Børglum Elv (TA).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 42 Blomsterstranden (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 47a Zig-Zag Dal (PF), 48a Kap Holbæk (EK).
- IV: 49 Koralkysten (KH), 53 Neergaard Elv (KH), 63 Nord (MW).
- V: 65 Kap Vaarbrud (KH), 67 Mudderbugten (KH), 68 South coast of Herlufsholm Strand (KH), 69 Kap Eiler Rasmussen (KH), 70 and 71 Herlufsholm Strand (KH), 72 Hellefiskefjord (JT).
- VI: 95 Nordpasset (EK).
- VII: Jørgen Brønlund Fjord: A, B1, B2, B3, C, D, E (BF, KH).

Common on dry soil, whether clayey, sandy or gravelly. Is never found in wet soil, but sometimes in moist. It prefers places exposed to the sun, with few other species, and thus rarely enters the close plant-communities. A single exception from the communities on dry, SE-exposed slopes with *Melandrium triflorum*, *Braya thorild-wulffii* etc., where it is rather frequent. It is usually free of snow during the winter, but it may be found with a heavy protection of snow, though always in places where the snow disappears fast in spring. Commonly flowering

on the first days of July; first flowering specimen seen on June 26. Produces ripe seeds. Ascends to 1000 m above sea-level, but is most frequent in the lowland.

Common everywhere in Peary Land, and further known from most parts of Greenland, except from the southern part of the east coast. Northernmost record is Low Point 83°09' lat. N. (TW).

*Sagina intermedia* FENZL

OSTENFELD (1915, p. 377).

Localities:

III: 37 Sidste Næs (PF).

From this area the species is known from the above mentioned place only, so the Dansk Pearyland Expedition did not succeed in finding it, though everyone was looking eagerly for it. The species must be considered very rare in Peary Land, and therefore new features as to its biology and ecology are not given here. Its Greenland distribution is nearly total. Northernmost record is Sommerdalen 82°29' lat. N. (TW), west of Peary Land.

*Silene acaulis* JACQ.

OSTENFELD (1915, p. 377; 1923b, p. 235).

Localities:

I: 3 Low Point (TW), 7 Mascart Inlet (ER), 9 Strømstedet (TW).

III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabas-holme (KH), 40 Blomsterstranden (KH), 41 Diabasnæs (KH), 45 Saxifragadal (KH), 46 Krognæs (PJ), 47b Sjællandsslette (PF).

In Peary Land growing under very different conditions, in stony deltas, on rocky shelves, or in moist, boggy places, together with *Cassiope* and *Vaccinium* and an abundance of mosses. During the winter the species is free of snow or covered with thin layers only. Although free of snow in early spring, the species is, nevertheless, very late flowering. Specimens collected by FRISTRUP in Itukussuk Dal on July 25 were in full flower. Produces ripe seeds everywhere. Not found above 200 m.

The occurrence of *Silene* in Peary Land is very much like that of *Cassiope* and several others, but it seems absent from the eastern outer coast. It is fairly common in the area around the head of Independence Fjord and in north western Peary Land. Its Greenland distribution is totally "circumgreenlandic". Northernmost record is Low Point 83°09' lat. N. (TW).

The Peary Land material may be referred to var. *exscapa* (ALL.) D.C. because of its campanulate form, purplish calyces, and its rather short scapes. On this variety see further FERNALD & ST. JOHN (1921).

*Stellaria longipes* GOLDIE coll.

OSTENFELD (1915, p. 377 and 1923b, p. 235).

Localities:

- I: 6 Lemming Fjord (TW), 11 John Murray Ø (TW).
- II: 24 Øvre Midsommersø (KH), 31 Børglum Elv (JT).
- III: 33 Itulussuk Dal (BF), 35 Vildt Land (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 43 Kap Glacier (KH), 45 Saxi-fragadal (KH), 48a Kap Holbæk (EK), 48b Lolland Sø (EK).
- IV: 53 Neergaard Elv (EK), 54 Slebsager Elv (KH), 60 Prinsesse Thyra Ø (ÅS), 61 Kap Kronborg (PF), 63 Nord (EK, MW).
- V: 64 Kjøvesletten (KH), 65 Kap Vårbrud (KH), 66 Mudderbugten (KH), 69 Kap Eiler Rasmussen (KH), 70 and 71 Herlufsholm Strand (KH), 72 Head of Hellefiskefjord (JT).
- VI: 93 Harebugt (EK), 96 Kap Bopa (EK).
- VII: Jørgen Brønlund Fjord: A, B2, C (BF, KH).

The above list includes all finds of *Stellaria longipes* of the area, the name here used in the most comprehensive sense, as it was used by numerous authors previous to the appearance of the treatise on this form-complex by HULTÉN (1943), in which he accounts for and describes several micro-species within the complex. A reliable determination of these species is dependent on the presence of flowers; unfortunately these were lacking on the greater part of the material, which was collected during sledge-journeys and accordingly still in wintering condition. I spent some time trying to separate the species by the characters of the leaves, but in vain. This part of the material could not be referred to anything closer than to *S. longipes s. lat.* It is my impression, however, that the bulk of it belongs within *S. crassipes*. The list above is given merely to demonstrate that *Stellaria longipes* is very common in Peary Land.

The list includes, too, the material collected during the 1st and 2nd Thule Expeditions, by Peter Freuchen and Thorild Wulff, resp. This material was first examined by OSTENFELD (l. c.), and later revised by BÖCHER (1951b) in his monograph on the Greenland *Stellaria longipes*-complex. According to this latter 4 species should occur in Peary Land, viz. *S. crassipes*, *S. ciliatosepala*, *S. laeta* and *S. laxmanni*. I agree that the two first mentioned species do occur. On *S. laeta* BÖCHER (l. c.) p. 414 states, "North-East Greenland: (?) Adam Bjerings Land, 800 m above sea-level (9/1910 P. Freuchen (C))". The specimen, however, was

not collected in Adam Bjerling Land in southern Peary Land (which area was not visited by Freuchen until the summer of 1912), but on Adam Bjerings Nunatak in North-West Greenland. A number of other specimens in our herbarium, collected on Adam Bjerings Nunatak, have unfortunately likewise been mis-labelled Adam Bjerings Land by Ostenfeld. In this way the said specimen also finds its place within the closed area of *S. laeta*.

On *S. laxmanni* BÖCHER (l. c.) p. 415 gives the station as 82°53' Lemming Fjord (6/1917 TH.WULFF (C)). As mentioned by BÖCHER himself the material is very poor, and the determination must be rather uncertain. I have seen the material, but could not find any pubescence on the sepals, so I am inclined to refer it to *S. crassipes*.

*Stellaria ciliatosepala* TRAUTV.

Localities:

II: 31 Børglum Elv (JT).

III: 38 Kap Ejnar Mikkelsen (KH).

Very little can be said on the ecology and phenology of this species, as there was no opportunity of studying it in the field in the summer. At Kap Ejnar Mikkelsen it was growing in a moist stone-field near a pond together with *Cassiope*, *Silene*, *Trisetum*, *Poa arctica*, *Saxifraga oppositifolia* a. o. It may during the winter have been covered with only small amounts of snow, thus being free already at the time of collecting (June 6). The specimen from Børglum Elv was collected by TROELSEN, in slightly moist, sandy flats, together with *Deschampsia brevifolia*, *Poa hartzii*, *Oxyria*, *Chamaenerium* and *Potentilla pulchella*. This specimen was still flowering (Aug. 5). Both places of collection were situated below 200 m above sea-level. Ripe seeds were not found.

The Greenland distribution of the species is mapped by BÖCHER (1951) fig. 5, an area stretching from Scoresby Sund on the east coast and north round to Disko on the west coast. Northernmost record is Børglum Elv 82°23' lat. N. (JT).

*Stellaria crassipes* HULTÉN

OSTENFELD (1915, p. 377) and (1923b, p. 235) sub. nom. *S. longipes*; BÖCHER (1951, p. 408).

Localities:

I: 6 Lemming Fjord (TW), 11 John Murray Ø (TW).

III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 48a Kap Holbæk (EK).

IV: 63 Nord (EK, MW).

VI: 93 Harebugt (EK).

VII: Jørgen Brønlund Fjord: A, B2 (BF, KH).

The information given here on the ecology of this species is chiefly based upon studies in the field at Jørgen Brønlund Fjord, where the identity of the species could still be controlled. It was very common here, found under the most different ecological conditions, growing in almost all kinds of vegetation, from wet, mossy swamps to dry, gravelly slopes. During the winter the species is found completely free of snow as well as in the most extreme snow-patches with a snow-protection of 4—5 m, sometimes it is found covered with ice.

Flowering is rather early, first specimen with flowers seen on June 22. Specimens with ripe seeds were not seen. Ascends to 600 m.

It may be presumed that *S. crassipes* is common and widespread all over Peary Land. Its Greenland distribution is mapped in BÖCHER (1951) fig. 5. Like the preceding species it finds its southern limits at Scoresby Sund and on Disko. It has, however, only few stations in north-eastern Greenland. Northernmost record is Harebugt at the head of Frederick E. Hyde Fjord 82°55' lat. N. (EK).

### Cruciferae.

#### *Braya purpurascens* (R. BR.) BUNGE

##### Localities:

II: 15 Head of I.P. Koch Fjord (PJ), 19, 20, and 21 Baggården (KH, PJ), 32 Børglum Elv (JT).

III: 33 Itukussuk Dal (BF), 48b Lolland Sø (EK).

VI: 93 Harebugt (EK).

VII: Jørgen Brønlund Fjord: A, B1, C, D, E (KH).

In the lowland at Brønlund Fjord rather common on moist, sandy soil, rare in other places. It is growing along rivers, in deltas, and often also in open plant-communities, in places without snow, as well as in places with a large protection of snow during the winter. The species is always absent from vegetation rich in mosses, but is frequently met together with species like *Saxifraga flagellaris* and some of the *Draba* species. The species is commonly flowering in the first days of July, dependent on the time when it becomes free of snow. First flowering specimen seen on June 22. Produces ripe seeds everywhere. Ascends to 200 m above sea-level.

The size of the plants in Peary Land varies somewhat, but this variation is undoubtedly due to the different conditions in the growing-places. Also a variation in the pubescence of the whole plant was found, though it is never so dense as that of *B. thorild-wulffi*. The difference in the pubescence of the leaves in the two species may often be used to separate specimens with no flowers or fruits. The margins of the

leaves of *B. purpurascens* have few hairs, simple as well as branched, while the leaves of *B. thorild-wulffii* have numerous, but exclusively simple, hairs on their margins.

Judging from the list of localities the species is, in Peary Land, confined to the innermost, very continental parts of the country, though completely absent from the Cassiope-zones. Its Greenland distribution is northern, with southern limit at about 70° lat. N., on the west coast as well as on the east coast. Northernmost record is Harebugt at the head of Frederick E. Hyde Fjord 82°55' lat. N. (EK).

*Braya thorild-wulffii* OSTENF.

Localities:

II: 21 Baggården (KH), 32 Børglum Elv (JT).

III: 48b Lolland Sø (EK).

VII: Jørgen Brønlund Fjord: A, B3, D (BF, KH).

Not common in Peary Land, but rather frequent in the lowland at Jørgen Brønlund Fjord, where it is mostly found on the large areas of old elevated marine terraces, especially on the south side of the fjord. As regards ecology the species has no wide range, being found almost exclusively on dry to slightly moist clayey sand, on slopes exposed to S or SE and during the winter covered with rather large amounts of snow. Owing to the exposition of these slopes the species is nevertheless early free of snow in spring, that is about the end of June. The species is usually growing together with *Taraxacum pumilum*, *Melandrium triflorum*, *Oxyria digyna*, *Potentilla pulchella* and *Draba arctogena*, in soil with a very high pH figure (between 7 and 8.5). Sometimes the species is also met with in very dry, gravelly places, with no snow protection at all during the winter. The flowering is rather early here, first flowering specimen seen on June 20. Produces ripe seeds everywhere. Ascends to 900 m above sea-level, but is very rare above 100 m.

The taxonomic rank of this species has been discussed by SEIDENFADEN & SØRENSEN (1937) with the conclusion that it is a really good species, and the author agrees. The species seems to be endemic to Greenland, but most probably the species will some day be found in Ellesmere too, the flora of which area has much in common with that of Peary Land. In Greenland the species is known only from the area between Germania Land on the east coast and Gunnar Anderssons Dal on the north coast, west of the area treated here. The species is calciphilous and in Peary Land confined to the most continental parts. Northernmost record is still the type-locality in Gunnar Anderssons Dal 82°28' lat. N. (TW).

*Cardamine bellidifolia* L.

OSTENFELD (1915, p. 377 and 1923b, p. 235).

## Localities:

- I: 3 Low Point (TW), 10 Kap Salor (TW).  
 III: 36 Kap Schmelck (PF), 38 Kap Ejnar Mikkelsen (KH).  
 V: 70 Herlufsholm Strand (KH).  
 VII: Jørgen Brønlund Fjord: A, B2, B3 (BF, KH).

In Peary Land this rather insignificant species is always found on wet soil in cushions of moss either along rivulets or in wet spots in stone-fields. It is usually protected by snow during the winter, but only by thin layers, and is accordingly early free in spring. It was found flowering already at the end of June. Produces ripe seeds.

At Jørgen Brønlund Fjord it was found only in a single place in the lowland. The species does not become common until above 450 m above sea-level, just like *Cassiope* and many others. The species was found only in few places outside Jørgen Brønlund Fjord; this may be owing to its small size, as it was easily overlooked during the sledge-journeys. In spite of the few localities the species should no doubt be referred to the same distributional type within Peary Land as that of *Cassiope* (see this species). The species is known in all parts of Greenland except the extreme south. Northernmost record is Low Point 83°09' lat. N. (TW).

*Cochlearia officinalis* L.

## Localities:

- III: 33 Itukussuk Dal (BF), 46 Krognæs (PJ), Lolland Sø (EK).  
 V: 69 Kap Eiler Rasmussen (KH), 77 Kap John Flagler (EK).  
 VII: Jørgen Brønlund Fjord: A, B2, C, E (KH).

The species is undoubtedly more common in Peary Land than appears from the list of localities. Judging from its frequent occurrence at Jørgen Brønlund Fjord it should be possible to find it in all parts of the country, but like the preceding species it may have been overlooked during the sledge-journeys because of its small size. The species is growing on moist ground, either in sandy-gravelly river-beds and deltas, where during the winter it is usually free of snow, or in long-lasting snow-patches, in sandy soil, wet during the growing-season. This species is very resistant, which was proved during investigation of the vegetation of these snow-patches. In August 1950 several specimens of this species were found in full flower in a certain snow-patch; exactly the same spot was covered with snow all during the summer of 1949, but had been free of snow in the summer 1948. Thus, through a period of 23 months, the specimens had resisted a continuous cover of snow and a temperature constantly below zero.

The flowering of the species takes place relatively early, first flowering specimen was seen on June 17. Produces ripe seeds everywhere. Ascends to 500 m above sea-level, but is by far commonest in the lowland.

The material from Peary Land may be referred to var. *groenlandica* (L.) GELERT, for which the name *C. artica* SCHL. has often been used in recent literature. The problems of this form-complex, however, have not yet been solved satisfactorily.<sup>1)</sup>

The species is known from all parts of Greenland, "circumgreenlandic". Northernmost record is Kap John Flagler 83°10' lat. N. (EK).

### Draba.

The study of the arctic *Draba*-Flora may to-day be said to be a study reserved for specialists, but to my knowledge there is no one just now willing to undertake the task of studying and determining the collections of *Drabae* from different parts of the Arctic. And for a non-botanist it is difficult to evaluate the different concepts of the species advanced by previous authors, the most outstanding of which are EKMAN (1929—41), FERNALD (1934), SCHULZ (1927), POLUNIN (1940), TOLMATCHEW & PETKOV (1930) and TOLMATCHEW (1939).

It may be maintained that it is usually rather easy to separate different types or forms of *Drabae* in the field within one's own area.

On one hand some of the Peary Land species are easily determinable and very easily referred to what may be taken as good species; these are: *D. lactea*, *D. subcapitata*, *D. nivalis*, *D. micropetala* and *D. oblongata*. On the other hand, a large variation is found in my material within the groups belonging to the *D. alpina*- and the *D. cinerea*-complex. All material with yellow corellas of the *D. alpina*-group is in this paper referred to *D. bellii* HOLM, while the material of the *D. cinerea*-group is referred to a rather distinct *D. cinerea* and a most variable *D. arctogena* EKM. This grouping procedure may, however, be taken as rather artificial. A definite determination does not seem possible until some future specialist may undertake a general monographic treatment of the Arctic representatives.

#### *Draba arctogena* E. EKMAN.

- OSTENFELD (1915, p. 377 sub. nom. *D. hirta* L. var. *arctica* (J. VAHL) S. WATS.;  
OSTENFELD (1923b, p. 236) sub. nom. *D. magellanica* LAM. var. *cinera* (ADAMS);  
EKMAN (1929, p. 490) sub. nom. *D. groenlandica* EKM. var. *arctogena* EKM.

#### Localities:

I: 9 Strømstedet (TW).

II: 21 Baggården (JT), 25 Øvre Midsommersø (KH), 27 Mågeklippe (KH), 29 Søjren (KH), 31 Børglum Elv (TA).

<sup>1)</sup> SAUNTE has recently (in "Hereditas" 1955) stated that the Greenland species is *C. groenlandica* L.

III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 45 Saxifragadal (KH),  
48a Kap Holbæk (EK), 46b Lolland Sø (EK).

VII: Jørgen Brønlund Fjord: A, B1, B2, B3, C, D, E (BF, KH).

The greater part of the Peary Land material belonging to the *Cinerea* group is referred to this species. While the true *D. cinerea* usually is easy to recognize on the pubescence of the leaves, a dense cover of genuinely stellate hairs with only a few simple hairs on the margins, giving the fresh leaves a special bluish tinge, the pubescence of the leaves of *D. arctogena* is quite different. Here the stellate hairs are usually very sparse, while other types of hairs are dominating; a mixture of simple, furcate, branched and stellate hairs is often met with, and of these the simple hairs are usually dominating. It is my impression that the varying ratio of these hair-types is dependent chiefly on the ecological conditions of the growing-place. Experience from studies in the field show that specimens from dry, exposed places are densely covered with a pubescence of mainly simple hairs, while specimens from moist, or slightly moist, sheltered places are chiefly supplied with stellate and branched hairs. The pubescence of the scapes and the pedicels is usually the same as that of the leaves. On the pods stellate hairs are always dominating.

When EKMAN (1929) states that the *D. cinerea* in Greenland, as determined by previous authors, is more than one species, she is certainly right, though it is doubtful whether all her northern Greenland species within this group, that is *D. arctogena*, *D. groenlandica*, *D. ostensfeldii* and *D. ovibovina*, may be maintained as separate species. In Ellesmere, where similar difficulties no doubt are met with, POLUNIN (1940), on the other hand, includes all material in *D. cinerea*.

All previous material of this area (2 specimens) was studied by EKMAN personally (1929, p. 490) and referred to *D. groenlandica* EKMAN var. *arctogena* (raised later by EKMAN (1936) to the rank of species).

*D. arctogena* seems to be common in Peary Land, at least in the continental parts of the country. At Jørgen Brønlund Fjord it was very common in the lowlands as well as at higher altitudes, ascending to 1000 m. It was growing under most varying ecological conditions, from extremely dry, exposed, gravelly fields with no protection of snow whatever during the winter, to very moist long-lasting snow-patches. Was also commonly found in dried-up river beds and in screes. It is a frequent component in certain closed plant-communities, especially in those on slopes with a heavy protection of snow during the winter.

The time of flowering is relatively early, but of course depends on how early the species is free in spring; first flowering specimen was found on June 16. Ripe seeds are commonly produced.

The Greenland distribution of the species is not sufficiently known, but according to EKMAN (1929) *D. groenlandica* var. *arctogena* is known from Holsteinsborg on the west coast and northwards to Peary Land. Northernmost record is Strømstedet near the mouth of I. P. Koch Fjord 82°51' lat. N. (TW).

*Draba bellii* HOLM

OSTENFELD (1915, p. 377 and 1923b, p. 236) sub. nom. *D. alpina* L. var. *glacialis* (ADAMS) DICKIE; EKMAN (1931, p. 469—474) sub. nom. *D. bellii* var. *gracilis* EKM.

Localities:

- I: 9 Strømstedet (TW), 11 John Murray Ø (TW).  
 II: 14 Merqujoq (PJ), 16 Aftenstjernesø (PJ), 31 Børglum Elv (TA).  
 III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 36 Kap Schmelck (PF), 42 Blomsterstranden (KH), 47 a Zig-Zag Dal (PF), 48 a Kap Holbæk (EK).  
 IV: 51 Graptolit Elv (KH), 53 Neergaard Elv (EK), 63 Nord (EK, MW).  
 V: 66 Kap København (KH), 68 Southern part of Herlufsholm Strand (KH), 69 Kap Eiler Rasmussen (KH), 71 Herlufsholm Strand (KH).  
 VI: 93 Harebugt (EK), 94 Nordpasset (EK).  
 VII: Jørgen Brønlund Fjord: all districts (BF, KH).

In her treatise on the yellow-flowered *Draba* (1931) and in her key (1941) EKMAN considers the lengths of the petals as an important diagnostic character. It seems rather impossible to maintain this supposition in the case of the part of the Peary Land material here referred to *D. bellii*. The specimens included in *D. bellii* always have bright yellow petals, large-sized on the main part of the material, though specimens with small petals are often found. Of the pods the rounded, obtuse shape, and the distinct, longish style are characteristic. In contradistinction to this group the Oblongata-group has a rudimentary style, always small petals, in *D. oblongata* yellowish-white, and often purple sepals. These two groups are always easy to separate, especially in the field.

The material of *D. bellii* was most varying in many ways, first of all in the floral characters. The lengths of the petals vary from 4 to 7 mm, and the petals, whether large or small, may or may not be emarginate. Also the shapes and lengths of the pods are submitted to great variation; they are usually broadly obovate, but may sometimes be narrower, and the length varying from 5 to 13 mm. But common to all of the material is the habit, which is low, but vigorous and densely pulvinate. The whole plant, including the pods, is always covered with

an often very dense, pubescence of rough, stiff hairs, distinguishing it from the *D. alpina* (cf. also SEIDENFADEN & SØRENSEN (1937) p. 44). FERNALD (1934) p. 286 regards *D. bellii* as "an extreme arctic development, with the regular reduction in size and the increase of trichomes which one would expect under most xerophytic conditions" and considers it a *D. alpina* L. var. *nana* HOOK. However, the greater part of the Peary Land material is far from "reduced", but shows a very vigorous growth, and further *D. bellii* is not really a xerophytic plant, as it generally occurs in moist (often wet) places, and it may finally be emphasized that the dense, stiff pubescence is still present even on plants from wet places.

Like the preceding species *D. bellii* has a very wide ecological range, being found both in dry and in moist (in spring often very wet) places, and in places with no protection of snow during the winter as well as in places with a large protection, in the lowland as well as at high altitudes (commonly met with up to 1000 m). Most plentiful in riverbeds and deltas with moist, stony-sandy soil. In the plant-communities often found together with *D. arctogena* in the latest snow-patches, though it seems to prefer the moist soil, more so than does this latter. The flowering of the species begins very early, first flowering specimen seen on June 11. Produces ripe seeds everywhere.

The species is common and widespread throughout Peary Land. At Jørgen Brønlund Fjord it was the commonest species within the genus. According to EKMAN (1931) the distribution of the species in Greenland is northern, reaching from Nûgssuaq on the west coast to Kong Oscars Fjord on the east coast. Northernmost record is Harebugt at the head of Frederick E. Hyde Fjord 82°55' lat. N. (EK).

In HOLMEN (1952) the chromosome-number is given for *D. macrocarpa* ADAMS. The material examined may very well be referred to the species of ADAMS; when it is referred to *D. bellii* here, it is to avoid any anticipation until a more detailed account of the species and the concept of the species within the whole of the *D. alpina*-group has appeared.

*Draba cinerea* ADAMS.

Localities:

VII: Jørgen Brønlund Fjord: A, B2 (KH).

Rare, but found in some places in the lowland at Jørgen Brønlund Fjord, on stony or gravelly fields in extremely dry places exposed to the winds. In contradistinction to *D. arctogena* it is rather specialized ecologically, as it is never found in moist ground nor in snow-patches. In winter usually free of snow or covered only with a thin layer. It does not enter the real plant-communities, but is often seen together with

*Dryas*, *Melandrium triflorum*, *Potentilla pulchella*, *Lesquerella arctica*, *Carex nardina* and *Poa abbreviata*. Flowering at the end of June, first flowering specimen found on June 23. Produces ripe seeds. Ascends to 500 m, though very rare at this altitude.

As mentioned under *D. arctogena* this species is easy to recognize because of its dense and uniform stellate pubescence of the leaves. In HOLMEN (1952) the cytological material of this species was unfortunately referred to *D. groenlandica* because the plant in question had a few simple hairs on pods and pedicels (cf. (EKMAN, (1941)). A study of a larger material, however, shows that simple hairs like these are always present in the true *D. cinerea*, too.

The Greenland distribution of the species is, according to EKMAN (1929), northern with southern limit on the west coast at the Arctic Circle, and on the east coast at Scoresby Sund. Northernmost record is near Cape Belknap in northern Ellesmere (BRUGGEMANN & CALDER, 1953) 82°32' lat. N.

*Draba lactea* ADAMS.

OSTENFELD (1923b, p. 236) sub. nom. *D. fladnizensis*; EKMAN (1932, p. 442).

Localities:

I: 3 Low Point (TW), 9 Strømstedet (TW), 11 John Murray Ø (TW).  
VII: Jørgen Brønlund Fjord: A, (noted in B2), E (KH).

*Draba lactea* is probably much more common in Peary Land than appears from the list above, especially in the lowland in Heilprin Land it was very common. But because of its small size and the fact that the rosettes are often hidden in moss-cushions, the species has evidently escaped attention on the sledge-journeys. The species was growing in moist or wet ground, in mossy meadows and springs, but often also in late snow-patches, in river-beds and deltas. Where the species is not growing in mossy places, it is always protected by snow during the winter, often by several metres. In mossy places it is usually free of snow. Flowering is early, first specimen seen on June 18. Produces ripe seeds. But in many specimens undeveloped pods were found besides the normal ones. Ascends to 600 m.

The material collected during the 2nd Thule Expedition, was by OSTENFELD (1923b) referred to *D. fladnizensis*. This determination was later correctly changed by EKMAN to *D. lactea* in the case of the three above mentioned stations. Although her labels are still found on the sheets, EKMAN (1932, p. 442), in her list of stations, enumerates only the find from John Murray Ø. On p. 444, on the other hand, she enumerates 2 finds of *D. lactea* from Kap Schmelek and from Sjællandslette, collected by P. Freuchen in 1912. These specimens actually belong to

*D. subcapitata*. It must be by a slip of the pen that these specimens are placed in the list of *D. lactea*.

The distribution of *D. lactea* in Greenland reaches from about 63° lat. N. on the west coast and north around Greenland to about 68° lat. N. on the east coast. Northernmost record is Low Point (TW) 83°09' lat. N.

*Draba micropetala* HOOK.

OSTENFELD (1923b, p. 236) sub. nom. *D. adamsii* Ledeb.; EKMAN (1931, p. 468) sub. nom. *D. oblongata*.

Localities:

I: 6 Lemming Fjord (TW), 9 Strømstedet (TW), 11 John Murray Ø (TW).

IV: 63 Nord (EK).

V: 71 Herlufsholm Strand (KH).

Among the specimens here referred to *D. micropetala*, three were collected by Thorild Wulff in 1917, in NW Peary Land. These were determined by OSTENFELD (1923b) to *D. adamsii* LEDEB. (syn. *D. oblongata* auctt.). OSTENFELD has no doubt had some trouble with the determination of these plants, having added on the sheets the name *D. leptopetala* TH. FR. In her treatise on *Draba oblongata* and *D. micropetala* EKMAN (1931) tries to give an account of these species in Greenland, considering them as two separate species, and listing Thorild Wulff's three specimens under *D. oblongata*, while *D. micropetala* is being regarded as an exclusively East-Greenland species. Later (1935) EKMAN seems to have changed her mind and proposes that there should be one species only, and that the name should be *D. micropetala*, thus discarding the original name of *D. oblongata*, because the type-material was too poorly preserved to permit of a reliable determination.

