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DEN BOTANISKE EKSPEDITION TIL VESTGRØNLAND 1946

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CONTRIBUTIONS TO  
THE FLORA AND PLANT GEOGRAPHY  
OF WEST GREENLAND

III.

VASCULAR PLANTS COLLECTED OR OBSERVED  
DURING THE BOTANICAL EXPEDITION  
TO WEST GREENLAND 1946

BY

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WITH 35 FIGURES IN THE TEXT

KØBENHAVN  
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BIANCO LUNOS BOGTRYKKERI

1952





## 1. INTRODUCTION

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The vascular plants collected during the Botanical Expedition to West Greenland 1946 are the main subject of the present paper. All the findings appear from Table 1. Various notes on the occurrence, systematics, and biology of the species have been collected in a floral treatment comprising the main working area: Søndre Strømfjord and the surrounding area. In the final chapter the flora of the Søndre Strømfjord region is compared with some other local floras of Greenland and an account has been given of some important floristic boundaries in central West Greenland.

The work of determination and the studies of the ranges of the plants were made with the support of the Botanisk Museum of Copenhagen supplemented with the arctic collections of the museums of Stockholm and Uppsala, which were visited by me in the autumn of 1948. At the treatment of certain difficult genera I have received valuable assistance by various colleagues, whom I offer my best thanks.

In my introductory work (1949 a) the localities investigated during the expedition were mentioned in detail. It is therefore sufficient in this place to refer to the previous paper and to figs. 1—2, where the situation of the localities is seen, and to the list of localities below.

### List of Localities.

Localities in the interior of the country around Søndre Strømfjord:

- (1) The ice-margin area at the head of Sandflugtdalen.
- (2) The terrain around Keglen.
- (3) The region at the head of the northern branch of the fjord, north of the river.
- (4) Ringsødal and its surroundings.
- (5) The tract about Strømfjordshavn.
- (6) Bredesand and the central part of Ørkendalen.
- (7) The country between the lake Taserssuatsiaq and the western part of Ørkendalen.
- (8) The northeastern part of the Nákajanga peninsula.

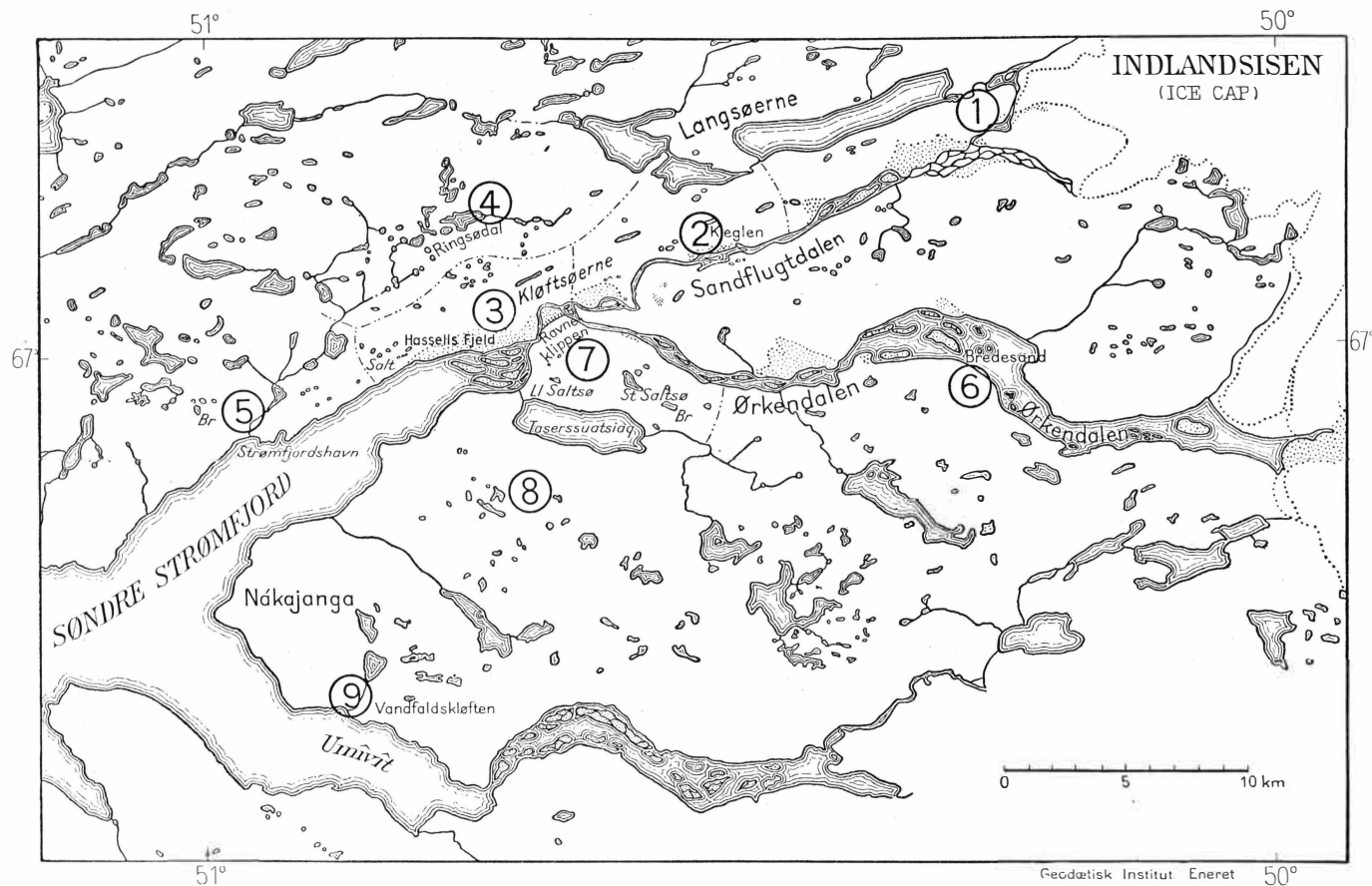


Fig. 1. Map of the inland area at the head of Søndre Strømfjord showing situation and demarcation of Localities 1—9.

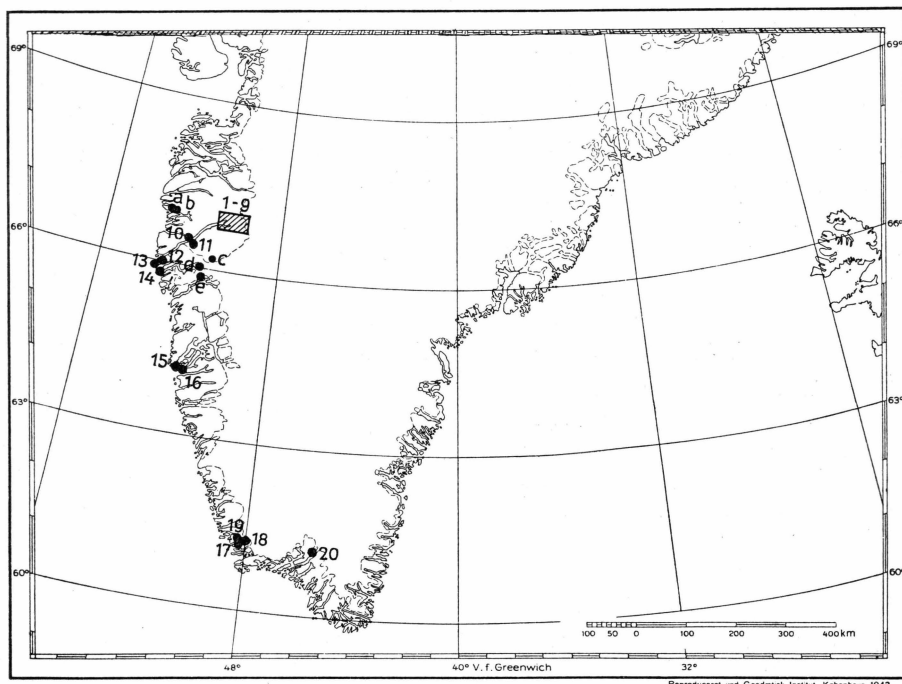


Fig. 2. Map of the southern part of Greenland, showing the situation of the localities mentioned below. Loc. 1—9 are situated within the rectangular hatched area which corresponds to the area shown in fig. 1 on an enlarged scale.

- (9) Nákajanga at Vandfaldskløften.
- (10) Itivdlínguaq, half-way down the fjord on the northern side.
- (11) Kùgssuaq opposite to Itivdlínguaq on the southern side of the fjord.

Localities in the coastal area of West Greenland and in South Greenland.

- (12) Pá at the entrance to Søndre Strømfjord.
- (13) Ungôrsivik, island in archipelago south of the mouth of the Strømfjord.
- (14) Kangâmiut, on an island off the mouth of Evighedsfjorden.
- (15) Godthaab, close surroundings of the colony.
- (16) The mountains Store Malene and Lille Malene near Godthaab.
- (17) The Ivigtut valley and Guldfjeld near Ivigtut.
- (18) Grønnedal in Arsuk Fjord.
- (19) The northern side of Arsuk Fjord opposite Ivigtut.
- (20) Narssarssuaq in Tunugdliarfik Fjord.

Locality 11 was visited by a number of the crew of the naval vessel Heimdal and therefore the collections from there include only a section

of the commonest or most conspicuous species in the place. The material from Ungôrsivik (Loc. 13) was collected by Tyge Møller, M. Sc., who has no doubt managed to get practically all species growing on this small skerry island. From Loc. 19 there are practically only collections of cryptogams made by my three collaborators on the expedition. This locality therefore was not included in Table 1. The rest of the localities were not equally thoroughly examined. From Narssarssuaq there are thus only the results of observations during a single afternoon, while e. g. Loc. 3 was thoroughly examined for nearly a week in all.

Besides the localities mentioned above there are a few collections of plants from the tract between Sukkertoppen and Holsteinsborg made by Danish geodesists during their surveys on some mountain tops (see Table 2). The localities in question were Loc. a—d in fig. 1:

- (a) Præstefjeldet near Holsteinsborg; 550 m above sea level. Collector: P. Frederiksen.
  - (b) Kællingehætten near Holsteinborg; 700 m above sea level. Collector: P. Frederiksen.
  - (c) Nunatak south of Tasersiaq. Collector: B. Kerb.
  - (d) Quinguakujatdleq in Evighedsfjorden; 7—800 m above sea level. Collector: B. Kerb.
  - (e) Qugdlugissat near S. Isortoq ( $65^{\circ}45'$  N.;  $51^{\circ}$  W.); 8—1100 m above sea level. Collector: S. i Dali.
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## 2. SURVEY OF ALL COLLECTIONS AND FLORISTIC OBSERVATIONS

The floristic material of the expedition is grouped in Table 1. Collections are indicated by c, observations of species with o in the column of locality. A bold-type c indicates several collections from the same locality. All collections (Böcher 1946 nos. 1—1181) are found in the Botanisk Museum of the University of Copenhagen.

In order to facilitate the survey the table is divided vertically into three main sections. Loc. 1—41 are in the continental area about Søndre Strømfjord, loc. 12—48 in the coastal area of Southwest Greenland, and loc. 20 in the interior of southernmost Greenland.

Table 1.

[illegible]

Species	Localities cf. figs. 1—2																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20
<i>Lycopodium alpinum</i> .....	..	..										o	..	e	o	o	e	o	..
— <i>annotinum</i> .....	..	..	e					e	..			o	..	..	o	o	o	e	o
— <i>Selago</i> .....	..	..						e	..	o	o	..	..	e	o	o	o	o	..
<i>Selaginella rupestris</i> .....	..	..										..	..	..	..	..	..	..	e
— <i>selaginoides</i> .....	..	..										..	..	..	..	..	e	..	..
<i>Isoetes echinosporum</i> .....	..	..										..	..	..	e	..	e	..	..
<i>Juniperus communis</i> var. <i>montana</i> ..	..	..	e	..	..	..	..	..	o	o	..	o	..	..	..	o	o	o	o
<i>Salix arctophila</i> .....	o	o	e	o	o	o	o	e	o	o	..	o	e	e	e	e	e	e	o
— <i>glauca</i> incl. ssp. <i>callicarpaea</i> ..	o	o	e	e	o	e	o	o	o	o	o	o	e	e	o	o	e	o	o
— <i>herbacea</i> .....	..	..	o	e	..	..	..	e	..	o	o	o	o	o	o	o	e	e	..
— <i>Uva ursi</i> .....	..	..										..	..	..	..	..	e	e	e
<i>Alnus crispa</i> .....	..	..										..	..	..	..	..	o	e	..
<i>Betula glandulosa</i> .....	..	..										..	..	..	..	..	..	o	e
— <i>nana</i> .....	o	o	o	o	o	o	o	o	o	e	o	o	..	..	o	e	..	..	..
— <i>pubescens</i> s. l. ....	..	..										..	..	..	..	..	e	e	e
— — × <i>glandulosa</i> .....	..	..										..	..	..	..	..	e	o	o
<i>Koenigia islandica</i> .....	..	..										..	e	..	..	..	..	..	..
<i>Oxyria digyna</i> .....	..	..	o	e	..	o	..	e	..	o	o	o	e	o	o	o	o	o	o
<i>Polygonum aviculare</i> .....	..	..										..	e	..	..	..	..	..	..
— <i>viviparum</i> .....	o	o	o	o	o	o	o	o	o	o	o	o	e	o	o	o	o	o	o
<i>Rumex acetosa</i> .....	..	..										..	..	..	..	..	..	..	e
— <i>acetosella</i> .....	e	e	e	..	..	o	o	..	o	..	..	..	..	..	o	..	..	..	e
<i>Montia lamprosperma</i> .....	..	..	e	e	..	e	..	..	..	..	..	..	..	..	..	..	e	..	..
<i>Cerastium alpinum</i> .....	o	o	e	o	o	o	o	o	o	o	o	o	e	o	o	o	e	o	o
— <i>cerastioides</i> .....	..	..										e	e	e	o	o	..	..	..
<i>Honckenya peploides</i> var. <i>diffusa</i> ..	..	o	e	..	..	..	e	..	..	..	..	..	e	..	o	..	..	..	..
<i>Melandrium affine</i> .....	e	e	e	..	..	e	e	o	o	e	..	..	..	..	..	..	..	..	..
— <i>triflorum</i> .....	o	e	e	o	o	e	e	e	e	e	o	..	..	..	..	..	..	..	..
<i>Minuartia biflora</i> .....	..	..										e	..	..	e	e	..	..	..
— <i>groenlandica</i> .....	..	..										e	..	e	e	..	..	..	..

Table 1 (continued)

Species	Localities cf. figs. 1—2																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	
Ranunculus confervoides . . . . .	.	.	e	o	e	o	e	o	.	e	.	.	.	.	.	.	.	.	.	.
— Cymbalaria . . . . .	.	.	.	.	.	.	e	.	.	.	.	.	.	.	.	.	.	.	.	.
— hyperboreus . . . . .	o	e	e	o	e	.	e	.	.	.	.	.	.	o	e	.	.	.	.	.
— lapponicus . . . . .	o	o	e	o	o	o	e	o	o	e	.	.	.	.	.	.	.	.	.	.
— pedatifidus (affine) . . . . .	o	e	e	.	e	e	e	.	.	.	.	.	.	.	.	.	.	.	.	.
— pygmaeus . . . . .	.	.	.	e	.	.	.	e	.	.	.	o	.	e	o	o	e	.	.	.
— reptans . . . . .	.	e	e	.	e	.	e	.	.	.	.	.	.	.	.	.	.	.	.	.
Thalictrum alpinum . . . . .	.	.	.	.	e	.	e	.	e	.	.	o	.	o	.	o	o	o	o	o
Papaver radicatum . . . . .	.	.	e	.	.	e	o	e	.	e	o	.	.	.	.	.	e	e	e	e
Arabis alpina . . . . .	.	.	.	.	.	.	.	.	.	.	.	e	.	o	.	o	e	e	.	.
— arenicola . . . . .	e	e	o	.	.	o	e	.	.	.	.	.	.	.	.	.	.	.	.	.
— Holboellii . . . . .	.	.	e	.	.	.	.	.	e	e	.	.	.	.	.	.	.	.	.	.
Braya linearis . . . . .	.	.	e	.	.	.	e	.	.	e	.	.	.	.	.	.	.	.	.	.
Cardamine bellidifolia . . . . .	.	.	.	.	.	.	.	e	.	.	.	o	.	.	.	e	.	.	.	.
— pratensis . . . . .	.	e	.	o	e	.	.	.	.	.	.	.	.	.	.	.	o	e	.	.
Cochlearia officinalis s. l. . . . .	.	.	.	.	.	.	.	.	.	e	.	.	e	o	.	.	.	.	.	.
Draba aurea . . . . .	e	e	e	o	o	.	e	e	e	.	.	.	.	.	.	.	e	e	e	e
— cinerea . . . . .	.	.	e	o	e	.	.	.	.	e	.	.	.	.	.	.	.	.	.	.
— — ssp. groenlandica . . . . .	.	.	e	.	.	.	.	.	.	e	.	.	.	.	.	.	.	.	.	.
— hirta . . . . .	e	e	e	o	o	e	e	e	e	.	.	.	.	.	.	.	.	.	.	.
— incana . . . . .	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	e	e	e	.
— lactea . . . . .	.	.	.	.	.	.	.	e	.	e	.	.	.	.	.	.	.	.	.	.
— lanceolata . . . . .	e	e	e	.	.	.	e	e	e	.	.	.	.	.	.	.	.	.	.	.
— nivalis . . . . .	e	.	e	.	.	e	.	e	.	e	.	e	.	.	.	e	e	e	.	.
— rupestris . . . . .	.	.	.	.	.	.	.	.	.	o	.	e	.	e	.	e	.	.	.	.
Halimolobos mollis . . . . .	e	.	e	.	e	.	e	.	.	.	.	.	.	.	.	.	.	.	.	.
Lesquerella arctica . . . . .	.	.	e	.	.	.	o	.	.	.	.	.	.	.	.	.	.	.	.	.
Rorippa islandica . . . . .	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	e	.	.	.
Torularia humilis . . . . .	.	.	e	.	e	.	.	.	e	.	.	.	.	.	.	.	.	.	.	.
Sedum annuum . . . . .	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	e	o	.
— Rosea . . . . .	.	.	.	.	.	.	.	.	.	o	.	o	e	o	.	o	o	o	o	.
— villosum . . . . .	.	.	e	.	.	.	.	.	.	.	.	.	.	.	.	.	.	e	o	.
Saxifraga aizoides . . . . .	.	.	.	.	.	.	e	e	e	.	.	.	.	.	.	.	.	e	e	.
— aizoon . . . . .	.	o	o	.	.	o	o	.	o	o	.	o	.	.	.	o	.	o	e	.
— caespitosa . . . . .	e	.	.	.	.	o	e	.	.	o	o	o	.	o	o	o	e	e	.	.
— cernua . . . . .	o	e	e	o	o	o	e	o	o	e	.	o	.	.	o	o	e	e	.	.
— foliolosa . . . . .	e	.	.	.	.	e	.	e	.	e	.	.	.	e	.	e	.	.	.	.
— nivalis . . . . .	o	e	e	.	.	o	o	e	.	o	o	o	.	o	o	e	.	.	e	.
— oppositifolia . . . . .	o	e	o	o	.	o	o	o	o	o	o	o	.	.	.	o	e	o	.	.
— rivularis . . . . .	.	.	e	o	.	o	.	e	.	.	.	.	.	o	o	o	e	.	.	.
— stellaris . . . . .	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	e	.	.	.
— tenuis . . . . .	.	.	.	.	.	.	.	.	.	.	.	o	.	.	.	e	.	.	.	.
— tricuspidata . . . . .	o	e	e	o	o	o	o	o	o	o	e	e	.	.	.	.	.	.	.	.
Alchemilla alpina . . . . .	.	.	.	.	.	.	.	.	.	.	.	o	.	e	o	.	o	o	o	.
— filicaulis . . . . .	.	.	.	.	.	.	.	.	.	.	.	o	.	.	.	.	e	o	.	.
— glomerulans . . . . .	.	.	.	.	.	.	.	.	.	.	.	o	.	.	.	.	o	o	e	.