The uncertainty shown by OSTENFELD and EKMAN as to delimitation of species is not felt in the treatise on the Drabas in the Flora USSR by TOLMACHEW (1939). Here *D. micropetala* and *D. oblongata* are kept apart with distinct characters. Already TOLMACHEW & PETKOV (1934) have discussed the species, the name *D. leptopetala* being used for *D. micropetala*, but they consider *D. oblongata* different from *D. micropetala* (= *D. leptopetala* sensu Tolm. & Petk. 1934). Later, TOLMACHEW (1939), however, has become aware that the designation *D. leptopetala* had been used for mixed materials containing *D. oblongata* as well as *D. micropetala*. TOLMACHEW's (1939) concept of these species seems definitely the most suitable for the Peary Land material. TOLMACHEW (l. c.) places the two species in the group *Oblongata* TOLM., and includes no other species. On p. 390 is given a short description of the group, the special characters of which: small petals, rudimentary style, may be

emphasised. To keep the two species apart he gives the key characters as follows:

- I. Petals yellowish-white or light sulphur. Pods oblongate-elliptical, slightly acute ..... *D. oblongata* R. BR.  
 II. Flowers a bright yellow. Pods obovate ... *D. micropetala* Hook.

Here are some additional characters which are most helpful in separating the two species, at least as they grow in Peary Land. In

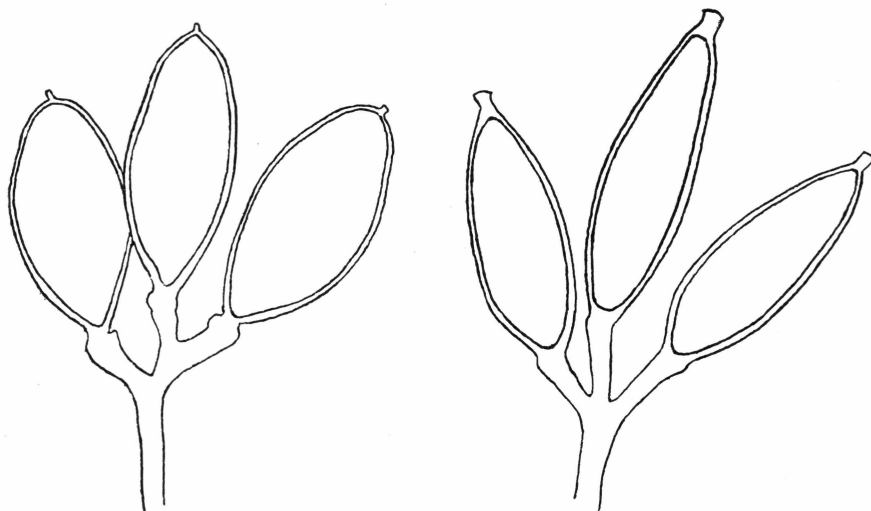


Fig. 16. Pods of *Draba micropetala* (left) and *D. oblongata* (right). The pods are drawn without valves and seeds, so as to show better the form and size of the styles. ( $4\frac{1}{2}\times$ ).

*D. micropetala* the leaves are narrow with a dense pubescence of stiff, simple and stellate, hairs<sup>1</sup>). Pods broadly obtuse with an extremely short style or none at all. In *D. oblongata* the leaves are broadly obovate with a rather scanty pubescence on the blades of the leaves, but ciliated like the preceding species. Short style, but more distinct than in *D. micropetala*. The pods of both species have usually few hairs on the valves, or none at all. Also the sepals of the two species have few hairs only, and the colour of the sepals is, at least in *D. oblongata*, purple on the back-side. Rather good figures of the two species at the fruiting stage is given in TOLMACHEW & ПЕТКОВ (l. c.); a flowering specimen of *D. oblongata* is figured in GELERT (1898).

During my stay in Peary Land I was unfortunately not aware of

<sup>1</sup>) In her key EKMAN (1941) uses the character of the stiff pubescence of the leaves in *D. oblongata*. As this key was published posthumously, we cannot tell whether it was compiled before her paper of 1935, or whether it represents her last opinion on this problem.

*D. micropetala*, so only little can be said here on its ecology and biology. The only place where I collected it myself was on Herlufsholm Strand. It was growing on a slope together with *Saxifraga flagellaris*, *S. nivalis*, *S. caespitosa*, *Poa arctica*, *Salix* and others, in sandy soil, which during the summer is probably rather moist. At the time of collecting (May, 13) the species was free of snow, but of course still in wintering condition. The distribution of the species in Greenland is not sufficiently known, and the material of yellow Drabas from Greenland is rather scanty in the Copenhagen herbarium, so I dare not make other considerations on its distribution than that it is probably confined to the northern parts of the country. Northernmost record is Lemming Fjord 82°55' lat. N. (TW).

*Draba nivalis* LILJEBL.

Localities:

II: 21 Baggården (PJ).

VII: Jørgen Brønlund Fjord: B2 (KH).

The find from Baggården was made during the winter and only few notes could be given on its ecology. In the second locality the material was collected on one of the earliest days of August, and at this time even the fruiting stage was passed, so the pods were emptied and the valves shed, and it was not possible to see if the valves actually had been glabrous; nevertheless, the identity of the species is beyond discussion, the leaves and scapes being furnished with a pubescence of small hairs of the stellate type only. The only species for which it might be mistaken is *D. cinerea*, but this has an altogether different pubescence of the scapes, with stellate as well as simple hairs. And, besides, the statures of these two plants are very different.

The species was found in a dry open stone-field at an elevation of 500 m, growing together with *Potentilla hyparctica*, *Trisetum spicatum*, *Poa glauca*, *Cetraria nivalis* and *Orthotrichum killiasii*. The snow-covering during the winter is probably very slight, and the flowering taking place rather early. Ripe seeds are produced.

It is known from all parts of Greenland, but evidently rare in the far North. Northernmost record, according to POLUNIN (1940), is Dumbbell Harbour 82°28' lat. N. in northern Ellesmere (Capt. FEILDEN).

*Draba oblongata* R. BR.

OSTENFELD (1923b, p. 236) sub. nom. *D. alpina* L. (legitima).

Localities:

I: 9 Strømstedet (TW).

VII: Jørgen Brønlund Fjord: A, B1, B2, B3 (BF, KH).

Rather common in Heilprin Land, and always easily recognizable because of its yellowish-white petals, purple sepals and almost glabrous pods. (On its relationship to *D. micropetala* see under this). From an ecological point of view *D. oblongata* is closest related to *D. lactea*, and they often occur together, although *D. oblongata* seems to be largely confined to the extreme snow-patches, very late free of snow in summer (usually not until the end of July). The species is, however, occasionally found in wet, mossy places with only very little protection of snow during winter. SEIDENFADEN & SØRENSEN (1937) regards *D. oblongata* and *D. micropetala* as one species only, *D. micropetala*, stating this to be the most exclusive snow-patch *Draba*. This no doubt chiefly refers to the material of *D. oblongata*, as it is my impression that *D. micropetala* s. str. is not generally confined to snow-patch vegetation.

In Peary Land the flowering of *D. oblongata* is usually rather late; in places outside the snow-patches, however, single specimens were seen in flower already on June 18. Produces ripe seeds. Ascends to 1100 m above sea-level.

The distribution of the species in Greenland is not sufficiently known, but like *D. micropetala* it is probably a northern species. Northernmost record is Strømstedet near the mouth of I.P.Koch Fjord 82°51' lat. N. (TW).

*Draba subcapitata* SIMM.

OSTENFELD (1915, p. 377) sub. nom. *D. fladnizensis*; 1923b, p. 237); EKMAN (1932, p. 444) sub. nom. *D. lactea*; 1934, p. 74).

Localities:

- I: 3 Low Point (TW), 6 Lemming Fjord (TW), 9 Strømstedet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).  
 III: 34 Valmuedal (PF), 36 Kap Schmelck (PF), 45 Saxifragadal (KH), 46 Krognæs (KH), 48 Sjællandsslette (PF).  
 IV: 52 Marius Fiil Fjord (KH), 53 Neergaard Elv (KH), 63 Nord (EK, MW).  
 V: 65 Kap Vaarbrud (KH), 67 Mudderbugten (KH).  
 VII: Jørgen Brønlund Fjord: all districts (BF, KH).

Frequently found in very dry, gravelly fields exposed to the wind. It was growing most luxuriously in moist, stony ground, in river-beds and deltas, but its ecological range seems to be rather wide, as it was often seen in the latest snow-patches. In dry places with no snow-cover during the winter the occurrence of the species is very sparse, while in the snow-patches it is usually a frequent component of the plant-communities. These are often rather open and poor in mosses, but rich in different species of *Drabae*. The flowering of the species is early outside the snow-patches, first flowering specimen noted on June 18. Produces

ripe seeds everywhere. At Jørgen Brønlund Fjord common in the lowland as well as at higher altitudes. Ascends to 1100 m.

The species in Peary Land is somewhat varying, especially as regards the shape of the pods, which are usually obovate to almost circular, but also often oblong and acute, resembling those of *D. oblongata*. Further, the pubescence of leaves is varying, as now and then specimens with a few stellate or furcate hairs on the blades are found. The variation, however, is never so great as to prevent the species from being distinguished from the other species within the area.

In his paper on the material of the 1st Thule Expedition OSTENFELD (1915) p. 377 refers some specimens collected at Valmuedal, Kap Schmelck and Sjøllandsslette to *D. fladnizensis* WULFF. This determination was later by himself changed correctly on the herbarium sheets to *D. subcapitata* in the case of the two last mentioned specimens (the material from Valmuedal seems to have disappeared). Unfortunately these two specimens are enumerated, probably by mistake, by EKMAN (1932) in her list of the Greenland localities of *D. lactea*. EKMAN has not left any determination labels on the sheets, and may not have seen these specimens. In her list of *D. subcapitata* (EKMAN 1934, p. 74) a specimen from Kap Schmelck indeed is mentioned; this, however, is a specimen, which was left undetermined by OSTENFELD, but later was determined by EKMAN.

*D. subcapitata* is frequent in most parts of Peary Land apart from the innermost, highly continental areas. Its Greenland distribution reaches from Scoresby Sund on the east coast, and north round to Disko on the west coast (cfr. map fig. 41 in GELTING (1934)). Northernmost record is Low Point 83°09' lat. N. (TW).

*Erysimum pallasii* (PURSH.) FERN.

Localities:

II: 16 Aftenstjernesø (PJ & JT).

III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH).

The species is rare in Peary Land. It is growing on very dry, sun-exposed, stony slopes, during the winter usually free of snow. It does not enter the real plant-communities, but occurs sparsely. At Kap Ejnar Mikkelsen near the head of Independence Fjord—the only place, where I found it myself—it was growing very sparsely with a distance of about 4—5 m between the individuals. On the slope here, and growing under the same conditions, specimens of *Potentilla pulchella*, *Poa abbrevita* and *Dryas integrifolia* var. *canescens* were found.

Although it seems possible for the species to start its growth early in spring, the flowering takes place rather late. Flowering specimens

were collected by FRISTRUP in Itukussuk Dal on July 25. The flowers are situated on very short scapes and the flowering cymes are contracted. In the beginning of the ripening of the siliques, the scapes and the cymes are strongly elongated. Similar phenomena are observed in *Carex misandra* and *Potentilla pulchella*. Considering the poor growing conditions of their habitat the fruiting specimens often exhibit a very vigorous growth. Specimens of 34 to 40 cm were not uncommon. The species produces lots of ripe seeds, capable of germination (cf. HOLMEN 1952). Ascends to about 200 m.

In the Greenland literature the species was previously named *Hesperis pallasii* (PURSH.) TORR. & GRAY. But FERNALD (1925) has shown that the species really belongs to the genus *Erysimum*.

In Peary Land the species was found only in the innermost parts of the country. Its Greenland distribution was mapped by GELTING (1934) fig. 29. It is known from the north coast only, between 30° and 70° long. W. It is high-arctic continental and absent from both East- and West-Greenland. Northernmost record is Sommerdalen 82°29' lat. N. (TW), just west of this area.

*Eutrema edwardsii* R. BR.

Localities:

II: 29 Søjren (KH).

VII: Jørgen Brønlund Fjord: A, E (KH).

Apart from the single collection from the lake Midsommersø, the species was only observed in the lowland at Jørgen Brønlund Fjord. It was rather frequent on moist to wet soil, growing in mossy vegetations with *Carex misandra*. It was also found in moist, sandy places dominated by *Eriophorum scheuchzeri*, and here often in large quantities. During the winter the species is usually covered with small layers of snow (10—50 cm). Though rather early free of snow in spring, the species is not commonly flowering until the end of July; single flowering specimens were, nevertheless, collected as early as July 4. Produces ripe seeds. Ascends to 100 m.

The few Peary Land localities are situated within the extremely continental part of the area. From a map of the species in GELTING (1934), fig. 31, appears that the species actually is continental. From this map appears, too, that the species is rare in Greenland, and of approximately the same distribution as *Lesqurella arctica*, that is northern with southern limit on the west coast at Disko and on the east coast at Scoresby Sund. Northernmost record is Sommerdalen 82°29' lat. N. (TW) just west of this area.

*Lesquerella arctica* (WORMKJ.) S. WATS.

## Localities:

- II: 15 Head of I. P. Koch Fjord (PJ & JT), 19, 20 and 21 Baggården (KH, PJ), 25 Øvre Midsommersø (KH), 29 Søjren (PJ fot.), 30, 31 and 32 (TA, JT) Børglum Elv.  
 III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabas-holme (KH), 41 Diabasnæs (KH), 48b Lolland Sø (EK).  
 VII: Jørgen Brønlund Fjord: A, B1 (KH).

Undoubtedly the kind of the species which more than others are adapted to an existence under the desert-like, high-arctic conditions of the innermost parts of Peary Land. Here it is rather common on very dry ground, in open sunny places and slopes, often on gravelly soil. During the winter it is usually free of snow or only covered with thin layers. The dense pubescence of the characteristic, silvery hairs is often the only protection of the buds. The species never enters the real plant-communities. It usually occurs in groups of a few individuals only, in otherwise bare soil, sometimes accompanied by other xerophilous plants. Old specimens are often forming the so-called "pillarforms". The flowering takes place at the end of June or on the first days of July. First flowering specimen was seen on June 30. Produces ripe seeds everywhere.

At Jørgen Brønlund Fjord the species was common in the lowland, below 200 m. At Midsommersø extra vigorous specimens were found. The occurrence in Peary Land and the distribution of the species in Greenland clearly show that the species is high-arctic continental, with a southern limit on the west coast at the Arctic Circle, and on the east coast at Scoresby Sund. Northernmost record is Gunnar Anderssons Dal 82°28' lat. N., just west of this area.

*Torularia humilis* (C. A. M.) SCHULZ

## Localities:

- II: 24 Øvre Midsommersø (KH).

The only find of this species was made on May 27, during a sledge-journey to the innermost Peary Land. The species was still in wintering conditions, growing on a low basaltic ness, on sun-exposed shelves with a thin layer of sand. The growing-place is undoubtedly very dry throughout the summer, this being in good accordance with the fact that it occurred together with species from dry soil, e. g. *Potentilla pulchella*, *Poa abbreviata*, *Melandrium triflorum* and *Kobresia myosuroides*. The growing-place is hardly covered with snow during the winter, at least at the time of collecting it was completely free of snow. The flowering of

the species was not observed. The emptied siliques of the specimens indicate that it produces ripe seeds.

The question of the Greenland *Torularia (Braya) humilis* has recently been discussed, first by BÖCHER (1950), later by SØRENSEN (1954). BÖCHER considers the Greenland material to be consisting of two taxa, of which the material from West-Greenland is referred to the main species of *Torularis humilis*, while the material from North-East Greenland and the author's material from Peary Land are referred to a ssp. *arctica* BÖCHER. SØRENSEN (l. c.), however, is of the opinion, that BÖCHER's ssp. *arctica* from North and North-East Greenland is identical with the main species of *Torularia humilis*, while the West Greenland plants should rather be referred to the *Braya* genus.

Beyond discussion is, however, the fact that the material in question actually does belong to *Torularia humilis* (ssp. or not) and is identical with the plants from North-East Greenland.

From the distributional map fig. 10 in BÖCHER (l. c.) appears that there is a gap of about 900 km between the Peary Land locality and the localities in North-East Greenland. There is, however, no doubt that the species may be found in several other places in the continental parts of this large, almost unexplored area, and that the species thus will show a more continuous distribution. The northernmost known place is Peary Land (82°15' lat. N.).

### Oenotheraceae.

#### *Chamaenerium latifolium* (L.) SWEET

OSTENFELD (1915, p. 377) sub. nom. *Epilobium l.* L.

#### Localities:

- II: 16 Aftenstjernesø (JT), 19 Baggården (PJ), 24 and 25 Øvre Midsommersø (KH), 28 Teltnæs (JT), 29 Søjren (EK), 32 Børglum Elv (JT).
- III: 33 Itukussuk Dal (BF), 36 Kap Schmelek (PF), 38 Kap Ejnar Mikkelsen (KH), 40 and 42 Blomsterstranden (KH), 46 Krognæs (PJ), 47b Sjællandsslette (PF), 48b Lolland Sø (EK).
- V: 75 G.B.Schley Fjord (JT).
- VI: 85 Northside of Frederick E. Hyde Fjord (EK), 90 Kap Regnar Lodbrog (EK).
- VII: Jørgen Brønlund Fjord: B1 and C (KH).

The species is not common in Peary Land, but is met with locally in large quantities, growing in moist, stony-sandy soil in deltas and riverbeds. At Botaniker Elv, near the mouth of Jørgen Brønlund Fjord, the species was completely covering large areas in the almost 1 km broad

delta of this river. Along Blomsterstranden, the north side of Independence Fjord, the species was common in the large stone-rings formed by solifluction. At Lake Midsommersø the species was rather common. It is often found together with *Melandrium apetalum*, *Alopecurus alpinus*, *Poa abbreviata*, *Salix arctica*, Papaver and *Saxifraga oppositifolia*.

The specimens of Peary Land never attain the same large size as do those of more southerly areas of Greenland; the leaves are usually smaller, more densely arranged, and thicker, almost succulent. The flowering takes place very late in summer, the first flowering specimens seen on July 20, about one month later than the flowering of almost all other species. Nevertheless, ripe seeds are generally produced. During the winter the species is usually free of snow or covered with only very thin layers of snow. All finds were made below 150 m.

In Peary Land the species was confined to the innermost parts of the country, but what is known from other parts of Greenland about its occurrence makes it impossible to consider it a genuinely continental plant. The species is common throughout Greenland.

Northernmost record is Frederick E. Hyde Fjord 83°06' lat. N. (EK).

### Papaveraceae.

#### *Papaver radicum* ROTTB.

SIMMONS (1909, p. 74); OSTENFELD & LUNDAGER (1910, p. 22); OSTENFELD (1915, pp. 377—378 and 1923b, pp. 237—238).

#### Localities:

- I: 1 Lockwood Ø (Lockwood), 10 Kap Salor (TW), 11 John Murray Ø (TW).
- II: 15 Head of I.P. Koch Fjord (PJ), 16 Aftenstjernesø (PJ), 19 Baggården (PJ), 24 and 25 Øvre Midsommersø (KH), 27 Mågeklippe (HK), 29 Søjren (KH).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 45 Saxifragadal (KH), 46 Krog-næs (KH), 47a Zig-Zagdal (PF), 47b Sjællandsslette (EK), 48a Kap Holbæk (EK).
- IV: 51 Graptolit Elv (KH), 52 Marius Fiil Fjord (KH), 53 Neergaard Elv (KH), 54 Slesager Elv (KH), 55 Kap Peter Henrik (EK), 58 Hagen Fjord (ÅS), 60 Prinsesse Thyra Ø (ÅS), 61 Kap Kronborg (PF), 63 Nord (EK, MW).
- V: 65 Kap Vårbrud (KH), 66 Kap København (KH), 67 Mudderbugten (KH), 71 Herlufsholm Strand (KH), 72 Hellefiskefjord (JT), 78 Frederick E. Hyde Fjord (IPK), 79 Kap Ole Chiewitz (EK).

VI: 82 and 85 north side of Frederick E. Hyde Fjord (EK), 87, 88 and 89 Frigg Fjord (EK), 93 Harebugt (EK), 95 Head of O. B. Bøggild Fjord (EK).

VII: Jørgen Brønlund Fjord: all districts (BF, KH).

Very common everywhere on moist and dry soil, ranging from clayey to stony, in late snow-patches, and in places free of snow during the winter. At Jørgen Brønlund Fjord it is common in the lowland as well as at higher altitudes, ascending to 1000 m. The species is often found in plant-communities, especially those poor in mosses, but never as an important component. Most frequently the species is met with singly, and in places free of snow in winter such specimens are often very vigorous and richly flowering. Flowering attains its maximum in the first days of July, but begins some time earlier (in 1949 the first flowering specimen was seen on June 25). The flowers are often visited by flies. Produces ripe seeds everywhere. This species is one of the few of the area which continue their flowering long after frost has set in, in autumn.

It is well known that *Papaver radicum* in Greenland is most varying, this is also the case in Peary Land to a rather large extent, especially as regards the colour of the petals and of the milk-juice, but also in the shape of the leaves a variation could be demonstrated. Most frequent were specimens with yellowish-white petals; also specimens with yellow petals were common, but more rare were specimens with white flowers. The colour of the milk-juice was varying from yellowish-orange to yellowish-white and to white. It was not possible to demonstrate any fixed relationship between the colour of the petals and the colour of the milk-juice. At Jørgen Brønlund Fjord the following combination could be demonstrated:

Specimens with yellowish-white petals and yellowish-white milk-juice					
“	“	yellow	“	“	white
“	“	white	“	“	yellowish-orange
“	“	white	“	“	white
“	“	yellowish-white	“	“	white

Of these combinations the first mentioned is far the commonest.

The variation of the leaves especially concerns the lobes of these. Two types are very conspicuous, one with acute lobes, and another with obtuse lobes, the latter usually with very fleshy, almost succulent, leaves. For further reference there will be a future treatise on the circum-polar complex of this species by Prof. C. A. JØRGENSEN, Copenhagen, to whom most of my material has been handed over.

Like in Peary Land the species is common and widespread in most parts of Greenland (rare in the southernmost parts). Northernmost record is Lockwood Ø 83°22' lat. N. (Lockwood).

### Polygonaceae.

#### *Koenigia islandica* L.

##### Localities:

VII: Jørgen Brønlund Fjord: A (KH).

This species was found in one place only, situated about 1 km south of the wintering station. It was growing in rather large quantities in a moist *Eriophorum triste* meadow, rich in mosses, together with *Ranunculus sulphureus*, *Draba lactea* and *Juncus biglumis*. During the winter the habitat is covered with thin layers of snow only. The flowering takes place in the middle of July, and the seeds ripen in the first part of August. *Koenigia islandica* is the only annual plant of the area. The find was made at an elevation of 60 m.

The distribution of the species in Greenland is mapped in GELTING (1934) fig. 46; to this map, however, some more recent finds may be added, e. g. those of SEIDENFADEN & SØRENSEN (1937), and it appears that the station of the species in Peary Land is situated about 500 km farther to the north. It is known from most parts of Greenland, though up to now, in the area between Skærfjorden and Thule, known only from the station in Peary Land, which is also the northernmost record of the species (82°10' lat. N.).

#### *Oxyria digyna* (L.) HILL.

OSTENFELD (1915, p. 378 and 1923b, p. 238).

##### Localities:

- I: 9 Strømstedet (TW), 11 John Murray Ø (TW).
- II: 18 Sydpasset (PJ), 19 and 20 Baggården (KH), 25 Øvre Midsommersø (KH), 29 Sølejren (KH), 32 Børglum Elv (JT).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 45 Saxifragadal (KH), 46 Krognæs (KH), 48a Kap Holbæk (EK).
- IV: 49 Koralkysten (KH), Neergaard Elv (KH).
- V: 86 North side of Frederick E. Hyde Fjord (EK), 87 Frigg Fjord (EK).
- VII: Jørgen Brønlund Fjord: A, B2, C, E (KH).

This species is found in very different kinds of soil, stony, gravelly as well as sandy and clayey, though not in extremely dry and wind-swept places. It is found on dry, moist and wet substratum, and during

the winter in places completely free of snow, and also in places covered with very thick layers of snow. Where the species is unprotected during the winter and where the soil is manured, or rich in salts, it reaches its most vigorous development. This almost ubiquitous plant is naturally often met with in the closed plant-communities. It is frequently found in knolly snow-patch vegetation together with *Carex misandra* and mosses. But it is also an important plant in the slope vegetations, with *Melandrium triflorum* and *Taraxacum pumilum*. The flowering begins at the end of June, first flowering specimens were seen on June 20. No specimens with ripe seeds were found. Collected upwards until 600 m.

In Peary Land the species was found in most parts of the country, except on the eastern outer coast, from which it is absent probably because of the prevailing low summer temperature. Common in most parts of Greenland. Northernmost record is Frigg Fjord 83°05' lat. N. (EK).

*Polygonum viviparum* L.

OSTENFELD (1915, p. 378).

Localities:

- II: 21 Baggården (PJ), 24 Øvre Midsommersø (KH), 25 Øvre Midsommersø (KH), 29 Søjren (KH), 32 Børglum Elv (JT).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 39 Diabasholme (KH), 40 Blomsterstranden (KH), 46 Krognæs (KH). 48 a Kap Holbæk (FK), 48 b Lolland Sø (EK).
- IV: 50 Falkefjeld (KH), 53 Neergaard Elv (KH), 62 Prinsesse Dagmar Ø (EK).
- V: 72 Hellefiskefjord (JT), 74 G.B.Schley Fjord (JT).
- VI: 90 Kap Regnar Lodbrog (EK).
- VII: Jørgen Brønlund Fjord: A, B2, C, D (KH).

As regards ecology this species is very much like *Oxyria*, and was also found on most varying substrata, though seemed always absent from dry places. It is most frequently found in moist or wet, mossy soil, along rivers and brooks, where it is often growing together with *Pedicularis hirsuta* and *Salix arctica*. The species is frequent in closed plant-communities, but never as an important component. During the winter the species is free of snow or covered with thin layers only. Even in places, free of snow in winter, the species is not flowering until late in July or the first days of August. Bulbils and leaves are developed long time before the flowering. It may be mentioned that single, flowering specimens were seen as early as June 30. Ripe seeds were not produced. Ascends to 600 m above sea-level.

*Polygonum viviparum* was found in most parts of Peary Land, and is common throughout Greenland. Northernmost record is Kap Regnar Lodbrog 83°02' lat. N. (EK).

### Ranunculaceae.

#### *Ranunculus affinis* R. BR.

Localities:

VII: Jørgen Brønlund Fjord: A (KH).

Found in a single place only near the wintering station. Here it was growing in a hollow in the upper marine terrace at an elevation of about 60 m. The soil consisted of clay mixed with sand, dry to slightly moist through the summer, and snow-covered during the winter, but early free in spring. The species was growing in an open community together with *Oxyria digyna*, *Juncus biglumis*, *Alopecurus alpinus*, *Mi-nuartia rubella*, *Draba subcapitata*, *Puccinellia angustata* a. o. The flowering takes place rather late, about the middle of July. Produces ripe seeds.

The Greenland representative within the Affinis-group was generally named *R. affinis* R. BR. by earlier writers, but already FERNALD (1917) called attention to the possibility of the Asiatic species, *R. pedatifidus* SM., being identical with the species of R. BROWN, in such case the old name *R. pedatifidus* ought to be used for the American material, too. It may, however, be mentioned that OVCZINNIKOV (1937) in his treatise on the Ranunculi of SSSR is keeping the two species apart within this area. By means of the key (p. 371) and the detailed descriptions (p. 388) an attempt was made to find out to which of the two species the Peary Land material belongs; this was indeed very difficult, as the differential characters of the two species given in this flora are often found to be more or less mixed in the Peary Land material. This latter seems, however, to come nearest to *R. affinis*. When this name has been used here, it is also because I am disinclined to use new names before it has been definitely proved that there are reasons for doing so. It may also be mentioned that in OVCZINNIKOV (1937) *R. affinis* is regarded as an arctic species, based upon arctic American material, while *R. pedatifidus* is a subalpine species, based upon material from Alta. This problem has been made further complicated after the recent discovery that there are two chromosome-races in Greenland (cf. HOLMEN, 1952). The material from Peary Land is identical with that from the east coast figured in SØRENSEN (1933), plate IV.

The species is rare in Greenland; it is known only from the northern part of the country, with southern limit on the east coast at about 68°40' lat. N., and on the west coast at the Arctic Circle. In the area

between Skærfjorden and Peary Land it has not yet been recorded (these areas were never visited by botanists). Northernmost record is that of Peary Land, 82°10' lat. N.

*Ranunculus hyperboreus* ROTTB.

Localities:

VII: Jørgen Brønlund Fjord: A (KH), B1 (noted, KH).

Found in several places in the lowland at Jørgen Brønlund Fjord, growing at the shores of lakes, in shallow pools, and in rivulets. The species occurred everywhere in a fluitant form, the leaves floating on the surface of the water. It was always growing amongst mosses, and usually together with *Pleuropogon sabinei*.

During the winter the species is covered with ice, and becomes early free in spring, but was nevertheless nowhere found flowering.