Species	Localities cf. figs. 1—2																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	
<i>Dryas integrifolia</i> .....	o	o	o	o	o	o	o	o	o	c	o	c	..	..	..	o	o	c	..	
<i>Potentilla Chamissonis</i> .....	c	c	c	c	o	c	c	c	o	c	..	..	..	..	..	..	..	..	..	
— — var. <i>umanakensis</i> .....	..	..	..	..	c	..	c	..	c	c	..	..	..	..	..	..	..	..	..	
— — other varieties (cp. text) ..	..	..	c	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..	..	
— <i>Crantzii</i> .....	..	..	c	..	..	..	..	..	..	..	..	o	..	..	..	o	o	c	c	
— <i>Egedii</i> .....	..	..	..	..	..	..	..	..	c	c	..	..	..	..	..	..	..	..	..	
— <i>hyparetica</i> (emarginata) .....	..	..	..	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	
— <i>nivea</i> .....	..	..	c	..	..	..	..	..	c	c	c	..	..	..	..	..	..	..	..	
— — var. <i>subquinata</i> .....	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..	
— <i>palustris</i> .....	..	..	c	o	c	..	..	..	..	..	..	..	..	..	c	..	..	..	..	
— <i>pulchella</i> .....	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..	..	
— <i>tridentata</i> .....	o	o	c	..	o	..	o	o	c	o	..	c	..	o	o	o	..	c	c	
<i>Rubus chamaemorus</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	..	..	..	
<i>Sibbaldia procumbens</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	o	o	o	o	c	..	
<i>Sorbus decora</i> ssp. <i>groenlandica</i> ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	o	o	
<i>Viola palustris</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	o	o	..	
<i>Chamaenerium angustifolium</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	c	..	..	o	o	o	
— <i>latifolium</i> .....	o	o	c	o	o	o	o	o	o	o	o	o	..	..	..	o	o	o	o	
<i>Epilobium anagallidifolium</i> .....	..	..	..	..	..	..	..	..	..	..	..	c	..	c	..	..	..	..	..	
— <i>anagallid.</i> × <i>Hornemannii</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	..	..	..	..	
— <i>davuricum</i> var. <i>arcticum</i> × <i>palustre</i> .....	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
— <i>lactiflorum</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	
— <i>palustre</i> .....	..	..	c	o	c	..	..	..	..	..	..	..	..	o	..	..	..	..	..	
<i>Hippuris vulgaris</i> .....	o	o	o	o	o	..	o	o	o	o	..	o	..	..	c	..	..	..	..	
<i>Myriophyllum spicatum</i> ssp. <i>exalbescens</i> .....	..	c	c	..	c	o	c	..	..	..	..	..	..	..	..	..	..	..	..	
<i>Cornus suecica</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	o	c	..	..	
<i>Angelica Archangelica</i> .....	..	..	..	c	o	..	..	..	..	..	..	o	..	..	..	..	o	o	o	
<i>Pirola grandiflora</i> .....	o	o	o	o	o	o	c	c	o	c	o	..	..	..	..	..	c	..	..	
— <i>minor</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	c	o	o	c	c	..	
<i>Arctostaphylos Uva ursi</i> .....	..	..	c	..	c	..	..	..	c	c	..	..	..	..	..	..	..	..	..	
<i>Cassiope hypnoides</i> .....	..	..	..	..	..	..	..	..	..	o	..	o	..	o	o	o	o	o	..	
— <i>tetragona</i> .....	o	o	o	o	..	o	o	c	o	o	o	..	..	..	..	..	..	..	..	
<i>Ledum palustre</i> ssp. <i>decumbens</i> ..	o	o	o	o	o	o	o	c	o	o	o	c	..	..	..	..	..	..	..	
— <i>groenlandicum</i> .....	..	..	..	..	..	..	o	c	..	o	..	c	..	o	o	c	c	c	..	
<i>Loiseleuria procumbens</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	o	o	o	c	o	..	
<i>Phyllodoce coerulea</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	c	o	o	c	o	..	
<i>Rhododendron lapponicum</i> .....	o	o	o	o	o	o	o	o	o	c	o	..	..	..	..	o	c	c	..	
<i>Oxycoccus quadripetalus</i> var. <i>microphyllus</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	
<i>Vaccinium uliginosum</i> ssp. <i>microphyllum</i> .....	o	o	o	o	o	o	o	o	o	o	o	o	..	o	o	o	o	o	o	
— <i>vitis idaea</i> ssp. <i>minus</i> .....	..	..	c	c	o	..	c	o	o	..	..	..	..	..	..	..	..	..	..	



Table 1 (continued)

Species	Localities cf. figs. 1—2																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	
<i>Empetrum nigrum</i> ssp. <i>hermaphroditum</i> . . . . .	o	o	o	o	o	o	o	o	o	o	o	o	c	c	o	o	o	o	o	
<i>Diapensia lapponica</i> . . . . .	..	..	o	..	..	..	..	o	..	o	..	o	..	o	o	c	c	..	..	
<i>Primula stricta</i> . . . . .	c	o	c	o	c	..	c	..	..	..	..	..	..	..	..	..	..	..	..	
<i>Armeria scabra</i> ssp. <i>sibirica</i> . . . . .	o	o	c	o	..	o	o	c	..	c	..	..	..	..	..	..	..	..	..	
<i>Gentiana aurea</i> . . . . .	..	..	c	..	..	..	..	..	c	..	..	..	..	..	..	..	1	..	..	
— <i>detonsa</i> var. <i>groenlandica</i> . . . . .	..	c	c	..	..	o	c	..	..	c	..	..	..	..	..	..	..	..	..	
— <i>nivalis</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	o	o	..	..	
— <i>tenella</i> . . . . .	c	c	o	..	..	o	c	..	..	..	..	..	..	..	..	..	..	..	..	
<i>Lomatogonium rotatum</i> . . . . .	c	c	c	..	c	o	o	..	..	..	..	..	..	..	..	..	..	..	..	
<i>Menyanthes trifoliata</i> . . . . .	..	o	c	o	c	o	o	..	..	..	..	..	..	..	..	..	..	..	..	
<i>Thymus Drucei</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	c	o	
<i>Bartsia alpina</i> . . . . .	..	..	..	..	o	..	..	c	c	c	o	c	..	o	..	o	o	o	o	
— — <i>f. rosea</i> . . . . .	..	..	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	
<i>Euphrasia frigida</i> . . . . .	o	c	c	..	o	..	c	c	o	c	..	..	..	..	..	..	o	o	..	
<i>Pedicularis flammea</i> . . . . .	o	..	c	o	o	o	o	o	o	o	o	..	..	..	..	o	o	c	o	
— <i>hirsuta</i> . . . . .	o	o	c	o	..	o	c	c	o	c	o	..	..	..	..	..	..	..	..	
— <i>labradorica</i> . . . . .	c	c	c	o	o	o	c	o	..	..	..	..	..	..	..	..	..	..	..	
— <i>lanata</i> . . . . .	..	..	c	..	..	..	o	c	..	o	c	..	..	..	..	..	..	..	..	
— <i>lapponica</i> . . . . .	o	o	c	o	o	o	o	c	o	o	..	c	..	..	..	..	..	..	..	
<i>Rhinanthus groenlandicus</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	c	..	
<i>Veronica alpina</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	c	c	c	..	..	c	..	..	
— <i>fruticans</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	o	o	c	..	
— <i>Wormskjoldii</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	..	..	..	c	c	..	
<i>Pinguicula vulgaris</i> . . . . .	..	o	..	..	c	..	o	c	o	o	..	..	..	..	..	o	o	c	..	
<i>Utricularia ochroleuca</i> . . . . .	..	..	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	
<i>Plantago maritima</i> ssp. <i>juncoides</i> . . . . .	o	..	c	o	o	..	c	..	o	..	..	..	..	o	o	..	c	..	..	
<i>Galium Brandegei</i> . . . . .	..	c	c	c	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
— <i>triflorum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	o	c	..	
<i>Linnaea borealis</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	..	
<i>Campanula rotundifolia</i> coll. . . . .	o	o	c	o	o	o	o	c	o	o	o	o	..	o	..	..	o	o	o	
— <i>uniflora</i> . . . . .	..	..	..	..	..	..	..	c	..	c	c	..	..	..	..	..	..	..	..	
<i>Antennaria affinis</i> . . . . .	..	..	c	..	c	..	..	..	c	..	..	..	..	..	..	..	..	..	..	
— <i>canescens</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	c	o	c	..	..	..	..	..	
— <i>Ekmaniana</i> . . . . .	..	o	..	..	..	c	..	c	..	..	..	..	..	..	..	..	..	..	..	
— <i>Hansii</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	c	c	
<i>Arnica alpina</i> ssp. <i>angustifolia</i> . . . . .	o	c	c	o	o	o	o	c	o	c	o	..	..	..	..	..	..	..	..	
<i>Artemisia borealis</i> . . . . .	o	o	c	o	o	o	o	o	o	c	o	..	..	..	..	..	..	..	..	
<i>Erigeron boreale</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	c	..	..	..	..	c	o	c	
— <i>compositus</i> . . . . .	..	c	c	..	o	..	o	..	o	c	..	..	..	..	..	..	..	..	..	
— <i>uniflorum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	c	..	..	..	..	c	c	o	
<i>Gnaphalium norvegicum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	c	..	..	o	c	..	
— <i>supinum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	o	o	o	o	..	..	
<i>Hieracium alpinum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	..	
— <i>groenlandicum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..	..	
— <i>hyparcticum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	c	c	..	o	c	..	

<sup>1</sup> See p. 36.

Table 1 (continued)

Species	Localities cf. figs. 1—2																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	
<i>Hieracium rigorosum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..
<i>Taraxacum campylodes</i> cf. p. 43. . . . .	..	..	..	..	..	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..
— <i>croceum</i> coll. . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	o	o	o	o	o	o	o
— <i>lacerum</i> . . . . .	c	o	c	..	..	..	c	..	..	c	c	..	..	..	..	..	..	..	..	..
— <i>umbrinum</i> . . . . .	..	..	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..
<i>Sparganium hyperboreum</i> . . . . .	..	c	c	o	c	c	..	..	..	c	..	..	..	..	..	..	..	o	..	..
<i>Potamogeton alpinus</i> ssp. <i>tenuifolius</i> . . . . .	..	c	c	o	o	c	..	..	..	..	..	..	..	..	..	..	..	..	..	..
— <i>filiformis</i> . . . . .	o	c	c	o	c	o	c	o	..	c	..	..	..	..	..	..	..	..	..	..
— <i>gramineus</i> . . . . .	..	c	..	o	c	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..
— <i>pusillus</i> ssp. <i>groenlandicus</i> . . . . .	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Triglochin palustre</i> . . . . .	..	o	c	..	o	o	c	..	..	..	..	..	..	..	..	..	..	..	c	..
<i>Agrostis borealis</i> . . . . .	..	..	c	..	..	..	..	..	..	..	..	o	..	c	..	o	c	o	..	..
— <i>canina</i> . . . . .	..	..	c	..	..	..	..	..	c	..	..	..	..	..	..	..	..	c	..	..
<i>Anthoxanthum odoratum</i> (A. <i>alpinum</i> ) . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..
<i>Calamagrostis canadensis</i> ssp. <i>Langsdorffii</i> . . . . .	c	c	o	c	c	o	c	o	o	o	..	c	..	o	o	o	o	o	c	..
— <i>lapponica</i> var. <i>groenlandica</i> . . . . .	c	c	c	c	o	o	c	c	..	..	..	..	..	..	..	..	..	..	..	..
— <i>neglecta</i> . . . . .	o	c	c	c	o	c	c	c	o	c	..	..	..	..	..	..	..	..	..	..
— <i>purpurascens</i> . . . . .	o	o	c	o	o	o	c	o	o	c	o	..	..	..	..	..	..	..	..	..
<i>Deschampsia alpina</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	c	..	..	c	o	..	..
— <i>flexuosa</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	c	..	..	o	o	o	o	o	..
<i>Elymus mollis</i> . . . . .	o	o	o	..	o	o	o	..	o	o	..	c	c	o	o	..	..	..	..	..
<i>Festuca rubra</i> . . . . .	o	c	c	..	c	o	o	..	o	..	..	o	..	..	o	..	c	c	..	..
— <i>brachyphylla</i> . . . . .	..	o	c	..	c	o	o	c	..	c	..	o	..	..	c	..	c	..	..	..
— <i>vivipara</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	o	o	o	o	o	..	..
<i>Hierochloa alpina</i> . . . . .	o	o	c	o	o	o	o	o	o	o	..	c	..	o	..	..	..	..	..	..
— <i>orthantha</i> <sup>1</sup> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	c	c	..
<i>Phleum commutatum</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	o	..	c	..	..	o	c	o	..
<i>Poa alpina</i> . . . . .	c	c	c	..	..	..	..	..	..	..	..	o	..	o	o	o	o	c	..	..
— <i>arctica</i> . . . . .	..	..	c	..	..	c	c	c	..	..	..	..	..	..	..	..	..	..	..	..
— <i>glauca</i> . . . . .	c	c	c	o	o	o	o	c	o	c	..	..	..	o	..	c	c	c	o	..
— <i>nemoralis</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	c	..	..
— <i>pratensis</i> var. <i>iantha</i> . . . . .	c	c	c	c	o	o	c	c	o	c	c	..	..	..	..	..	..	..	..	..
— — var. <i>domestica</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	c	c	..
— — var. <i>rigens</i> . . . . .	..	..	c	..	..	..	..	c	..	..	..	c	..	..	c	..	..	..	..	..
— — var. <i>gelida</i> , see p. 48. . . . .	..	..	..	..	..	..	..	..	..	..	..	..	c	c	c	..	..	..	..	..
<i>Puccinellia deschampsoides</i> . . . . .	c	c	c	..	c	c	c	..	..	c	..	..	..	..	..	..	..	..	..	..
— <i>groenlandica</i> . . . . .	..	..	c	..	..	..	..	..	..	c	..	..	..	..	..	..	..	..	..	..
— <i>phryganodes</i> . . . . .	..	..	..	..	..	..	..	..	c	c	..	..	..	..	..	..	..	..	..	..
<i>Roegneria Doniana</i> var. <i>virescens</i> . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	c	..
— <i>violacea</i> . . . . .	..	..	c	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Trisetum spicatum</i> . . . . .	c	o	c	o	o	o	o	o	o	o	o	o	..	c	o	o	o	o	o	o

<sup>1</sup> A new species which will be described by Dr. TH. SØRENSEN.



Table 1 (continued)

Species	Localities cf. figs. 1—2																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	
<i>Juncus trifidus</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	o	o	o	o	o	o	
— <i>triglumis</i> ( <i>J. albescens</i> ) .....	..	..	e	..	..	..	e	..	e	e	..	..	..	..	..	..	..	..	..	
<i>Luzula arctica</i> .....	..	o	e	o	..	..	e	e	e	e	..	..	..	..	..	..	..	..	..	
— <i>confusa</i> .....	e	e	e	o	o	e	e	e	e	e	o	e <sup>1</sup>	..	e	o	o	e	o	..	
— <i>groenlandica</i> .....	e	e	e	e	e	o	e	..	..	..	..	e	..	..	..	..	..	..	..	
— <i>multiflora</i> ssp. <i>frigida</i> .....	..	..	..	..	..	..	..	..	..	?o	..	e	..	..	o	o	o	e	e	
— <i>parviflora</i> .....	..	..	..	..	..	..	..	..	..	..	..	o	..	e	o	..	e	..	e	
— <i>spicata</i> .....	e	..	e	..	..	..	e	..	..	..	..	o	..	o	o	o	o	o	o	
<i>Streptopus amplexifolius</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	e	o	..	
<i>Tofieldia coccinea</i> .....	..	..	..	..	..	..	e	..	e	..	..	..	..	..	..	..	..	..	..	
— <i>pusilla</i> .....	o	..	o	o	o	o	e	o	o	o	o	e	..	..	o	o	o	o	o	
<i>Sisyrinchium montanum</i> .....	..	..	e	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
<i>Corallorrhiza trifida</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	e	..	..	
<i>Leuchorchis albida</i> ssp. <i>straminea</i> ..	..	..	..	..	..	..	..	..	..	..	..	e	..	..	..	..	e	e	..	
<i>Listera cordata</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	e	..	..	
<i>Orchis rotundifolia</i> .....	..	..	..	..	..	..	..	..	e	..	..	..	..	..	..	..	..	..	..	
<i>Platanthera hyperborea</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	e	..	
Number of species...	86	102	149	80	101	90	121	105	97	119	44	102	23	79	76	73	129	117	79	

<sup>1</sup> Specimens habitually reminding much of *L. arcuata* (Wahlenb.) Sw.

Table 2. Plants from mountain tops collected  
by Danish geodesists.

	Localities cf. p. 6 and fig. 2				
	a	b	c	d	e
<i>Cystopteris fragilis</i> .....	×	..	..	..	..
<i>Lycopodium Selago</i> .....	..	×	..	..	..
<i>Salix glauca</i> ssp. <i>callicarpaea</i> .....	..	..	..	×	×
— <i>herbacea</i> .....	..	..	..	×	..
<i>Oxyria digyna</i> .....	..	×	..	..	..
<i>Polygonum viviparum</i> .....	×	..	..	×	..
<i>Cerastium alpinum</i> .....	×	..	..	×	..
<i>Silene acaulis</i> .....	..	×	..	×	×
<i>Viscaria alpina</i> .....	×	×	..	..	×
<i>Papaver radicatum</i> .....	..	×	×	..	..
<i>Draba hirta</i> .....	..	×	..	..	..
— <i>nivalis</i> .....	..	..	×	×	..
<i>Sedum Rosea</i> .....	..	×	..	×	..
<i>Saxifraga cernua</i> .....	..	..	..	×	..
— <i>caespitosa</i> .....	..	×	..	×	..
— <i>nivalis</i> .....	..	×	..	×	..
— <i>oppositifolia</i> .....	..	×	..	..	..
— <i>tricuspidata</i> .....	×	×	..	×	..
<i>Alchemilla glomerulans</i> .....	..	×	..	..	..
<i>Dryas integrifolia</i> .....	×	×	..	..	..
<i>Potentilla Crantzii</i> .....	×	..	..	..	..
— <i>hyparctica</i> .....	×	×	..	..	..
— <i>nivea</i> .....	×	×	..	×	..
— <i>Vahlana</i> .....	×	..	..	..	..
<i>Chamaenerium latifolium</i> .....	..	..	..	×	..
<i>Pirola grandiflora</i> .....	×	..	..	×	..
<i>Cassiope hypnoides</i> .....	..	..	..	×	..
<i>Armeria scabra</i> ssp. <i>sibirica</i> .....	×	×	..	..	..
<i>Bartsia alpina</i> .....	..	×	..	..	..
<i>Pedicularis hirsuta</i> .....	..	×	..	..	..
<i>Veronica alpina</i> .....	×	..	..	..	..
<i>Campanula rotundifolia</i> .....	..	×	..	..	..
— <i>uniflora</i> .....	×	×	..	×	..
<i>Antennaria canescens</i> .....	..	..	..	×	..
<i>Arnica alpina</i> .....	×	×	..	×	..
<i>Artemisia borealis</i> .....	×	×	..	..	..
<i>Erigeron uniflorum</i> .....	×	×	..	..	..
<i>Taraxacum umbrinum</i> .....	..	..	..	×	..
<i>Festuca brachyphylla</i> .....	..	..	..	×	..
<i>Hierochloe alpina</i> .....	..	..	..	×	..
<i>Poa arctica</i> .....	..	..	..	×	..
<i>Trisetum spicatum</i> .....	..	..	..	×	..
<i>Carex Bigelowii</i> .....	..	..	..	×	..
<i>Luzula confusa</i> .....	..	..	×	..	×
— <i>spicata</i> .....	..	..	..	×	..

### 3. DETAILED ACCOUNT OF THE FLORA OF THE CONTINENTAL REGION AROUND THE INNER PARTS OF SØNDRE STRØMFJORD

The area included in the detailed treatment of the flora is the interior of the country east of 52°30' long. W. to the ice margin at about 49°30'—50°00' long. W., i. e. Loc. 1—11 (see figs. 1—2).

The first great collections from this region were brought home in 1884 by I. A. D. Jensen and are found mentioned by J. LANGE (1886, pp. 141—144). Later (1925) O. Hagerup made some collections in the inner area around the fjord. These collections are found in the Botanisk Museum of Copenhagen, but have not been specially mentioned in the literature. Finally C. O. Erlanson in 1927 visited the area around the head of the fjord and published a list of the flora from there (ERLANSO 1941). As to the lowland flora this list is copious, including 125 species, and supplements my list below with the rare *Corallorrhiza trifida*. Unfortunately ERLANSO treats his area of investigation as a whole and mostly does not make any definite statement of the situation of his stations. His plants originate from the area around 67°00' lat. N. and between 50° long. W. and 50°50' long. W.

#### *Pteridophyta and Gymnospermae.*

1. *Cystopteris fragilis* (L.) Bernh. *Cystopteris* with spiny spores was collected only at Loc. 10 (Itivdlinguaq), but is hardly uncommon in particular on acid soils, cf. the following subspecies.

2. *Cystopteris fragilis* ssp. *Dickieana* (Sim.) Hylander (*C. Dickieana-Baenitzii* complex, cf. MANTON 1950, p. 118). *Cystopteris* forms with verrucose spores may preliminarily be referred to this subspecies which in Greenland has a striking arctic-continental range entirely different from that of *C. fragilis* proper, which is a southern type (see maps in LARSEN 1951).

Dr. A. H. G. Alston, British Museum, has kindly called my attention to the frequent occurrence of "*C. Dickieana*" in Greenland. In British Museum it is found e. g. from Søndre Strømfjord collected by H. G. Vevers 1936 at "Camp Lloyd", i. e. Strømfjordshavn (Loc. 5). All my own material (4 collections from different places on Hassell Fjeld, Loc. 3) belong to the complex with spineless spores. At the head of Søndre Strømfjord its favourite station was willow scrub on dry loess soil with a neutral reaction.



Fig. 3. *Dryopteris fragrans* in dry rocky cleft near Strømfjordshavn (Loc. 5). On the left, *Kobresia myosuroides*; on the right beside the match-box, *Campanula rotundifolia*. Note that the withered leaves from the previous season are preserved and surround the basal part of the fern. T.W.B. phot. Aug. 3, 1946.

3. *Dryopteris fragrans* (L.) Schott. Very characteristic of the whole continental area. In dry rocky clefts and in scree of large blocks of stone. Once (Nákajanga 1/8, 200 m above sea level) observed on rocks on north-facing mountain side. On sunny sides generally good-sized specimens (fig. 3). Transplanted specimens have difficulty in managing in Copenhagen and remain very low. *D. fragrans* has a markedly continental-arctic total range; see detailed maps in KALLIOLA (1937), RAUP (1947), and BÖCHER (1938).

4. *Woodsia alpina* (Bolton) Gray. Rare. Noted together with *W. ilvensis* from dry rocks near Itivdlínguaq, the specimens from there unfortunately being lost. The Botanisk Museum of Copenhagen has specimens only from Tuperssuatsiaq (64°44') south of Søndre Strømfjord, while there are several findings from regions farther north.

5. *Woodsia glabella* R. Br. Not common. Only seen on rocks near running water. ERLANSON also saw it "on spray dashed ledge of stream". The stations in the Søndre Strømfjord area perhaps are the southern limit of the connected range of the species in West Greenland.

6. *Woodsia ilvensis* (L.) R. Br. Common on dry rocks; sometimes covering rather large spots.

7. *Equisetum arvense* L. Very common on wet ground near streams. Abundant together with *Salix arctophila* and *Tomenthypnum nitens* in meadow-like vegetation with circumneutral soil reaction. Frequent in wet willow scrub and scattered in heath vegetation on north-facing slopes.

8. *Equisetum scirpoides* Michx. Fairly common in willow scrub, along river banks, in *Rhododendron lapponicum* heath and similar associations on moist soil rich in nutrients. Selective, but not rare as stated by ERLANSON. Interesting range; see p. 76 and fig. 34.

9. *Equisetum variegatum* Schleich. In places similar to those of the preceding species, but not so selective and therefore more frequent.

10. *Lycopodium annotinum* L. This species, which is common in the coastal area of West Greenland, was found only in alpine localities in the interior of the country. In such places it was nowhere frequent, but very selective, clearly connected with heaths which during winter are constantly covered with snow. On Nákajanga (Loc. 8) on north-facing slopes between 300 and 500 m above sea level in *L. annotinum-Hylocomium splendens*- or *L. annotinum-Timmia austriaca* sociations. On Hassells Fjeld 430 m above sea level as dominant species in low *Salix glauca* (*callicarpaea*)-*Polytrichum hyperboreum* sociation.

11. *Lycopodium Selago* L. Like the preceding species common in the coastal area, but very rare in the interior. Here only observed on the top plateau of Nákajanga (Loc. 8) at heights of more than 500 m above sea level in snow-patch vegetation, mostly along steep north-facing rocks. In the central fjord area (Loc. 10—11) less rare; here also observed in the lowlands.

12. *Juniperus communis* L. var. *montana* Ait. (*J. sibirica* Burgsd.). Rare; at the head of the fjord seen only in two places in connexion with dry willow scrub on sunny exposure. At Vandfaldskløften as dominant species in the understorey of willow scrub, 30 cm high. At the foot of Hassells Fjeld as scattered shrubs in willow scrub, mostly more or less shaded.

### *Angiospermae I. Choripetalae.*

13. *Salix arctophila* Cock. Common on boggy lake-shores. Also observed in alpine localities, e. g. on Nákajanga along river-banks and lake-shores forming nearly unmixed sociations. ERLANSON did not see the pure *S. arctophila*, but hybrids, which, however, were dominated by the characteristics of this species. In my opinion *S. arctophila* mostly occurs in a pure state, without interpersation from the *S. glauca* complex, a fact which is obviously characteristic of West Greenland in contradistinction to East Greenland, from where I do not think I ever saw a pure *S. arctophila*, and where the interspersation of this species among the *S. glauca* complex according to recent views of this complex must be taken up for renewed consideration.

14. *Salix glauca* L. A variable and critical group. At the head of Søndre Strømfjord there were two ecologically and morphologically different types, both often forming scrub. One was found on sunny exposures; it was broad-leaved and often very hairy, also on the upper surfaces of leaves and on young twigs (no. 808). To this type may also belong a large-leaved, less hirsute form in a scrub in Ørkendalen (largest leaves:  $6 \times 3.5$  and  $7.5 \times 3.7$  cm). The shrubs here had possibly been damaged by frost, and new, particularly vigorous shoots had broken out everywhere and lent quite a singular look to them (no. 818). The other type grew in moister places, e. g. on northern exposures or near constantly running water, and here might form scrubs of up to three metres in height. The leaves were narrower and smoother, particularly on their upper surfaces, and the young shoots were less hairy. Similar, but low and repent types were growing on the mountains and were seen in large numbers along the outer coast of West Greenland. There is no doubt that it is this more narrow-leaved, less hirsute willow that is the most important type in the



southern part of Greenland. It has often, inspired by FLÖDERUS' determinations, been termed *S. arctophila*  $\times$  *glauca*. Its hybrid nature is, however, ill-founded. It corresponds very well to what FERNALD (1926) and RAUP (1943) termed *S. cordifolia* Pursh. var. *callicarpaea* (Trautv.) Fern., whereas the more hirsute forms correspond to *S. cordifolia* var. *intonsa* Fern. Some taxonomists are of the opinion that the Greenland *Salix glauca* ought to be called *S. callicarpaea* Trautv. However, this can hardly apply to all Greenland forms, e. g. probably not to the greatly hirsute type mentioned above. Furthermore, it does not seem to me that the distinguishing marks of *S. glauca* s. str. and *S. callicarpaea* are so obvious as to justify raising the units to the status of species. The more smooth Greenland willows might enter in a combination *S. glauca* L. ssp. *callicarpaea* (Trautv.). HULTÉN (1941—50, III, p. 526) also describes forms corresponding to *S. cordifolia* var. *callicarpaea* under *S. glauca*, but he prefers terming these forms *S. glauca* ssp. *desertorum* (Richards.) Ands. On the other hand LÖVE (1950, p. 37) thinks that *S. glauca* L. is clearly separated from the Iceland-Greenland species, which he refers to a combination *S. cordifolia* ssp. *callicarpaea* (Trautv.) Löve.

15. *Salix herbacea* L. Rare at the head of the fjord, and always alpine. Not found below 400 m above sea level. Frequent, although selective, at a height of 600—700 m above sea level on Nákajanga ridge.

16. *Betula nana* L. Abundant everywhere, dominant on large stretches.

17. *Oxyria digyna* (L.) Hill. Not common, but observed in several places in alpine snow-patches and in the field stratum of the rarely occurring moist willow scrubs along streams at an altitude of 200—300 m (Loc. 4).

18. *Polygonum viviparum* L. Frequent, but selective, and never in the low-arctic steppes or other xerophytic communities.

19. *Rumex acetosella* L. Frequent on drift-sand areas east of the head of the fjord. Seen in a single place on a sandy lake-shore.

20. *Montia lamprosperma* Cham. Found in four places in moss, particularly along streams. Two of the stations are montane (300 and 400 m above sea level), situated near Kløftsøerne and the *Menyanthes* lake within main locality 3. The third station is about 200—300 m. above sea level in Ringsø Dal (Loc. 4), and the fourth beside a brook on the northern side of Ørkendalen (Loc. 6), about 100—200 m above sea level. The occurrence of this species, generally with an oceanic range, in this the most continental part of West Greenland is remarkable.

21. *Cerastium alpinum* L. Common. Mainly in a tomentose form. It was easy to cultivate a sample of this form from Loc. 3 with 2n 72 chromosomes in pots in the open in Denmark. Many plants even held out for more than one year in heavy loam on the experimental field at Vridsløselille.

22. *Honckenya peploides* (L.) Ehrh. var. *diffusa* (Hornem.). Found in the dunes in Sandflugtdalen in three different places; sometimes rather frequent.

23. *Melandrium affine* Vahl (*M. furcatum* (Raf.) Hultén). Not rare in north-facing or alpine herbaceous sociations. Absent from types of vegetation of a southern character, but abundant in a peculiar *Primula stricta*-*Lomatogonium* sociation near Store Saltø together with *Saxifraga aizoides* and *Pinguicula vulgaris*.

24. *Melandrium triflorum* (R. Br.) Vahl. Abundant (20 collections from Søndre Strømfjord). Connected with nearly all xerophilous sociations in the continental area. A good number of specimens reach a height of 30—40 cm. Seed from a vigorous specimen from the southern slopes of Hassells Fjeld gave numerous good plants, which were easily cultivated in pots and which also in the experimental field at Vridsløselille managed very well, reaching an average height of 29.3 cm (14 indi-



Fig. 4. Normal plant of *Viscaria alpina* from Strømfjordshavn cultivated at Vridsløselille. T.W.B. phot. May 1948.

viduals flowering in the second season of cultivation; the tallest individual 39 cm, the lowest 15 cm; the tallest individual with four flowering stems, the others with 1—3; two individuals at rosette stage also in the second season). *M. triflorum*, which reaches the northernmost Greenland perhaps contains special high arctic races. First of all it is a plant with markedly continental climatic requirements and perhaps otherwise rather indifferent to temperature. LANGE (1886) mentions var. *pallida* collected by I. A. D. Jensen near the river debouching into the Umivit branch.

25. *Minuartia rubella* (Wahlenb.) Hiern. Frequent in most places. Observed from the lowlands up to 650 m above sea level (Loc. 8). Growing in herbaceous sociations on dry soil. Rare on wet rocks.

26. *Silene acaulis* Jacq. Frequent, but selective; mostly on gravel on the mountains or on drift-sand in the lowlands. In sand-drift areas near Keglen there were on flats from which the sand was drifting off, 3—5 cm high cushions, which like *Stereocaulon-Lecidea* "cakes" in Danish dune areas surrounded a flat dome of sand. The cushion thus at the margin always grows obliquely downwards and keeps pace with the drifting-off.

27. *Stellaria humifusa* Rottb. On salt marshes at Itivdlinguaq and Umivit.

28-29. *Stellaria longipes* coll. In Greenland *S. longipes* Goldie and *S. monantha* Hultén are not clearly separated (Böcher 1951b). I refrain, however, at present

from making alterations of the systematic rank of the species set up within the *S. longipes* group as I feel that this must wait until more cytogenetic work has been done. The southern, fertile *S. longipes* with  $2n = 52$  found in Canada (BÖCHER & LARSEN 1950) may perhaps represent one natural unit while the more northerly, less fertile *S. longipes-monantha*-population of Greenland with  $2n = 104$  may be referred to another unit which then would come to include varieties with and without scarious bracts.

28. *Stellaria longipes* Goldie. Collected by I. A. D. Jensen, e. g. on the Isorgdlerssuaq nunataks. No doubt distributed in the whole area, but hardly as frequent



Fig. 5. *Viscaria alpina* f. *chrysochloa* from Strømfjordshavn cultivated at Vridsløselille. T.W.B. phot. May 1948.

as *S. monantha*. Otherwise reference is made to the detailed mention and dot maps in BÖCHER (1951b).

29. *Stellaria monantha* Hultén. Abundant in the whole area, particularly on dwarf-shrub heaths; neither in the *Carex supina*- nor the *Kobresia muosuroides*-sociations. Mature seeds observed by ERLANSON and in several places by me. Seeds sown in Copenhagen produced vigorous plants, which, however, like seed plants of *S. longipes* from Canada, do not flower much.

30. *Stellaria media* (L.) Vill. Abundant in a cave in Ravneklippen (Loc. 7). Here together with, amongst others, *Halimolobos mollis*. No doubt carried to the cave by Greenlanders, who may have used the cave for staying overnight during reindeer stalking.

31. *Viscaria alpina* (L.) G. Don. Common in Søndre Strømfjord. From the head of the fjord (Loc. 5) quickly decreasing in frequency and not found at the ice margin (Loc. 1, 2, and 6). Growing in herbaceous sociations on dry, frequently shallow and slightly acid soil and on *Arctostaphylos Uva ursi*-heath.

*V. alpina* f. *albiflora* Lge. was collected by I. A. D. Jensen and was seen by me at Loc. 5. In 1946 it was found by Knud Ellitsgaard at Holsteinsborg and by me in South Greenland at Narssarssuaq, where it has previously been collected by Kornerup.



Fig. 6. On the left, normal *Viscaria alpina* (from Loc. 3, no. 139), in the middle and on the right f. *chrysochloa* from Loc. 5 (nos. 143a—b). Scale 10 cm. M. Kōie phot.