The species is undoubtedly rare in these northern areas, but hardly so rare as indicated in the list above. There are, especially in the inner parts of the country, numerous lakes which may offer good conditions for the species. It was not to be expected that the species should be brought home from the sledge-journeys. The species is "circumgreenlandic", meaning that it is known from all parts of the country. Northernmost record is Alert in northern Ellesmere 82°31' lat. N. (cf. BRUGGEMANN & CALDER, 1953).

*Ranunculus sabinei* R. BR.

A rather poor material from loc. 9, Strømstedet, near the mouth of I.P. Koch Fjord, collected by Thorild Wulff during the 2nd Thule Expedition, was with some hesitance referred to this species by OSTENFELD (1923b, p. 238). I have also studied this material, the specimens of which are all without flowers, and only some of them have developed leaves, and I dare not refer them to *R. sabinei*. They are probably *R. sulphureus*. It may be mentioned that *R. sabinei* may very well occur in Peary Land, having been found only just west of this area.

*Ranunculus sulphureus* SOL.

OSTENFELD (1915, p. 378 and 1923b, p. 238).

Localities:

I: 3 Low Point (TW), 9 Strømstedet (TW).

III: 34 Valmuedal (PF), 35 Vildt Land (PF).

V: 67 Mudderbugten (KH), 71 Herlufsholm Strand (KH).

VII: Jørgen Brønlund Fjord: A, B2, E. (KH).



Fig. 17. *Ranunculus sulphureus* in moist moss-meadow in Heilprin Land at Jørgen Brønlund Fjord. Aug. 9, 1947. Phot. KH.

Frequent in the lowland at Jørgen Brønlund Fjord, growing on moist to rather wet soil. The species is often met with in meadows, snow-patches, river-beds etc. and is often found in the plant-communities, although never as an important component. One of the most characteristic communities with *R. sulphureus* is the *Eriophorum triste*-soc., rich in mosses and without snow-protection during the winter. The wintering buds of the species are deeply hidden in the moss-cushions. Unlike this are the communities on polygon-soil, with a very large (4—5 m) cover of snow during the winter, and very late free in summer. This community is very poor in mosses, and the wintering buds are placed rather superficially. The time of flowering is of course dependent on how early the plants become free in spring, but it was interesting to note that the flowering of the species *Eriophorum*-soc. did not take place until about 25 days later than could have been expected from the natural conditions, that is when the frost had left the soil down to a depth of 10 cm or more, and moisture and temperature reached an optimal size. The species therefore may be said to behave quite dissimilar to most

other species of Peary Land, which flower very soon after the frost has left the surface of the soil. In the late snow-patches the flowering took place 5—6 days after the growing place had become free of snow.

From the list above appears that the species was found on the outer coast as well as in the inner parts of the country. The Greenland distribution of the species is mapped in BÖCHER (1938). It is a northern species, reaching from Scoresby Sund on the east coast, round north and then south to about 68° lat. N. on the west coast. Northernmost record is Low Point 83°09' lat. N. (TW).

## Rosaceae.

### Dryas.

In 1929 a detailed paper on the *Dryas* genus was published by JUZEPCZUK. Here the former *D. octopetala* and *D. integrifolia* are divided into a long series of species, which by the modern taxonomist most likely would be regarded as sub-species. It is rather strange that the very comprehensive Greenland material of the Botanical Museum of Copenhagen of this genus, should not have been taken up for revision as a consequence of this publication. So far this is not the case, and in all papers on the Greenland flora the traditional two species are still being employed.

Not until JUZEPCZUK (1941) transferred his system to Flora URSS did there appear, from PORSILD (1947), a survey on the American species of the genus, based on this system. In his work, where Greenland is included, PORSILD points out the presence of *D. punctata* in this latter country, while *D. octopetala* is eliminated from the Greenland flora. Owing to the 2nd World War, unfortunately, PORSILD has not had occasion to examine the Copenhagen material; only minor Greenland collections in Ottawa have been available to him.

An examination of the material here in Copenhagen plainly shows that *Dryas punctata* does grow in East Greenland, though apparently is rare. On the other hand there is no doubt that several of JUZEPCZUK's species must be present here. Especially one or several species of subsect. *Tenellae* seem of importance. This group is most characteristic by the lack, on petioles and the ribs on the under sides of the leaves, of the petiolate glands, otherwise so characteristic of the whole *Dryas* genus. The species, universal in West Greenland, *D. integrifolia*, belongs to this group. *D. integrifolia* is found, though is not so frequent, in East Greenland, too, but besides the latter there is also a form belonging to the *tenella*-group, a form with small, short and broad, dentate leaves (see figure 18), which in the area between Scoresby Sund and Thule seems to be the most frequent representative of the genus. In this treatise it

is referred to *D. chamissonis*. In the southern part of North-East Greenland, in the great plexus of fjords, very large-leaved plants, also of the tenella-group, are very frequently found. In the various herbaria, the corresponding forms from Alaska are referred, now to *D. chamissonis*,

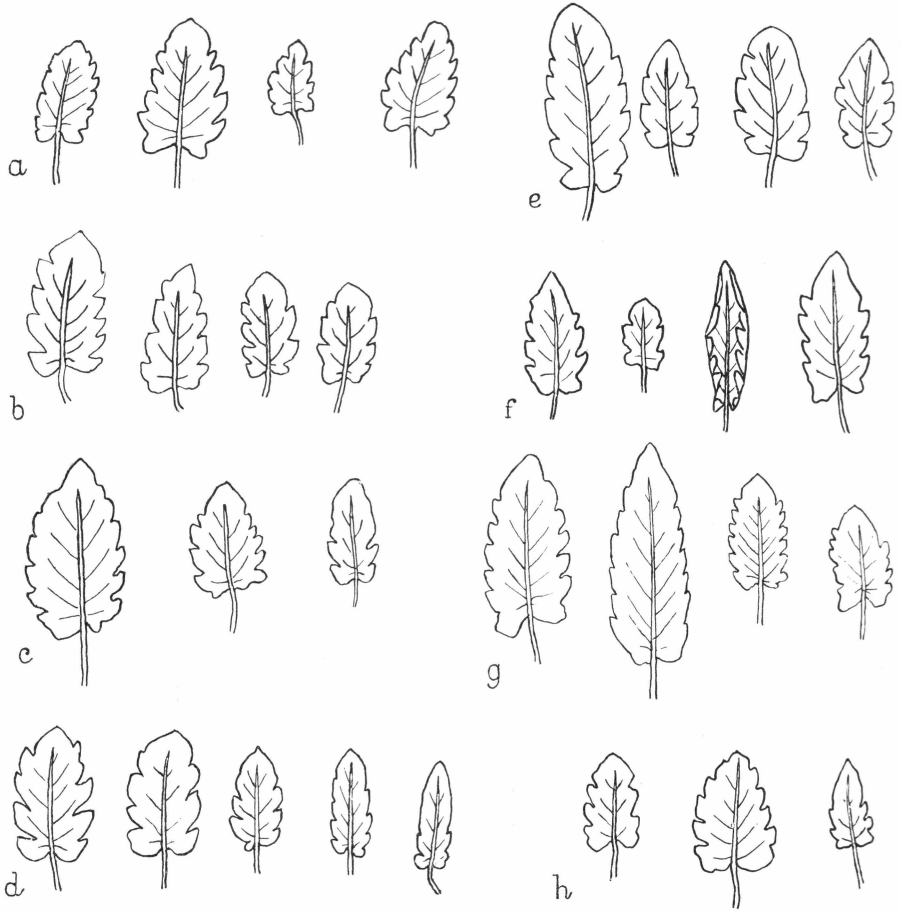


Fig. 18. Leaves of *Dryas chamissonis* (seen from under side) from different localities. For each are shown leaf-shape and variations from a single individual. a. Aleutian Isl. Eyerdam no. 1873 (cf. PORSILD, 1947, plate II). b. Southampton Isl. Malte, 120598. c. Thule, J. Noe-Nygaard 1919. d. Peary Land KH. no. 6090. e. Peary Land, KH. no. 6689. f. Skærfjorden, Th. Sørensen no. 2072. g. Ymer Ø, Th. Sørensen no. 4320a. h. Ella Ø, KH. 1950. (2 ×).

and now to *D. crenulata*. A splitting up of forms inside the *Dryas* genus seems on the whole to have taken place in North-East Greenland, corresponding fairly closely with what has taken place in Alaska. A discussion of these phenomena is, however, outside the scope of the present work.

In this treatise the valuation of the Peary Land species is based on the works of JUZEPCZUK (1929 and 1941), though most likely HULTÉN (1950) is right in considering this splitting up into many species hardly justifiable, and that these should sooner be considered as races. It is quite plain that HULTÉN has no confidence in the character given so great importance by JUZEPCZUK, namely the absence or presence, on petioles and under sides of leaves, of the above mentioned peculiar petiolate glands. And of course the taxonomic value of this character is to some degree weakened by the fact that all species have these glands, at least on calyx and scapes, so that apparently they have a genetic predisposition for producing these glands. A final solution of the *Dryas*

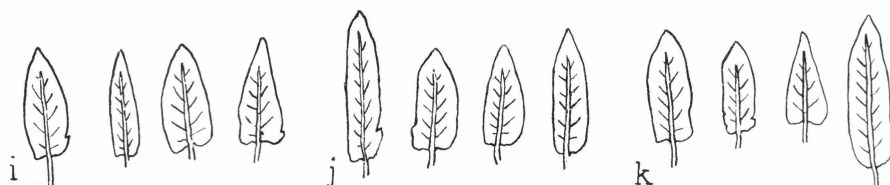


Fig. 19. Leaves of three specimens of *Dryas integrifolia* from Greenland. Type-specimen, leg. Suther (left). Spec. from Peary Land, leg. KH. (middle). Spec. from Jordanhill, NE-Greenland, leg. Seidenfaden. ( $2 \times$ ).

problem may hardly be expected until such time when the group has been thoroughly examined experimentally.

The Peary Land material of the genus belongs to the tenella-group, and is divided between *D. integrifolia* and *D. chamissonis*. In the case of a number of plants it seems, however, difficult to make a safe determination, as in these individuals we find entire as well as dentate leaves.

The material brought home by previous expeditions was investigated very thoroughly by OSTENFELD (1910, 1915, 1923a, and 1923b), and he, too, had great difficulty in determining this material, and especially in ranging it within the old species, *D. integrifolia* and *D. octopetala*. OSTENFELD to some degree leans on the work by HARTZ (1895), and to begin with operates with a certain var. *intermedia* NATH., which is referred soon to the former and soon to the latter species. OSTENFELD (1915) finally refers a material with small, dentate leaves to *D. octopetala* f. *minor* HOOK. A great deal of the material from Peary Land is, to be sure, rather small-leaved, and thus it seems as though this f. *minor* HOOK. must be considered synonymous with *D. chamissonis*.

In determining the two species in Peary Land, only the characters of the leaves seem usable, as the floral parts show only slight differences. In *D. integrifolia* as well as in *D. chamissonis* the flowers are small, though, as a rule, smallest in *D. integrifolia*. In both species they often show a

faint yellow tinge in the colour of the petals. Finally it is worth mentioning that in both species, especially when found in the most continental parts of the country, there is a frequent occurrence of "canescens" forms, e. i. forms with a dense pubescence on the top sides of the leaves. Ecologically the two species seem fairly well separated.

*Dryas chamissonis* SPRENG. ex JUZ.

OSTENFELD & LUNDAGER (1910, p. 28) sub. nom. *D. octopetala* L. var. *intermedia* NATH.; OSTENFELD (1915, pp. 378—79) nom. *D. integrifolia* M. VAHL pro parte and *D. octopetala* f. *minor* HOOK pro parte; OSTENFELD (1923b, p. 239) sub. nom. *D. integrifolia* M. VAHL var. *intermedia*.

Localities:

- I: 9 Strømstedet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).  
 II: 14 Merqujoq (PJ), 18 Sydpasset (PJ), 22 Øvre Midsommersø (KH), 25 Øvre Midsommersø (JT), 28 Telt næs (PJ), 29 Søjren (KH, PJ), 30 and 32 Børglum Elv (JT).  
 III: 33 Itukussuk Dal (BF), 36 Kap Schmelek (PF), 39 Diabasholme (KH), 41 Diabas næs (KH), 42 Blomsterstranden (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 48a Sjølandsslette (PF).  
 IV: 49 Koralkysten (KH), 50 Falkefjeld (KH), 51 Graptolitelv (KH), 52 Marius Fiil Fjord (KH), 53 Neergaard Elv (EK, ÅS), 54 Slebsager Elv (KH), 55 Kap Peter Henrik (EK), 58 Hagen Fjord (ÅS), 62 Prinsesse Dagmar Ø (EK).  
 V: 66 Kap København (KH), 71 Herlufsholm Strand (JT).  
 VI: 96 Kap Bopa (EK).  
 VII: Jørgen Brønlund Fjord: A, B2, B3, C, D, E (BF, KH).

Of the two species this is far the most common in Peary Land. It is attached to dry or somewhat moist soil, and usually has a snow cover of 1 to 2 m in winter; on rare occasions it is found free of snow. Even in places with a fairly heavy cover of snow it is comparatively early free, especially on SW-exposed slopes—its most frequent growing-place. The species is generally flowering in the beginning of July, first flowering specimen found, however, as early as June 24. Produces ripe seeds.

The species is a prominent component in a number of plant-communities. Most important is the *Dryas-Carex nardina* heath on dry, sunny slopes, with a medium snow cover in winter. In similar places, with only a slight snow-cover or none at all, the species is forming communities together with *Kobresia myosuroides*. Further the species is frequently found in slightly moist soil in a knolly *Dryas-Carex misandra-Oxyria* community with a medium snow cover. And finally the species

is also rather frequent in *Cassiope*-heaths and *Carex rupestris* communities.

The species is found almost everywhere in Peary Land, from the lowlands up to 1000 m above sea-level, but is definitely rare in the outer coastal areas, where it is rather insignificant in the plant-communities. Northernmost known habitat is Kap Bopa 83°00' lat. N. (EK).

*Dryas integrifolia* M. VAHL

OSTENFELD (1915, pp. 378—79) sub. nom. *D. integrifolia* M. VAHL pro parte, and *D. octopetala* L. f. *minor* ad var. *intermedia*? NATH.; OSTENFELD (1923b, p. 239).

Localities:

- I: 3 Low Point (TW), 11 John Murray Ø (TW).  
 II: 15 Head of I. P. Koch Fjord (JT), 16 Aftenstjernesø (JT), 19 Baggården (KH, PJ), 21 Baggården (KH, PJ, JT), 20 Baggården (PJ), 24 and 25 Øvre Midsommersø (KH), 27 Mågeklippe (KH), 29 Sølejren (KH, PJ).  
 III: 34 Valmuedal (PF), 35 Vildt Land (PF), 38 Kap Ejnar Mikkelsen (KH), 42 Blomsterstranden (KH), 45 Saxifragadal (KH), 46 Krog-næs (KH), 47a Zig-Zag Dal (PF), 48a Kap Holbæk (EK), 47b Sjæl-landslette (EK), 48b Lolland Sø (EK).  
 IV: 49 Koralkysten (KH), 54 Slebsager Elv (KH), 57 Hagen Fjord (ÅS).  
 V: 72 Head of Hellefiskefjord (JT).  
 VII: Jørgen Brønlund Fjord: A, B1, D, E (KH).

This species is plainly confined to the interior parts of the country, and, especially in the very continental area round Midsommersø, was the most important of the two in the plant-communities. In Peary Land it is an exclusively dry-soil species, mostly found in places exposed to sun and wind, with slight or no snow covering in the winter-time.

Flowering takes place generally a little earlier than is the case in the previous species, owing no doubt to the conditions of the snow covering. First flowering specimen was seen on June 24.

At Jørgen Brønlund Fjord, where both species grew in the lowland, *D. integrifolia* was not very common, and seldom found as a component in fair-sized plant-communities. Most frequently it was found in spots of a few square metres, often together with species as *Potentilla pulchella*, *Lesquerella arctica*, *Melandrium triflorum*, *Salix arctica*, *Minuartia rubella*, *Cerastium alpinum*, *Kobresia myosuroides*, and others. Not found above 200 m.

Northernmost known habitat is Low Point 83°09' lat. N. (TW).

*Potentilla chamissonis* HULT.

OSTENFELD & LUNDAGER (1910, p. 27) sub. nom. *P. pulchella* R. BR.; OSTENFELD (1915, p. 379) sub. nom. *P. nivea* L.; OSTENFELD (1923b, p. 240) sub. nom. *P. pedersenii* (RYDB.) OSTF.

## Localities:

- I: 9 Strømstedet (TW).  
 II: 16 Aftenstjernesø (PJ & JT), 18 Sydpasset (PJ), 19, 20 and 21 Baggården (KH, PJ), 24 Øvre Midsommersø (KH), 27 Mågeklippe (KH), 29 Sølejren (KH, PJ), 30 and 32 Børglum Elv (JT).  
 III: 33 Itukssuk Dal (BF), 35 Vildt Land (PF), 36 Kap Schmelek (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 42 Blomsterstranden (KH), 47 Zig-Zag Dal (PF).  
 V: 78 Frederick E. Hyde Fjord (IPK).  
 VII: Jørgen Brønlund Fjord: A, B2, E (KH).

In determination of the *Potentilla* of Peary Land the greater part of the material, and that means all the specimens not belonging to the easily recognizable *P. pulchella* and *P. hyparctica*, is a most troublesome problem. Botanists who have previously studied the scanty material from this area, apparently have had their troubles too, resulting in long discussions and a great number of names (*P. nivea*, *P. nivea pinnatifida*, *P. pedersenii*, *P. rubricaulis*, *P. rubricaulis arctica*, *P. vahliana*, *P. emarginata* and *P. pulchella*, *P. pulchella* f. *humilis* for a material of 15 specimens). In the study of the arctic *Potentilla* the recent treatise by HULTÉN (1945) is a large step forwards, although it may sometimes be difficult to use his delimitation of species in the case of this high-arctic material in which the pubescence of the plants is often developed to a much larger extent and is much denser, than is the case in plants from southerly areas. It is, nevertheless, found most appropriate in this paper to follow HULTÉN. A new revision will have to be based upon cultivation experiments and cytological investigation of the whole of the arctic *P. nivea* group. The attempt by HILTTONEN (1947) at ranking some of the species of LEHMAN and HULTÉN as subspecies seems of minor interest.

No true *P. nivea* in the HULTÉN (1945) sense was found in Peary Land, while on the other hand the closely related *P. chamissonis* seems to be rather frequent here. A minor part of the present material may easily be referred to this species, while a very large part of it, mainly from very dry, exposed places, resembles *P. rubricaulis* or *P. vahliana*, having a very dense cover of silky hairs on both sides of the leaves. While the genuine *P. rubricaulis* (pinnatifide) actually does occur within the area, the presence of *P. vahliana* must be regarded as most doubtful. The only specimen previously referred to this species is that of loc. 9

Strømstedet, I.P. Kochs Fjord, collected during the 2nd Thule Expedition.

OSTENFELD (1923b) first referred the specimen to *P. pedersenii*, a name which according to OSTENFELD (1923a) was to replace *P. rubri-caulis* var. *arctica* SIMM. Examination of specimens from Ellesmere of this variety, collected and named by SIMMONS himself, plainly shows that they are quite different from the specimen from I.P. Kochs Fjord. The same plant was later labelled *P. vahliana*. The specimen is in wintering condition, lacking the yellowish tinge of the pubescence and the distinctly revolute margins of the leaves always found in *P. vahliana*. Therefore it is being referred to *P. chamissonis* in spite of the pubescence of long, silky hairs on the leaves. In the writer's opinion the material determined by OSTENFELD & LUNDAGER (1910) to *P. pulchella* (later changed to *P. nivea* (cf. OSTENFELD (1915)), and that determined by OSTENFELD (1915), to *P. nivea*, belong likewise to the same type, and are consequently referred to *P. chamissonis* in this book.

*Potentilla chamissonis*, as taken here, is most varying in Peary Land, especially as to the density of the hairs and size of flowers. Rather constant characters, on the other hand, are those of the petioles bearing long, silky hairs only, and the leaves being tomentous on the under sides. Specimens from rather moist places (with a thick snow-cover during the winter) are usually devoid of hairs, or have only a few long hairs on the leaves, while the ones from dry, wind-swept places have a dense cover of long hairs on both sides of the leaves, covering the tomentum completely. The former type was found in a few places only, while the latter is common and widespread. There is a great variation in the size of the flower (from 8 to 20 mm in diameter). I think this variation is owing to a different genetic constitution, sooner than to ecological conditions.

*P. chamissonis* undoubtedly belongs to a complicated apomictic complex of forms.

The species rarely enters closed vegetation. On dry, exposed ground, where it is most common, it is often found together with *Melandrium triflorum*, *Lesquerella arctica*, *Draba arctogena*, *D. cinerea* and *Dryas integrifolia*. On moist slopes with a thick snow-cover during the winter, it is growing together with *Festuca hyperborea*, *Saxifraga oppositifolia*, *Juncus biglumis*, *Taraxacum pumilum*, *Potentilla pulchella* a. o.

The flowering takes place in the first days of July, first flowering specimen seen on June 26. Produces ripe seeds. Was found upwards to an elevation of 600 m.

*Potentilla chamissonis* was found to be common only in the inner parts of the country, in districts II and III including Jørgen Brønlund Fjord, but was almost absent from the other districts. This may be due

to the relatively high summer-temperatures, prevailing in these two districts. Its Greenland distribution is still not sufficiently known; according to HULTÉN (1945) it is northern with southern limit on the east coast at Scoresby Sund, and on the west coast at the Arctic Circle. Northernmost record is that from Strømstedet in I. P. Koch Fjord 82°51' lat. N. (TW).

*Potentilla hyparctica* MALTE

OSTENFELD (1915, p. 379, 1923b, p. 239) sub. nom. *P. emarginata* PURSH.

Localities:

- I: 3 Low Point (TW), 4 Kap Benet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).  
 III: 34 Valmue Dal (PF), 36 Kap Schmelck (PF), 37 Sidste Næs (PF), 39 Diasbasholme (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH).  
 V: 71 Herlufsholm Strand (KH).  
 VII: Jørgen Brønlund Fjord: B2 (KH), B3 (BF).

In Peary Land the species is clearly confined to the Cassiope areas. It is always a prominent plant in the so-called "fell-field" vegetation. Growing in dry ground, and often together with *Luzula confusa*, in places usually rich in mosses and lichens (*Orthotrichum killiasii*, *Aulacomnium turgidum*, *Racomitrium lanuginosum* and *Cetraria* spp.). On the stone-fields of Herlufsholm Strand dominated by *Racomitrium lanuginosum* it was, together with *Luzula confusa*, the most important flowering plant.

During the winter it is free of snow or covered only with small layers of snow. The flowering takes place at the end of June and in the beginning of July. Produces ripe seeds. Ascends to 900 m above sea-level, and was in Jørgen Brønlund Fjord not found below 400 m. The part of the material which was collected during the 1st and 2nd Thule Expeditions was by OSTENFELD (1915 & 1923b) referred to *P. emarginata* PURSH. FERNALD (1943), however, has recently demonstrated that the right name of the Greenland material is *P. hyparctica*. Cf. also HYLANDER (1945) and PORSILD (1946).

In Peary Land the species is found only in districts I, III, and V, and seems to be absent from the decidedly continental areas. The distribution of the species in Greenland was mapped by SEIDENFADEN & SØRENSEN (1937) sub. nom. *P. emarginata*. According to this map it seems to be almost "circumgreenlandic", but so far it has not been found on the west coast south of the Arctic Circle. Northernmost record is Low Point 83°09' lat. N. (TW).

*Potentilla pulchella* R. BR.

OSTENFELD (1915, p. 379 and 1923b, p. 240).

## Localities:

- I: 11 John Murray Ø (TW).  
 II: 16 Aftenstjernesø (PJ), 18 Sydpasset (PJ), 19 Baggården (KH, PJ),  
 20 Baggården (PJ), 25 Øvre Midsommersø (KH), 31 Børglum Elv  
 (TA), 32 Børglum Elv (JT).  
 III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 37 Sidste Næs (PF),  
 43 Kap Glacier (KH), 48a Kap Holbæk (EK).  
 IV: 49 Koralkysten (KH), 53 Neergaard Elv (KH).  
 V: 65 Kap Vårbrud (KH), 67 Mudderbugten (KH), Frederick E. Hyde  
 Fjord (IPK).  
 VI: 83 Frederick E. Hyde Fjord (EK), 87 Kap Kraka (EK), 91 Nord-  
 kroneli (EK), 93 Harebugt (EK), 94 Nordpasset (EK).  
 VII: Jørgen Brønlund Fjord: A, B2, B3, C, E (BF, KH).

The species is common in Peary Land owing to its rather wide ecological range. Never found in really wet places, but grows both in moist and extremely dry soil, stony, gravelly, sandy or clayey. As regards the snow covering during the winter the species seems rather indifferent too, being found unprotected and in the most extreme snow-patches. The various conditions of course influences the appearance of the species, the most luxuriant specimens usually being found in deltas, on slightly moist, sandy soil, and with no snow-protection during the winter. Here the tufts often reach a diameter of 25—30 cm and are very densely haired. Another extreme form occurs in the very heavy snow-patches on moist solifluction soil, these specimens being very small, only scantily haired, and of course late flowering. A third form is the so-called "pillar form". Such plants are densely haired and are found in extremely dry, wind-exposed places. The species begins its flowering at the end of June, first flowering specimen seen on June 21. Produces ripe seeds everywhere. Ascends to 1000 m above sea-level, but is by far commonest in the lowland. The species is often found in plant-communities, but usually only in the most open ones.

In Peary Land *Potentilla pulchella* is commonest in the inner, very continental parts of the country, so it is very strange to note that far south on the east coast of Greenland the species is commonest at the outer coasts (cf. GELTING, 1934). GELTING (1934) further mentions that the species probably is halophilous. Here I may add that the species in Peary Land is often found in soils covered with thin crusts of salt, which salts, however, are non-chloride, as mentioned under *Carex maritima*. In Greenland the species is northern with southern limit on the

west coast at the Arctic Circle, on the east coast at about 69°45' lat. N. Northernmost record is loc. 83 on the north coast of Frederick E. Hyde Fjord 83°13' lat. N. (EK).

*Potentilla rubricaulis* LEHM.

Localities:

- III: 41 Diabasnæs (KH), 45 Krognæs (PJ).  
VII: Jørgen Brønlund Fjord: A, D (KH).

*Potentilla rubricaulis* is here taken in a somewhat stricter sense than by HULTÉN (1945), the only material included being the specimens with pinnate leaves (usually 3 upper, large leaflets and two small, lower leaflets). This concept agrees near enough with SØRENSEN (1933) and with SIMMONS (1906), and makes it possible clearly to separate *P. rubricaulis* from the often very densely haired representatives of the *P. nivea*-group (see further discussions in SØRENSEN (1933) p. 64—72). The Peary Land material is closest related to that from Ellesmere, named var. *arctica* by SIMMONS. In most parts of the plants many of the leaves are ternate, but leaves with 5 leaflets will always be found, specially among those first developed in spring. It states in SEIDENFADEN & SØRENSEN (1937) and in SØRENSEN (1943) that "The East Greenland form seems to come close to the Asiatic *Potentilla sericea*." This would hardly be the case of the Peary Land material. And when POLUNIN (1940) says that it may sometimes be difficult to keep *P. rubricaulis* apart from *P. pulchella*, I do not agree. The flowers of the two species are so different that we may hardly speak of related species. Further, the scapes of *P. pulchella* are very short, the flowers being only just level with the tops of the tufts, or even below. Not until past florescence and during the ripening of the fruits are the scapes elongated, while in *P. rubricaulis* the scapes are elongated already when the flowering takes place.

*Potentilla rubricaulis* is rare in Peary Land. In one loc. only it was found in quantity, on the mountain Buen in Jørgen Brønlund Fjord, being the dominant species in a rather open plant-community on a dry, S-exposed, gravelly slope, which during the winter was snow-bare or only covered with a very thin layer of snow. Of species rather frequent in this community may further be mentioned *Saxifraga oppositifolia*, *Polygonum viviparum*, *Potentilla pulchella*, *Kobresia myosuroides*, *Melandrium triflorum* and *Poa abbreviata*; there were no mosses. This locality was being specially watched all during the summer, and although the plants were early free of snow in spring, and the exposition favourable, the species was, nevertheless not found flowering until the middle of July, about 3 weeks later than any other *Potentilla*-species of Peary Land growing under similar conditions. The species produces ripe seeds. It was found in the lowland only, below 100 m.