*Viscaria alpina* f. *chrysochloa* f. (or var.) nova; a *typo differt basilaribus modo foliis viridibus, ceteris cum caule aureis, floribus pallide roseis*. See pictures figs. 4—6. This strange type with yellow cauline leaves, green rosette leaves and pink flowers was discovered at Strømfjordshavn (Loc. 5). It is peculiar that the mutation underlying the variety has affected the cauline leaves only. The work of assimilation no doubt mainly takes place in the green rosette leaves, but will be sufficient to cover the requirements of the plant. At the station there was apparently nothing wrong about the vitality and fertility of the plants. The *chrysochloa* plants were much more frequent than the typical plants. Seeds collected from f. *chrysochloa* in a place where no typical plants were observed in the immediate neighbourhood, were later sown in Copenhagen and the plants were transplanted to the experimental field in 1947. In May 1948 there were 30 plants, 29 of which were in flower. 18 of these had normal and 11 had yellow cauline leaves. Of the latter 8 had pink and 3 white flowers. As crossing with normal plants is not quite excluded, too much should not be concluded from this result. However, there is every indication that f. *chrysochloa* does not give a constant offspring. The most curious feature is perhaps the segregation of white-flowered individuals, as such were not seen in the natural population in spite of ardent search. This indicates that the form is a double heterozygote. Furthermore it was strange that both white- and pink-flowering individuals, both groups with yellow cauline leaves, should look much weaker than the normal plants, while the same type in Greenland did not seem to have weakened to any degree worth

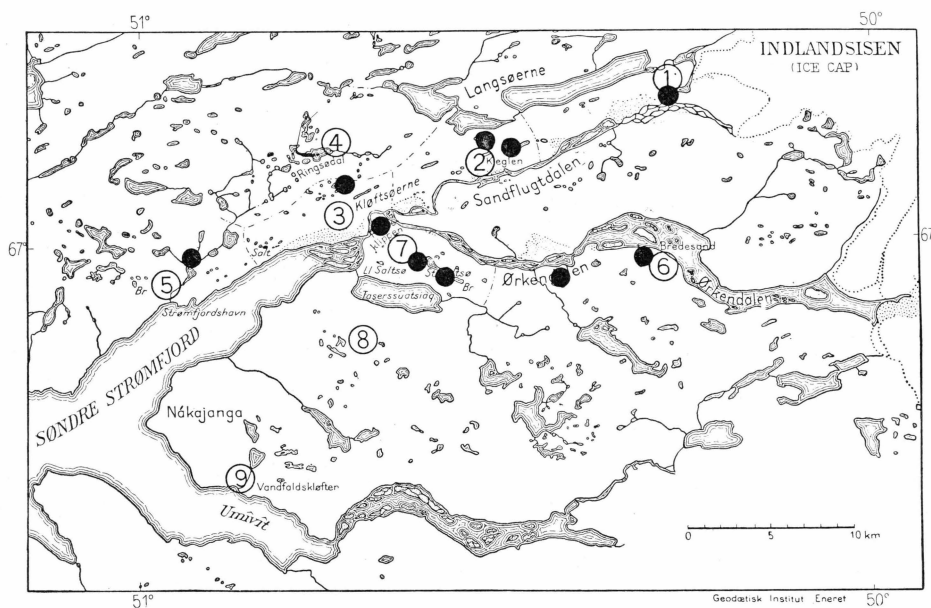


Fig. 7. Stations for *Ranunculus pedatifidus* at the head of Søndre Strømfjord.

mentioning. Figs. 4—5 shows the difference between a normal plant and a *chrysochloa* individual in the culture experiment, and fig. 6 one normal plant and two of *f. chrysochloa* Nos. 143a, 143b from Greenland.

32. *Coptis trifolia* Salisb. (*C. groenlandica* Fern.). This species is common near the outer coast, but was seen only in one place in the interior, viz. in a willow scrub at Itivdliunguaq half-way into the fjord.

33. *Ranunculus pedatifidus* J. E. Smith (*R. affinis* R. Br.). This species, which is otherwise very rare in West Greenland, is rather common at the head of Søndre Strømfjord, observed here in 10 places in all; see fig. 7. The area of its frequent occurrence no doubt stretches to the middle of the fjord area, where it was collected at Kangimut Sangmissoq (66°39', on the southern side of the fjord (I. A. D. Jensen)). At the same distance from the outer coast it has previously been collected by Kornerup on the mountain Arssalik (67°30'), so the area probably stretches northwards to the inner ramifications of Nordre Strømfjord.

The type of *R. pedatifidus* which grows in continental West Greenland is very characteristic of mossy meadow-like sociations on level ground, a kind of summer-dry bog. But it was also found in the cave in Ravneklippen (no. 1029), see no. 30. Transplants from there and from the Store Saltø basin besides numerous plants raised from seeds from the Store Saltø area and the areas east of Keglen are at present being cultivated in Denmark, both in pots and in the experimental field. They are all completely alike in appearance, which, together with the highly irregular meiosis (Böcher & Larsen 1950), suggests that it is an apomictic species.

In favourable places in Greenland the plants grow to be very tall. My collections nos. 1027, 1028, and 1029 include plants which are respectively 25—35, 35, and 44 cm in height. 25—30 cm is a normal height both in Greenland and in culture in Denmark (fig. 8). With the exception of no. 1029 all collections have glabrous fruits and may thus be referred to var. *leiocarpus* (Trautv.) Fern.

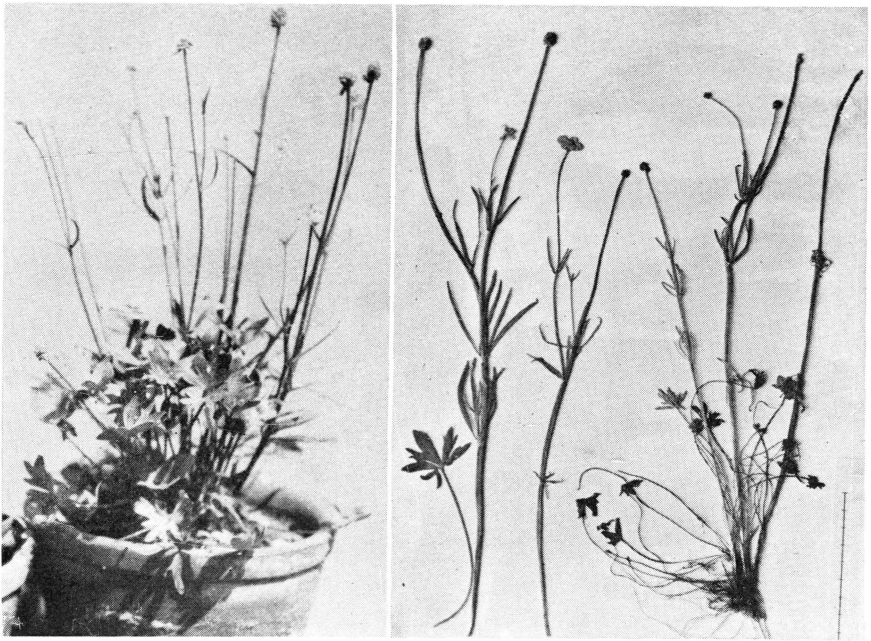


Fig. 8. On the left, an individual of *Ranunculus pedatifidus* transplanted from Søndre Strømfjord to Denmark and photographed after one year's cultivation. On the right, herbarium material from Loc. 2. (No. 1027). Scale 8 cm.

As compared with most individuals from arctic Northeast Greenland (see Plate IV in SØRENSEN 1933) the type found by me is very large and robust. There also seems to be an ecological difference between this arctic type and the robust type from the Strømfjord area. GELTING (1934) thus writes about his Northeast Greenland plant that it is "mainly restricted to the outer coast or to high mountain levels in the interior." The species thus here behaves as a typical high arctic psychrophilous plant, whereas the robust type grows in the dry, warm interior of West Greenland under low arctic conditions. According to GELTING the Northeast Greenland type is calciphile, whereas this may hardly be said about my plants, which have been found in soils rich in humus with pH between 5.3 and 6.9.

There can hardly be any doubt that the two types represent two different micro-species within the no doubt mainly apomictic *R. pedatifidus-affinis* complex, which highly needs a monographical and cytogenetic treatment.

34. *Ranunculus confervoides* Fr. (*R. aquatilis* var. *eradicatus* Læst.). Found in a number of small lakes from the lowlands up to 400 m above sea level, in acid as well as alkaline lakes. Was observed on August 22 in the *Menyanthes* lake (Loc. 3, 400 m above sea level), with unopened flowers below the surface of the water, also fructifying amply there.

35. *Ranunculus Cymbalaria* Pursh. var. *alpina* Hooker. On the clayey shore of Lille Salt Sø about 100 m above sea level. Previously found only at Ameralik by Vahl 1830 and M. P. Porsild 1931, cp. PORSILD (1935, pp. 65—69). On the range see BÖCHER 1950 (pp. 35—36). I found no specimens of the species on the clayey shores of the innermost branches of the Strømfjord where, in accordance with the experiences from Ameralik, it might be expected to occur.



36. *Ranunculus hyperboreus* Rottb. Rather frequent in lakes and springs. The floating form may in small ponds in protected places cover large parts of the surface of the water.

37. *Ranunculus lapponicus* L. Very frequent in the whole inland area in mossy moist places, e. g. *Betula nana*-*Vaccinium uliginosum*-*Aulacomnium palustre* sociations rich in *Carex rariflora*. Observed in *Carex holostoma* soc. 550 m above sea level. Avoids wet-soil vegetation on basic soil.

38. *Ranunculus pygmaeus* Wg. Rare and distinctly alpine. Found in snow-patch vegetation and has not been observed below 500 m above sea level. Frequent on the outer coast.

39. *Ranunculus reptans* L. Not rare. Observed flowering on the shore of Lake Taserssuatsiaq and beside a lake at Keglen. Furthermore as f. *submersa* Glück in two lakes, one 400 m above sea level. ERLANSON does not mention it, but his No. 2540 (1/8 1927) belongs to f. *submersa* and not to *Juncus subtilis* (*bulbosus*). The sheath and tip of the leaves afford distinguishing marks between the sterile submerged forms of the two species. Whereas *Juncus subtilis* has pointed leaves, *R. reptans* f. *submersa* always has a rudiment of the limb in the form of a minute extension at the extreme end.

40. *Thalictrum alpinum* L. This plant of scrubs and herbaceous mountain slopes is rare and has not previously been collected at the head of Søndre Strømfjord. It was seen in two different moist willow scrubs through which brooks constantly flow, and in two cases in moss cushions below dwarf birch or willow on banks of lakes with neutral-acid water.

41. *Papaver radiculatum* Rottb. Not rare on the alpine plateaux. From there it now and then descends to the lowlands in places where the competition is not too intense, e. g. in north-facing scree, where there are groups of specimens up to a height of 37 cm (Loc. 10), and on sandy river banks. I found it in the lowlands also at Narssarsuaq in South Greenland. Seeds from there were later sown in Denmark for the purpose of cultivation. The plants proved to manage surprisingly well in culture on clay exposed to drought and rather high summer heat. Of 20 experimental plants 13 were bearing fruit on August 26 after sowing of the seeds in the spring of the same year. The plants managed well the first year, but were weakened by the winters. In 1950 few plants were left.

42. *Arabis arenicola* (Rich.) Gelert. Widely distributed in Ørkendalen and Sandflugtdalen from the margin of the ice-cap to the dunes below Ravneklippen and the open sandy and gravelly plains along the innermost northern branch of the fjord. Occurring only on sand and gravel in the river beds and not on open gravelly soil on alpine plateaux or in scree. Very strange total range in Greenland; see p. 76 and fig. 9.

43. *Arabis Holboellii* Hornem. Found in two places (Loc. 3 and 9) at the head of the fjord and furthermore at Itivdlinguaq (Loc. 10), in all the three places as a characteristic element of the low-arctic steppe vegetation. The Itivdlinguaq plants are diploid, while plants from the other two places are triploid; cf. further BÖCHER 1951a.

*Arabis Hookeri*, see No. 56 (*Halimolobos mollis*).

*Braya humilis*, see No. 59 (*Torularia humilis*).

44. *Braya linearis* Rouy. Connected with rather saline basic soil near the salt lakes (see BÖCHER 1949b); but furthermore mentioned by ERLANSON from the sand-flats of the river and found by me as individuals to a height of 25 cm on a roadside inside the air base. Near the salt lakes associated with *Primula stricta*, *Gentiana*

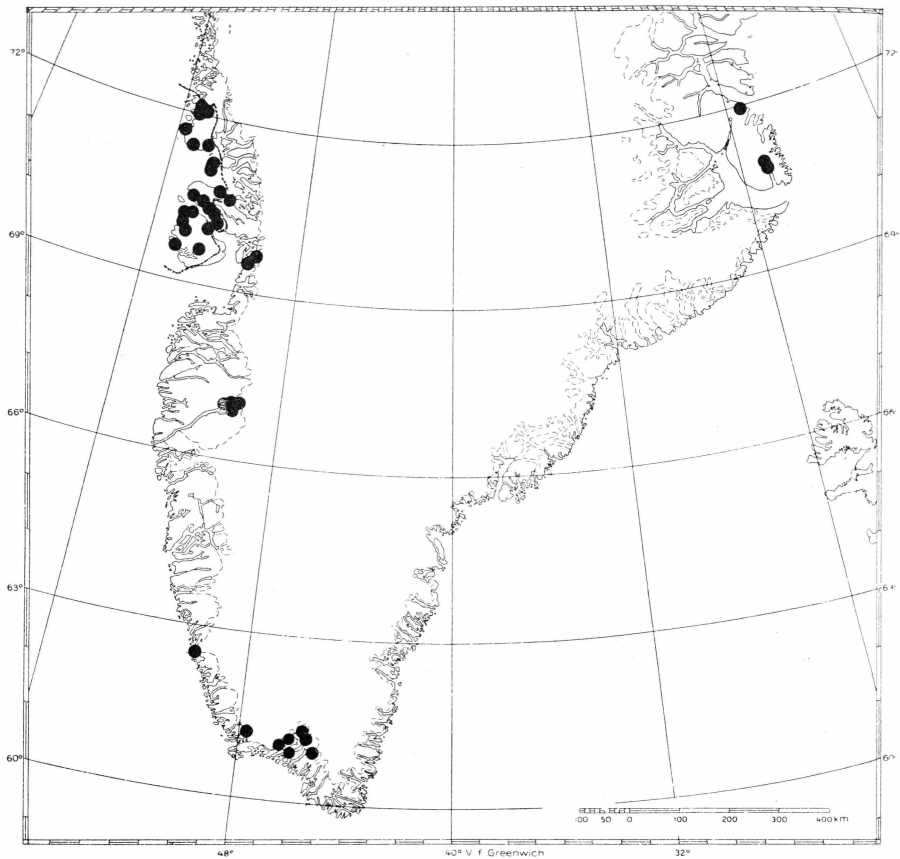


Fig. 9. Greenland range of *Arabis arenicola*. The approximate eastern limit of basalt in the Svartenhuk-Nugssuaq-Disko-area indicated.

*detonsa*, and *Puccinellia deschampsoides*; cf. fig. 15. My material varies somewhat as regards hairiness of stems and siliquae. No. 493 from the roadside mentioned is nearly completely smooth, while the other collections are more or less slightly hairy. The hairy individuals are clearly distinct from both *B. pilosa* Hook. and *Torularia humilis*; cf. BÖCHER 1950, pp. 24—25. The occurrence near Søndre Strømfjord is restricted to main localities 3, 7, and 10. Within the former two localities at the head of the fjord it has in Loc. 3 been found in three stations (one of which is a salt lake), and in Loc. 7 in two places, viz. near Store and Lille Saltso. Otherwise the area of distribution in Søndre Strømfjord is very isolated. The nearest known station is at 71°7' in Ingnerit Fjord (M. P. and R. T. Porsild 1929); next in Northeast Greenland and Norway (cp. NORDHAGEN 1935).

45. *Cardamine bellidiflora* L. Found only on the northern slope of the Náka-janga plateau, 400 m above sea level (Loc. 8).

46. *Cardamine pratensis* L. Not common. On the beach of a pond at Keglen (Loc. 2) as groups of individuals up to 30 cm in height.

47. *Cochlearia officinalis* L. (s. l.). Only collected at the head of Itivdlinguaq.





Fig. 10. Plants of *Draba hirta* L. from two different stations at the head of Søndre Strømfjord. Both plants belong to cultures started at the same time from seed and cultivated under identical conditions. The plant on the right belongs to an alpine race (ecotype) from a mountain east of Hassells Fjeld, 450 m. above sea level; that on the left originates from the shore of a salt lake near Keglen, 250 m above sea level. T.W.B. phot. 1948.

48. *Draba aurea* Vahl. Common in dry willow scrubs and dry herbaceous vegetation, more rarely on dried-up lake-shores. In favourable places up to 50 cm in height (No. 637). Observed on south-facing slope to a height of 500 m above sea level on Nákajanga ridge. Found by I. A. D. JENSEN on the Isorgdlerssuaq nunataks.

49. *Draba cinerea* Adams. Sporadically, especially on dry rocks. No. 675 from a mountain west of Hassells Fjeld has a much scattered hairiness on the pods, and perhaps is a hybrid between *D. cinerea* and *D. nivalis*.

50. *Draba cinerea* ssp. *groenlandica* (Ekman) comb. nov. Three collections from Hassells Fjeld with surroundings (Loc. 3) and one from Itivdlinguaq (Loc. 10) agree with material determined by Elisabeth Ekman as *D. groenlandica*, e. g. the material from Ungôriarfik in Nordre Strømfjord.

The *D. cinerea* complex in Greenland deserves a closer study. It contains several units which, however, are not sharply defined and, therefore, may be interpreted as subspecies of *D. cinerea*, cf. GELTING (1934, p. 74). For *D. groenlandica* mentioned by EKMAN (1929, pp. 486—491) I propose the name *D. cinerea* ssp. *groenlandica*.

51. *Draba hirta* L. No doubt the most important *Draba* species of the continental area. From the lowlands to the highest parts of the mountain plateaux, from sociations rich in mosses on slightly acid soil to greatly basic soils on the shores

of alkaline lakes. Whereas the material from Søndre Strømfjord does not seem to vary with regard to chromosome number (BÖCHER and LARSEN 1950), there appeared, at cultivation of plants from different heights above sea level, to be distinct racial divergencies, which especially appeared in hereditary differences in height (fig. 10).

52. *Draba lactea* Adams. Rare, at the head of the fjord collected only at 650 m above sea level.

53. *Draba lanceolata* Royle. Common at the head of the fjord, where it is associated with dry places with circumneutral-basic soil. On southern exposure noted at 500 m above sea level. No doubt a markedly continental element in the flora; furthermore a southern species, which in East America has not been found

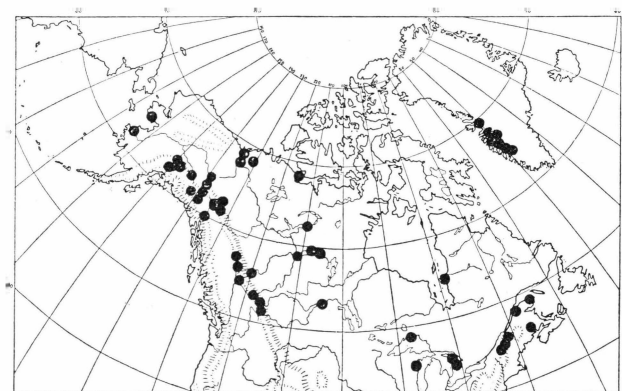


Fig. 11. Greenland-American range of *Draba lanceolata* Royle. The species further occurs in Colorado and Utah.—American stations after maps in FERNALD (1934) and RAUP (1947).

north of 55° lat. N., and the northern limit of which, like that of several other species, describes a large curve south of Hudson Bay (cf. BÖCHER 1951c). Its isolated range in the continental parts of West Greenland (cf. figs. 11 and 31) will be discussed in a later paper. The species is easily cultivated in Copenhagen.

54. *Draba nivalis* Liljebl. Not rare in the highlands; sparser in the lowlands; there particularly on north-facing hillsides and rocks.

55. *Draba rupestris* R. Br. Not found at the head of Søndre Strømfjord, but frequent along the outer coast, from where it penetrates to Itivdlinguaq.