The Greenland distribution of the species is mapped by SØRENSEN (1933) in fig. 3; to this map may, however, be added some finds of later date (SEIDENFADEN & SØRENSEN (1937) and SØRENSEN (1943)). Although it is rare in northernmost Greenland, its distribution no doubt continues from Melville Bugt north around Greenland, and southwards to Scoresby Sund on the east coast. It seems to be confined to calcareous soil, and is often found in the innermost parts of the country. Northernmost record is the mountain Buen in Jørgen Brønlund Fjord 82°12' lat.N. (KH), and not I.P. Koch Fjord as stated by POLUNIN (1940). The specimen from this latter place should, as mentioned above, sooner be referred to *P. chamissonis*.

### Salicaceae.

#### *Salix arctica* PALL.

OSTENFELD & LUNDAGER (1910, pp. 15—16) var. *brownii* (ANDERS.) LUNDSTR.; OSTENFELD (1915, p. 379, 1923b, p. 240) sub. nom. *S. arctica* PALL. × *glauca* L.

#### Localities:

- I: 7 Mascart Inlet (ER), 11 John Murray Ø (TW).  
 II: 14 Merqujoq (PJ), 15 Head of I.P. Koch Fjord (PJ), 16 Aftenstjernesø (JT), 18 Sydpasset (PJ), 19, 20 and 21 Baggården (KH, PJ), 22, 24 and 25 Øvre Midsommersø (KH), 27 Mågeklippe (KH), 29 Sølejren (KH), 30 and 32 Børglum Elv (JT).  
 III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 40 Blomsterstranden (KH), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 40 Blomsterstranden (KH), 41 Diabasnæs (KH), 42 Blomsterstranden (KH), 43 Kap Glacier (KH), 44 NE of Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 47a Zig-Zag Dal (PF), 47b Sjællandsslette (PF, EK), 48a Kap Holbæk (EK).  
 IV: 49 Koralkysten (KH), 50 Falkefjeld (KH), 51 Graptolit Elv (KH), 52 Marius Fiil Fjord (KH), 53 Neergaard Elv (KH), 54 Slebsager Elv (KH), 55 Kap Peter Henrik (EK), 57 and 58 Hagen Fjord (ÅS), 61 Kap Kronborg (PF), 62 Prinsesse Dagmar Ø (EK), 63 Nord (EK, MW).  
 V: 65 Kap Vårbrud (KH), 66 Kap København (KH), 71 Herlufsholm Strand (KH), 75 Ormen (EK), 74 G.B. Schley Fjord (JT), 77 Kap John Flagler (EK), 78 Frederick E. Hyde Fjord (IPK), 79 Kap Ole Chiewitz (EK).  
 VI: 83, 84, and 85 North side of Frederick E. Hyde Fjord (EK), 89 Frigg Fjord (EK), 90 Kap Regnar Lodbrog (EK), 93 Harebugt (EK), 95 Head of O.B. Bøggild Fjord (EK), 96 Kap Bopa (EK).  
 VII: Jørgen Brønlund Fjord: all districts (BF, KH).

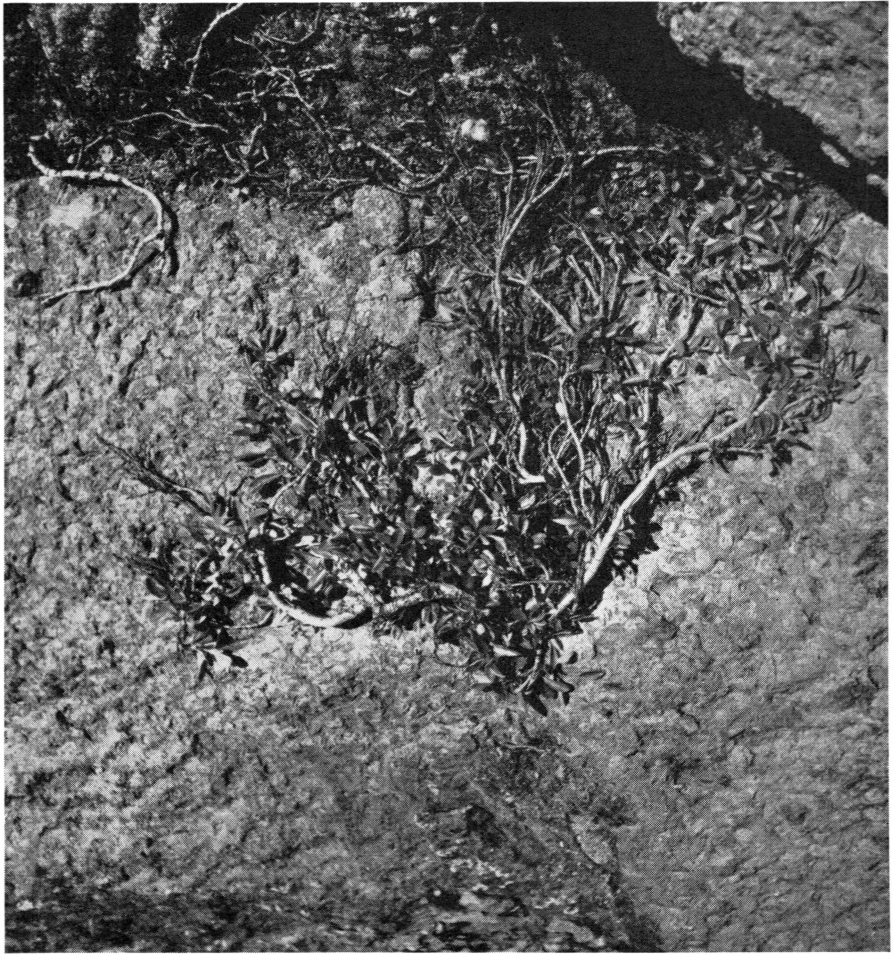


Fig. 20. Vigorous specimen of *Salix arctica*, closely adpressed to exposed dolomite rock. Aug. 13, 1947. Phot. KH.

Very common both in wet and in dry soil, growing on most different substrata from clay and sand to rocky crevices, often forming espalier densely adpressed to rocks or stones. Also found within a wide range of pH of the soil. During the winter it is found completely free of snow as well as covered with up to 4—5 m. The most vigorous plants, however, are found in warm, sunny places, where they are unprotected during the winter. Such conditions were specially found in the area around the two Midsommersø lakes. The altitude does not seem to influence the occurrence of the species. It was common up to 600 m, but will ascend as high as 1100 m above sea-level. The species is one of the earliest flowering plants of Peary Land, first male plants found flowering on

June 13, and a few days later the female plant. The flowers are often visited by insects, especially by bumble-bees. The species produces ripe seeds.

*Salix arctica* is found everywhere as a very prominent plant in many plant-communities, in snow-patches, in meadows, on solifluction soil, as well as on slopes and along rivers. The species is an important forage for hares, ptarmigans and musk-oxen, specially during the winter (cf. JOHNSEN, 1953).

The delimitation of species within the genus *Salix* affords, also in Greenland, a difficult problem, owing to a presumed rich hybridation between the species. In his treatment of the Greenland *Salices* FLODERUS (1923) operates with a species concept which seems rather arbitrary, as least as far as the Peary Land material is concerned. In this paper all material has been referred to *Salix arctica* PALL., including a specimen, referred by OSTENFELD (1923b) to *S. arctica* × *glauca*. It may, however, be mentioned that in Peary Land *Salix arctica* is very uniform, varying only slightly in the pubescence of the leaves. Only a single specimen had a deviating, oblong-lanceolate shape of the leaves. In the common type they are broadly obovate with a rounded apex.

From the list above appears that the species is common throughout Peary Land. It gives the impression, however, of being commonest in the inner, very continental areas, while it seems to be sparse at the outer coasts. Our knowledge of the distribution of the species in Greenland is limited, of course, but at least it seems to be northern. The occurrence of the species seems to have been demonstrated as far south as 63° lat. N. on the east coast, and to about 70° lat. N. on the west coast (cf. BÖCHER, 1938). Northernmost record is Kap Ole Chiewitz 83°18' lat. N. (EK).

### Saxifragaceae.

#### *Saxifraga caespitosa* L.

OSTENFELD (1915, p. 380) & (1923b, p. 241) sub. nom. *S. groenlandica* L. var. *uniflora* (R. BR.) SIMM.

#### Localities:

- I: 5 Black Cape (TW), 9 Strømstedet (TW).  
 II: 24 Øvre Midsommersø (KH), 27 Mågeklippe (KH).  
 III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 36 Kap Schmelck (PF), 38 Kap Ejnar Mikkelsen (KH), 45 Saxifragadal (KH), 46 Krog-næs (PJ).  
 IV: Neergaard Elv 53 (KH), 62 Prinsesse Dagmar Ø (EK), 63 Nord (EK).  
 V: 68, 70 and 71 Herlufsholm Strand (KH), 72 Hellefiskefjord (JT).  
 VII: Jørgen Brønlund Fjord: A, B1, B2, B3, C, D (BF, KH).

The species is rather common in Peary Land locally. Most frequent around the innermost parts of Independence Fjord and at the east coast of Peary Land. In the latter place it is a very important component of the vegetation, more so than *S. oppositifolia*. It is rare in the most continental parts of the country, and at Jørgen Brønlund Fjord does not become common until above 200 m above sea-level, and then very common between 400—600 m. Usually growing in slightly moist, stony or gravelly soil. Is also found in rocky crevices or in the shade of large boulders. The individuals are generally growing singly, rarely entering the plant-communities. During the winter it is always covered with snow, but never with thick layers, and is accordingly early free of snow in spring. The flowering starts in the beginning of July, even in plants at high altitudes. Produces ripe seeds. Ascends to 1100 m above sea-level.

As mentioned in HOLMEN (1952) the Peary Land material of *S. caespitosa* belongs to the eu-caespitosa following ENGLER & IRMSCHER (1916), and within this to f. *uniflora*. Of numerous specimens seen, only a few had scapes with more than one flower.

*S. caespitosa* is known from all parts of Greenland, in the different areas represented by different ssp. and forms. The distribution of f. *uniflora* seems to be north eastern, it is the only form found in NE Greenland and on the north coast (cfr. also SEIDENFADEN & SØRENSEN (1937)). It seems to me that it deserves the rank of var. or ssp. as it is rather well defined morphologically as well as geographically. Northernmost record is Black Cape 83°03' lat. N. (TW).

#### *Saxifraga cernua* L.

OSTENFELD (1915, p. 380; 1923b, p. 240).

##### Localities:

- I: 3 Low Point (TW), 10 Kap Salor (TW).
- II: 27 Mågeklippe (KH).
- III: 33 Itukussuk Dal (BF), 37 Sidste Næs (PF), 34 Valmuedal (PF), 48c Campanuladal (EK).
- IV: 49 Koralkysten (KH).
- V: 65 Kap Vårbrud (KH), 69 Kap Eiler Rasmussen (KH), 70 Herlufsholm Strand (KH).
- VII: Jørgen Brønlund Fjord: A, B2, B3, C (BF, KH).

Found on most varying substratum, on clayey as well as stony ground. As regards moisture it occurs from wet swamps to rather dry slopes. As to snow-cover during the winter it also seems indifferent, found in places with a very large cover of snow (4—5 m) as well as in places completely free from snow. On snow-bare ground the winter-buds

are hidden deep down in cushions of moss. The flowering takes place very late, also in places early snow-free in spring. A few specimens, however, were seen flowering already on June 30. From each scape usually only one, rarely two, flowers are developed. Ripe seeds are not produced, but the propagation with bulbils is effective.

The species is undoubtedly common throughout Peary Land, from the lowland to the highest altitudes. It was not commonly found during the sledge-journeys, which may be due to the fact that the epiterranean parts of the plants disappear very fast when frost sets in. The species is known from all parts of Greenland. Northernmost record is Low Point 83°09' lat. N. (TW).

*Saxifraga flagellaris* WILLD.

OSTENFELD (1915, p. 380; 1923b, p. 241).

Localities:

- I: 4 Kap Benet (TW), 9 Strømstedet (TW), 11 John Murray Ø (TW).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF).
- IV: 53 Neergaard Elv (KH), 63 Nord (MW).
- V: 67 Mudderbugten (KH), 71 Herlufsholm Strand (KH).
- VI: 83 North side of Frederick E. Hyde Fjord (EK).
- VII: Jørgen Brønlund Fjord: A, B2, B3, C, D, E (BF, KH).

The species occurs on all kind of moist substratum, from stony river-beds to clayey solifluction soil. During the winter it is covered with thin layers of snow only, or is often free of snow. The growing period is accordingly rather long for this species. The flowering starts at the end of June, first flowering specimen seen on June 23. Produces ripe seeds, but the vegetative propagation by means of the very characteristic red runners, measuring up to 20 cm, is undoubtedly the most important. These are usually present in a number of 4 to 8. The species is found among mosses and on bare ground but is always absent from dense vegetation of vascular plants. *S. flagellaris* is often associated with the moss *Tortella fragilis*. This moss is, however, ecologically more selective than *S. flagellaris*. In other words where *Tortella fragilis* is found, *S. flagellaris* is met with too.

Contradictory statements in SCHOLANDER (1934) and GELTING (1934), induced POLUNIN (1940) to discuss the demand for pH of the soil for this species. While SCHOLANDER says that it is absent from areas with dolomitic rock, GELTING and POLUNIN call it calciphilous. I agree with the two latter authors, as in Peary Land all the stations of the species were rich indeed in dolomite chalk. Some figures of pH from *S. flagellaris* communities in my area are e. g. 7,2; 6,9; 6,8.

The species was found in several places in Peary Land, both at the outer coast and in the inner parts of the country, though not in the most continental areas around the lake Midsommersø.

At Jørgen Brønlund Fjord it was common in the lowland and upwards to 900 m above sea-level. Its Greenland distribution is mapped in SEIDENFADEN & SØRENSEN (1937) fig. 54. It reaches from Kejser Franz Josephs Fjord on the east coast, and north round to Thule on the west coast. Northernmost record is from Frederick E. Hyde Fjord 83°13' lat. N. (EK).

According to PORSILD (1954) the Greenland representative of the species should be referred to ssp. *platysepala* (TRAUTV.) A. E. PORS.

*Saxifraga foliolosa* R. BR.

OSTENFELD (1923b, p. 271) sub. nom. *S. stellaris* L. var. *comosa* RETZ.

Localities:

I: 9 Strømstedet (TW noted), 3 Low Point (TW).

The species is known only from these two places in the NW corner of Peary Land, and was not found during Dansk Pearyland Expedition. So on the ecology and biology of the species in Peary Land nothing can be said here.

The distribution of the species in Greenland is mapped in BÖCHER (1938) fig. 57. It seems to be a northern vicariant of the closely related *S. stellaris*, but is evidently very rare in the far North. Northernmost record is Low Point 83°09' lat. N. (TW).

*Saxifraga hyperborea* R. BR.

Localities:

VII: Jørgen Brønlund Fjord: B2, B3 (BF, KH).

This species, by ENGLER & IRMSCHER (1916) regarded as a variety within the complex of *S. rivularis* L., has recently, after further investigations by JØRGENSEN et al. (1957), again been given the rank of species. The said authors have shown that it is separate from *S. rivularis*, morphologically as well as cytologically and geographically.

In Peary Land it was found only at Jørgen Brønlund Fjord and here only in three places at altitudes of 400 m, 500 m and 1100 m resp. In all places it was growing in wet, mossy soil, in spring-bogs or along rivulets. The snow-cover during the winter was of medium thickness, but although in summer rather early free from snow, the species was late-flowering, first flowering specimens seen at the end of July. Ripe seeds are produced.



Fig. 21. *Saxifraga nivalis* from stone-field at Jørgen Brønlund Fjord.  
Phot. U.MØHL HANSEN, Aug. 1947.

While *S. rivularis* is known from most parts of Greenland except the northernmost parts, the distribution of *S. hyperborea* is not sufficiently known. Northernmost record is Jørgen Brønlund Fjord 82°10' lat. N. (KH).

*Saxifraga nivalis* L.

OSTENFELD (1915, p. 380 and 1923b, p. 241).

Localities:

- I: 3 Low Point (TW), 9 Strømstedet (TW).
- III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 39 Diabasholme (KH),  
45 Saxifragadal (KH).
- V: 70 and 71 Herlufsholm Strand (KH).
- VII: Jørgen Brønlund Fjord: A, B1, B2, E (KH).

In Peary Land this species was rather common locally. It does not usually enter the close plant-communities, but is growing in slightly moist ground, often among mosses in stone-fields. It has an occurrence similar to that of *Cassiope tetragona*. At Jørgen Brønlund Fjord it was found only in two places in the lowland, and does not become common until above 400 m, just like several other species, e. g. *Cardamine bellidifolia*, *Trisetum spicatum*, *Poa arctica*, and *Potentilla hyparctica*, all of which have almost the same distribution in Peary Land, being restricted to the outer coasts and the innermost part of Independence Fjord. The species seems to be absent from the very continental, wind-swept areas.

During the winter the species is covered only with thin layers of snow. The wintering buds are usually hidden deep in the moss-cushions, so a further protection is not necessary. Although early free in spring, the species is late-flowering. The flowering begins in the first days of July. Specimens with ripe seeds were not found, but may well occur. Ascends to 600 m above sea-level. From the closely related *S. tenuis* it is clearly separated with regard to ecology.

The species is known from all parts of Greenland. Northernmost record is Low Point 83°09' lat. N. (TW).

*Saxifraga oppositifolia* L.

SIMMONS (1909, p. 65); OSTENFELD & LUNDAGER (1910, p. 25); OSTENFELD (1915, p. 380); OSTENFELD (1923b, p. 241).

Localities:

- I: 1 Lockwood Ø (Lockwood), 2 Jewell Fjord (ER), 3 Low Point (TW), 8 Mascart Inlet (ER), 9 Strømstedet (TW), 10 Kap Salor (TW).
- II: 14 Merqujoq (PJ), 15 Head of I.P. Koch Fjord (PJ), 16 Aftenstjernesø (JT), 18 Sydpasset (PJ), 19, 20 and 21 Baggården (KH, PJ), 22, 24 and 25 Øvre Midsommersø (KH, JT), 27 Mågeklippe (KH), 28 Teltnæs (EK), 29 Sølejren (KH, PJ), 30, 31 and 32 Børglum Elv (TA, JT).
- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 36 Kap Schmelek (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 40 Blomsterstranden (KH), 41 Diabasnæs (KH), 42 Blomsterstranden (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH, PJ), 47a Zig-Zag Dal (PF), 47b Sjøllandsslette (EK), 48a Kap Holbæk (EK), 48b Lolland Sø (EK).
- IV: 49 Koralkysten (KH), 50 Falkefjeld (KH), 51 Graptolit Elv (KF, KH), 52 Marius Fiil Fjord (KH), 53 Neergaard Elv (KH, EK), 54 Slesbager Elv (KH), 55 Kap Peter Henrik (EK, ÅS), 56 Kap

Ludovica (ÅS), 58 Hagen Fjord (ÅS), 59 Kap Rigsdagen (ÅS), 60 Prinsesse Thyra Ø (ÅS), 61 Kap Kronborg (PF), 62 Prinsesse Dagmar Ø (EK), 63 Nord (EK, MW).

V: 66 Kap København (KH), 67 Mudderbugten (KH), 68 South of Kap Eiler Rasmussen (KH), 69 Eiler Rasmussen (KH), 70 and 71 Herlufsholm Strand (KH, JT), 72 Hellefiskefjord (JT), 74 G. B. Schley Fjord (JT), 75 Ormen (EK), 76 Mouth of G.B.Schley Fjord (JT), 77 Kap John Flagler (EK), 78 Frederick E. Hyde Fjord (IPK), 79 Kap Ole Chiewitz (EK), 81 Kap Morris Jesup (Lauge Koch).

VI: 82, 83, 84 and 85 North side of Frederick E. Hyde Fjord (EK), 91 Nordkroneli (EK), 93 Harebugt (EK), 95 Head of O.B.Bøggild Fjord (EK), 96 Kap Bopa (EK).

VII: Jørgen Brønlund Fjord: all districts (BF, KH).

Very common everywhere in Peary Land. Its ecological range seems very wide; it was thus found growing in almost every kind of soil, dry and moist alike, but never in wet places. It is often a very important component of many plant-communities. pH of the soil on which it occurred varied from 5.4 to 8.0. As regards protection by snow during the winter, the species does not seem to have any special demands, being found in the most extreme snow-patches and with no protection of snow at all. Even in snow-patches, which in some summers do not become free of snow, the species was found richly flowering during the summers of observation. In a single, controlled place, the specimens were covered with snow throughout 23 months.

The flowering begins very early, in the first days of June, i. e. about a fortnight before the flowering of most of the other species generally begins. In 1949 the first flowering specimens were seen on June 6, at Diabasholme. The following day flowering specimens were reported also from Kap Glacier, Saxifragadal, Astrups Fjord, Graptolit Elv and Jørgen Brønlund Fjord. Especially were the densely tufted specimens richly flowering; in one large tuft, for instance, several hundred flowers were counted, covering the plant completely. There were also single specimens with white flowers. The species produces ripe seeds. Ascends to 1100 m above sea-level.

In Peary Land *S. oppositifolia* was found in two forms, answering a f. *reptans* and a f. *pulvinata* (see ANDERSSON & HESSELMANN, 1900), the former with long creeping shoots, long internodes and of a loosely caespitose growth, the latter with very short internodes, the leaves densely arranged in four rows, and of a pulvinate growth. Forma *reptans* in Peary Land is usually confined to the snow-patches, while forma *pulvinata*, which is by far the commonest, is usually found in places free of snow during the winter.

These two forms have recently been discussed by LØVE & LØVE (1951), who think they should be regarded as separate species. In Svalbard f. *pulvinata* is said to be known to be tetraploid ( $2n = 52$ ), while f. *reptans* at several stations within its area is thought to represent the diploid form. In Peary Land f. *pulvinata* and f. *reptans* were both diploid ( $2n = 26$ ).

*Saxifraga oppositifolia* is common throughout Greenland. Northernmost record is Kap Morris Jesup  $83^{\circ}39'$  lat. N. (Lauge Koch).

*Saxifraga tenuis* (Wg.) H. Sm.

Localities:

V: 70 Herlufsholm Strand (KH).

VII: Jørgen Brønlund Fjord: A, B2, B3 (BF, KH).

Judging from the list above this species should be rather rare in Peary Land, but this is probably not the case. Because of its small size (never more than 5 cm high) it is easily overlooked on the sledge-journeys. While *S. nivalis* is found in places climatically favoured, *S. tenuis* seems well suited to resist the hard conditions of Peary Land. At Jørgen Brønlund Fjord, where the species was commonly met with in the lowland as well as at higher altitudes, it was usually growing in snow-patches during the winter covered with 5 or 6 m of snow. The species has a growing period of about 3 to 4 weeks only; and it is not flowering until the first days of August. *S. tenuis* is always found in moist, but never in dry ground. It is a frequent component in snow-patch vegetation, together with *Draba oblongata*, *D. bellii*, *Ranunculus sulphureus*, *Luzula arctica*, *Alopecurus alpinus*, etc.

The Greenland distribution of *S. tenuis* is not sufficiently known, but like *S. nivalis* it seems to have been found in most parts of the country, although it is rarer than the latter. Northernmost record is Herlufsholm Strand  $82^{\circ}40'$  lat. N. (KH).

**Campanulaceae.**

*Campanula uniflora* L.

Localities:

III: 39 Diabasholme (KH), 44 E. of Kap Glacier (KH), 46 Krognæs (PJ).

The finds were all made on sledge-journeys on the first days of June, when the plant was still in wintery condition with withered culms, leaves and capsules. In the two localities near the head of Independence Fjord, which the author had the opportunity of visiting, the plants were found on steep, basaltic rocks, on sun-exposed shelves covered with

a thin layer of sand. At locality no. 39 the species was growing together with *Armeria scabra*, and in loc. 44 it was found in *Cassiope tetragona*-heath, rich in mosses. It may be presumed that the presence of the species at these high latitudes is conditioned specially by the steep, dark coloured basaltic rock, which in summer offers a rather warm growing-place. The time of flowering is unknown; ripe seeds were found in the year-old capsules. All the finds were made below 50 m.

The distribution of the species in Greenland is mapped and discussed by BÖCHER (1938). It is found in most parts of the country, being rare in East Greenland south of Scoresby Sund and in North Greenland. The finds in Peary Land are about 350 km north of finds previously known. Future investigations will probably show that the species is "circum-greenlandic".

Northernmost record is Diabasholme 82°00' lat. N. (KH).

### Compositae.

#### *Erigeron eriocephalus* J. VAHL

OSTENFELD (1923b, p. 242) sub. nom. *E. uniflorus* L. var. *unalaschensis* (D.C.).

Locality: I: 9 Strømstedet (TW).

The species was not seen during our expedition, so only the specimen collected by Thorild Wulff on the 2nd Thule Expedition is at hand. There is thus nothing new regarding biology and ecology to be added to what is found in OSTENFELD (1923b, p. 242). This latter, however, refers the material to *E. uniflorus* var. *unalaschkensis*, although the material is in fine accordance with the type-specimen of J. VAHL, in the Copenhagen Herbarium.

The species has often been referred to *E. uniflorus* as a variety, and it is indeed closely related to *E. uniflorus*; several newer floras, however, are inclined to give *E. eriocephalus* the rank of species.

The station in Peary Land is far from all other stations of the species in Greenland. According to BÖCHER (1938) it is restricted to the areas between about 63°—75° lat. N. on the east coast, and between about 67°—78° lat. N. on the west coast. Northernmost record is that of Peary Land, 82°51' lat. N.

#### *Erigeron compositus* PURSH.

OSTENFELD (1915, p. 380).

Localities:

II: 21 Baggården (KH), 30 Børglum Elv (JT).

III: 33 Itukussuk Dal (BF), 36 Cape Schmelck (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 41 Diabasnæs (KH). 48 b Lolland Sø (EK), 48 c Campanuladal (EK).

VI: 93 Harebugt (EK).

VII: Jørgen Brønlund Fjord: A (KH), B1 (KH, PJ).

Here and there growing on dry sun-exposed hills or in rocky crevices facing south. During the winter it is usually heavily covered with snow, but is always early free from snow in spring, due to the exposition. The flowering nevertheless, takes place rather late, first flowering specimen seen on July 15. The species produces ripe seeds. In Peary Land the colour of the radiate flowers is usually white, rarely light purple.

The material may be referred to var. *discoideus* A. GRAY, the leaves being mostly once ternate (cf. CRONQUIST (1947)).

The species was found only in the very continental parts of the area, far from the outer coast; this is in good accordance with SEIDENFADEN & SØRENSEN (1937), who regard it a typical arctic desert plant. Its Greenland distribution is mapped by BÖCHER (1938). It is specially frequent in the inner parts of the broad coast tracts in east and west, and is rare, or completely lacking, in Melville Bugt and in the south-east. Northernmost record is Harebugt 82°55' lat. N. (EK).

The species is never found in closed vegetation, but is usually met with in scattered tufts, together with *Poa abbreviata*, *Potentilla pulchella*, *Melandrium triflorum* and *Lesquerella*. Most frequent in the lowland, but found upwards to 500 m.

#### *Taraxacum.*

Four very distinct species were found in the area, each of them so characteristic that no mistake should be possible. They are very different, not only morphologically, but ecologically and cytologically, too (see HOLMEN, 1952).

Characteristics of the 4 species:

*T. pumilum*: tiny, leaves lobed, flowers orange-yellowish, heads open campanulate.  $2n = 16$ .

*T. phymatocarpum*: leaves margin entire, or nearly so; flowers light-yellow.  $2n = 24$ .

*T. arcticum*: leaves lobed, flowers white.  $2n = 40$ .

*T. arctogenum*: leaves lobed, flowers large, bright yellow. Ceratophorous.  $2n = 32$ .

#### *Taraxacum pumilum* DAHLST.

Localities:

VII: Jørgen Brønlund Fjord: A, B1 (noted in D) (KH).

This very characteristic little plant belongs to the smallest *Taraxacum* species ever seen by the author. The rosettes rarely measure more than 6 cm in diameter. The dark-yellow *capitulum* is very small on a

short (1—2 cm) scape. In the three other species the flowering *capitulum* is quite open, often flat; in this species it is rather campanulate.

I did not succeed in finding this species outside the Jørgen Brønlund Fjord area, undoubtedly due to the fact that during the winter it is always covered by a deep layer of snow, and therefore inaccessible on sledge-journeys. At Jørgen Brønlund Fjord the species is rather common in the lowland up to 150 m, growing especially on slopes facing S or SE, in places where the soil is sandy or clayey and moderately moist. pH of the soil is often above 7. In spite of the large snow-cover in winter the plants are early free from snow in spring, and the flowering takes place in the first days of July. The first flowering specimen was seen on July 2. Produces ripe fruits.

On SE-exposed clayey slopes the species is the most prominent plant in a rather open vegetation, free from mosses. Other frequent species are for instance *Melandrium triflorum*, *Braya thorild-wulffii*, *Taraxacum arctogenum*, *Potentilla pulchella*, *Oxyria digyna* and *Minuartia rubella*.

*T. pumilum* is a very rare arctic species, and no material outside Ellesmere and North and North-East Greenland seems to have been referred to this species, which was described by DAHLSTEDT (1905) on specimens from southern Ellesmere, collected by SIMMONS. The diagnosis covers the Peary Land material in every way. Unfortunately literature is very scanty concerning the taxonomy of this species, and only two authors have seen the species in the field previously to the present writer, i. e. SØRENSEN (see SEIDENFADEN & SØRENSEN, 1937) and SIMMONS, who collected the type-specimen without being aware, however, of its peculiarity. After my own studies in Peary Land I have no hesitation in considering it a really good species, which furthermore proved to be diploid (HOLMEN, 1952) and probably sexual. To my knowledge this is the first time the occurrence of diploid *Taraxaca* has been demonstrated within the Arctic. Specimens grown from seeds brought home from Peary Land and cultivated in the Botanical Gardens, Copenhagen, showed very fine accordance, also regarding size, with the Greenland field plants, so these are not to be considered "a depauperate form". HANDEL-MAZZETTI (1907), FERNALD (1933) and POLUNIN (1940) have simply referred it to *T. phymatocarpum*, owing to the fact, maybe, that these authors have not had sufficient material at their disposal. HAGLUND (1943) quotes *T. pumilum* as a synonym to *T. alaskanum* RYDB. *T. alaskanum* as described by RYDBERG (1901) and pictured by SHERFF (1920) seems to me to have nothing in common with *T. pumilum*. Later on, however, HAGLUND (1948) has changed his mind, on p. 334 he says about *T. pumilum* "cannot be identical with the former" (*T. alaskanum*). On *T. pumilum* he further says (p. 335), "I can hardly believe the latter

(*T. pumilum*) to be a species of its own. It is probably a *T. phymatocarpum* with better developed lateral lobes". Even the latter suggestion must be discounted.

Outside Peary Land the species is known from only two places in Greenland; these are Skærfjord on the east coast (about 78° lat. N.) and Gunnar Anderssons Dal west of Peary Land. Gunnar Anderssons Dal is the northernmost known locality of the species (82°29' lat. N., TW).

*Taraxacum phymatocarpum* J. VAHL

Localities:

- II: 18 Sydpasset (PJ), 24 Øvre Midsommersø (KH), 29 Søjren (KH), 30 Børglum Elv (JT).  
 III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 42 Blomsterstranden (KH), 46 Krognæs (PJ), 48a Kap Holbæk (EK).  
 VII: Jørgen Brønlund Fjord: A, B2 and D (KH).

The commonest *Taraxacum* species of the area, growing in moist, stony places, especially along rivers and in deltas, where vegetation is open and poor. The species rarely enters the closed plant-communities, but is frequently found with *Potentilla pulchella*, *Papaver radicum*, *Salix arctica* and *Melandrium apetalum*. In contrast to the other *Taraxacum*-species of the area, it usually grows in places free from snow in winter. Flowering takes place first in July. First flowering specimen seen June 27. Produces ripe seeds. Common in the lowland and ascending to 460 m.

In Greenland *T. phymatocarpum* is known in the northern part only. Southern limit on the east coast at Scoresby Sund and on the west coast at about 70° lat. N. Northernmost known locality of the species is Sommerdalen 82°29' lat. N. (TW), just west of Peary Land.

*Taraxacum arcticum* (TRAUTV.) DAHLST.

Locality:

- VII: Jørgen Brønlund Fjord: B2 (KH).

The species was found in this locality only, and only a few specimens were seen. It was growing in a moist, mossy spot in a stony field situated 500 m above sea-level. In the same place were found *Salix arctica*, *Alopecurus alpinus*, *Pedicularis hirsuta* and *Arctagrostis latifolia*. The find was made on August 5, while the plants were still flowering, but the specimens had also ripe fruits, so the species seems to be late-flowering, that is not until the middle of July. The colour of the flowers was white as is usual in the Greenland representative of the species, f. *albiflora* KJELLM. It is difficult to say anything about the snow-covering during

the winter. But the species would hardly have been covered with more than 1 m of snow.

OSTENFELD (1923b) mentions that some small specimens without flowers, collected by TH. WULFF at loc. 10, Kap Salor, and loc. 11, John Murray Ø, probably belong in this species. The specimens were too poor for a safe determination.

In Greenland the species is restricted to the NE-part, extending from Scoresby Sund to Sommerdalen (82°29' lat. N.), where it finds its westernmost and northernmost locality (TW).

*Taraxacum arctogenum* DAHLST.

Localities:

II: 32 Børglum Elv (JT).

III: 46 Krognæs (PJ), 48a Kap Holbæk (EK), 48b Lolland Sø (EK).

VII: Jørgen Brønlund Fjord: A, B1, B2, D (KH).

With regard to ecology the species has much in common with *T. pumilum*, with which it is often found. They are as mentioned previously, usually met with on S- and SE-exposed clayey slopes where the snow-covering during winter is heavy. However, this species has a wider ecological range and is also frequent in moist, sandy river-beds and on solifluction-soil, and is often found together with *Alopecurus alpinus*. In manured soil very vigorous specimens are often met with. Although the species is usually heavily covered with snow, it nevertheless becomes early free from snow in spring. Flowering starts in the first days of July, first flowering specimen was seen on June 26. Produces ripe seeds. Ascends to 500 m.

The species is easy recognizable because of its very large capitula, which are of a bright, shiny, yellow colour; it belongs in the *Ceratophorum* group. It may, however, be mentioned that the specimens collected at the mountain Buen and at Børglum Elv were lacking those appendicules on the involucreal squamae. They are referred to *T. arctogenum* because of the habit of the plants and the shapes of the leaves.

Actually *T. arctogenum*, *T. groenlandicum* DAHLST. and *T. lacerum* GREENE are closely related. In recent Arctic American literature they are usually included in one species, *T. lacerum*. It may be mentioned, however, that HAGLUND (1948) is inclined to believe that *T. arctogenum* is a separate species.

In Peary Land the species was found only in the very continental parts of the country. In Greenland it is known from the northern part only, that is north of 76° lat. N. in West Greenland and eastwards to Peary Land. Northernmost known locality is Sommerdalen, 82°29' lat. N. (TW), just west of Peary Land. GELTING (1934) mentions that the



Fig. 22. Flowering specimen of *Taraxacum arctogenum* on SE-exposed clayey slope near the wintering station at Jørgen Brønlund Fjord. Aug. 5, 1949. Phot. KH.

species is endemic to Greenland. One specimen, however, collected on Fosheim Pen. in western Ellesmere (about 80° lat. N.), belongs undoubtedly in this species.

*Cassiope tetragona* (L.) D. DON.

OSTENFELD (1915, p. 380); OSTENFELD (1923b, p. 243).

Localities:

I: 2 Jewell Fjord (ER), 3 Low Point (TW).

III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 35 Vildt Land (PF), 36 Kap Schmelck (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 40 Blomsterstranden (KH), 44 East of Kap Glacier (KH), 45 Saxifragadal (KH), 47b Sjællandsslette (PF; EK), 48b Lolland Sø (EK).

V: 71 Herlufsholm Strand (JT), 72 Hellefiskefjord (JT).

VII: Jørgen Brønlund Fjord: B2 (BF, KH, PJ).

*Cassiope tetragona* is one of the most selective species of the area. Where the species is found it is growing in small, moist hollows in stone-fields, forming heath-patches of a size often not more than a few square metres. The soil is always rich in humus; in samples from Jørgen Brønlund Fjord JENSEN (1951) found a content of humus of 35.6 % and 45.0 %. The humus is usually mixed with fine sand. The pH of the soil is somewhat varying, in different samples of soil figures between 6.4 and 8.0 were found.



Fig. 23. Vegetation of *Cassiope tetragona* from stone-field at Jørgen Brønlund Fjord. 450 m above sea-level. Aug. 12, 1947. Phot. KH.

During the winter the species is always covered with snow, but the latter rarely reaches more than 1 m. Accordingly the species is rather early free from snow in spring, usually during the month of June. On account of the snow-melting the growing-places are at first rather wet, but become dry very fast, though they never dry up completely during the summer, probably because of the high content of humus. Flowering takes place rather late, i. e. about 3 weeks after the plants have become free from snow. At Jørgen Brønlund Fjord the first flowering specimen was seen on July 8, the maximum flowering occurs in the middle of July. The species produces ripe seeds.

The species is always forming a dense growth (*Cassiope tetragona*-heath); accompanying vascular plants, usually frequent but never dominant, are *Salix arctica*, *Carex misandra*, *Saxifraga oppositifolia*,

*Carex nardina* and *Poa arctica*. The Cassiope-heath is always rich in mosses; frequent are *Hypnum revolutum*, *Orthotrichum killiasii* and *Tortula ruralis*.

In Peary Land *Cassiope tetragona* has a remarkable distribution. It is known along the outer coast in the east and north west, and from the innermost parts of the large fjords, especially at the head of Independence Fjord, where it grows from sea-level and upwards. At Jørgen Brønlund Fjord it is found only in a zone between 450 and 700 m above sea-level, where it is rather frequent. Lack of the species in the lowland is probably due to the same factors that prevent it from growing in the area between the outer coast and the inner fjords. It may be pointed out that it would hardly be the edaphic factors or the climatic conditions during the winter period that effect this distribution, the cause may sooner be found in the climatic conditions during the summer period. The occurrence of *Cassiope tetragona* in Peary Land seems to support the statement by BÖCHER (1933) that this plant is a very fine climatic indicator, for also here the species reacts on small climatic alterations.

Besides *Cassiope tetragona* a number of other species have a similar occurrence in Peary Land, e. g. *Cardamine bellidifolia*, *Potentilla hyperbatica*, *Poa arctica*, *Luzula confusa* and *Saxifraga nivalis*. Even within the mosses this distributional type is found; examples are *Aulacomnium turgidum*, *Tomenthypnum nitens* and *Rhacomitrium lanuginosum*.

The distribution of *Cassiope tetragona* in Greenland is given in a map in BÖCHER (1933) fig. 12. To this map must be added some localities from newer investigations, although they do not change the picture of the distribution. It occurs in the northern part of Greenland, southern limit on the west coast in the Godthåbsfjord-complex and on the east coast at Angmagssalik. In the southern part of the area it is specially confined to places far from the coast.

The northernmost known locality is Low Point 83°09' lat. N. (TW).

### Plumbaginaceae.

*Armeria scabra* PALL. ssp. *sibirica* (TURCZ.) HYL.

OSTENFELD (1915, p. 380) sub. nom. *Statice armeria* L. var. *sibirica* (TURCZ.) ROSENV.

Localities:

III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 39 Diabasholme (KH), 48b Lolland Sø (EK).

Growing in moist to dry, sandy soil. In Itukussuk Dal it was, according to FRISTRUP, found in moist, sandy soil near the river. At

Diabasholme, the only place where I had the opportunity of seeing it myself, it was growing on small shelves on a steep basaltic wall, exposed to the south. It was found in company with *Campanula uniflora*, *Silene acaulis*, *Potentilla hyparctica*, *Saxifraga oppositifolia* and others, in a thin layer of sand. This locality was visited on June 6; the plants were free from snow, but the growing-place was being watered from a snow-fan above. During the summer the place is very hot and dry, and during the winter it would hardly be covered with more than 30 to 40 cm of snow. The flowering takes place probably first in July; the specimens collected in Itukussuk Dal on July 25 were past flowering.

As will be seen from the list the species is very rare in Peary Land. Evidently it belongs to the same distributional type as *Silene acaulis*, although it is lacking in the north-west. Its Greenland distribution is given in a map by IVERSEN (1940) fig. 10 (sub. nom. *A. labradorica*). It is a northern species with southern limit on the west coast at Godthåbsfjord, and on the east coast at Angmagssalik. Northernmost known locality is Itukussuk Dal (82°05' lat. N. (BF).

### Scrophulariaceae.

#### *Pedicularis hirsuta* L.

OSTENFELD & LUNDAGER (1910, p. 31); OSTENFELD (1915, p. 381); OSTENFELD (1923b, p. 244).

#### Localities:

- I: 3 Low Point (TW), 9 Strømstedet (TW).  
 II: 18 Sydpasset (PJ), 21 Baggården (PJ), 27 Mågeklippe (KH), 29 Søjren (KH).  
 III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF), 38 Kap Ejnar Mikkelsen (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krog-næs (PJ), 48b Lolland Sø (EK).  
 V: 71 Herlufsholm Strand (JT), 78 Frederick E. Hyde Fjord (IPK).  
 VI: 93 Harebugt (EK), 94 Nordpasset (EK), 95 Head of O.B. Bøggild Fjord (EK), 96 Kap Bopa (EK).  
 VII: Jørgen Brønlund Fjord: A, D, E (KH).

Only this one species was found within the genus, in Peary Land. It was rather frequent in moist, sandy soil, rich in mosses, especially along the rivers. During the winter the species is covered with snow, but rarely with more than 10 to 40 cm. The species is rarely found in the plant-communities, but is often growing with *Salix arctica* on which plant it probably sponges. In places early free from snow the growth of the species is very vigorous already in the middle of June, but it is

not commonly met with in the flowering stage until the first days of July. First flowering specimen seen June 23. Produces ripe seeds everywhere.

In Peary Land the species was found in the greater part of the country, at the outer coast as well as in the inner, very continental, part. Its Greenland distribution is given in a map in BÖCHER (1938) fig. 96. It is a northern species, extending from Godthåbsfjord in West Greenland to Angmagssalik in East Greenland, just like the preceding species and *Cassiope*.

Found specially in the lowland, reaching 200 m. Northernmost record of the species is Kap Bopa 83°00' lat. N. (EK).

### Vacciniaceae.

*Vaccinium uliginosum* L. ssp. *microphyllum* LGE.

#### Localities:

III: 45 Saxifragadal (KH), 46 Krognæs (PJ), 48b Kap Holbæk (EK).  
48b Lolland Sø (EK), 48c Campanuladal (EK).

One of the most interesting finds from the sledge-journeys was undoubtedly the find of *Vaccinium* from these northerly areas. The species was, however, not found in Peary Land itself, but just south of it, at two stations on the south coast of Independence Fjord, and in 1955 at the head of Danmark Fjord. At Saxifragadal it was growing in rather large quantities on a slightly north-exposed slope situated 150 m above sea-level. Here the species was forming a dense vegetation together with *Carex misandra*, *Eriophorum triste*, *Juncus biglumis*, *Cassiope tetragona*, *Silene acaulis* and several others, in a rich cover of mosses, especially *Aulacomnium palustre*, *A. turgidum*, *Tomenthypnum nitens*, *Meesia triquetra* etc. The soil was very peaty, and must undoubtedly be moist or wet during the summer. According to P. Johnsen *Vaccinium* was found under similar conditions at Krognæs in Astrup Fjord. At both stations the growing-places were partly free from snow on the 7th and 9th of June, so the snow-cover during the winter would hardly have been more than 30 to 40 cm. The specimens had still all the leaves from the preceding year. Remains of flowers or berries were not found. The species was, however, richly flowering at the head of Danmark Fjord (see further p. 27).

*V. uliginosum* is found in all parts of Greenland although it seems rare in the northern parts. Northernmost known place of the species is Krognæs in Astrup Fjord 81°55' lat. N. (PJ).

## Cyperaceae.

*Carex maritima* GUNN.

## Localities:

- II: 16 Aftenstjernesø (JT), 22 Øvre Midsommersø (KH).  
 III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH), 40 Blomsterstranden (KH), 43 Kap Glacier (KH).  
 VI: 90 Kap Regnar Lodbrog (EK), 94 Nordpasset (EK).  
 VII: Jørgen Brønlund Fjord: A, D, E (KH).

Not common in Peary Land. Usually found along the shores of the fjords or at the lakes in moist, sandy soil, often where salt-crusts are covering the surface of the ground. Specially vigorous specimens are found on old musk-ox dung or at duck's nests. In Peary Land the species is not exclusively confined to places near the sea. The place of the specimen from Øvre Midsommersø was situated about 70 km from the nearest sea-water. The species seems to prefer soils rich in mineral salts, though not particularly NaCl. Analysis of salt-crusts from a *Carex maritima* vegetation did not show any contents of Cl<sup>-</sup>, but a good deal of SO<sub>4</sub><sup>-</sup>.

*Carex maritima* generally occurs unprotected in winter.

The species usually occurs in quantity, always dominating the vegetation, and often accompanied by *Alopecurus alpinus* and *Saxifraga cernua*. The species is early flowering; first flowering specimen noted on June 22. Produces ripe seeds, although propagation by runners is the most important.

In Peary Land the species is confined to the inner, very continental parts, far from the outer coasts. As to the rest of Greenland it occurs on the west coast north of the Arctic Circle (only few stations south of it, conf. BÖCHER, 1952), but is still not reported from the western part of the north coast. On the east coast south to Kangerdlugssuaq. Northernmost record is that of Kap Regnar Lodbrog 83°03' lat. N. (EK).

*Carex misandra* R. BR.

OSTENFELD (1923, p. 228).

## Localities:

- I: 4 Kap Benet (TW), 9 Strømstedet (TW), 10 Kap Salor (TW).  
 III: 15 Head of I. P. Koch Fjord (PJ), 16 Aftenstjernesø (JT), 21 Baggården (KH), 22 and 25 Øvre Midsommersø (KH), 29 Sølejren (KH).  
 III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH), 40 Blomsterstranden, 41 Diabasnæs (KH), 42 Blomsterstranden (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 47b Sjællandsslette (EK), 48b Lolland Sø (EK).

- IV: 49 Koralkysten (KH), 54 Slebsager Elv (KH).  
 VII: Jørgen Brønlund Fjord: A, B2, C, D, E (KH).

Usually growing in wet to moist, sandy soil. Often found along rivulets, but also frequent in moist, knolly solifluction soil in a mossy vegetation, together with *Oxyria* and *Dryas*, in *Cassiope tetragona* heath and in *Vaccinium*-bogs. In winter the snow-cover of the species varies from 0 to 200 cm. Flowering begins ultimo June, just after the spikelets have become visible, and are still level with the tuft. Later during the ripening of the fruits the scapes become elongated, finally reaching a length of 20—25 cm above the tufts. In places early free from snow the fruits will ripen about August 1.

In Peary Land the species is specially common in the strongly continental part, and has a distribution much like that of *Dryas*, being absent from the eastern outer coast, but found on the north western. Its absence from the eastern outer coast is owing to the low summer temperatures prevailing there. The total Greenland distribution as given by BÖCHER (1938), falls chiefly north of the Arctic Circle. Northernmost record is that from Kap Benet 83°05' lat. N. (TW).

The forma *flavida* FERN, which according to FERNALD (1934b) is found in north western Greenland, was not found in Peary Land.

*Carex nardina* E. FRIES

OSTENFELD (1915, p. 375), *C. nardina* var. *Hepburnii* (BOOT) KÜK.; OSTENFELD (1923, p. 229).

Localities:

- I: 9 Strømstedet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).  
 II: 15 Head of I.P. Koch Fjord (PJ, JT), 17 Sydpasset (PJ), 19 and 20 Baggården (KH, PJ), 25 Øvre Midsommersø (KH), 29 Sølejren (KH).  
 III: 33 Itukussuk Dal (BF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 41 Diabasnæs (KH), 42 Blomsterstranden (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 47a Zig-Zag Dal (PF), 47b Sjællandsslette (PF, EK), 48a Kap Holbæk (EK).  
 IV: 51 Graptolit Elv (KH), 52 Marius Fiil Fjord (KH), 54 Slebsager Elv (KH), 55 Kap Peter Henrik (EK, ÅS).  
 V: 72 Hellefiskefjord (JT), 76 G.B.Schley Fjord (JT).  
 VII: Jørgen Brønlund Fjord: A, B1, B2, C, E (KH).

Frequent on dry, sandy or gravelly ground, often in wind-swept places with no snow-cover during the winter. On the other hand, it is also commonly met with in places which during the winter have a

snow-cover of up to about 2m. Here it often forms a dense vegetation with *Dryas*, on slopes exposed to the south or south-west. The *Dryas* heaths on dry slopes in Peary Land may be divided into two types: 1, a *Dryas*—*Carex nardina* soc. with considerable snow-cover, and 2, a *Dryas*—*Kobresia myosuroides* soc. with only a thin snow-cover, or none at all. In these communities *Carex nardina* and *Kobresia* seem to replace each other. *Carex nardina* is, however, most vigorously developed in sheltered, rocky crevices.

The flowering takes place rather early, first specimen in flower seen on June 26. Produces ripe fruits everywhere; these latter are often

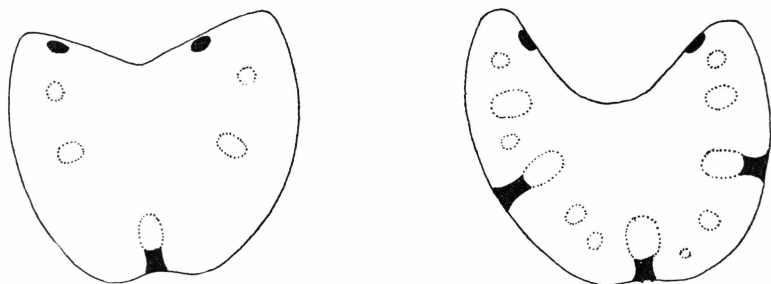


Fig. 24. Transverse section of leaves of *Carex nardina* (left) and *Kobresia myosuroides* (right). (90 ×).

attacked by fungi. Notwithstanding the short growing-season of snow-covered plants they will show a higher rate of fertility than do the snow-bare plants.

As regards ecology and adaptation to the growing-place, and in morphological structure, too, *C. nardina* comes very close to *Kobresia myosuroides*. As they are often found growing together, a separation will always be difficult where the specimens are without spikes. In order to secure a safe determination of the material collected on the sledge-journeys, viz. material in wintering condition, we tried to find some differential characters of the leaves, and here transects proved very helpful. Under the microscope transverse sections of the leaves afford the following characters:

*Carex nardina*: Only one vascular bundle is connected with the under side of the leaf by a stereome strand (Fig. 24).

*Kobresia myosuroides*: More than one, usually 3 to 5 vascular bundles, are connected with the lower side of the leaf by stereome strands (Fig. 24).

*Carex nardina* is common in the inner continental part of Peary Land, but rare at the outer coasts. It is widely distributed in Greenland, although rare in the southern parts. Northernmost record is from G.B.Schley Fjord 83°00' lat. N. (JT).

*Carex rupestris* ALL.

## Localities:

III: 45 Saxifragadal (KH), 48b Lolland Sø (EK).

IV: 49 Koralkysten (KH).

VII: Jørgen Brønlund Fjord: B2 (KH).

Was found only in these four localities. At Jørgen Brønlund Fjord it was rather frequent in the *Cassiope*-zone between 500 and 600 m above sea-level (and never outside this zone). It was growing in moist, sandy humus-soil in the stone-fields, together with *Dryas*, *Trisetum spicatum*,

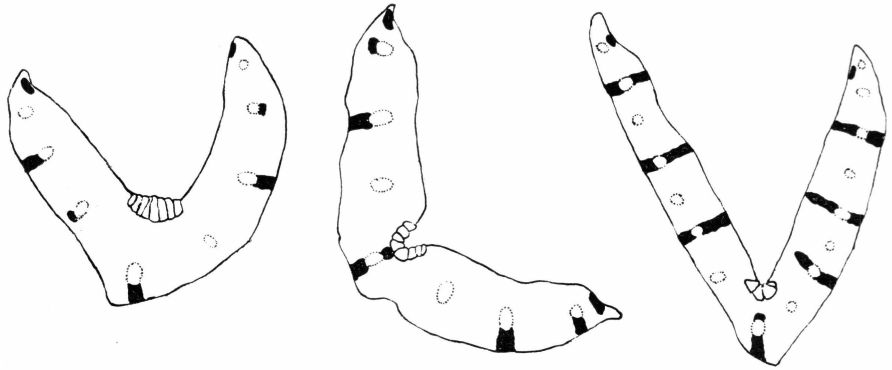


Fig. 25. Transverse section of *Carex maritima* (left), *C. rupestris* (middle) and *Kobresia simpliciuscula* (right). (90  $\times$ ).

*Poa arctica* and *Salix arctica*. In Saxifragadal it was found in a mossy, moist *Vaccinium*-vegetation with *Cassiope*, *Poa arctica* a. o., also in moist soil rich in humus. On Koralkysten the species was found in the shade of a large rock on a wind-swept, gravelly plain with very poor vegetation.

On the winter snow-cover only little can be said, only that it is not heavy, and the species are free from snow in the middle of June. The flowering is probably early, and ripe fruits are produced.

Some of the author's material was collected on sledge-journeys. Such material in wintering condition, and specimens without spikes, may often be confused with specimens of *Carex maritima* or *Kobresia simpliciuscula* in the same condition. A separation of these three species, however, is possible by a study of transverse sections of the leaves, in the microscope. The most important diagnostic characters are given in a key:

- A. Several of the vascular bundles are connected with the upper side of the leaf by stereome strands. The groove with bulliform cells is formed like a sector of 180°. *Kobresia simpliciuscula* (Fig. 25)

A. None of the vascular bundles are connected with the upper side of the leaf by stereome strands.

B. The groove with bulliform cells is formed like a "U".

*Carex rupestris* (Fig. 25)

B. The groove with bulliform cells is formed like a rectangle with the under sides more or less arched. *Carex maritima* (Fig. 25)

The distribution of the species in Greenland is mapped by BÖCHER (1938). It is known from most parts north of the Arctic Circle, specially common in the Disko area and in the Clavering Ø—Ella Ø area, but rapidly decreasing towards the north. A distributional type common to several species. Northernmost record is Koralkysten 82°15' lat. N.

### *Carex stans* DREJ.

#### Localities:

II: 17 Sydpasset (PJ).

III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH), 45 Saxifragadal (KH).

VI: 89 Frigg Fjord (EK).

VII: Jørgen Brønlund Fjord: A, B2, E (KH).

Judging from the list above one would not think that this plant in some part of Peary Land is the most important species of all, dominating the vegetation of vast areas. At Jørgen Brønlund Fjord it was occurring in quantity. It occurs in moist to wet, sandy places and often inundated by water. Two types of growing-places completely dominated by the species, can easily be distinguished: 1. Broad hollows which during the vegetative period are constantly wet. It is here the only species (sometimes single individuals of *Eriophorum triste* are also found) in a dense cover of mosses, of which *Drepanocladus brevifolius* is the most conspicuous. 2. In moist, sandy flats along rivers, in deltas and on "islands" formed by anastomosing rivers. Because of the annual accumulation of sand no mosses are found here. Outside *Carex stans* usually small quantities of *Alopecurus alpinus*, *Melandrium apetalum*, *Salix arctica* and *Saxifraga cernua* are met with in this vegetation.

During the winter the species is covered with small layers of snow only, or sometimes with ice. Accordingly the species is early free from snow. The annual production of matter is rather large, and this probably conditions the presence of the large stock of musk-oxen actually found in Peary Land. The species is flowering at the end of June. Ripe seeds are usually produced. It is commonest in the lowlands, but ascends to 600 m.

In recent arctic literature this species, which has long been regarded as a var. of *Carex aquatilis*, is ranked as a species of its own. It con-



Fig. 26. *Carex stans*-moss-meadow in Heilprin Land near Kajakelv. Background is the mountain Buen. Aug. 2, 1947. Phot. KH.

stitutes a distinct type, morphologically as well as geographically. Moreover, the chromosome-numbers of the two species are different.

In Peary Land the species is only found in the inner part, and may be regarded a continental species. Its Greenland distribution is not yet quite clear. According to SEIDENFADEN & SØRENSEN (1937) it is found in some stations on the east coast, being common on Germania Land and northward. Judging from its occurrence in Peary Land, it is presumably common in the whole area between Germania Land and Thule. On the west coast it has a slip in Melville Bugt, but is found south until 68° lat. N. Northernmost record is Frigg Fjord 83°10' lat. N. (EK).

*Eriophorum scheuchzeri* HOPPE

OSTENFELD (1915, p. 376).

Localities:

- III: 33 Itukussuk Dal (BF), 34 Valmuedal (PF).  
 VII: Jørgen Brønlund Fjord: A, E (KH).



Fig. 27. Meadows with *Eriophorum scheuchzeri* and *Alopecurus alpinus* along a rivulet on Oksesletten, Heilprin Land. Aug. 13, 1947. Phot. KH.

According to the list of localities the species seems to be rare in Peary Land; this is, however, probably not really the case, although it was not seen or collected on the numerous sledge-journeys to most parts of the country. Since it covers extensive areas in the northern part of Heilprin Land, it was surprising not to find it in other places. When the species is rare in other parts of the country it is probably owing to the ecological demands of the species. It is well known that the species prefers a growing-place where the water is not stagnant, viz. along rivulets, and in broad hollows where small rivers or brooks almost disappear in the vegetation, or in swamps and springs. In the broad lowland in Heilprin Land at Jørgen Brønlund Fjord such growing-places were abundant.