56. *Halimolobos mollis* (Hooker) Rollins (*Arabidopsis mollis* (Hook.) Schulz, *Arabis Hookeri* Lge). Found first by I. A. D. Jensen on Nákajanga (1884). I found it in four places in 1946, in natural vegetation uninfluenced by culture within main localities 1, 3, 5, and 7. Furthermore in a cave in Ravneklippen together with *Stellaria media* (see no. 30) and on recently dug-out soil near a pool beside the road to the air base. The spreading of the species thus is favoured by culture (cp. PORSILD 1932), but on the other hand it seems to constitute an extremely natural element in the south-facing steppe communities on Hassells Fjeld, where it occurred in the same places as *Arabis Holboellii*. On its curious total range see BÖCHER 1951c.

57. *Lesquerella arctica* (Wormskj.) Watson. Found in two places only, partly in an alpine locality (see BÖCHER 1949b, p. 43), partly in dunes at the western end

of Ørkendalen associated with *Arabis arenicola*, *Dryas*, and *Carex nardina*. The species is cultivated with difficulty in Copenhagen. After germination rather vigorous rosettes developed in the first summer. However, all of these died the following winter, perhaps because of too great dampness. The species has not previously been observed south of 69° lat. N. in Greenland.

58. *Rorippa islandica* (Oeder) Borbas (*R. palustris* (L.) Besser). Found only 15/8 1884 by I. A. D. Jensen as very low specimens on a lake-shore near the river debouching into Søndre Strømfjord, i. e. no doubt the river debouching into the Umivît branch. The occurrence is greatly isolated, not only from the few South Greenland stations, but also from the East American ones. The species thus is not mentioned at all by POLUNIN (1940) from the Canadian Eastern arctic.

59. *Torularia humilis* (C. A. M.) Schulz (*Braya humilis* (C. A. M.) Robins). In Greenland found only in the inland about Søndre Strømfjord. On its occurrence there, and on the ecology and variation of the species see BÖCHER 1950.

60. *Sedum Rosea* (L.) Scop. Ranges from the outer coast to Itivdlinguaq, where it seems to be fairly rare.

61. *Sedum villosum* L. Very rare. Found only on moist rocks near the *Sisyrinchium montanum* locality on the southern slope of Hassells Fjeld and in a ravine running parallel to Sandflugtdalen higher up on the same mountain side. It has three stations in the Holsteinsborg region (cf. map fig. 55 in BÖCHER 1938).

62. *Saxifraga aizoides* L. Not rare on the Nákajanga peninsula and near Store Saltø, on the shores of which it was seen in spots as dominant species together with *Carex capillaris* ssp. *robustior* (see no. 159) on soil with pH 7.1—7.2. Ascends to about 650 m above sea level.

63. *Saxifraga Aizoon* Jacq. var. *neogaea* Butters. Not infrequent on sunny rocks.

64. *Saxifraga caespitosa* L. (cf. WEBB, Proc. Royal Irish Acad. 53, 1950). Not common. Particularly on north-facing rocks rich in mosses and in a ravine on Ravneklippen. Observed also in a single place in a summer-dry *Poa pratensis iantha*-*Aulacomnium turgidum* sociation.

65. *Saxifraga cernua* L. Common in moist rocky clefts and on steep north-facing mountain sides. Some transplants from Søndre Strømfjord are easy to cultivate in pots in Copenhagen.

66. *Saxifraga foliolosa* R. Br. Noted in the lowlands on north-facing hillside near the inland ice at Loc. 6 and immediately at the ice margin in Loc. 1. There it was found in a mossy cliff of a torrential glacial stream. Otherwise only in *Oxyria* snow-patches on Nákajanga, 600 m above sea level.

67. *Saxifraga nivalis* L. Very rare in the lowlands, but frequent on peaks or on the mountain plateaux between 300 and 700 m above sea level. *S. tenuis* H. Smith was not found in the continental area.

68. *Saxifraga oppositifolia* L. According to ERLANSON only on sand flats of the river. The species, however, is not rare in the highlands, where it occurs e. g. on moving soil and from where it descends into the lowlands on steep shady sides of the mountains.

69. *Saxifraga rivularis* L. Only in alpine areas in snow-patch vegetation with *Salix herbacea* and *Ranunculus pygmaeus* at heights of above 400 m above sea level.

70. *Saxifraga tricuspidata* Rottb. The most important species of *Saxifraga* of the continental area. Very common in rock vegetation in dry places, e. g. associated with *Dryopteris fragrans*. Rare on the outer coast at Pá.

71. *Dryas integrifolia* Vahl. Common everywhere in the inland, particularly on slightly acid-neutral soil exposed to the wind in the mountains and on highly basic soil in the lowlands. At Itivdlínguaq occasionally with yellowish petals.

72. *Potentilla Chamissonis* Hultén. Widely distributed in the continental area from the dry steppes of the lowlands to the open mountain vegetation of the highlands. It is more frequent in the lowlands than the closely related *P. nivea*, a fact which seems to be connected with its ability to stand greater drought. The variation of *P. Chamissonis* is very great. The var. *umanakensis* Hultén was found in several places (see Table 1), mostly in very tall specimens such as no. 804 (Loc. 7) 40 cm in height and no. 997 (Loc. 9) 35 cm in height. In my material the hairiness of petioles and the ramification and number of flowers of the inflorescence varies highly:

(1) The inflorescence. With only 1—4 flowers on each flowering shoot: nos. 794, 798 (Loc. 1); normal type with 3—6 flowers to each shoot (e. g. no. 802, Loc. 3); a coarse plant of var. *umanakensis* (no. 998, Loc. 5) has 8—10 flowers to each shoot. Finally there is a variant from Loc. 3 (no. 1003) with 14—16 flowers placed in a corymb on each shoot. This variant is so strange that it deserves being pictured (fig. 12).

(2) Hairiness of petioles. The variation ranges from types with a quite typical *Chamissonis*-hairiness (cf. HULTÉN 1945 fig. 5) to an intermediate stage between *Chamissonis*- and *nivea*-hairiness. In a few cases it approaches closely to the hairiness considered characteristic of *P. Hookeriana* Lehm. (*P. nivea* ssp. *Hookeriana* (Lehm.) Hiitonen). The most critical plants fall into two categories:

(a) petioles pilose with long straight hairs and also with many short floccose hairs, nos. 1002—1003 (Loc. 3), cp. fig. 13a.

(b) petioles pilose with long straight hairs and almost puberulent with short straight hairs, no. 998 (see above), no. 1008 (Loc. 3), cp. fig. 13b.

The plants mentioned under (a) may be interpreted as intermediate forms between *P. Chamissonis* and *P. nivea*. Professor Hultén, who has most kindly gone through my material, was also inclined to consider them as such intermediate forms. In his opinion the same also applies to those mentioned under (b), as he could demonstrate a few attempts by the short hairs at getting bent at the apex so that perhaps they might be derived from floccose short hairs. If HULTÉN's key is used (1945 p. 128), the plants mentioned under (b) will nearly inevitably be grouped with *P. Hookeriana*. Therefore I had first classed them there; but having studied *P. Hookeriana* in Stockholm I must admit that it is possible to find a difference between the hairiness of this species and that of my plants. On *P. Hookeriana* (e. g. specimens from Irkutsk collected by Nilsson-Ehle) the short hairs are shorter and the difference in length between long and short hairs is more constant than in my material. LEHMANN (1856 Pl. 55) gives a fine picture of *P. Hookeriana*. The individual selected is multi-flowered with a corymbose inflorescence and rather small flowers just as my nos. 1003 and 998. The latter both in respect of habit and as regards hairiness approaches closely to *P. Hookeriana* as pictured by LEHMANN, and I do not feel convinced that a reference of it to *P. Hookeriana* is not possible. *P. Chamissonis* and *P. Hookeriana* according to HULTÉN constitute a circumpolar group. The two species are vicarious, *P. Chamissonis* being northern amphi-Atlantic, *P. Hookeriana* having a large Central Asiatic-Northwest American range and apparently not going as far north as *P. Chamissonis*, which is growing in North Greenland, Spitzbergen, and on nunataks in East Greenland. From an ecological point of view it is imaginable that the dry slopes in the lowlands of continental West Greenland might harbour *P. Hookeriana*. In other places, too, it seems that the areas of *P. Hookeriana* and *P. Chamissonis* overlap. A collection from Cape Ssópotchuaaja Kargá, 71°53', on the

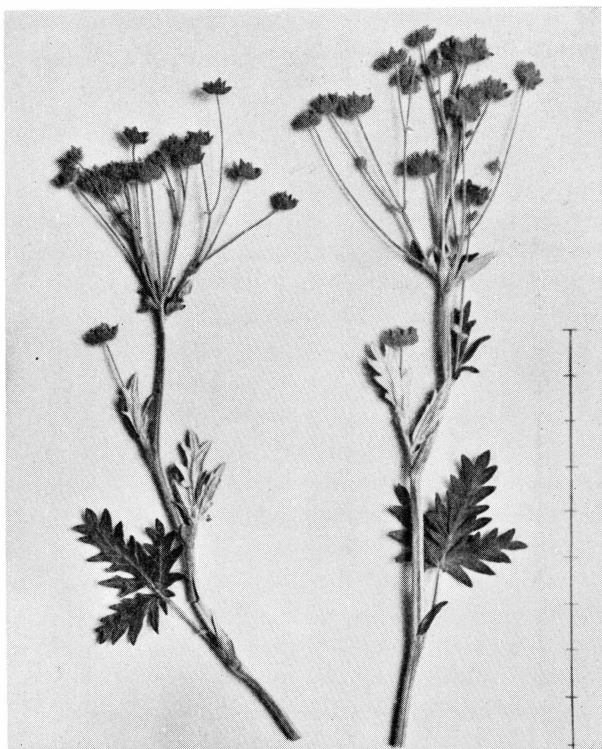


Fig. 12. Peculiar variety of *Potentilla Chamissonis* with corymbose inflorescence (No. 1003) from Hassells Fjeld. Scale 9 cm. M. Kōie phot.

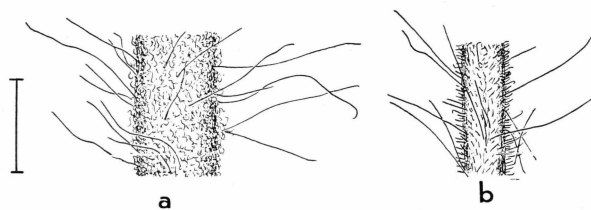


Fig. 13. Variation in pilosity of petioles in two deviating forms of *Potentilla Chamissonis* from the head of Søndre Strømfjord. — a, No. 1003 (cf. fig. 12); b, No. 1008 (with pilosity reminding of that on *P. Hookeriana*). Both from the southern slope of Hassells Fjeld. Scale: 1 mm.

Yenissei (12/8 1926 A. Tolmatchew) thus in my opinion belongs to *P. Chamissonis*. It is remarkable that three of the four plants mentioned under (a) and (b) originate from the southern slopes of Hassells Fjeld, where a very great number of species (e. g. no. 61, 73, 132, 197) have an isolated occurrence.

73. *Potentilla Crantzii* (Cr.) G. Beck. Common in the coastal area. In the continental area found only on the southern slopes of Hassells Fjeld in willow scrub, on dry herbaceous slopes, or in *Kobresia myosuroides* vegetation.

74. *Potentilla Egedii* Wormskj. Collected on the shores of the fjord at Umivit and Itivdlinguaq. Hardly common.

75. *Potentilla hyparctica* Malte ampl. Fern. (*P. emarginata* Pursh. (cf. HYLANDER 1945 and further also M. P. PORSILD 1946 pp. 10—18)). Only found at an altitude of 900 m at Kūgssuaq, the southern limit of the species thus being moved half a degree of latitude from Holsteinsborg, where it has long been known (cf. also Loc. a-b).

76. *Potentilla nivea* L. Frequent in the highlands, rarer in the lowlands. Quite typical individuals not found in the interior at heights below 300 m above sea level. Var. *subquinata* Lge. found on Nákajanga ridge. On the relation of the species to *P. Chamissonis* see the latter.

77. *Potentilla palustris* (L.) Scop. In pools with acid water in the lowlands. Not rare in main localities 3—5. Approaches closely to its northern limit (cf. BÖCHER 1938, fig. 69).

78. *Potentilla pulchella* R. Br. Found only on greatly wind-eroded stone- or gravel-fields below Rayneklippen (Loc. 7). Not previously observed in the continental inland south of Nūgssuaq, but found at 68°15' and 66°56' on the outer coast.

79. *Potentilla tridentata* Sol. Rather frequent in the lowlands on dry rocks and slopes.

80. *Chamaenerium latifolium* (L.) Spach. Very frequent in the whole area particularly among the dunes in the large valleys, where it forms extensive growths.

81. *Epilobium davuricum* Fischer in Hornem. var. *arcticum* (Samuels.) Polunin. Found as the hybrid *E. dav. arcticum* × *palustre* on the bank of a slightly salt lake southwest of Strømfjordshavn (Br. in fig. 4; Loc. 5). The material was compared with *E. davuricum* × *palustre* from Jukkasjärvi, Torne Lapmark (14/7 1920, C. G. Alm), which it greatly resembles. *E. davuricum* is a sub-arctic, slightly continental species, which in the north is supplanted by a type that by SAMUELSSON (1922) was considered as a species, but which POLUNIN (1938, Journ. Bot. 76) reduces to being a variety. This is associated with basic soil in Northeast Greenland and in Northwest Greenland as far south as Disko (BÖCHER 1938, fig. 77). The occurrence at the head of Søndre Strømfjord thus is greatly isolated and shows that the connexion of this species with outer-coast stations farther north is not due to climatic, but to edaphic conditions. At Strømfjordshavn it was found associated with several other rarities: *Carex bicolor*, *Scirpus pauciflorus*, and *Juncus alpinus*.

82. *Epilobium palustre* L. On the bank of the slightly saline lake together with the preceding hybrid; furthermore near a lake farther northeast close to the boundary of main locality 3, and finally in one place near the lakes Kløftsoerne, 300 m above sea level, and on the banks of a small acidic lake on Hassells Fjeld, 400 m above the sea in Loc. 3.

83. *Hippuris vulgaris* L. Frequent in the whole area. Observed in small ponds on Nákajanga ridge, 600 m above the sea.

84. *Myriophyllum spicatum* L. ssp. *exalbescens* (Fern.) Hultén. Widely distributed at the head of Søndre Strømfjord in acid as well as alkaline lakes, flowering and no doubt fructifying in the lowlands, observed up to 400 m above sea level, where it even on August 22 did not show any signs of flowering. Individuals from slightly saline lakes have leaves closer together and are stiffer and do not flower. The species is associated with the central regions of West Greenland, the stations forming a southern limit (fig. 32). The Greenland area is greatly isolated from the American area, where the northern limit is stated to pass from Great Bear Lake by S. Hudson Bay to S. Labrador.

85. *Angelica Archangelica* L. ERLANSON states that it is rare, but that he has "located several plants". We saw it only in and beside constantly running water in Ringsødal and its continuation towards Strømfjordshavn (cf. Pl. 1 in BÖCHER 1949b). In some places the plants were above the height of a man. The rare occurrence is peculiar as compared with its frequency in Nordre Strømfjord (PORSILD 1920, BÖCHER 1938, fig. 81), but may be due to the rare occurrence of constantly water-bearing springs or small local streams around Søndre Strømfjord.

### *Angiospermae II. Sympetalae.*

86. *Pyrola grandiflora* Rad. Very common in the whole area in the lowlands as well as in the highlands, mostly as a heath and scrub plant, never in the steppe-like sociations. On August 29 observed with fully developed vigorous wintering buds. These were developed on the non-flowering rosettes, while such buds were only exceptionally formed on shoots which had just been flowering, cf. collection no. 59 (Ravneklippen, Loc. 7).

87. *Arctostaphylos Uva ursi* (L.) Spreng. Found in 4 localities in the continental area around Søndre Strømfjord. Along the foot of south-facing rocks on Hassells Fjeld there were large patches, while there were extensive "heaths" on the south-facing slopes both at Strømfjordshavn (fig. 8 in BÖCHER 1949b) and Vandfaldskløften. In the latter place great amounts of ripe berries were found on August 21. On the greatly isolated Greenland area see BÖCHER 1950 and 1951c, fig. 5.

88. *Cassiope hypnoides* (L.) G. Don. Common on the outer coast, from where it penetrates to Itivdlinguaq in Søndre Strømfjord and to Qinguakujatdleq in Evighedsfjord (Loc. d).

89. *Cassiope tetragona* (L.) G. Don. Common in the continental area in highlands above 500 m above sea level, from where it descends to steep north-facing slopes in the lowlands. ERLANSON considers it to be rare and terms it a bog plant, which is not to the point. It forms alpine heaths rich in moss, these evidently being snow-covered in winter.

90. *Ledum groenlandicum* Oeder. Although it must be admitted that there may be some few critical intermediary forms between this species and *L. palustre* ssp. *decumbens*, I do not find it possible to accept HULTÉN's reduction (Fl. Alaska & Yukon) of *L. groenlandicum* to a subspecies, and that for two reasons: The two species occur without intermediary forms in the same plant communities. The two species are sharply contrasted in an ecological respect. *L. groenlandicum* is predominant in the coastal regions of Southwest Greenland, but rare and selective in the continental area around Søndre Strømfjord. In one place there it was seen in damp moss besides a brook, in a *Betula nana*-*Ledum decumbens* heath rich in moss beside a lake (both in Loc. 7), and in alpine heaths with snow-patch character on Nákažanga at a height of 600 m above sea level. In South Greenland, too, it is most frequent on the outer coast (ROSENVINGE 1896). Its total range is southerly, sub-low arctic. It passes right across North America (map in RAUP 1947), but in the interior is associated with peat bogs ("muskegs"), while in Quebec it also occurs in *Pinus Banksiana* forest rich in moss (RAYMOND 1950). Thus it constantly requires stations with high air humidity, and no doubt is snow-covered in winter, also in the inland muskegs, as it there preferably appears where these are invaded by *Picea mariana*, cf. RAUP 1935. The distribution in Greenland appears from fig. 14.