The species was met with in wet, usually sandy soil, always dominating the vegetation, and often found together with *Alopecurus alpinus* and sometimes also with *Carex stans*. The *E. scheuchzeri*-communities in meadows and springs were rich in mosses, specially *Drepanocladus brevifolius*; along the rivers they were always free from moss, because of a rather thick yearly accumulation of sand. During the winter the species is covered with small layers of snow (or ice) only, and accordingly early free in spring. Flowering is early, first flowering specimen seen on June 17. Produces ripe seeds. Was not found at altitudes above 150 m.

In Peary Land the species was found only in Heilprin Land. Otherwise it is known from all parts of Greenland except from a small area on Blossville Kyst (see BÖCHER, 1938). Northernmost record is Alert on the north coast of Ellesmere Isl. (82°30' N. lat.) (BRUGGEMAN & CALDER, 1953).

*Eriophorum triste* (TH. FR.) HADAC & LÖVE

OSTENFELD (1915, p. 375); OSTENFELD (1923, p. 229).

Localities:

- I: 3 Low Point (TW), 9 Strømstedet (TW).
- II: 18 Sydpasset (PJ), 22 Øvre Midsommersø (KH).
- III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 38 Kap Ejnar Mikkelsen (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 48b Lolland Sø (EK).
- VI: 84 North coast of Frederick E. Hyde Fjord (EK), 89 Frigg Fjord (EK).
- VII: Jørgen Brønlund Fjord: A, B1, B2, C, D, E (KH).

Commonly met with in wet, sandy soil, especially in places rich in mosses, and contrary to the preceding species often where the water in the soil is stagnant. The species is often the main constituent of the vegetation at lakes and in meadows, where it grows with *Carex stans*, *Ranunculus sulphureus*, *Polygonum viviparum* a. o. During the winter the species is covered with thin layers of snow or is completely free from snow. Accordingly it will start its growth early in spring, and flowers are found early. First flowering specimen noted June 11, and first ripe seeds in the middle of July. Ascends to 500 m.

The right taxonomic evaluation of *E. triste* is of recent date. It was previously considered a var. of *E. polystachyum*, but LÖVE (1950) proposes to give it the rank of species. It may, however, be mentioned that already SØRENSEN (1933) gave an account of its taxonomic status in Greenland. He also gives the Greenland distribution of *E. triste*. It is a northern species reaching from Nûgssuaq in West Greenland, around

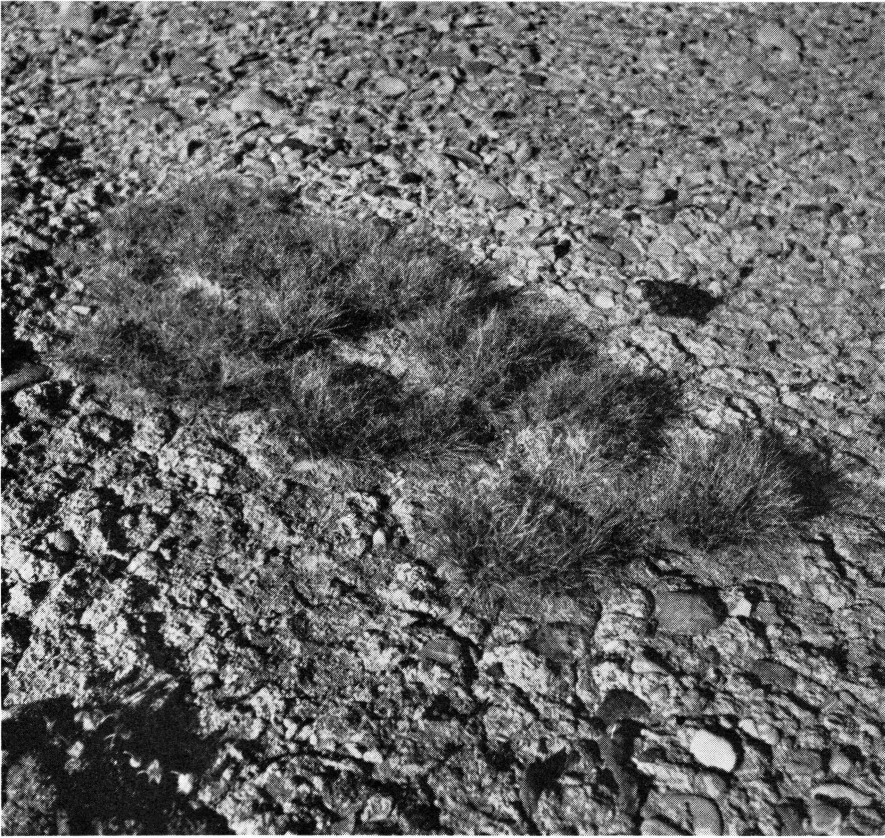


Fig. 28. Tufts of *Kobresia myosuroides* in small hollow in a very dry, gravelly plain. Heilprin Land, near the wintering station at Jørgen Brønlund Fjord. Aug. 9, 1947. Phot. KH.

N. Greenland to Scoresby Sund in East Greenland. In Peary Land it is known from most parts of the country, but lacking at the eastern outer coast. Northernmost record is the north coast of Fr. E. Hyde Fjord 83°13' lat. N. (EK).

*Kobresia myosuroides* (VILL.) F. & PAOL.

OSTENFELD (1923, p. 229) sub. nom. *Cobresia Bellardi* (ALL.) DEGL.

Localities:

- I: 3 Low Point (TW), 7 Mascart Inlet (ER).
- II: 21 Baggården (KH, PJ), 22 and 24 Øvre Midsommersø (KH), 27 Mågeklippe.
- III: 44 East of Kap Glacier (KH), 46 Krognæs (KH).
- IV: 57 Hagen Fjord (ÅS), 49 Koralkysten (KH), 50 Falkefjeld (KH).
- VII: Jørgen Brønlund Fjord: A, B1, B2, C, D (KH).

Is frequently met with in dry, sandy or stony places, in winter snow-bare or only slightly covered with snow. With regard to biology and ecology the species comes very close to *Carex nardina* (see under this), but it seems to want a warmer growing-place and a longer growing-season. Most vigorous plants are found on slopes exposed to the south, often growing with *Dryas integrifolia*. The species is also found in stray patches in the same places as *Lesquerella arctica*, *Erigeron compositus*, *Poa abbreviata*, *Potentilla chamissonis* a. o. Flowering is rather early, first specimen noted on June 21, commonly in flower on the first days of July. Produces ripe seeds, but these are often attacked by fungi. The species is common in the lowland at Jørgen Brønlund Fjord, but found upwards to 600 m.

In Peary Land the species is specially confined to the strongly continental part of the country apart from two stations in the north west, and is thus of a similar occurrence to that of *Dryas*. Its total distribution in Greenland is given in a map by SEIDENFADEN (1933). To this map a good many finds have to be added, e. g. those of SEIDENFADEN & SØRENSEN (1937) and those of BÖCHER (1952). It appears that the species is known from most parts of Greenland, but is specially common in the inner parts of the large complexes of fjords. In the south east it seems to be rare, and SEIDENFADEN (1933) presumes that this fact is due to the maritime climate. It is, however, doubtful if the species is a genuinely continental one; it is for instance very commonly met with even in the most maritime parts of Iceland.

Northernmost record is Low Point 83°09' lat. N. (TW).

*Kobresia simpliciuscula* (Wg.) MACK.

Locality:

III: 40 Blomsterstranden (KH).

The species was growing on a sun-exposed slope in company with *Cassiope tetragona*, *Carex misandra*, *Luzula confusa*, *Saxifraga oppositifolia* and some mosses. The soil was slightly moist, sandy with a rather high content of humus. The place was visited only once, on June 8, on a sledge-journey, so the plant was still in wintering condition, with withered culms, leaves, and year-old spikes. Ripe seeds are produced.

Although the material collected was rather poor, a safe determination was, nevertheless, achieved by a microscopic examination of cross-sections of the leaves. The only species with which it could be confused are *Carex rupestris* and *Carex maritima*; the shape of the grooves with bulliform cells are, however, clearly different in the three species (see fig. 25 and further under *Carex rupestris*).

The Greenland distribution of the species is given in a map by BÖCHER (1951a). From this map appears that the station in Peary Land is rather isolated, nearest station being in Skærfjorden on the east coast, 450 km farther south. It is common from this fjord and southwards to Scoresby Sund. On the west coast the species is known from the area between Godthåbsfjord and Svartenhuk. In BÖCHER (1951a) we find furthermore an account of the phytogeography and ecology of the species; it is considered an arctic, continental type. The species is often regarded as "bicentric" in Greenland, by previous authors. The finds from Peary Land do not support this supposition. Most probably the species will be found in many places in the continental parts of the still poorly investigated, large areas between Skærfjorden and Thule, although it is undoubtedly rare farthest north. Northernmost record is that of Peary Land (82°01' lat. N.).

In the Canadian Arctic, too, the species has recently been found far north. It was collected by J.C. TROELSEN in 1952 in Canyon Fjord, north western Ellesmere (about 80° lat. N.).

### Gramineae.

#### *Alopecurus alpinus* SM.

OSTENFELD, 1915, p. 376.

#### Localities:

- II: 16 Aftenstjernesø (PJ), 20 Baggården (PJ).
- III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 43 Kap Glacier (KH), 46 Krognæs (KH), 47 a Zig-Zag Dal (PF), 48b Lolland Sø (EK).
- IV: 53 Neergaard Elv (KH).
- V: 65 Kap Vårbrud (KH), 66 Kap København (KH), 67 Mudderbugten (KH), 71 Herlufsholm Strand (KH), 77 Kap John Flagler (EK).
- VI: 83, 84 and 90 Frederick E. Hyde Fjord (EK), 93 Harebugt (EK), 96 Kap Bopa (EK).
- VII: Jørgen Brønlund Fjord: A, B2, B3, C, D, E (BF, KH).

Very common, especially in moist to wet, sandy soil, but also found in clayey or stony, dry soils. The amount of snow-cover in winter is most varying; the species occurs in places with no snow-cover as well as in the most extreme snow-patches with a snow-cover of several metres. The most vigorous specimens are found in snow-free places. In deltas or along rivers it often forms an extensive, pure growths, but is also met with in communities rich in other species. In wet snow-patches it often grows with *Luzula arctica* and *Polytrichum alpinum*. Commonest in the lowlands, but ascends to 1000 m. In places free of snow in winter

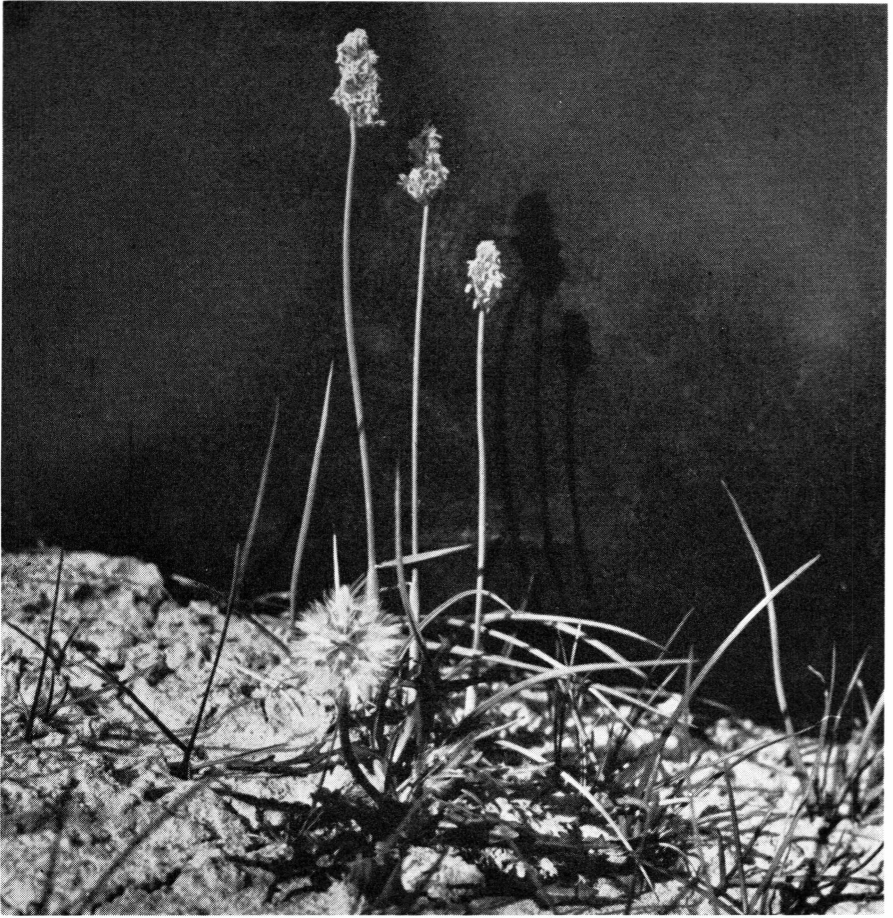


Fig. 29. *Alopecurus alpinus*, growing on clayey slope at Jørgen Brønlund Fjord. Foregrund, fruiting specimen of *Taraxacum arctogenum*. (The black background is artificial). Aug. 1948. Phot. KH.

the spikes were visible on June 17. As the emptied anthers remain on the spikes during the whole summer, the species always has the appearance of being flowering when collected. The species produces ripe seeds, but the most important propagation is probably achieved by means of runners.

In Peary Land the species is common and widespread. Although not represented in the collections from north western parts, it is known to grow here (TW in OSTENFELD, 1923b). The Greenland distribution of the species is mapped in BÖCHER (1938, fig. 112). It is northern, southern limit on the east coast about 70° lat. N., and on the west coast at the Arctic Circle (single stations farther south). Northernmost record is on the north coast of Frederick E. Hyde Fjord 83°13' lat. N. (EK).

*Arctagrostis latifolia* (R. BR.) GRISEB.

OSTENFELD (1923b), p. 230).

## Localities:

- I: 4 Kap Benet (TW), 9 Strømstedet (TW).  
 II: 18 Sydpasset (PJ), 22 Øvre Midsommersø (KH), 29 Sølejren (KH).  
 III: 33 Itukussuk Dal (BF), 45 Saxifragadal (KH), 46 Krognæs (KH),  
 48c Campanuladal (EK).  
 V: 71 Herlufsholm Strand (KH).  
 VI: 83 Frederick E. Hyde Fjord (EK), 94 Nordpasset (EK).  
 VII: Jørgen Brønlund Fjord: A, B2, C, E (KH).

Rather common to the whole area, and very common in the area around Jørgen Brønlund Fjord, where it was frequently found in moist, sandy soil, but was also found in swamps and often in ponds in shallow water. The species rarely grows with other vascular plants, but is usually found in pure clons in moss-cushions or in bare soil. Most frequent in the lowlands, but found up to 500 m above sea-level.

The flowering takes place about the beginning of July. First specimen with visible spikes was seen on June 27. As mentioned by HOLMEN (1952) most of the spikes are partly, sometimes completely, sterile. Most frequent are spikes with scattered sterile and withered spikelets. In all specimens investigated the pistils had withered shortly after the flowering, and the pollen is often irregular.

In winter the species is usually covered with snow and ice of varying thickness, rarely found snow-bare.

In Peary Land the species varies from clon to clon, from slender forms with contracted spikes to very robust forms with open spikes.

Its Greenland distribution is northerly, extending from Scoresby Sund on the east coast and north round to Disko on the west coast. Northernmost record is the north coast of Frederick E. Hyde Fjord 83°13' lat. N. (EK).

*Calamagrostis purpurascens* R. BR.

## Localities:

- II: 21 Baggården (KH), 24 Øvre Midsommersø (KH), 29 Sølejren (PJ),  
 30 Børglum Elv (JT).  
 III: 48c Campanuladal (EK).

Found on dry, stony slopes exposed to the south, in summer relatively warm places. Two of the stations at lake Midsommersø were confined to basaltic rocks. In one place the species was growing with *Potentilla pulchella*, *Salix arctica*, *Lesquerella arctica*, *Erigeron compositus*, *Melandrium triflorum* and *Braya thorild-wulffii*. In another place it was found in pure tufts on sandy rock shelves. These finds were made ultimo

May, when temperature had not yet passed zero, and were free from snow, so the species would hardly have been covered with any large amount of snow, although in Peary Land a lot of snow disappears by evaporation before the positive temperatures set in. The time of flowering is unknown, specimens collected first in August had finished flowering. The species is one of the tallest in Peary Land, measuring 50 cm or more. It shows a strictly continental occurrence.

The distribution of the species in Greenland is given by SØRENSEN (1954). It is chiefly northern, reaching from Scoresby Sund on the east coast, and north round to Sdr. Strømfjord in West Greenland, with a few stations far south. Northernmost record is Børglum Elv 82°26' lat. N. (JT).

*Colpodium vahlianus* (LIEBM.) NEVSKI

SØRENSEN (1953, p. 112).

Localities:

- III: 33 Itukussuk Dal (BF).
- IV: 53 Neergaard Elv (ÅS), 54 Slebsager Elv (KH).
- V: 65 Kap Vårbrud (KH).
- VI: 83 Frederick E. Hyde Fjord (EK), 96 Kap Bopa (EK).
- VII: Jørgen Brønlund Fjord: A, B1, B2, D, E (KH).

Not common, although found here and there at Jørgen Brønlund Fjord. It was growing in moist, sandy soil along the rivers and sometimes in snow-patches with open vegetation. Where the species is most vigorous it is snow-bare during the winter. In the snow-patches, where it is often covered with up to 4 to 5 m of snow, the specimens are small. Flowering takes place at the end of June in places early free from snow. The species is most frequent in the lowlands, but ascends to 500 m above sea-level. In Peary Land it is specially confined to the inner, strongly continental areas. In the list above all localities mentioned by SØRENSEN (1953) are included. In SØRENSEN's list it is erroneously mentioned that the specimen from Itukussuk Dal was collected by me, the collector being B. FRISTRUP.

The distribution of the species in Greenland is mapped by SØRENSEN (1953) fig. 101. It extends from Scoresby Sund on the east coast, and north round to Thule (the range is probably continuous, as records are lacking only from non-investigated areas). On the west coast it is found between Svartenhuk and Disko. Northernmost record the north coast of Frederick E. Hyde Fjord 83°13' lat. N. (EK).

*Deschampsia brevifolia* R. BR.

## Localities:

- II: 19 Baggården (PJ), 24 Øvre Midsommersø (KH), 32 Børglum Elv (JT).  
III: 33 Itukussuk Dal (BF).  
IV: 53 Neergaard Elv (KH).  
V: 65 Kap Vårbrud (KH), 68 Herlufsholm Strand (KH).  
VI: 84 Frederick E. Hyde Fjord (EK), 89 Frigg Fjord (EK), 93 Harebugt (EK).  
VII: Jørgen Brønlund Fjord: A (KH).

Not common. It is growing in moist to wet, sandy soil, forming large tufts in deltas, along rivers and at lakes. In the eastern part of Peary Land only, it was found entering the plant-communities; here it was found in mossy meadows. During the winter it is usually free of snow or covered only with a thin layer. Though early free of snow it flowers relatively late. First visible spikes noted on July 2. Ripe seeds were not seen. It is a lowland plant, found only below 150 m above sea-level. It was, however, rare in the extensive areas of lowland at Jørgen Brønlund Fjord, found at a few stations only, and in a number of altogether no more than 25 individuals.

The problem of the Greenland *Deschampsia*'s belonging to the caespitosa-group has been specially studied by OSTENFELD (1923a) and GELTING (1934). According to these authors the material from Peary Land ought to be referred to *D. arctica* (TRIN.) OSTENF. HULTÉN (1942), however, mentions the great confusion within the taxonomy of this group. After some discussion he finally places the arctic forms, including *D. arctica*, within the group of his own ssp. *orientalis* of *D. caespitosa*, pointing out that ssp. *orientalis* is most varying, and that further investigation would possibly involve a division of the arctic material. To avoid further confusion I prefer, in this treatise, to use ROBERT BROWN'S (1823) name, *D. brevifolia*, also used by FERNALD (1934).

According to GELTING (1934) it is a typical outer coast species, never found in the fjords. In Peary Land it was found in almost all parts of the country, even in the most continental. It seems to be absent from Cassiope zones and fell-field communities, thus largely avoiding the communities best suited to an oceanic climate. Forms belonging to *D. pumila* were not found in the area.

The distribution of the species extends from about 73°30' lat. N. on the east coast, and north round to Thule on the west coast. Northernmost record is from the north coast of Frederick E. Hyde Fjord 83°13' lat. N. (EK).

*Festuca baffinensis* N. POLUNIN

OSTENFELD (1923b, p. 230) sub. nom. *F. ovina* L. var. *brevifolia* (R. BR.) HARTM. pro parte.

## Localities:

- I: 9 Strømstedet (TW).  
 II: 16 Aftenstjernesø (JT), 22 Øvre Midsommersø (KH).  
 III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH).  
 VII: Jørgen Brønlund Fjord: A, B2, C, D (KH).

As mentioned in HOLMEN (1952) two species of *Festuca* occur in Peary Land, *F. baffinensis* and *F. hyperborea*. Of these *F. baffinensis* is far the commonest, especially in the areas around Jørgen Brønlund Fjord. The ecological range of the species seems very wide; apart from wet places and clayey soils it is found in almost all conditions of soil, with or without snow protection during the winter. Most luxuriant, however, in moist, sandy or stony, dried-up river beds. Very often a rather important component of many plant-communities from Cassiope-heaths to extreme snow-patches.

The flowering begins at the end of June, first flowering specimen seen on June 25. Although flowering and development of pollen seemed quite normal, there was not a single specimen with ripe fruits. In good and long summers ripe seeds are probably abundant. In Jørgen Brønlund Fjord the species ascends to 600 m.

In Peary Land the species is commonest in the inner parts of the country, rare at the outer coasts. Its distribution in Greenland is northern, extending from the Franz Joseph Fjord complex on the east coast round North Greenland, and south to Nûgssuaq on the west coast (see further HOLMEN, 1957). Northernmost record is Strømstedet at I. P. Koch Fjord, 82°51' lat. N. (TW).

*Festuca hyperborea* K. HOLMEN

OSTENFELD (1923b, p. 230) sub. nom. *F. ovina* var. *brevifolia* (R. BR.) HARTM. pro parte.

## Localities:

- I: 3 Low Point (TW), 5 Black Cape (TW), 9 Strømstedet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).  
 III: 45 Saxifragadal (KH).  
 IV: 53 Neergaard Elv (KH), 57 Hagen Fjord (ÅS).  
 V: 70 and 71 Herlufsholm Strand (KH).  
 VII: Jørgen Brønlund Fjord: A, B2, E (BF, KH).

While *F. baffinensis* is a very definite species, *F. hyperborea* seems closely related to *F. brachyphylla*. On the relationship between these three species see HOLMEN (1952 and 1957).

The collections by THORILD WULFF may indicate that *F. hyperborea* is rather common in north western Peary Land. However, in the parts of Peary Land investigated by myself the species was certainly rare. In the areas around Jørgen Brønlund Fjord the species was found in 4 or 5 places only. Apart from a single specimen collected at an elevation of 500 m it was found only in the lowland, growing on sandy or clayey slopes with a large snow protection during the winter. In other parts of Peary Land it was sometimes found without snow-cover in winter. The species was often found with *Saxifraga oppositifolia*, *Juncus biglumis*, *Taraxacum pumilum*, *Potentilla pulchella*, *Salix arctica*, *Saxifraga cernua*, *Potentilla chamissonis* a. o., a plant community associated with moist soil and deep snow-cover, and almost free from mosses. It was never found with ripe fruits. The flowering takes place in the first part of July.

The Greenland distribution of the species, as represented in the Copenhagen Herbarium, seems to be north eastern, extending from Scoresby Sund to Wulff Land west of Peary Land. Outside Greenland the species is found in Svalbard and in the Canadian arctic archipelago. It is richly represented in SIMMON's collection from Ellesmere.

Northernmost record is Low Point, 83°09' lat. N. (TW).

*Hierochloë alpina* (Sw.) R. & S.

OSTENFELD (1915, p. 376), OSTENFELD (1923b, p. 231).

Localities:

- I: 3 Low Point (TW).  
 III: 35 Vildt Land (PF), 39 Diabasholme (KH), 43 Kap Glacier (KH),  
 44 East of Kap Glacier.

The species was collected on basaltic rocks, either on rocky shelves or in crevices, but always in sheltered, sunny places. It was growing in large tufts, in dry, sandy soil, and rarely entering the closed plant-communities. Sometimes found together with *Salix arctica* (see fig. 30).

At the time of collecting (June 6) the species was free of snow in all three stations, so the snow-cover during the winter has probably been very slight or lacking entirely. On the time of flowering nothing can be said. Ripe seeds were found in the withered spikes from preceding year.

Although found only in few places, the plant seems to behave in a similar way to that of *Silene acaulis*. Like this latter it is only known from the inner parts, near the inland ice, and in north western Peary



Fig. 30. Basaltic rock, ice-scored, Kap Glacier. In the foreground vegetation of *Salix arctica* with a single tuft of *Hierochloë alpina*. June 7, 1949. Phot. KH.

Land. The distribution of the species in Greenland is mapped in SØRENSEN (1954, fig. 55); it is almost "circumgreenlandic", absent only from the southernmost parts, where it seems to have been replaced by *H. orthantha*. Northernmost record is Low Point ( $82^{\circ}09'$  lat. N. (TW).

*Phippsia algida* (SOL.) R. BR.

OSTENFELD (1923b, p. 230), sub. nom. *Catabrosa algida* (SOL.) FR.

Localities:

- I: 6 Lemming Fjord (TW), 11 John Murray Ø (TW).
- IV: 63 Nord (MW).
- V: 69 Kap Eiler Rasmussen (KH).
- VII: Jørgen Brønlund Fjord: A, B1, B3 (BF, KH).

Growing on wet to moist, sandy soil, sometimes also in clayey soil. The species is often taken as characteristic of extreme snow-patches, in Peary Land it behaves otherwise. As formerly pointed out (HOLMEN, 1952) two distinct eco-types occur, one with adpressed culms, forming low-growing tufts in snow-patches, and another, answering a forma *vestita* HOLMB., tall with erect culms, found at the sea-shore. The latter is sometimes growing with *Puccinellia andersonii*. The former, of the snow-patches, is usually found on sandy soil with e. g. *Saxifraga oppositifolia*, *S. cernua* and *Cochlearia officinalis*.

The flowering of the species depends, of course, on how early the plants become free of snow. The form from the sea-shore, which is almost free from snow-cover during the winter, is flowering already at the end of June. In the snow-patches it is often very late. Ripe seeds are commonly produced.

The species is commonest in the lowland, but ascends to 1000 m. It is probably much more common than appears from the list of localities above. Distributed all over Greenland. Northernmost record is Lemming Fjord on Sverdrup Ø, 82°55' lat. N. (TW).

*Pleuropogon sabinei* R. BR.

OSTENFELD (1915, p. 376).

Localities:

III: 34 Valmuedal (PF).

V: 71 Herlufsholm Strand (KH, noted only).

VII: Jørgen Brønlund Fjord: A, B1, B2 (KH).

The species was everywhere confined to fresh water, flowing or stagnant. At Jørgen Brønlund Fjord it was common along the rivers and in shallow water in pools or lakes, where it was forming long, floating leaves. It always grows in large quantities and often together with *Ranunculus hyperboreus* in a dense carpet of mosses. In winter it is covered with ice. At Herlufsholm Strand, the northernmost known station of the species (82°46' lat. N.), it was found ice-bound on May 12.

In spring the species is early free, as lakes and rivers always thaw first along the borders. Although temperature in the rivers is rather low, about 5 or 6 centigrades, the species was found flowering already on June 27. It is often maintained that the species rarely flowers in the High-Arctic; nevertheless, here it was commonly flowering everywhere. No production of seeds was seen, propagation by means of stolons is probably the most important.