91. *Ledum palustre* L. ssp. *decumbens* (Ait.) Hultén. In this case it is considered more required to operate with a subspecies. Ssp. *decumbens* has an arctic

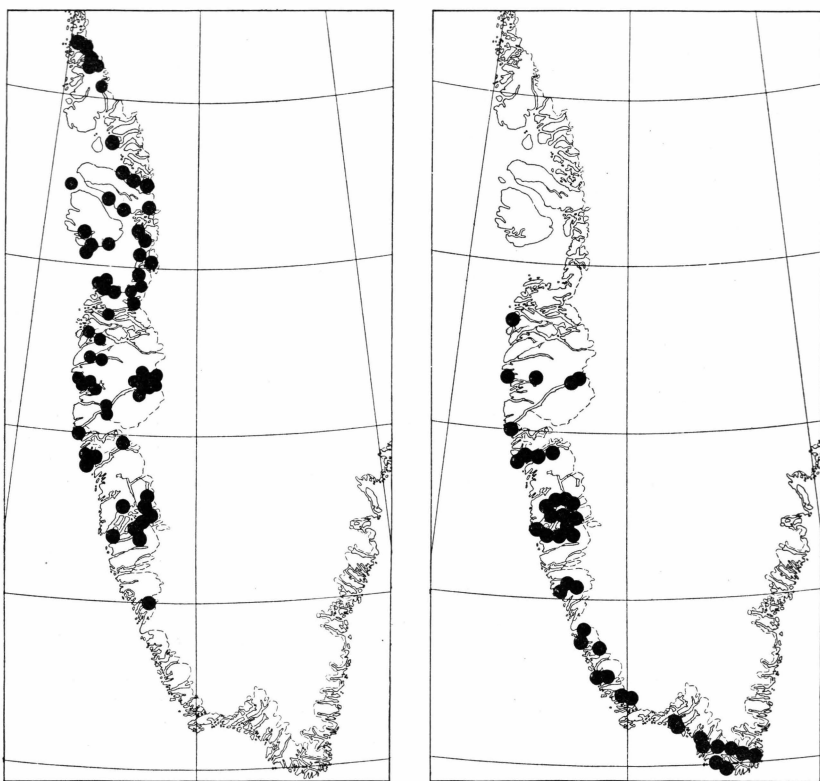


Fig. 14. Greenland ranges of *Ledum palustre* ssp. *decumbens* (left) and *Ledum groenlandicum* (right).

range, but shows its close relationship with the typical *L. palustre* L. by its clearly continental distribution in Greenland, where south of Godthaab it has not been found on the outer coast and only has one station in Bjørnesund (Kornerup). It is characteristic that *L. groenlandicum* is the most important of the species in Godthaabsfjord (see e. g. TRAPNELL 1933), while *L. palustre* ssp. *decumbens* is very abundant at the head of Søndre Strømfjord, where, associated with *Betula nana*, it is dominant in enormous areas (cf. p. 77). Otherwise *L. palustre* ssp. *decumbens* is evidently very rare within the basaltic areas of West Greenland. The extremely different ranges of the two *Ledum* species appear from fig. 14. *L. groenlandicum* requires a high degree of air humidity and has nearly mesomorphous leaves, whereas *L. palustre* ssp. *decumbens*, which will stand greater drought in the air, has xeromorphous leaves (see figures in WARMING 1886—87).

92. *Rhododendron lapponicum* (L.) Wg. Very frequent in the whole of the continental area, in the lowlands as well as the highlands. Forming heaths on neutral-basic soil, often together with *Dryas integrifolia*.

93. *Vaccinium uliginosum* L. ssp. *microphyllum* Lange. Frequent in the whole of the continental area, in the highlands, too. The variation at the head of Søndre Strømfjord was very slight, comprising exclusively small-leaved, presumably diploid plants. In the Copenhagen herbarium there are large-leaved plants from Itivneq,





Fig. 15. *Primula stricta* and *Braya linearis* on the shore of Store Saltsø. Besides, a few individuals of *Gentiana detonsa* which have ceased flowering are seen in the background on the right. T.W.B. phot. Aug. 8, 1946.

Ikertôqfjord (66°58') and several other places, particularly in the southern part of Grœnland (cf. B  CHER 1938).

94. *Vaccinium vitis idaea* L. ssp. *minus* (Lodd.) Hult  n. Not rare at the head of S  ndre Str  mfjord, although not found in localities 1—2 and 6 close to the ice-cap. Growing on dry and moist heaths and ascending to the highlands, where it is frequent on the *Cassiope tetragona* heaths. ERLANSON's remark: "grows in bogs only" therefore is less appropriate.

95. *Empetrum nigrum* ssp. *hermaphroditum* (Hagerup) comb. nov. The tetraploid, bisexual *Empetrum* is here listed as a subspecies of *E. nigrum* considering that it forms a genetically distinct unit which can hardly be considered a variety only (cp. S  RENSEN 1933), but which, on the other hand, in a morphological respect may be difficult to distinguish clearly from the monoecious *E. nigrum* and which ecologically is not essentially different from the latter as also ssp. *hermaphroditum* has a hygrophilous oceanic trend. In the continental Northeast Greenland it grows on moist, constantly snow-covered soil (S  RENSEN, loc. cit.), as also in the continental West Greenland area, where it was associated with the snow-covered heath type and furthermore occurred in *Sphagnum* bogs and in the field stratum of willow scrubs, while in the outer coastal areas it forms heaths on greatly wind-eroded soil.



Fig. 16. *Gentiana aurea* in dry *Calamagrostis purpurascens* vegetation on the southern slope of Hassells Fjeld. T.W.B. phot. Aug. 1946.

96. *Diapensia lapponica* L. Rare. Only in the "barrens" and dry heaths of the highlands at heights above 400 m above sea level.

97. *Primula stricta* Hornem. Frequent at the head of Søndre Strømfjord; cf. map, fig. 15, BÖCHER 1950. Not observed in the highlands. In the lowlands it is a characteristic element on the shores of alkaline or salt lakes, there e. g. associated with *Braya linearis*; cf. fig. 15. Beside such a lake individuals were found of up to a height of 50 cm and with 12—13 flowering stems (no. 554). Many individuals in my collections reach a height of 20—25 cm.

98. *Armeria scabra* Pallas ssp. *sibirica* (Turcz.) Hylander (*A. labradorica* Wallr.). Not rare on open barrens or in sand or gravel on the river plains. Varying with pilose scapes and quite smooth ones (f. *glabriscapa* Blake, e. g. no. 557, Nákajanga ridge, 500 m above sea level). In BÖCHER 1949b, p. 35, the species was called *A. sibirica*.

99. *Gentiana aurea* L. Very rare, found only on the southern slope of Hassells Fjeld and at Vandfaldskløften. The occurrence there is greatly isolated; cf. fig. 14 in BÖCHER 1950. On the expedition furthermore collected in Loc. 19, north of Ivigtut, by Kjeld Holmen, Sept. 28. As in Iceland *G. aurea* is not exclusively a shore plant. In Søndre Strømfjord I only observed it on the south-facing, loess-covered slopes, on basic, often somewhat saline soil (fig. 16). There it generally reached a height of 20 cm. Very robust individuals from Hassells Fjeld (no. 119, August 12) even reached heights of 28—39 cm, which is probably the record.

100. *Gentiana detonsa* Rottb. Not uncommon on greatly basic, saline soil beside salt lakes and on south-facing slopes (Tables 8—9, BÖCHER 1949b). On the

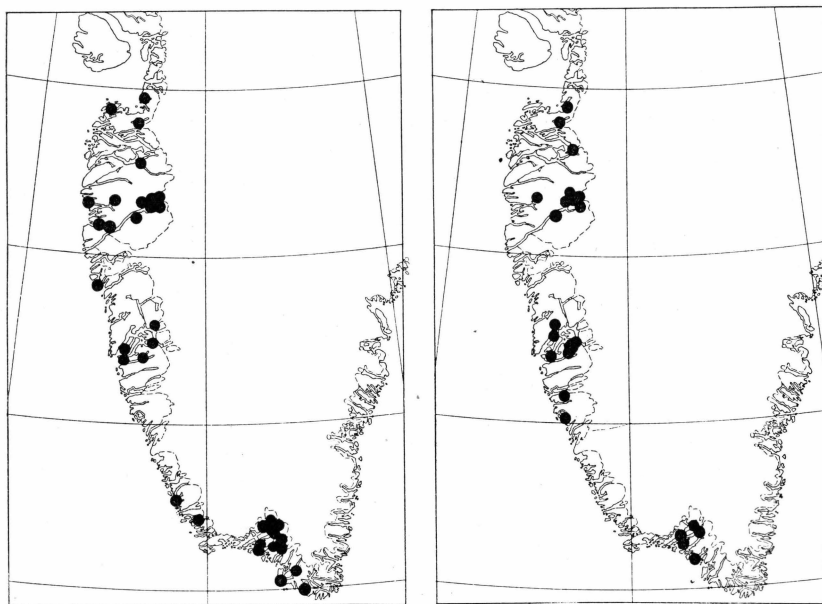


Fig. 17. Greenland ranges of *Lomatogonium rotatum* (left) and *Menyanthes trifoliata* (right).

greatly isolated occurrence in Søndre Strømfjord and the strange total range of the species, see BÖCHER 1950, fig. 12 and p. 36, and HULTÉN 1941—50, VIII, p. 1305. All my collections belong to var. *groenlandica* Marie-Victorin.

101. *Gentiana tenella* Rottb. In West Greenland this otherwise very rare species is exclusively associated with the continental area between Sydostbugten and the head of Søndre Strømfjord, where it is not rare and where it was found already in 1884 by J. A. D. Jensen near the southern branch and close to the inland ice. I found it particularly around Store and Lille Saltø, near small ponds and a dune lake in Sandflugtdalen, all of them bodies of water without outlets.

102. *Lomatogonium rotatum* (L.) Fries. Rather common in the continental area. In some places, such as shores of salt lakes, among dunes in Sandflugtdalen and on fresh soil at and near the air base it was very common so that its splendid flowers characterized the picture of the vegetation. The variation in colour of the flowers was considerable in the area between the ice margin and Keglen, as besides the blue-flowered normal race there was an abundance of white-flowered plants (f. *albiflorum* Polun.) and pale blue intermediate forms. The Greenland range appears from fig. 17.

103. *Menyanthes trifoliata* L. Common about the head of Søndre Strømfjord in acid-circumneutral lakes up to a height of about 400 m above sea level. In full bloom there at the end of July. Noted with nearly ripe fruits at the end of August in the lowlands. The species is close to its northern limit (cp. fig. 17) and is a typical subarctic element of the flora. Therefore it is interesting that it is capable of managing so well also at a height of 400 m above sea level.

104. *Bartsia alpina* L. Very common in the coastal mountains. From there decreasing in frequency towards the interior, where it was rare and greatly selective as it only occurred in fragments of herb mat vegetation in the bed of a constantly water-bearing rivulet and on banks of two rather large lakes which both had inflow



Fig. 18. Flowering individual of *Pedicularis labradorica* in *Betula nana*-heath rich in mosses on Hassells Fjeld at the head of Søndre Strømfjord. T.W.B. phot. July 29, 1946.

and outlet. Around Nordre Strømfjord *B. alpina* is known only from the coastal area and about 40 km inland to Ungôriarfik (Kornerup).

At Itivdlinguaq it occurred in heath vegetation. There I searched for the most peculiar yellow-flowered form var. *Jensenii* Lange, of which one specimen was found 3/8 1884 by I. A. D. Jensen in this locality. I did not succeed in finding it, but I found another nearly as conspicuous form with pink flowers and upper cauline leaves and—like var. *Jensenii*—with less inclination to get black by desiccation. This form I have named f. *rosea* and offer the following diagnosis: *differt a forma typica corollis cum foliis superioribus roseis foliisque siccando haud nigricantibus*. Numerous specimens are found as nos. 685a—b in the Botanisk Museum of Copenhagen.

105. *Euphrasia frigida* Pugsl. (cf. HYLANDER 1945, pp. 289—290). Not rare in *Kobresia myosuroides* sociations and herbaceous communities on dry soil. Sometimes abundant on shores of saline lakes. Observed up to 350 m above sea level. Varies as regards the extent of glandular pubescence. Nos. 699 and 702, both from the southern slope of Hassells Fjeld, have many glandular hairs on the leaves. According to ERLANSON the same variation is found in his material.

106. *Pedicularis flammea* L. Common in the whole area on moist to medium moist soil. On the southern slope of Hassells Fjeld it occurred near the *Sisyrinchium* locality with very vigorous specimens. From August 28 there is a 30 cm high specimen (no. 777) the stem of which is 12 mm. in breadth below. With the exception of a ring of large wintering buds in the crust of the surface of the soil the plant is completely withered and the rosette leaves have disappeared.

107. *Pedicularis hirsuta* L. Not rare; at the head of Søndre Strømfjord somewhat more frequent in the highlands than in the lowlands, in the latter place particularly being found on north-facing heaths.

108. *Pedicularis labradorica* Wirsing. Very common and characteristic of the continental area, although not found at Itivdlinguaq. The head of Søndre Strømfjord is situated centrally in the small Greenland area of the species (fig. 19). *P. labra-*

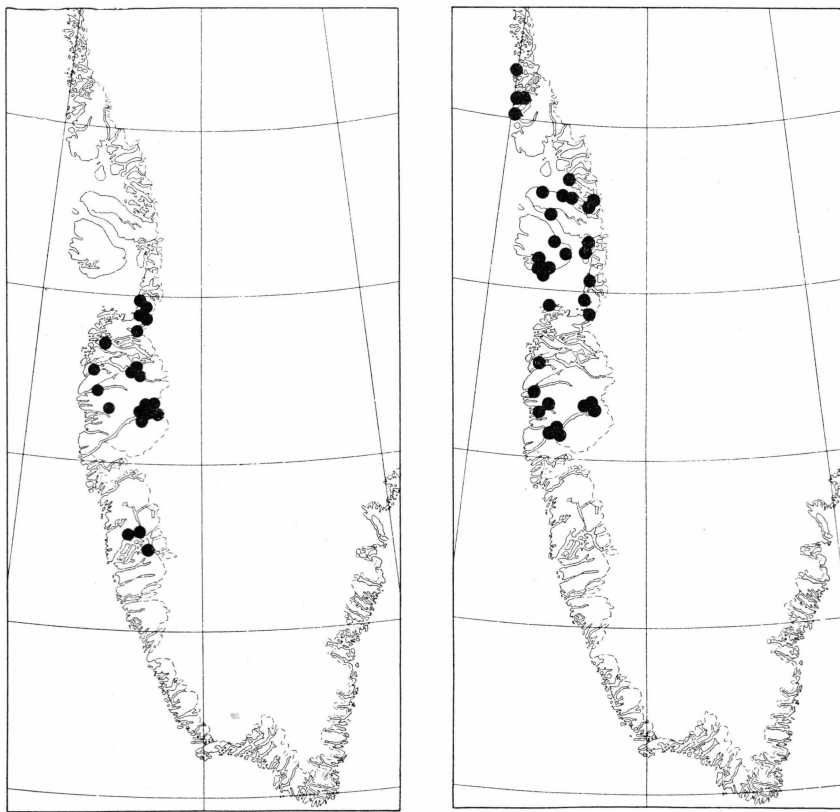


Fig. 19. Greenland ranges of *Pedicularis labradorica* (left) and *P. lanata* (right). The former may possibly have a southerly station at  $62^{\circ}5'$  lat. N., the latter probably further occurs in the Thule district.

*dorica* may be considered an important exclusive species of the heaths in the lowlands rich in *Ledum decumbens* and mosses. However, it will ascend to 400 m above sea level. At the end of July the plant was in full bloom (fig. 18) and at the end of August it was found in the lowlands with a basal rosette of leaves, wintering buds and withering parts above ground. Some individuals, however, were without rosettes and buds and therefore would perish after flowering. Large, richly branched plants, 25—30 cm in height, were seen in many places (e. g. nos. 788 and 789). *P. labradorica* if anything is a subarctic species and in East America only reaches the southernmost part of Baffin Land. Therefore it is interesting that its northern limit in East America nearly follows the same parallel as the southern limit of the species in Greenland, which is no doubt to be ascribed to the fact that it makes continental demands on the climate and cannot advance to the regions in South Greenland which are mild in winter and rich in precipitation. According to HULTÉN Alaska seems to have both continental and oceanic races, which enables a range from the south coast towards the north across the peninsula.

109. *Pedicularis lanata* Cham. & Schlecht. In the interior found by me only at heights above 480 m above sea level. Sporadic, but frequent on the plateaux at such heights, mostly in open vegetation and heath. The southernmost finding in

Greenland is the locality Kûgssuaq, where the species was found at a height of 800 m. ERLANSON only found it "on dry loam at an old camp site," which shows that it may also be met with in the lowlands. Its Greenland range appears from fig. 19. Like many other arctic species such as *Luzula arctica*, *Potentilla pulchella*, and *Lesquerella arctica*, *P. lanata* does not seem to cross the firn-covered highland region about 66° lat. N.

110. *Pedicularis lapponica* L. Common both in the lowlands and in the highlands, particularly in heath vegetation. Found already at Pá (Loc. 12), but increased in frequency inland in the fjord system. At the head of Søndre Strømfjord it had ceased flowering in the lowlands about August 1st, but was still in bloom in the highlands on August 10th.

111. *Pinguicula vulgaris* L. Not rare, e. g., on loamy beaches of lakes in the lowlands, but it also ascends high into the mountains, where it was seen in bloom at a height of 600 m on Nákajanga ridge together with *Carex misandra*, *Pedicularis flammea*, *Rhododendron*, and *Tofieldia pusilla* on flat moist terrain near a lake.

112. *Utricularia ochroleuca* R. Hartm. Found on July 24th at Itivdlínguaq in a small pool 150 m above sea level. Sterile but already with numerous turions. In Greenland the species has previously been found only farther north, at Sydostbugten and at Ikerasak in the Umanak district (fig. 33). Its total range is most strange. According to M. P. PORSILD (1935, p. 28) it is in America known only from Nova Scotia and from Teller in Alaska. To these stations should be added one station in British Columbia, one in the Mackenzie River Delta (A. E. PORSILD 1951 p. 289), and Côte-Nord north of Anticosti Island (RAYMOND 1950, p. 52). It is missing in Iceland. The isolation of the Greenland area of distribution therefore with our present knowledge seems great, as Côte-Nord is situated about 1800 km from Itivdlínguaq.

113. *Plantago maritima* L. ssp. *juncoides* (Lam.) Hultén (*P. maritima* var. *glauca* Hornem.). In the continental area distributed from loamy shores of the fjord to very dry south-facing slopes and beaches of salt lakes, where it occurs associated with *Puccinellia deschampsoides* (Tab. 8—9, BÖCHER 1949b). Northern limit at 70°47' lat. N.

114. *Galium Brandegei* Gray. Found in three places at the head of Søndre Strømfjord: The *Menyanthes* lake, 400 m above sea level (Loc. 3), lake east of Hassells Fjeld, 350 m above sea level (Loc. 3 near the boundary of Loc. 2), Ringsødal, 200 m above sea level (Loc. 4), in all places in damp moss. The occurrence at Søndre Strømfjord shifts the northern limit of the species by nearly 300 km. The Greenland area of the species seems greatly disrupted with four separate areas (see fig. 28), the three of which coincide with the three areas in which *Juncus alpinus* has been found. It is peculiar that this southern species did not, at its northern limit, occur as a lowland plant, a fact which is presumably due to the drought and sand-drift in the deeply depressed valleys. The station of the species closest to Greenland is in Labrador about 58° lat. N. and, according to LÖVE (1950, p. 53), in Iceland.

115. *Campanula rotundifolia* L. Common in the interior, particularly in dry, herbaceous vegetation or dry, steppe-like communities dominated by *Kobresia myosuroides* or *Calamagrostis purpurascens* from sea level to 500 above sea level, there in low specimens in dry open barrens. Material from the southern slope of Hassells Fjeld has been cultivated in Denmark and investigated cytologically. Like much other material from Greenland it proved to be diploid (BÖCHER & LARSEN 1950). The collections from Hassells Fjeld (nos. 13, 14) show a stiff, erect plant, 30—60 cm in height and with several comparatively small flowers (corolla 15—20 mm long). The stems are rich in anthocyanin below and bear numerous narrow leaves. Also white-flowered individuals with broader leaves at the base of the stem (no. 15)

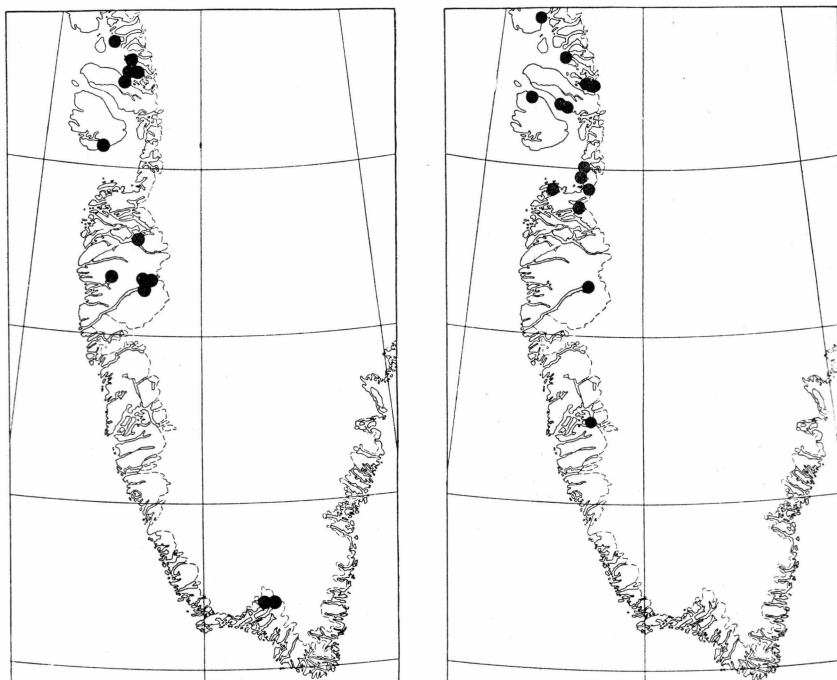


Fig. 20. Greenland ranges of *Antennaria affinis* (left) and *Heleocharis acicularis* (right).

occurred on Hassells Fjeld. The material reminded of a many-flowered type found by me at Angmagssalik in 1932 (Böcher 1938, fig. 102 E.). My investigations of *C. rotundifolia* are far from being concluded. Preliminarily I refer the large-flowered, tetraploid var. *arctica* Lge. to *C. rotundifolia* s. str., whereas the above-mentioned material should be referred to an independent subspecies including diploid plants. LANGE's var. *uniflora*, which often seems to be a modification, would also come under this subspecies, which has not yet been named.

116. *Campanula uniflora* L. In several places on Nákajanga ridge, on the top plateau, at a height of 6—700 m, and on the northern slope facing Lake Taserssuatsiaq up to a height of 300 m. Otherwise not observed at the head of Søndre Strømfjord, but seen both at Itivdlinguaq (200 m above sea level) and Kûgssuaq (800 m above sea level). I. A. D. Jensen found it close to the inland ice near Søndre Strømfjord, and ERLANSON on a "cliff with northern aspect". He adds that the southern limit of the species in West Greenland is at the head of Søndre Strømfjord, which is not correct (cf. map in Böcher 1938, fig. 104).

117. *Antennaria affinis* Fernald. Dr. A. E. Porsild, Ottawa, has kindly corroborated my determinations and informed me that he himself found it in 1942 at the head of Søndre Strømfjord on 66°56' lat. N., 50°50' long. W., i. e. Loc. 5. My collections originate from Loc. 5, 3, and 9, where it occurred on loess on the dry southern slopes. Porsild in his letter calls the species a "very clear-cut species, which, as far as I know, is endemic to Greenland." Its total range appears from fig. 20, which includes all findings in the Botanical Museums of Copenhagen and Stockholm and the National Herbarium of Canada (from the last-mentioned museum according



to kind information from Dr. A. E. Porsild). The range of the species is extremely interesting. Like several other species it has a wide gap between South Greenland and the region around Søndre Strømfjord (cp. BÖCHER 1950).

118. *Antennaria Ekmaniana* A. E. Porsild (*A. angustifolia* Ekman, *A. labradorica* Nutt). This arctic species, which previously was unknown south of Disko Bay on 68°37' lat. N., was found at three stations near Søndre Strømfjord: Nákajanga ridge, 500 and 600 m above sea level, the top of Keglen, 300 m above sea level, and Bredesand in Ørkendalen, in the last-mentioned place on a steep northern slope. Thus it belongs to the alpine flora of the area.

119. *Arnica alpina* (L.) Olin. ssp. *angustifolia* Maguire. Distributed in the whole of the continental area, particularly in the highlands, but also at several stations on sand in the river valleys. Often in *Kobresia myosuroides* sociations as differential species of this community towards the other steppe-like communities. Material from Loc. 2 which was investigated cytologically had a higher chromosome number than material from East Greenland and Scandinavia (cp. BÖCHER & LARSEN 1950).

120. *Artemisia borealis* Pall. Very common in the whole of the continental area from the lowlands to the highest peaks. On loess soil on the warm dry south-facing slopes it often reached a height of 25—40 cm. It also grows on the Isorgdlerssuaq nunataks east of Ørkendalen (I. A. D. Jensen). The Greenland range appears from fig. 4 in BÖCHER 1951c.

Material from Søndre Strømfjord was cultivated in Denmark. Seed was sown in 1947 and vigorous plants appeared, which in June were transplanted to the experimental field at Vridsløselille. All the 111 plants formed vigorous rosettes in late summer, but none of them blossomed until the summer of 1948. The flowering was irregular, 38 of the plants remaining in rosettes in 1948, and many of the others dying during the following winter after having finished flowering. This particularly applied to the individuals which had not during the flowering been able to form or reached forming new vigorous rosettes. The mean height of 73 flowering individuals at the ripening of the seed in the second season of cultivation was 25.3 cm, the variation ranging from 10 cm to 38 cm. During the next season some more plants died, so that in 1950 only about 10 plants were alive. It was evident that the plants stood drought and heat in summer very well, whereas they were weakened in the damp autumn and winter periods.

121. *Erigeron compositus* Pursh. Frequent on dry slopes in the continental area. In spite of the fact that the species is there at its southern limit for frequent occurrence, it is, if anything, most frequent in the lowlands, where it reaches a very great luxuriance (e. g. no. 333, which is 20 cm in height and has 23—26 flower heads).

122. *Matricaria Chamomilla* L. One plant collected by Erlanson on the site of an abandoned camp. Like Kornerup's find in the interior around Nordre Strømfjord, the species has no doubt been carried to the head of Søndre Strømfjord by a caribou hunter (cp. M. P. PORSILD 1932, p. 21).

123. *Taraxacum lacerum* Greene (*T. groenlandicum* Dahlst. cf. HAGLUND 1948a, p. 311). My material of this and the following species was kindly determined by Dr. G. Haglund, Stockholm. *T. lacerum* is common in the whole of the continental areas from Kùgssuaq-Itivdlinguaq to the edge of the inland ice. Between the ice margin and the head of Søndre Strømfjord it was found on sand flats of the river in Sandflugtsdalen and on sand and clay near the fjord, but not in other places, curiously enough not in Ørkendalen. No. 1012 without flowers and greatly etiolated was found in a deep cave in Ravneklippen and perhaps is a modification of *T. lacerum*. No. 1011 from the eastern part of Sandflugtdalen has on some individuals nearly entire leaves,





Fig. 21. *Taraxacum lacerum*, material from Sandflugtdalen cultivated at Vridsløselille, Denmark. T.W.B. phot. June 10, 1948.

while individuals from dry clay at the head of Søndre Strømfjord (no. 1016) have greatly incised leaves. Material from the former place (collected as seeds) was cultivated in 1947—49 at Vridsløselille, Denmark, and produced plants with incised leaves like no. 1016. The plants thrived and flowered amply. They remained low (10/6 1948 mean height of 29 plants 11.6 cm, range 8—17 cm; see fig. 21). The species is distributed in Alaska, Yukon and British Columbia, Northwest Territories, Manitoba, Baffin Land and Quebec (e.g. Ungava, Wakeham Bay, Mingan Island), Newfoundland. In Greenland it has a continental range and is rare south of about 66°.

124. *Taraxacum umbrinum* Dahlst. (HAGLUND 1943, p. 342). This species has not previously been observed in Greenland. According to HAGLUND this species comes closest to *T. norvegicum* Dahlst. of the European species. It is known from northern Labrador and Quebec (Hudson Strait) and so northerly a station as Arctic Bay (73°5') in Admiralty Inlet. Thus it is an arctic species, which is in good agreement with its occurrence in Greenland, where it has so far been found in alpine localities only and in the interior. I have myself collected it in a dry herbaceous mountain vegetation on Nakajanga ridge, 550 m above sea level. Furthermore, Mr. B. Kerb of the Danish Geodetic Institute has collected it on Qinguakujatleq at the head of Evighedsfjorden, 700 m above sea level (Table 2). The scarce *Taraxacum* flora in the continental area thus consists of two species, which are both American-Greenlandic. On the outer coast there are other species and floral elements. Here Tyge Møller, M. Sc., on Ungørsivik (Loc. 13) at the entrance to Søndre Strømfjord has found *Taraxacum campylodes* Hagl., which is also new to Greenland and which otherwise, according to HAGLUND (1948b, p. 56), has been found in Sør-Trøndelag (Trondheim and Glåmos) in Norway. Thus it is probably an eastern species.

### *Angiospermae* III. *Monocotyledones*.

125. *Sparganium hyperboreum* Laest. Not rare in small lakes in the continental area and mostly flowering and fruiting. Sterile specimens were found in a larger

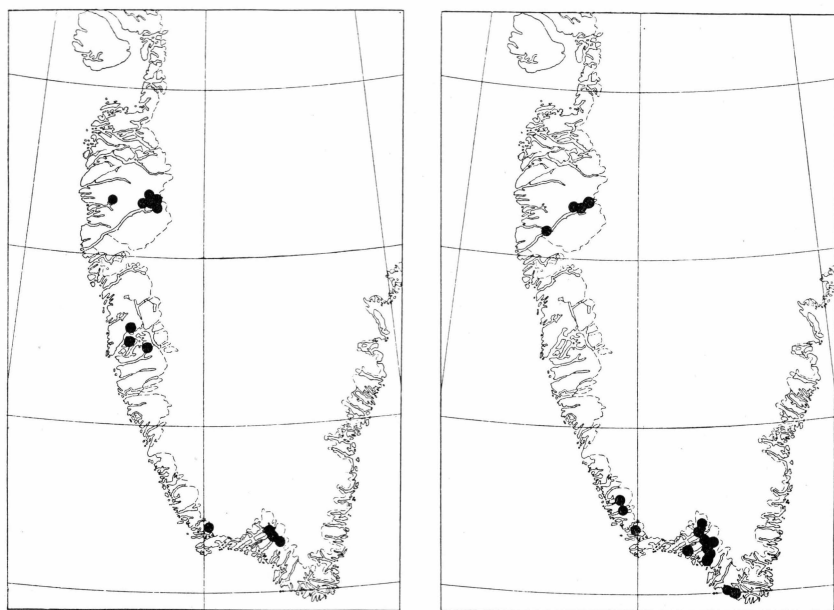


Fig. 22. Greenland ranges of *Potamogeton alpinus* ssp. *tenuifolius* (left) and *P. gramineus* (right).

lake at Keglen. The species is close to its northern limit (about 70° lat. N.) and was not found in lakes in the highlands.

126. *Potamogeton alpinus* Balbis ssp. *tenuifolius* (Raf.) Hultén. Previously collected by Warming & Holm at Itivneq near Holsteinborg and by Hagerup at the head of Søndre Strømfjord, where in my experience it is common and was found flowering in two lakes at heights of 100 and 300 m and sterile in lakes up to 400 m above sea level. These lakes are situated somewhat north of 67° lat. N. The present northern limit of the species (fig. 22) thus in part is constituted by highland localities, which is peculiar.

127. *Potamogeton filiformis* Pers. At the head of Søndre Strømfjord in lakes up to a height of 400 m., particularly in neutral-basic lakes and even in salt lakes. Noted with ripe fruits on August 8 in the lowlands. In slightly acid or neutral-oligotrophic lakes and in the salt lake near the harbour road it was sterile. In the latter place and in another lake of a similar type a modified form with short, somewhat broader leaves was found.

128. *Potamogeton gramineus* L. Found previously by I. A. D. Jensen and Erlanson at the head of Søndre Strømfjord. I found it in two places there, in one of them flowering (Loc. 2). Furthermore at Itivdlínguaq (Loc. 10). The Søndre Strømfjord occurrence is greatly isolated; cf. fig. 22 and BÖCHER 1950.

?129. *Potamogeton obtusifolius* M. & K. ERLANSON (1941) states having collected sterile specimens of this species at the head of Søndre Strømfjord. Not found by me. M. P. PORSILD (1920) mentions it from Ikamiut in Nivâq Bay, 68°40', collected by Kruuse, also as sterile specimens, but later (1946, p. 25) he is inclined to refer Kruuse's plants to the following species and doubts the occurrence of *P. obtusifolius* in Greenland.

130. *Potamogeton pusillus* L. (em. Fr.) ssp. *groenlandicus* (Hagstr.) comb. nov. [*P. groenlandicus* Hagstr., *P. Berchtoldii* Fieb., *P. pusillus* var. *mucronatus* (Fieb.)

Graebn.]. By FERNALD (1932) and HULTÉN (1941—50) the Greenland type was considered a variety of *P. pusillus*; the differences, however, may be great enough to give it the rank of a subspecies (cf. M. P. PORSILD 1946). The ssp. *groenlandicus* is endemic to Greenland and has been found in numerous places between 68° and 70° lat. N., but is otherwise extremely rare, besides localities at Strømfjordshavn found near Gieseckes Sø, 67°44', and in South Greenland in three places (fig. 31). The plants from Søndre Strømfjord (nos. 535—536), collected August 28, bear turions.

131. *Triglochin palustre* L. is rather common on moist sand or clay at the innermost branches of Søndre Strømfjord or in the river valleys. Also on the shores of Lille and Store Saltsø.

132. *Agrostis borealis* Hartm. Very rare. In the interior found only around the *Sisyrinchium* station on Hassells Fjeld.

133. *Agrostis canina* L. First found at the head of Søndre Strømfjord by ERLANSON "on gravelly clay loam". I found it in two places, viz. on wet rocks together with the preceding species on the southern slopes on Hassells Fjeld (Loc. 3) and on rocks along the shore below Vandfaldskløften (Loc. 9). The occurrence at the head of Søndre Strømfjord is isolated and marks the northern limit of the species.

134. *Alopecurus aequalis* Sobol. Found only by I. A. D. Jensen at the head of Søndre Strømfjord, near a small lake, in the same place and on the same day as *Rorippa islandica*. It belongs to the not quite small number of water- and marsh-plants which in West Greenland are astonishingly frequent near their northern limit (cp. M. P. PORSILD 1920, p. 34, and fig. 25).

135. *Calamagrostis canadensis* (Michx.) Beauv. ssp. *Langsdorffii* (Link) Hultén. Rather widely distributed, but selective, in the whole of the continental area, dominant particularly on moist soil near running water (e. g. together with *Angelica*) and in certain marshy communities. Not seen in the highlands above some 450 m above sea level.

136. *Calamagrostis lapponica* (Wg.) Hartm. var. *groenlandica* Lange (*C. hyperborea* Lange). One of the most important species of the continental area. Available from 17 stations, particularly from moist heaths rich in mosses and from willow scrubs in the lowlands and the lower parts of the mountains up to about 400 m above sea level. Specimens are often 50—60 m in height.

137. *Calamagrostis neglecta* (Ehrh.) G. M. & Sch. Very common on moist soil, particularly where the soil is neutral-basic. Forms meadow-like communities on the beaches of slight saline lakes. Not observed in the highlands above 400 m above sea level.

138. *Calamagrostis purpurascens* R. Br. Very common on dry soil in the continental area, where, in favourable places, it forms a kind of "tall grass prairie", which, however, only reaches a height of 0.5 m. In contrast to the other species of the genus, this species also occurs in the *Carex nardina*-*Dryas* vegetation of the highlands.

139. *Elymus mollis* Trin. (cp. LÖVE 1950). Frequent along the shore and in the interior in the large river valleys, where, e. g. in Sandflugtdalen, it penetrates right to the inland ice and here forms inland dune vegetation.

140. *Festuca brachyphylla* Schultes. Rather common on dry soil in the highlands. Sporadically in the lowlands with up to 30 cm high stiff culms and stiff leaves. Never viviparous. ERLANSON mentions var. *supina* from a moist sandy shore of a river.

141. *Festuca rubra* L. In the lowlands in dunes and sand flats in the large river valleys. Furthermore on dry slopes and in meadow-like vegetation (e. g. associated

with *Ranunculus pedatifidus*). No. 413 from dunes near the northern branch of Søndre Strømfjord is f. *prolifera* (Piper.) Hylander.

142. *Hierochloë alpina* (Sw.) R. & S. Very common in the whole of the continental area, but at the head of the fjord almost restricted to the highlands. Found also at Pá on the outer coast.

143. *Poa alpina* L. Rare in the continental area. Found only on moist sand in the river plain in Sandflugtdalen (there in a modified form with a loosely tufted structure) and on moist rocks on the southern slope of Hassells Fjeld. Not viviparous.

144. *Poa arctica* R. Br. At the head of Søndre Strømfjord frequent in the highlands above 400 m above sea level. From there it descends to sea level on north-facing slopes and is also found in the river valleys close to the ice margin. It is completely absent from southern slopes and flat ground with dense vegetation in the lowlands.