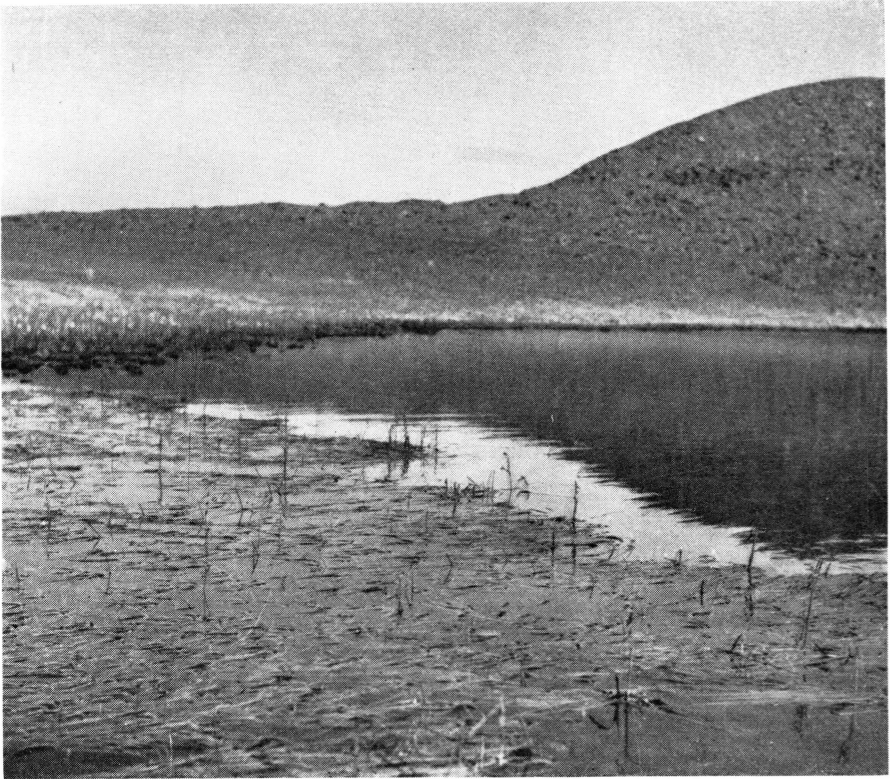


Fig. 31. *Pleuropogon sabinei*, growing on shallow water in the western end of lake Klaresø, Heilprin Land at Jørgen Brønlund Fjord. Aug. 9, 1947. Phot. KH.

Although found in a few places only the species may be common in the many lakes and ponds of Peary Land. The Greenland distribution extends from Thule on the west coast, and north round to Scoresby Sund on the east coast.

*Poa abbreviata* R. BR.

OSTENFELD & LUNDAGER (1910, p. 15), OSTENFELD (1915, p. 376), OSTENFELD (1923b, p. 231).

Localities:

- I: 3 Low Point (TW), 4 Kap Benet (TW), 5 Black Cape (TW), 6 Lemming Fjord (TW), 9 Strømstedet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).
- II: 14 Merqujoq (PJ), 16 Aftenstjernesø (PJ), 20 Baggården (PJ), 24 and 25 Øvre Midsommersø (KH), 27 Mågeklippe (KH), 29 Sølejren (PJ).

- III: 34 Valmuedal (PF), 35 Vildt Land (PF), 38 Kap Ejnar Mikkelsen (KH), 42 Blomsterstranden (KH), 43 Kap Glacier (KH), 47a Zig-Zag Dal (PF), 48a Kap Holbæk (EK).
- IV: 49 Koralkysten (KH), 52 Marius Fiil Fjord (KH), 53 Neergaard Elv (KH), 59 Kap Rigsdagen (ÅS), 61 Kap Kronborg (PF), 62 Prinsesse Dagmar Ø (EK), 63 Nord (EK, MW).
- V: 65 Kap Vårbrud (KH), 66 Kap København (KH), 69 Kap Eiler Rasmussen (KH), 70 and 71 Herlufsholm Strand (KH), 78 Frederick E. Hyde Fjord (IPK), 79 Kap Ole Chiewitz (EK), 80 Kap Bridgman.
- VI: 87 Frigg Fjord (EK), 91 Frederick E. Hyde Fjord (EK), 94 Nordpasset (EK).
- VII: Jørgen Brønlund Fjord: A, B1, B2, B3, D, E (BF, KH).

*Poa abbreviata* occurs in all parts of Peary Land, in the lowland as well as at high altitudes. It is one of the most common species of the area, challenged only by *Saxifraga oppositifolia* and *Salix arctica*. Contrary to the latter species, it is found only in dry or slightly moist soil. On the other hand, it seems indifferent to the structure of the soil, as it is frequently found on clayey, sandy as well as on rocky ground. The species is usually free of snow in winter, but is in many places covered with snow, found even in extreme snow-patches.

In snow-bare localities the flowering takes place during the first days of July, first flowering specimen was seen on June 25. Produces ripe seeds. Ascends to 1100 m above sea-level.

The species rarely enters closed vegetation, but often occurs in scattered tufts with other species confined to dry ground, e. g. *Potentilla pulchella*, *Melandrium triflorum*, *Lesquerella arctica* etc.

In contrast to most arctic plants *Poa abbreviata* is exceedingly monomorph.

Its Greenland distribution is northern. It is mapped by GELTING (1934) fig. 42, and it appears that its distribution is the same as that of *Poa hartzii*, though *P. abbreviata* is by far the commonest. Southern limit at about 70° lat. N., both in West and East Greenland. The distribution, however, does not seem to be continuous as the species is not found between Thule and Nügssuaq. Northernmost record is Kap Bridgman (83°30' lat. N. (EK)).

*Poa alpigena* (E. FR.) LINDM.

Localities:

- III: 33 Itukussuk Dal (LF).
- VII: Jørgen Brønlund Fjord: A (KH).

All the material from Peary Land belongs to the viviparous form of the species, var. *colpodea* (TH. FR.) SCHOL. At Jørgen Brønlund Fjord it was rather common in the lowland, especially on the elevated marine terraces, growing on moist, sandy or stony soil, in deltas or along the rivers. The species was often met with in pure clons, but also often entering vegetation of open type.

During the winter the species is usually covered with snow, but never more than 30 to 60 cm, in some places it was found free from snow. Nevertheless the "flowering" takes place rather late; first specimen with visible spikes was observed on June 9. Propagation by means of runners and by bulbils formed in the panicle.

The distribution of var. *colpodea* has been treated by SCHOLANDER (1934) and by SEIDENFADEN & SØRENSEN (1937). It appears to be a northern and north eastern species, extending from about 72° lat. N. on the east coast, to Thule on the west coast, but known only from a few localities. The occurrence within Peary Land as well as outside makes me consider it a high-arctic species, confined to calcareous soils. Northernmost record is Jørgen Brønlund Fjord (82°10' lat. N. (KH)).

*Poa arctica* R. BR.

OSTENFELD (1923b, p. 231).

Localities:

- I: 3 Low Point (TW), 4 Kap Benet (TW), 5 Black Cape (TW), 9 Strømstedet (TW), 10 Kap Salor (TW).
- II: 18 Sydpasset (PJ).
- III: 38 Kap Ejnar Mikkelsen (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH).
- IV: 58 Hagen Fjord (ÅS).
- V: 71 Herlufsholm Strand (KH, JT).
- VII: Jørgen Brønlund Fjord: B2, B3 (BF, KH).

Chiefly found in the same areas as *Cassiope tetragona*, thus f. instance at Jørgen Brønlund Fjord absent from the lowland but commonly met with in the zones between 450—1000 m above sea-level. It is usually found growing scattered in stone-fields in mossy places (frequently associated with *Aulacomnium turgidum*), but is also found in the Cassiope-heaths. During the winter it is covered with snow, but never with thick layers, and is accordingly rather early free from snow in spring. The flowering is nevertheless late; first specimen with visible spikes was seen on July 8. Does not seem to produce ripe seeds. Propagation by runners.

As mentioned in HOLMEN (1952) all the Peary Land material of the species has to be referred to ssp. *caespitans* NANNF., being more or

less caespitose. Some specimens, viz. those from locs. 3, 4, 5 and 9, have previously been determined by NANNFELDT himself (see further NANNFELDT, 1940).

The distribution of *Poa arctica* in Peary Land is very characteristic, and common to several species, e. g. *Cassiope tetragona*, *Luzula confusa*, *Potentilla hyparctica* a. o., confined to the outer coast and to the innermost part of Independence Fjord. Its Greenland distribution is northern, extending from Angmagssalik on the east coast, north around Greenland, and south to Godthåbsfjord on the west coast. Northernmost record is Low Point 83°09' lat. N. (TW).

*Poa glauca* M.VAHL

OSTENFELD (1915, p. 231); OSTENFELD (1923b, p. 376).

Localities:

I: 3 Low Point (TW), 4 Kap Benet (TW), 7 Mascart Inlet (ER), 9 Strømstedet (TW).

II: 25 Øvre Midsommersø (KH).

III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 36 Kap Schmelek (PF), 37 Sidste Næs (PF), 39 Diabasholme (KH), 40 and 42 Blomsterstranden (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH), 48b Kap Holbæk (EK).

VII: Jørgen Brønlund Fjord: A, B1, B2, B3, D (BF, KH).

Growing in dry, sandy to stony ground, rarely in clay. At the southern side of Jørgen Brønlund Fjord the species was very rare in the lowland, but frequently met with in the zones between 400 and 1000 m, and here found together with the species characteristic of this zone, viz. *Luzula confusa*, *Trisetum spicatum*, *Saxifraga nivalis* a. o., without entering the plant-communities, but often growing in cushions of *Cetraria nivalis* and *Orthotrichum killiasii*. On the sun-exposed slopes on the northern side of the fjord the species was descending to sea-level, growing in clayey soil, often in the shade of large boulders. In the inner parts of Independence Fjord the species was commonly found in the stone-fields, just as on the south side of Jørgen Brønlund Fjord. During winter it is free of snow or covered with small layers of snow only. So it is early free in spring; the flowering is, nevertheless, late, in the middle of July. Ripe seeds were not seen.

The species varies somewhat as to the size and form of tuft, and density of the spikes, owing probably mainly to the varying ecological conditions.

The occurrence of this plant in Peary Land is rather characteristic, being, like some other species, found chiefly in the north western areas

in the innermost parts of the large fjords near the inland ice. The species was not found at the eastern outer coast; it may be growing there, but is at least not common. In Greenland the species is known from all parts of the country, although rare on the south eastern coast. Northernmost record is Low Point 83°09' lat. N. (TW).

*Poa hartzii* GANDGR.

Localities:

- II: 19 Baggården (KH), 21 Øvre Midsommersø (KH), 25 Øvre Midsommersø (JT), 29 Sølejren (KH), 30 and 32 Børglum Elv (JT).  
 III: 33 Itukussuk Dal (BF).  
 VI: 93 Harebugt (EK).  
 VII: Jørgen Brønlund Fjord: A and E (KH).

The species is usually growing on dry to slightly moist clayey, or sandy soil, on slopes or sometimes in rocky ground. In Børglum Elv valley and in Wandel Dal it was growing in veritable dunes, where it is well suited to endure a frequent deposit of sand. Like most of the grasses in Peary Land it does not take part in the formation of dense vegetation, but sometimes forms scattered vegetations with e. g. *Poa abbreviata*, *Melandrium triflorum*, *Papaver radicum* and *Oxyria digyna*. During the winter the species is usually free of snow. Flowering is rather late, spikes visible on the first days of July. Ripe seeds were not found. A typical lowland species, never found above 100 m.

Since SØRENSEN (1933) called attention to this characteristic rigid, and prickly species several authors have discussed its origin and relationship to other species within the genus, though never questioning its rank of species. As mentioned by SØRENSEN himself the species is closely related to *P. abbreviata* and *P. glauca*, closest to the latter. In Peary Land there are various forms of *P. glauca*, but a confusion of any of these with *P. hartzii* does not seem possible in the field, especially as they are never found together. The latter, on the other hand, may well be confused with *P. abbreviata*; vigorous specimens of *P. abbreviata* are very easily mistaken for weak specimens of *P. hartzii* because of the similar habit, the dense, erect tufts, scarious glumes and lemmas, the convolute leaves and the scarious, inflated leaf-sheaths. Moreover the species are often accompanying each other.

As a means of separating the two species, in wintering condition and without floral characters, transverse sections of the leaves were found quite suitable. In *P. hartzii* the transverse section shows two large grooves with bulliform cells on each side of the midrib, while in *P. abbreviata* such grooves are absent or nearly so. Further the structure of

the leaf in *P. hartzii* is more scleromorphous, and the leaves more hairy (conf. Fig. 32).

With regard to their occurrence in Peary Land the two species are also different. While *P. abbreviata* is found in all parts of the country, *P. hartzii* is confined to the inner, most continental, areas. The total distribution in Greenland is given in a map in SØRENSEN (1933) fig. 7. To this map, however, may be added the localities mentioned in SEIDEN-

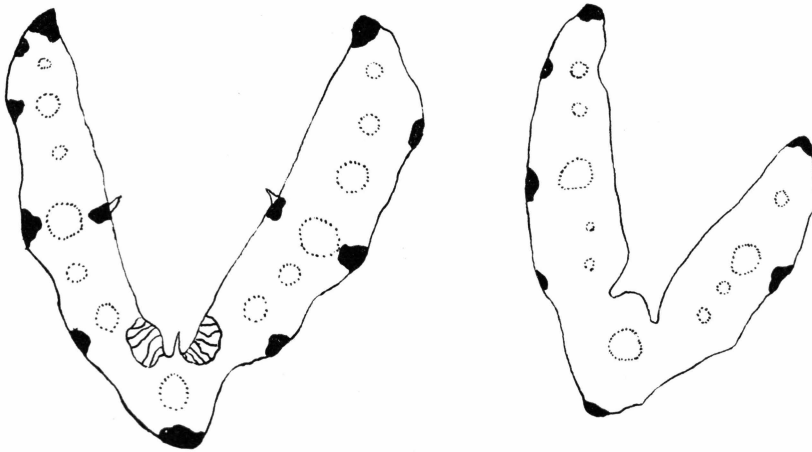


Fig. 32. Transverse section of leaves of *Poa hartzii* (left) and *Poa abbreviata* (right). (90 ×).

FADEN & SØRENSEN (1937), while a station in South-Greenland (loc. 6 on the map) must be excluded (see S. & S. pag. 165). After the finds in Peary Land I think there are reasons for presuming that it is distributed all over the continental areas of northern Greenland, extending south to 70° lat. N. on the west coast as well as on the east coast. Northernmost record is Harebugt at the head of Frederick E. Hyde Fjord 82°55' lat. N. (EK).

*Puccinellia andersonii* SWALL.

SØRENSEN (1953, p. 113).

Locality:

VII: Jørgen Brønlund Fjord: A (KH).

Was found only along the shores of the south coast of Jørgen Brønlund Fjord, especially on clayey flats flooded by the tide. It was occasionally found in large quantities, often as the only species here, but sometimes growing together with vigorous specimens of *Phippsia algida*. During the winter the species is covered with only a thin layer of snow, if not altogether snow-bare. Although the plant is free of snow early in spring, the growth and flowering are rather late, in the middle of July. Produces ripe seeds.

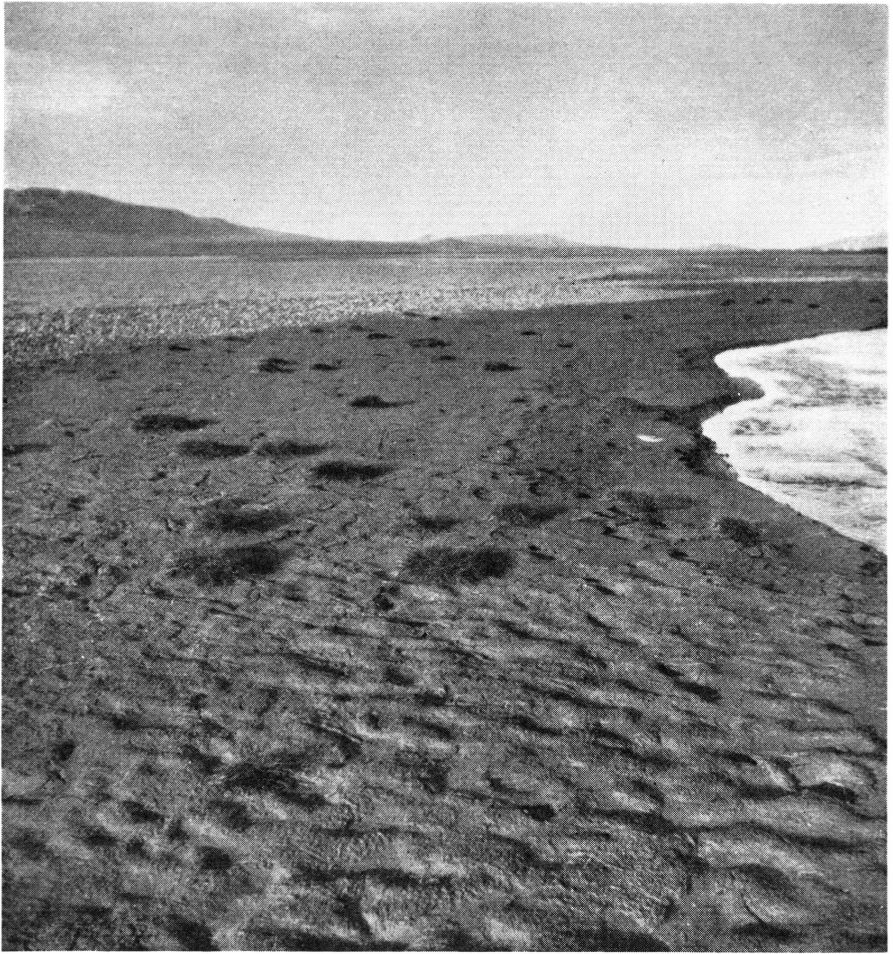


Fig. 33. Tufts of *Puccinellia andersonii* at the beach of Jørgen Brønlund Fjord, on wet, sandy-clayey soil. Left, the fjord, to the right Kedelkrogelv, running along the shore near its outlet. Aug. 8, 1947. Phot. KH.

The Greenland distribution is mapped by SØRENSEN (1953, fig. 103). It seems to be a rare northern species, found in isolated localities from Ymer Ø on the east coast and north round to Disko on the west coast. Northernmost record is that of Peary Land 82°10' lat. N. (KH).

*Puccinellia angustata* (R. BR.) RAND. & REDF.

LUNDAGER & OSTENFELD (1910, p. 14 (sub. nom. *Glyceria angustata*)). OSTENFELD (1923b, p. 232). SØRENSEN (1953, p. 115).

Localities:

I: 11 John Murray Ø (TW).

II: 14 Merqujoq (PJ), 15 Head of I.P. Koch Fjord (PJ), 19 Baggården (PJ), 21 Baggården (PJ, JT), 24 Øvre Midsommersø (KH),

25 Nedre Midsommersø (KH), 29 Sølejren (KH, PJ), 31 Børglum Elv (TA).

III: 38 Kap Ejnar Mikkelsen (KH).

IV: 49 Koralkysten (KH), 60 Prinsesse Thyra Ø (ÅS), 63 Nord (MV), 64 Kjovesletten (KH).

V: 66 Kap København (KH), 67 Mudderbugten (KH), 78 Frederick E. Hyde Fjord (IPK).

VI: 82 West of Flammens Fjord (EK), 87 Frigg Fjord (EK), 91 Nordkroneli (EK), 92 Frederick E. Hyde Fjord (EK).

VII: Jørgen Brønlund Fjord: A, C, D, E (KH).

The species was chiefly found in the lowland near the shores, usually on the old elevated marine terraces, in the bottom of the clefts or along the rivers. Also in the very continental areas far from the sea it was frequently met with, growing in soils covered with salt-crusts. It grows in moist, sandy or clayey soil which never dries up completely during the summer, and rarely enters the plant-communities. During the winter the species is free of snow or sometimes covered with a thin layer. Flowering takes place in the beginning of July, first flowering specimen seen on June 27. Produces large quantities of ripe seeds, which are a great attraction for snow-buntings in late summer. It rarely reaches an elevation of more than 150 m, but is found in a single station at lake Midsommersø at 500 m.

In Peary Land the species is confined to the continental areas. It is rare at the outer coasts and in the Cassiope-zones of the innermost parts of the large fjords. The total Greenland distribution is mapped by SØRENSEN (1953 fig. 104). It is northerly, extending from about 68° lat. N. on the west coast, round north, and then southwards to Scoresby Sund on the east coast. Northernmost record is that of I. P. KOCH, on the south coast of Frederick E. Hyde Fjord.

In the list by SØRENSEN (1953) on p. 115, a few corrections are needed in section "North VIII". The specimen collected at "Børglum River 5.VIII.1943" was collected by T. ANDERSEN, not by the present writer.

Another specimen, "82°10' lat. N. (Cape Peter Henrik, W. of Hagen Fjord) 11.VII.1907, I.P.Koch 284" was not collected at Kap Peter Henrik, but at Mallemuk Fjeld in Holm Land in North-East Greenland, 80°10' lat. N. on 11.VI.1907.

*Roegneria borealis* (TURCZ.) NEVSKI

Localities:

II: 19 Baggården (PJ), 30 Børglum Elv (JT).

III: 33 Itukussuk Dal (BF).

This species was not collected by the writer personally, so the ecological information is from comrades. It may be stated that the

species was found growing in slightly moist, sandy soil along rivers. Judging from the specimens collected, the flowering probably takes place in the beginning of July, a specimen collected on August 8 had almost ripe seeds. During the winter the species would hardly be covered with large quantities of snow, and probably is completely snow-free. All material was found below 150 m.

Recently the Greenland material of the genus *Roegneria* (*Agropyron*) has been studied intensively by MELDERIS (1950), who refers the material to three species. The Peary Land material may be referred to var. *hyperarctica* (POL.) MELD. based upon the description of POLUNIN (1940).

MELDERIS (1950) states that the var. *hyperarctica* is rather polymorphous in Greenland, and it may be said that the Peary Land material is deviating from the West Greenland specimens in some characters of the flower, especially the shape of the palea and the lodicules.

The occurrence of the species in Peary Land, as based upon the three collections, may be said to be continental, and probably is also calciphilous. The total distribution of the species in Greenland is given in a map in MELDERIS (l. c.), according to which the species should be "bicentric" in Greenland; found on the west coast in the Disko—Nügssuaq area, and on the east coast in the Ella Ø—Clavering Ø area. According to the finds in Peary Land the species may be called "tricentric". However, I think that the species is likely to be found in many other stations in the large, non-investigated fjord-complexes of the northern part of Greenland, and thus will show a rather continuous distribution.

Northernmost record is Børglum Elv 82°26' lat. N. (JT).

#### *Trisetum spicatum* (L.) RICHT.

OSTENFELD (1915, p. 376, 1923b, p. 232).

#### Localities:

- I: 9 Strømstedet (TW).
- II: 16 Aftenstjernesøen (JT).
- III: 33 Itukussuk Dal (BF), 36 Kap Schmeleck (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 40 Blomsterstranden (KH).
- VII: Jørgen Brønlund Fjord: B1, B2 (KH).

Not common in Peary Land. At Jørgen Brønlund Fjord it was almost absent from the lowland (found here in two specimens only), but on the other hand common in the zones between 450 to 600 m above sea-level. It is growing in dry, sandy soil in the stone-fields as one of the most characteristic species of the very poor so-called "fell-field" vegetation, often with *Luzula confusa*, *Poa glauca* and *Papaver radicum*.

During the winter the species is covered with thin layers of snow only, and early free from snow in spring. Flowering takes place in the first days of July. Ripe seeds are produced.

With regard to its occurrence in Peary Land the species has much in common with *Cassiope tetragona*, although it seems to be absent from the eastern outer coast. The species is common in all parts of Greenland. Northernmost record is Strømstedet at I.P.Koch Fjord 82°51' lat. N. (TW).

On *T. spicatum* POLUNIN (1940) p. 59 says, "The vast majority of individuals in the centre and north of our area (Canadian Eastern Arctic) . . . belong to or at least approach the rather doubtfully segregable var. *maidenii* (GANDOGER) FERNALD". Because of a great similarity between the Ellesmere and the Peary Land flora the occurrence of the var. might be expected in Peary Land, too. However, after a further study of the whole of my material, I find no reason for referring it to any but the main species, this conclusion probably being due to the fact that var. *maidenii* is "rather doubtfully segregable". Nor could any of the other varieties of *T. spicatum* treated in FERNALD (1916) be demonstrated from Peary Land.

### Juncaceae.

#### *Juncus triglumis* L. s. lat.

Localities:

II: 29 Søjren (KH).

III: 38 Kap Ejnar Mikkelsen (KH), 46 Krognæs (KH).

VII: Jørgen Brønlund Fjord: A and D (KH).

Rare in Peary Land, known only from the few localities mentioned above. In the thoroughly investigated area around Jørgen Brønlund Fjord it was only seen in a couple of stations. It is usually growing in moist or wet, mossy meadows with *Eriophorum triste*, *Carex stans* or *Carex misandra*. During the winter it is free of snow or sometimes covered with a thin layer. Although early free, the growth of the species is very slow in the first part of the summer, and the flowering does not take place until the last days of July. Thus it is one of the latest flowering plants of the area, if not the latest. Produces ripe seeds. Only found in the lowland below 100 m.

The species is always met with in very small-sized specimens, never exceeding 5 cm. The Greenland distribution of *J. triglumis* s. lat. is almost "circumgreenlandic", although it is rare, especially in the north. Northernmost record is Søjren at the eastern end of lake Midsommersø 82°16' lat. N. (KH).

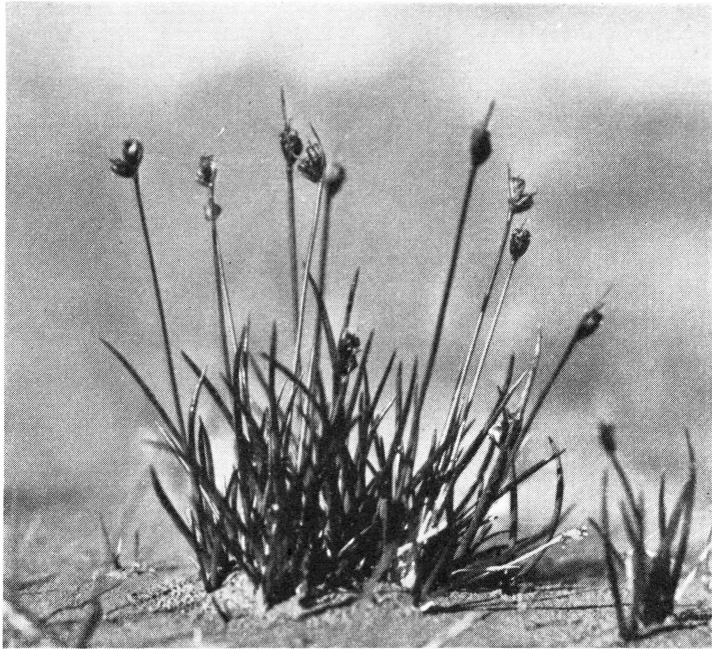


Fig. 34. *Juncus biglumis* from moist, clayey soil in the delta of Kedelkrogelv, Heilprin Land. Aug. 9, 1947. Phot. KH.

*Juncus biglumis* L.

OSTENFELD (1923b, p. 232).

Localities:

- I: 3 Low Point (TW), 9 Strømstedet (TW), 11 John Murray Ø (TW).
- II: 19 Baggården (KH), 21 Baggården (PJ), 29 Søjren (KH).
- III: 33 Itukussuk Dal (BF), 38 Kap Ejnar Mikkelsen (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH).
- IV: 53 Neergård Elv (KH).
- V: 65 Kap Vårbrud (KH), 70 Herlufsholm Strand (KH).
- VI: 84 and 90 North side of Frederick E. Hyde Fjord (EK), 94 Nordpasset.
- VII: Jørgen Brønlund Fjord: A, B2, C, E (KH).

Very common on moist to wet, sandy soil, especially in deltas and along rivers. Often met with in plant-communities on moist soil, in extreme snow-patches as well as in places free of snow during the winter. The species is commonly flowering in the first half of July, first flowering specimen, however, seen as early as on June 25. Produces ripe seeds. Most frequent in the lowland, but found upwards to 500 m.

Known from the outer coasts as well as from the inner parts of Peary Land, answering its rather wide ecological range. The Greenland

distribution is mapped by BÖCHER (1938) in fig. 129. Found all over Greenland, but most frequent in the north. To the south it is rarer or, in some small coastal stretches, lacking entirely. Northernmost record is Frederick E. Hyde Fjord (loc. 84) 83°13' lat. N. (EK).

*Luzula arctica* BLYTT

OSTENFELD (1915, p. 376) sub. nom. *L. nivalis*; OSTENFELD (1923b, p. 233) sub. nom. *L. nivalis*.

Localities:

- I: 3 Low Point (TW), 5 Black Cape (TW), 7 and 8 Mascart Inlet (ER), 9 Strømstedet (TW), 10 Kap Salor (TW), 11 John Murray Ø (TW).  
 II: 16 Aftenstjernesø (JT), 18 Sydpasset (PJ), 22 Øvre Midsommersø (KH), 29 Sølejren (KH).  
 III: 33 Itukussuk Dal (BF), 35 Vildt Land (PF), 38 Kap Ejnar Mikkelsen (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH).  
 IV: 53 Neergaard Elv (KH), 54 Slebsager Elv (KH).  
 V: 70 and 71 Herlufsholm Strand (KH).  
 VI: 84 and 90 North side of Frederick E. Hyde Fjord (EK).  
 VII: Jørgen Brønlund Fjord: A, B2, B3, D (BF, KH).

Common. At Jørgen Brønlund Fjord it is frequently found in the lowland, but is rarer above 100 m. Ascends to 900 m above sea-level. The ecological range of the species does not seem very wide; it is always confined to moist, sandy soil. It is common in snow-patch-communities, often together with *Salix arctica*, *Alopecurus alpinus* and *Ranunculus sulphureus* in mossy ground. Also commonly met with along rivers. The snow-cover during the winter is usually heavy (3 to 5 m), but sometimes it is also found with no cover at all. The flowering begins at the end of June, first flowering specimen found on June 27. Produces ripe seeds.

The species is widespread in Peary Land, commonly met with both at the outer coasts and in the inner parts of the country. The Greenland distribution is mapped by BÖCHER (1952) fig. 29. It is northern with southern limit on the east coast at Scoresby Sund, and on the west coast at Søndre Strømfjord. Northernmost record is from the north coast of Frederick E. Hyde Fjord (loc. 84) 83°13' lat. N. (EK).

*Luzula confusa* (HARTM.) LINDEB.

OSTENFELD (1915, p. 376) sub. nom. *L. arcuata* (WG.) Sw. subsp. *confusa* LINDEB.; OSTENFELD (1923b, p. 232).

Localities:

- I: 2 Jewell Fjord (ER), 3 Low Point (TW), 5 Black Cape (TW), 9 Strømstedet (TW), 10 Kap Salor (TW).

- III: 33 Itukussuk Dal (BF), 36 Kap Schmelck (PF), 37 Sidste Næs (PF), 38 Kap Ejnar Mikkelsen (KH), 39 Diabasholme (KH), 40 Blomsterstranden (KH), 43 Kap Glacier (KH), 45 Saxifragadal (KH), 46 Krognæs (KH).
- IV: 53 Neergaard Elv (KH), 57 and 58 Hagen Fjord (ÅS).
- V: 70 Herlufsholm Strand (KH), 80 Kap Bridgman (EK).
- VII: Jørgen Brønlund Fjord: B1, B2, B3 (BF, KH).

A typical species in the "fell-field" vegetation of the stone-fields. It usually follows the Cassiope areas and is of a similar occurrence, as is also such species as *Potentilla hyparctica*, *Saxifraga nivalis* and *Cardamine bellidifolia*. At Jørgen Brønlund Fjord it is completely absent from the lowland, but becomes common in the zones between 400 and 900 m, growing in dry, sandy soil in the stone-fields, often together with *Trisetum*, *Poa glauca*, and in cushions of *Orthotrichum killiasii* and different species of lichens. On Herlufsholm Strand it is, besides *Potentilla hyparctica*, one of the most conspicuous species of the stone-fields, and, together with *Rhacomitrium lanuginosum* and several *Cetraria* species, the dominant vegetation of this area.

During the winter the species is covered with small layers of snow, or altogether free of snow. The flowering takes place in the first half of July. First flowering specimen seen on July 8 (at an elevation of 465 m). Produces ripe seeds.

Although *L. confusa* and *L. arctica* are different as regards ecology, they may sometimes be found growing together. In order to make a safe determination of the *Luzula* material collected during the winter period, it was necessary to judge by the characters of the leaves. This proved to be very easy. Under the microscope a transverse section of the leaf showed that the epiderm of the upper side of the leaf of *L. arctica* was very rough, with high, rounded papillae, while the epiderm of the upper side of the leaf of *L. confusa* was completely smooth. This tallies well with the impression one gets from a superficial study of the plants, that the leaves of *L. arctica* are clearly opaque, while the leaves of *L. confusa* are always shiny.

In Peary Land, *L. confusa* is confined to the outer coasts and to the innermost parts of the Independence Fjord area. The three localities around Hagen Fjord form an exception. The species is known from all parts of Greenland. Northernmost record is Kap Bridgman, 83°30' lat. N. (EK). One of the northernmost vegetational species of all.

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## CONCLUSIONS

In most parts of Greenland we may, in places of the same latitude, distinguish between two groups, at least, of widely different types of vegetation, one group with a strongly maritime accentuation, growing along the outer coasts, and another group, consisting of continental types. This latter is found far from the coast, nearest the inland ice (cf. SØRENSEN, 1933, GELTING, 1934, and BÖCHER, 1954). It is an established fact that the two groups have only very few species in common. Similar conditions were found in Peary Land. The localities examined here fall plainly into two groups, each showing its own types of vegetation and its own characteristic species.

One group, in this treatise called the "Cassiope-areas", comprises districts I, III, V, and VII B2-B3, demarcated on the map fig. 2. The other group is designated the "Dryas-areas", and comprises the remaining part of the country, i. e. districts II, IV, VI, and VII: A, B1, C, D, E, the demarcations of the districts on the said map being, of course, subject to a certain reservation rendered necessary by the insufficient examination of many areas.

### The Cassiope-areas.

The vegetation of these areas is first and foremost characterized by the presence of *Cassiope tetragona*-heaths. These are frequent here, though not often very extensive. There is furthermore a fell-field vegetation, the most prominent species of which are *Potentilla hyparctica*, *Poa glauca*, *Trisetum spicatum*, and *Luzula confusa*, plus the cryptogams *Orthotrichum killiasii* and *Cetraria nivalis*. And thirdly we find mossy swamps, the most characteristic components of which are *Tomenthypnum nitens*, *Meesia triquetra*, *Drepancladus revolvens*, and *Aulacomnium turgidum*. Finally may be mentioned the heaths dominated by *Rhacomitrium lanuginosum*, with *Dicranoweisia crispula*, *Sphenobolus minutus*, and several species of lichens. None of these types of vegetation were found in the "Dryas-areas".

In addition to the plant-communities mentioned above, a number of species may be enumerated as characteristic of the "Cassiope-areas", species exclusively found here, or near enough exclusively. They amount to about 1/6 of all Peary Land species (the rare species are not entered). Thus for instance:

<i>Luzula confusa</i>	<i>Saxifraga caespitosa</i>
<i>Silene acaulis</i>	<i>Saxifraga nivalis</i>
<i>Trisetum spicatum</i>	<i>Cardamine bellidifolia</i>
<i>Poa glauca</i>	<i>Hierochloë alpina</i>
<i>Potentilla hyparctica</i>	<i>Cassiope tetragona</i>
<i>Poa arctica</i>	many species of mosses

In district III (cf. map fig. 2), comprising the areas nearest the inland ice, conditions are rather special, although the vegetation definitely shows most likeness to that of the outer coastal districts. Besides the types of vegetation common to both, we also find *Vaccinium*-heaths and *Carex rupestris* vegetation here. At the same time the number of species is much greater; there are, besides some special species (*Campanula uniflora*, *Kobresia simpliciuscula*, *Sagina intermedia*, *Woodsia glabella*, and *Armeria scabra*), also a number of the species which are characteristic of the "Dryas-areas". The relatively rich development of flora and vegetation in this special district is no doubt due to the fact that here we have a summer climate, the humidity of which corresponds with that of the outer coasts, while the temperatures answer those of the "Dryas-areas".

### The Dryas-areas.

The vegetation here is characterized especially by *Dryas*-heaths, *Kobresia myosuroides* vegetation, *Carex stans* meadows, and by rather open communities with *Melandrium triflorum* and *Taraxacum arctogenum*. The plant-communities mentioned above, under the Cassiope-areas, are lacking. Characteristic of the Dryas-areas are, moreover, the extensive areas entirely without vegetation. At a rough estimate the part of the Dryas-areas covered with vegetation is only about 2 or 3% of the whole area, included even the fairly open vegetation.

In the case of the Dryas-areas, too, a series of species may be enumerated as found exclusively in these areas, besides a number of species common here but rare elsewhere. Together they amount to about 25% of the 96 Peary Land species. Thus may be mentioned for example:

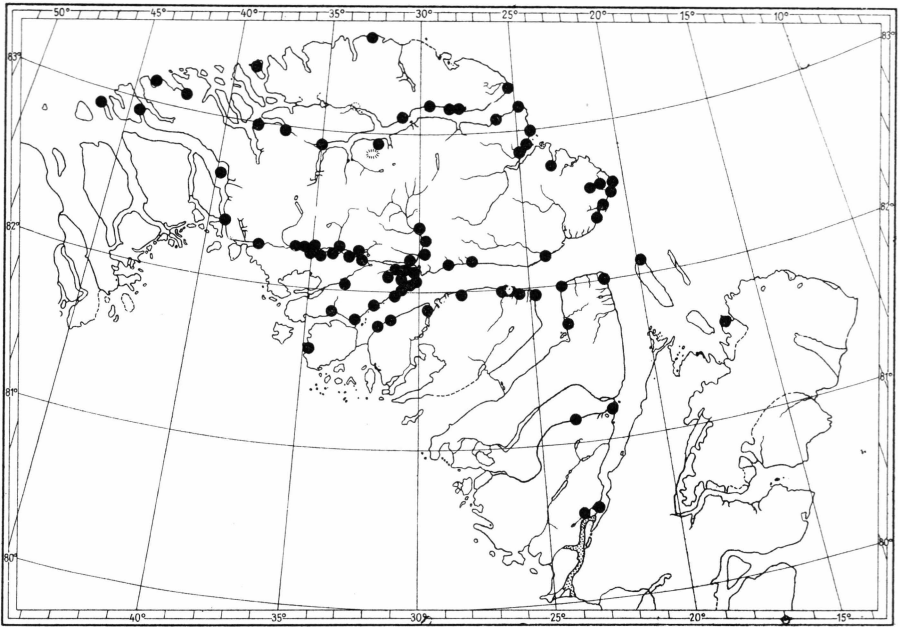
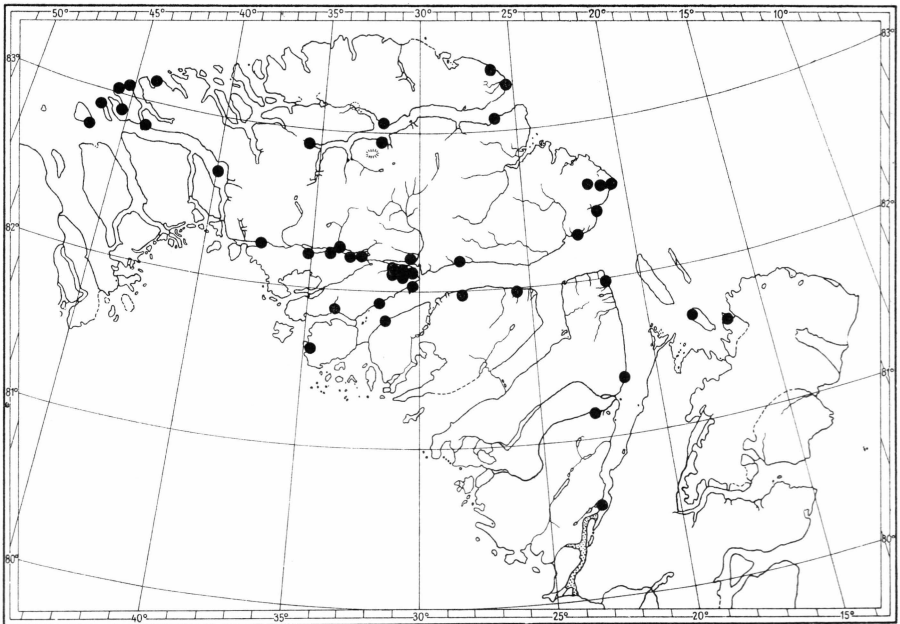
<i>Kobresia myosuroides</i>	<i>Carex nardina</i>
<i>Carex maritima</i>	<i>Dryas integrifolia</i>
<i>Draba cinerea</i>	<i>Eutrema edwardsii</i>
<i>Potentilla pulchella</i>	<i>Potentilla chamissonis</i>
<i>Braya purpurascens</i>	<i>Lesquerella arctica</i> (fig. 42)
<i>Erigeron compositus</i>	<i>Poa hartzii</i> (fig. 41)
<i>Roegneria borealis</i>	<i>Melandrium triflorum</i> (fig. 40)
<i>Taraxacum phymatocarpum</i>	<i>Calamagrostis purpurascens</i>
<i>Braya thorild-wulffii</i>	<i>Erysimum pallasii</i>
<i>Taraxacum arctogenum</i>	<i>Draba arctogena</i>

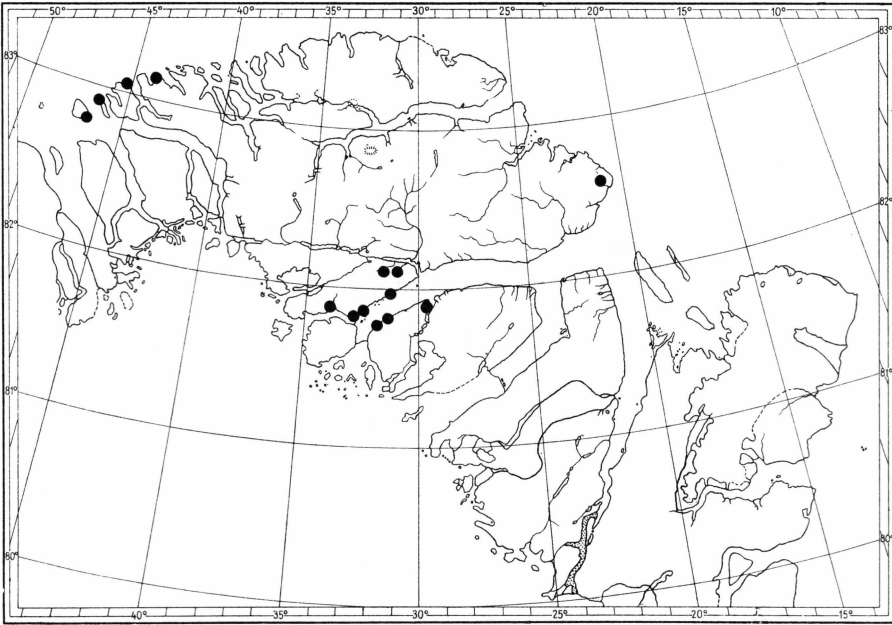
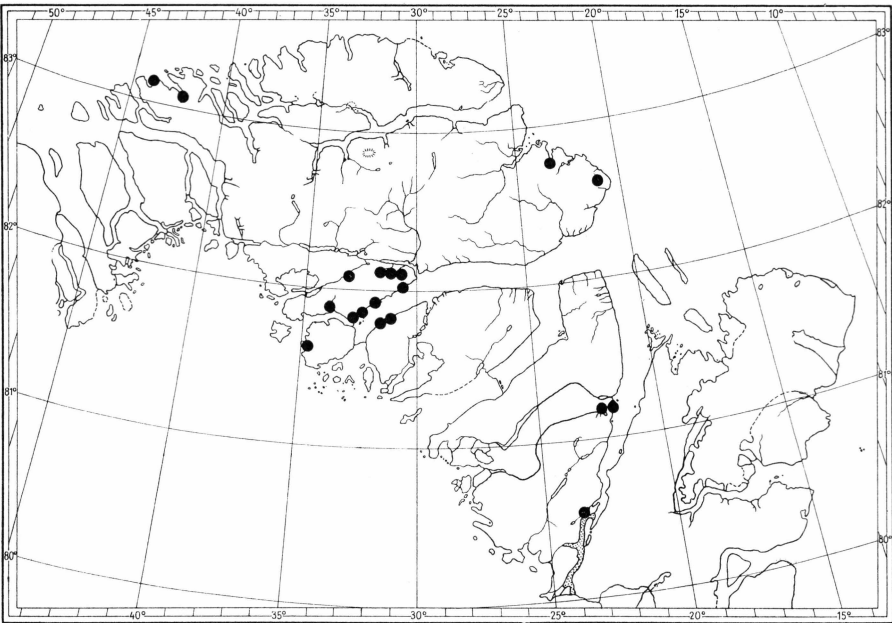
The fairly great difference in vegetation and flora between the Cassiope-areas and the Dryas-areas is definitely due to the different climates of the two areas, although the differences, taken point by point, do not seem very great. To throw light on the climatic differences the following table gives the conditions considered of importance in this connection:

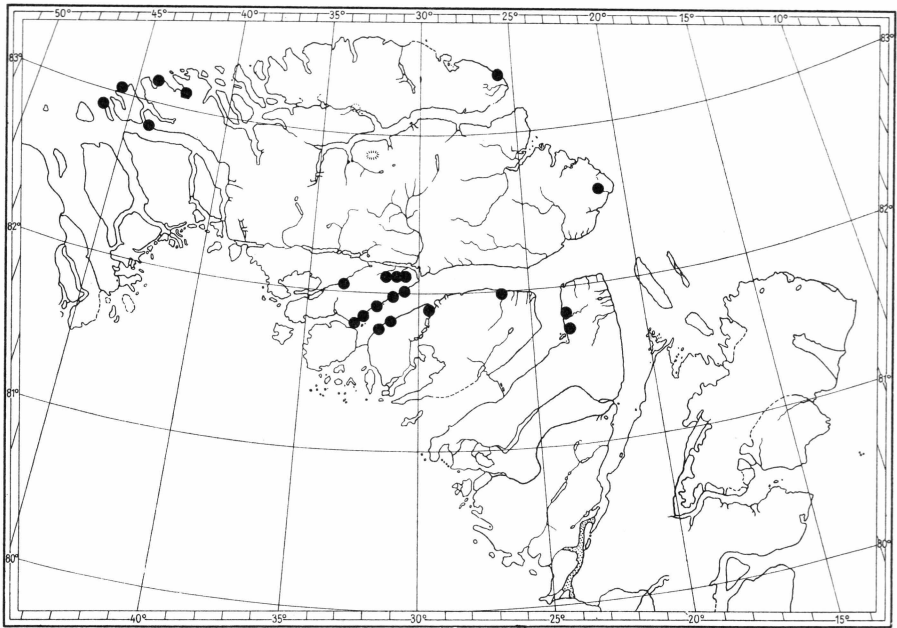
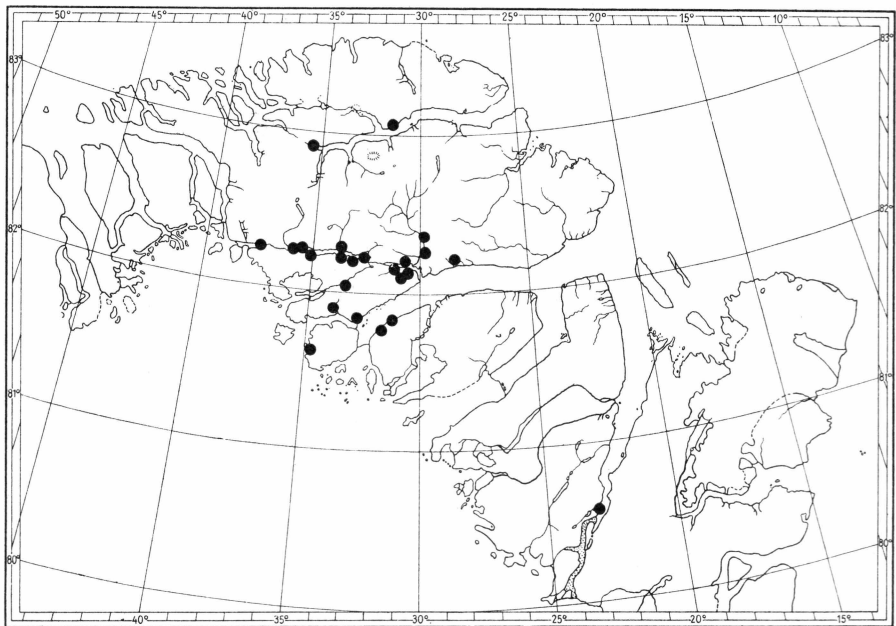
<i>Dryas</i> -areas:	<i>Cassiope</i> -areas:
relatively high summer-temps.	somewhat lower summer-temps.
long frost-free summer period	occasional frost in summer-time
many hours of sunshine	fewer hours of sunshine
very slight precipitation	somewhat greater precipitation
frequent dry gales	dry gales hardly frequent
winter snow unevenly distributed in the terrain	winter snow more evenly distributed in the terrain
mist rare in the summer-time	mist in summer-time not unusual

As previously mentioned Peary Land is built up geologically from sedimentary rock, often containing a fair amount of chalk. Thus, although the basis of the soil is everywhere the same, the climatic differences between the Dryas-areas and the Cassiope-areas nevertheless cause an essential difference in the development of the soil in the two areas. The soil in the Dryas-areas was often found to be purely mineral and calcareous, whilst that of the Cassiope-areas was frequently rich in organic components and slightly acid-neutral. These differences in the soil are, at anyrate in the case of phanerogams, of great importance for the distribution of the species in Peary Land.

While, as mentioned, about 16 % of the 96 Peary Land species are confined to the Cassiope-areas, and about 25 % to the Dryas-areas, the position as regards the rest of the species is this that about 25 % must be considered rare, and therefore difficult to place with regard to distribution, while about 35 % are distributed all over the country, the majority being very common, too. Of these ubiquitous species may be mentioned:

Fig. 35. Finds of *Saxifraga oppositifolia*.Fig. 36. Finds of *Poa abbreviata*.

Fig. 37. Finds of *Potentilla hyparctica*.Fig. 38. Finds of *Cassiope tetragona*.

Fig. 39. Finds of *Luzula confusa*.Fig. 40. Finds of *Melandrium triflorum*.

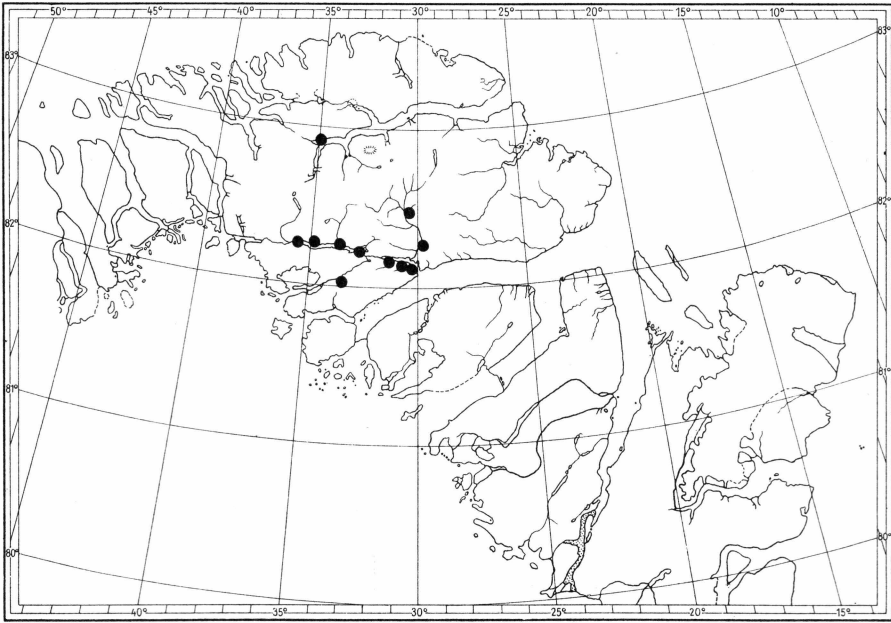


Fig. 41. Finds of *Poa hartzii*.

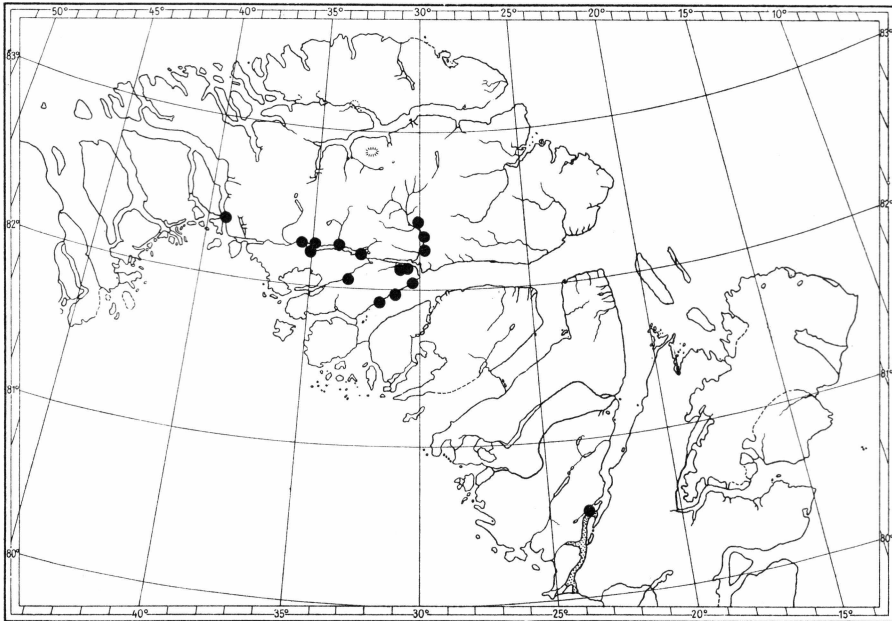


Fig. 42. Finds of *Lesquerella arctica*.

<i>Saxifraga oppositifolia</i> (fig. 35)	<i>Alopecurus alpinus</i>
<i>Polygonum viviparum</i>	<i>Ranunculus sulphureus</i>
<i>Oxyria digyna</i>	<i>Arctagrostis latifolia</i>
<i>Cerastium alpinum</i>	<i>Stellaria crassipes</i>
<i>Juncus biglumis</i>	<i>Draba bellii</i>
<i>Minuartia rubella</i>	<i>Luzula arctica</i>
<i>Papaver radicum</i>	<i>Poa abbreviata</i> (fig. 36)
<i>Cochlearia officinalis</i>	<i>Salix arctica</i>
<i>Dryas chamissonis</i>	<i>Puccinellia angustata</i>

Widely distributed are also numerous species of bryophytes.

Comparing with the outlined geographical classification by SØRENSEN (1933) and GELTING (1934) of the vegetation in the southern parts of North-East Greenland, we find that the *Dryas*-areas in Peary Land correspond near enough with the continental "Inner districts", "Inner Fjords", resp. Even though vegetation in these more southerly parts is far richer, the accordance is fairly great, as regards species as well as plant-communities. Thus *Dryas*-heaths as well as *Kobresia myosuroides*-communities are of great importance, too, in the southern part of North-East Greenland, and here too, may be considered among the types of vegetation characteristic of the continental areas.

It is, however, more difficult to make the vegetation of the Cassiope-areas fit in with the division of districts in North-East Greenland. In North-East Greenland the Cassiope tetragona-heath, which is the most characteristic type of vegetation of the Cassiope-areas, is stated as being mostly confined to the inner districts, but to be frequent also in the middle districts. With his limited knowledge of North-East Greenland the writer, nevertheless, is under the impression that the vegetation of the Peary Land Cassiope-areas shows most affinity with that of the middle districts (Outer Fjords resp.) in North-East Greenland. Types of vegetation corresponding with those of the outer coastal areas in North-East Greenland did not occur in Peary Land, where precipitation, even along the outer coasts, does reach the amount it does further south.

Seen against the background of the distribution of the species in Greenland, the Peary Land flora comprises representatives for a number of different distributional types. Two types are especially richly represented in the Peary Land flora, namely 1) species widespread in Greenland, "circumgreenlandic", and 2) species, which in North-East Greenland are not known south of the Scoresby Sund area.

About 35 % of the species in Peary Land belong to the group of species widespread in Greenland. In Peary Land these species are either ubiquitous or confined to the Cassiope-areas, while the *Dryas*-areas contribute only a couple of species. The other group, the species not known south of the Scoresby Sund area, amount in Peary Land to about

48 species, or 50 % of the flora of the country. These species belong partly to those ubiquitous in Peary Land, partly to the species confined to the *Dryas*-areas, whilst the *Cassiope*-areas contribute only a couple of species. (It should be observed, however, that these 48 species, especially with regard to their distribution in West Greenland, may be said to belong to different distributional types; especially interesting is the fact that a series of these species is not known south of Thule).

Peary Land is situated in the fairly extensive sedimentary area, constituted by Svalbard, North-East Greenland, North Greenland, and the northern part of the Canadian arctic archipelago. This area forms a floristic unit, especially characterized by high-arctic calcareous species. Peary Land is a natural link in this unit, the scarcity of species no doubt being only a consequence of its northerly position.

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#### Appendix.

After I have finished my manuscript I have come across a small botanical contribution, appearing in E. FRÄNKEL (1955): "Rapport über die Durchquerung von Nord Peary Land (Nordgrønland) im Sommer 1953". — *Medd. om Grønland* 103, 8.

The above contains a short list of 23 species, which together with some undetermined species were collected in the area between the head of Frigg Fjord and Kap Morris Jesup. None of the 23 species are new to the flora of Peary Land, but most of them indicate the northernmost record of the species concerned.

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