145. *Poa glauca* Vahl. Very frequent. Appears in the continental area in three different types, presumably races. (1) A 36—60 cm high type with a narrow panicle and scabrous panicle branches (? var. *glaucaantha* (Gaud)), in willow scrub on relatively moist soil. (2) A gracile 23—32 cm high type with nearly smooth, thin, rather long panicle branches, and not very stiff culms with two leaves. This type was found by me in an alpine *Dryas* vegetation (no. 396, Nákajanga ridge) and July 27, 1925 by O. Hagerup without statement of any closer station than Søndre Strømfjord. The latter material was determined by Ostenfeld as *P. pratensis*, but redetermined by Johs. Lid as *P. glauca*. (3) A rigid, intensely blue-green type with short, scabrous panicle branches, 22—26 cm high, mostly with one leaf on the culms. Growing in very dry places. The last-mentioned type has been cultivated in Denmark and investigated cytologically (BÖCHER & LARSEN). Cultivated in the experimental field it often gets two cauline leaves, and on vigorous specimens the panicle branches get longer, the lowest ones growing obliquely upwards and getting short branches of the second order, so that they come to resemble the whole panicle of the original plants collected in Greenland. The plant was very easily cultivated in Denmark. After sowing in spring 13 plants out of 20 succeeded in flowering in the first season and at the end of August had an average height of 21.5 cm (range 10—34 cm) with a 4—5 cm long panicle. The following years some of the plants became much more vigorous (24—32 cm high), while others, which had been weakened in winter, became very low or without culms. The intensely blue-grey colour, the stiffness of the culms, and the scabrous surface of the panicle branches were retained in the cultivated plants.

146-147. *Poa pratensis* L. This species in Greenland forms an interesting, but, as elsewhere, difficult complex. Our knowledge of cytogenetic conditions within *P. pratensis* effects that we must *a priori* give up trying to attain to a systematic classification covering all races of *P. pratensis*. I have had an opportunity to discuss my material from Greenland collected in 1946 with Professor I. A. Nannfeldt, who gave me some valuable information and hints. The material falls into four different types. Provisionally I consider these as varieties of *P. pratensis*, even though future cytogenetic investigations perhaps will make it justifiable to consider them as subspecies. It has not been possible for me to distinguish *P. alpigena* Lindm. sufficiently sharply from *P. pratensis*. HULTÉN (1941—50, II) operates with *P. alpigena* as a species, but adds (p. 198) that "where other types of *P. pratensis* s. l. occur there seems to exist all kinds of intermediate forms." This proves the justification of considering *P. alpigena* a variety or at most a subspecies. Add to this that *P. alpigena*

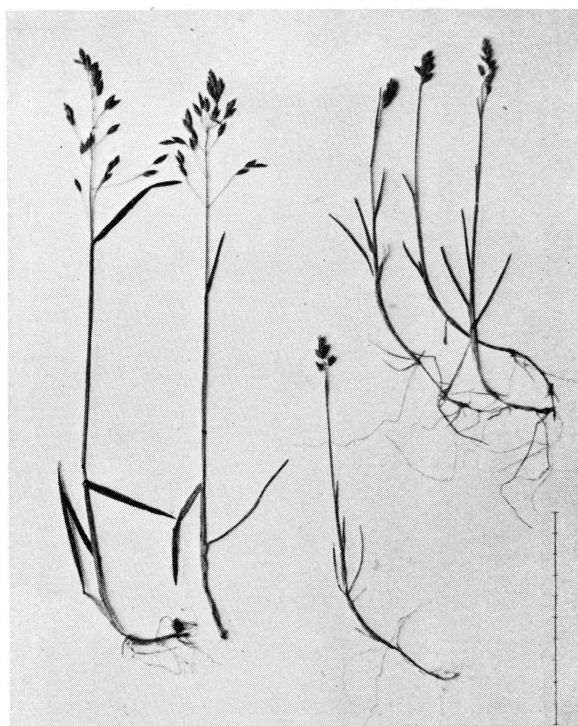


Fig. 23. On the left, *Poa pratensis* var. *gelida* from Torstein Islænder Ø in South-west Greenland (leg. Kai Larsen). On the right, *P. pratensis* var. *rigens* (T.W. Böcher No. 835) from alpine *Poa-Sphagnum* sociation (a kind of snowpatch vegetation) on Nákajanga ridge. Scale 10 cm.

by no means can constitute a natural unit. The two types *iantha* and *domestica* are geographically and morphologically distinct.

146. *Poa pratensis* var. *iantha* Laest. (*P. alpigena* var. *iantha*). A tall gracile plant with a long slender panicle of small, mostly purple spikelets. In my material 30—60 m tall with a 6—10 cm long and below 2—4(—5) cm broad panicle of 4—6 (mostly 4.5) mm long spikelets with hairs on marginal and dorsal nerves. Two collections (nos. 837 and 851) deviate from the others by being pilose between the nerves. However, they evidently do not belong to *P. arctica*, but should perhaps be referred to a particular variety, var. *groenlandica* (Steud.), STEUDEL (1855, p. 252) in his *P. groenlandica* having described a tall form whose lemnata are strongly nerved and pilose at the base (cf. NANNFELDT's remarks on similar races, 1934, p. 14, and 1940, p. 55). Very typical specimens of var. *iantha* was collected in loc. 2, 3, 7 and 10 (Nos. 836, 830, 840, 839, 828, 1022, 824).

A completely corresponding material has previously been collected in West Greenland north of 67° lat. N., but has also been found farther south. In the continental area at 67° this tall race was completely dominant, particularly in communities rich in moss (e. g. heaths), on medium moist soil, or on moist soil associated with *Calamagrostis canadensis* ssp. *Langsdorffii*. The chromosome number of a sample taken to Denmark as seed was  $2n = 95$  (BÖCHER & LARSEN). It was easily cultivated, but in the experimental field in Denmark became rather low (June 10, 1948, after

cultivation for more than one year, mean height of 22 individuals: 22.1 cm (range 10—40 cm).

*Poa pratensis* var. *domestica* Laest. (*P. alpigena* var. *domestica*). This name might possibly be applied to the coarse type with thick culms and broad leaves and with a many-flowered, often compact panicle mostly with scabrous panicle branches and about 5 mm long spikelets. This type on manured soil becomes very large and coarse, but occurring in non-manured places it is easily distinguished from the preceding variety. It is completely missing from my material from the continental area at 67°, while all collections from southern Greenland belong here.

147. *Poa pratensis* var. *rigens* Laest. According to NANNFELDT (1934) there are races which belong to *P. pratensis* sensu lat., but which are woolly also on the intermediate nerves. In Greenland this type has been collected by Vanhöffen in the Umanak region (Kome, July 20—25, 1892). It is long-haired on five distinct nerves on the lemnata. In my material this type is represented by low, 11—17 cm high, plants with 4—5 mm long spikelets, which in appearance remind of ssp. *irrigata*, which seems to occur at any rate in South Greenland, but which is pilose only on the dorsal and marginal nerves. The four collections nos. 829, 835, 848, and 1118 are somewhat different, but a remarkable feature is the ecological agreement, which suggests a unit found in the lowlands in coastal regions, but which in the continental area is restricted to alpine snow-patches. Nos. 835 and 848 originate from snow-patches at a height of 400 m near north-facing rocks.

Nos. 829 (from Pá) and 1118 (from Godthaab) is particularly different by having hairs between the five distinct nerves on the lemnata and therefore may perhaps be related to var. *groenlandica*. See above.

No. 835 from Nákajanga ridge is particularly distinct by its very compact panicle (cf. fig. 23) and may also have single hairs between the nerves.

*Poa pratensis* var. *gelida* (Roemer & Schultes) comb. nov. It appears from the detailed original diagnosis in ROEMER & SCHULTES, *Systema Veget.* vol. 2, p. 540 (1817) and from a photograph and description of the original specimen in the British Museum which were kindly lent to me by Professor Nannfeldt, that the most important characters of this type are the very large, 8—9 mm long, 4—5-flowered spikelets which are mostly situated singly in a few-flowered panicle with long smooth branches. The cauline leaves flat, long, and projecting. A good stretch of the dorsal and marginal nerves are pilose on the distinctly five-nerved lemnata. It says in the original description that the lists of hairs of the lowest flower are very short. This is the only character which does not agree with the forms I am trying to refer to this variety, as the fact that the original specimen has only one cauline leaf no doubt by ROEMER & SCHULTES was considered accidental, since they write: "Culmus . . . in nostro nodo unico, folioque unico . . ." LANGE 1880, pp. 178—179 mentions *P. gelida* under *P. flexuosa* Wahlenb., but thinks that it is doubtful that it should belong there. In the herbarium in Copenhagen there are several collections (e. g. Sukkertoppen, W. & H.; Fiskefjord, S. Hansen) which previously by LANGE and ROSENVINGE were determined as belonging to *P. flexuosa* β. *elongata* Blytt, but which then by GELERT were referred to *P. pratensis*. These plants very much resemble the material which I tentatively refer to var. *gelida*.

The most typical material does not occur in my collections, but in a private collection ((1) and (2)) and in early collections in the herbarium in Copenhagen, ((3) and (4)). These collections are:

- (1) Torstein Islander (small island in Southwest Greenland) July 18, 1947, Kai Larsen. 30 cm high with a few 7—9 mm long spikelets. 2—3 flat, 3—4 mm broad cauline leaves. Fig. 23 left.
- (2) Qarmat north of Julianehåb June 26, 1947, Kai Larsen. 20—26 cm high, otherwise like (1).
- (3) Qutdligssat, Disko. August 1890, N. Hartz. 35 cm high. Spikelets 7—8 mm. Cauline leaves 3—5 mm broad.
- (4) Julianehaab, "Peters Varde" July 4, 1900, G. Meldorf. Nearly like (3).

In the typical state it is plant 30—42 cm in height (the type specimen). My collections therefore perhaps are dwarf forms (modifications). They originate from three outer-coast stations, viz. localities 13, 14, and 15 (Nos. 98, 846, 847). They are about 10—14 cm in height, but have few and large spikelets. No. 847 from Godthaab somewhat resembles var. *rigens* by being slightly short-haired on the intermediate nerve of lemnata. No doubt var. *gelida* is so peculiar a type that it deserves the attention of botanists in the future.

148. *Puccinellia deschampsoides* Th. Sørensen. My material of *Puccinellia* has kindly been determined by Dr. Th. Sørensen, who took the whole Greenland material of the genus up for revision. *P. deschampsoides* is an important species in the whole of the interior on basic soil near salt lakes and in river plains and ascends to 500 m above sea level. It varies between prostrate and obliquely rising individuals and at the head of the northern branch of Søndre Strømfjord (Loc. 3) hybrids with the following species. My material includes 19 collections (nos. 1052—1070) from various places within seven of the main localities. See further SØRENSEN (1952, 1953).

149. *Puccinellia groenlandica* Th. Sørensen. According to Dr. Th. Sørensen's determinations there are no quite typical plants in the collection. The two species generally are distinct in all places but Søndre Strømfjord. The most typical material is that from Itivdlinguaq and from the head of the northern branch of the fjord, where it is growing in great quantities together with the preceding species and seems to form a complex hybridizing population there, with all transitions from large, coarse specimens of *P. groenlandica* to tender specimens of *P. deschampsoides*. On the south-facing slopes of Hassells Fjeld there are in some places pure *Puccinellia* sociations. They consist partly of specimens of *P. deschampsoides* (no. 1065), partly of the hybrid (thus nos. 1011—1012).

150. *Puccinellia phryganodes* (Trin.) Schrib & Merr. Observed only in Loc. 9 and 10 in salt marshes along the fjord.

151. *Roegneria violacea* (Hornem.) Melderis. Found only on the south-facing slope of Hassells Fjeld associated with *Arabis Holboellii* and *Halimolobos mollis*. Growing also in the Holsteinsborg region and in South Greenland; cf. MELDERIS 1950 and BÖCHER 1950, map fig. 11 a.

152. *Trisetum spicatum* (L.) Richt. Particularly in the river valleys, in dunes and on sand flats as well as on dry slopes. Evidently not so frequent in the interior as in the coastal regions, where it seems to vary most, and where, in the southernmost part of West Greenland, a race with a deviating chromosome number has been found (cf. BÖCHER & LARSEN 1950, p. 8). No. 561 from Hassells Fjeld has a slender panicle and the hairs on the axes of the spikelets are very short.

153. *Carex amblyorhyncha* Krecz. Occurring as the variety *fusca* Böcher near the *Menyanthes* lake on Hassells Fjeld and in Ørkendalen (western part of main Loc. 6). A eu-mesotrophic bog plant with a very remarkable range; see details in BÖCHER 1952 and p. 70.

154. *Carex bicolor* Bell. Only on the shore of a slightly saline lake at Strømfjordshavn. Furthermore noted from Narssarsuaq in South Greenland, from where, however, no specimens are available so that the occurrence there is doubtful. The species is of very sporadic occurrence in Greenland. Its area has, however, become somewhat more continuous after two findings around 68°10' lat. N. in East Greenland. (H. G. Wager 1936, Herb. British Mus.). The finding nearest to the Søndre Strømfjord locality is on Agto, 67°57' (Porsild 1924).

155. *Carex Bigelowii* Torr. (*C. rigida* Good). The typical *C. Bigelowii* is a low plant with broad, obtuse, black scales and with flowers close together in unstalked female spikelets. Such plants are extremely common on the coastal mountains, but clearly rarer in the continental regions. My collections hardly include this type from the continental area, as, indeed, no. 967 from the area of the ice margin is low and has obtuse bract scales, but these are not black as on the typical *C. Bigelowii*, but brown. The rest of the material from the continental area has ovate-lanceolate, dark brown scales, thus approaching the sedge mentioned below which I consider



a subspecies of *C. Bigelowii*. No. 107 from Ungôrsivik at the mouth of Søndre Strømfjord in some respects resembles *C. stans* and almost lacks papillae both on the upper and the lower surface of the leaves. It may be imagined to be the hybrid *C. Bigelowii*  $\times$  *stans*, which would not be improbable as *C. stans* just has its southern limit in the skerries a little farther north in West Greenland.

156. *Carex Bigelowii* Torr. ssp. *hyperborea* (Drej.) comb. nov. Cf. DREJER 1841 pp. 43—44 and a fine picture in *Flora Danica* Tab. MMCCCLXXII. This is a tall plant with distinct stalked female spikelets which have not got their flowers close together and have dark brown, ovate-lanceolate scales and long lower bracts. OSTENFELD & GELERT (1902) consider this type a moist-soil modification of *C. rigida*, but do not mention those of its characters which are hardly due to modification, viz. the colour and form of the scales and the stalked female spikelets. Particularly from East Greenland I know willow-scrub modifications of *C. Bigelowii* of tall growth, and they are different from the material which I propose to refer to ssp. *hyperborea*.

A description of the most typical material (fig. 24 left) gives certain supplements to the remarks above.

Nos. 1085—86: More or less tufted, but with vigorous runners. Brownish sheaths. Stems erect (20—)30—36 cm high, scabrous, with one male spike (which is sometimes female below; cf. the original diagnosis “sæpe basi feminea”; this character not mentioned by LANGE 1880) and three female spikes, the lowest of which is often short and separated considerably from the others, while the upper one may have a small number of male flowers at the top. The female spikelets, especially the lower one, more or less stalked with ovate-lanceolate dark brown scales, which are longer than the perigynia, the flowers being somewhat scattered. Lower bract often very long, in rare cases exceeding the uppermost spike, otherwise reaching the same height as the male spike.—Luxuriant heath 4 km east of the air base.

I have discussed this material with Swedish colleagues. There is a certain similarity in habit to the hybrid *C. Bigelowii*  $\times$  *juncella*, but a reference to this hybrid must be excluded because of a number of characters (among them the scales) and the fact that neither *C. Goodenoughii* nor *C. juncella* has been found outside South Greenland. There are several points of similarity to the hybrid *C. Lyngbyei*  $\times$  *rigida* (*C. haematolepis* Drej.; see *Flora Danica* MMCCCLXX, OSTENFELD & GELERT fig. 51), but this hybrid must be excluded as well, as *C. Lyngbyei*, too, is found in the very southernmost part of Greenland. In the Søndre Strømfjord area there are no other sedges which by hybridization with *C. Bigelowii* can be imagined to give a plant like the one described. Therefore it must be considered as something distinct. It is another matter that there are many intermediate forms, a fact which makes a reduction from species to subspecies seem natural.

Among the typical material I also include nos. 975 and 1087 from the bank of a rivulet at Vandfaldskløften (Loc. 9, August 21; 28 and 44 cm high plants), while no. 1088 from the same locality, which is 70 cm in height (fig. 24 right), deviates by having more rounded-off scales and yellowish perigynia. It greatly resembles plants collected at Kapisigdlit by Porsild. No. 1083 has very vigorous rhizomes and redly tarnished sheaths. It has papillae on the lower surface of the leaves and therefore cannot be a hybrid with *C. stans*. It was collected at Itivdlinguaq (Loc. 10), and may belong to ssp. *hyperborea*. No. 1089 from Nákajanga (500 m above sea level) approaches to *C. Bigelowii* s. str. by having short-stalked female spikelets. No. 1090 from the bank of the river draining Lake Taserssuatsiaq approaches typical *C. Bigelowii* still more.

Perhaps the two subspecies are the extremes of a cline. This should be investigated more closely. Provisionally, as regards the Søndre Strømfjord area, it looks





Fig. 24. *Carex Bigelowii* ssp. *hyperborea* (Drej.). On the left, typical material from luxuriant heath 4 km east of the air base of Søndre Strømfjord (Nos. 1085—86). On the right, deviating plant (No. 1088) from Vandfaldskløften. A 10 cm scale is seen between the plants in the middle of the picture. — M. Kōie phot.

as if the typical *C. Bigelowii* is most frequent in the coastal mountains and ssp. *hyperborea* most frequent in the interior. Furthermore ssp. *hyperborea* may be a more southern type than the typical *C. Bigelowii*.

157. *Carex canescens* L. Found in damp moss at Kløftsoerne on Hassells Fjeld, 350 m above sea level. ERLANSON mentions it from a marshy lake shore. It is rare and close to its northern limit. Only two stations, Gieseckes Sø, 67°44' (A. E. Porsild), and Disko, Nuk east of Marrait (R. T. Porsild), are farther north; cf. fig. 25.

158. *Carex capillaris* L. I include in *C. capillaris* only plants with constantly male terminal spikes corresponding to var. *tenuior* mentioned by DREJER 1841 and LANGE 1880 and var. *minima* Beck-Mannag. mentioned by BOIVIN 1948 (here divided into f. *typica* and f. *major*). It was found at several coastal stations, at Itivdlinguaq, and the head of Søndre Strømfjord at two alpine localities (Nákajanga and a mountain north of Ringsødal, both 500 m above sea level). Everything suggests that the Greenland material belongs to an arctic race which in the interior almost subarctic area becomes alpine. Also in Yukon this low-growing type only occurs in the high mountains (A. E. PORSILD 1951).

159. *Carex capillaris* L. ssp. *robustior* (Lange ex Drejer) comb. nov. (*C. capillaris* β. *major et robustior* etc., in DREJER 1841, p. 54, β. *robustior* in LANGE 1880,

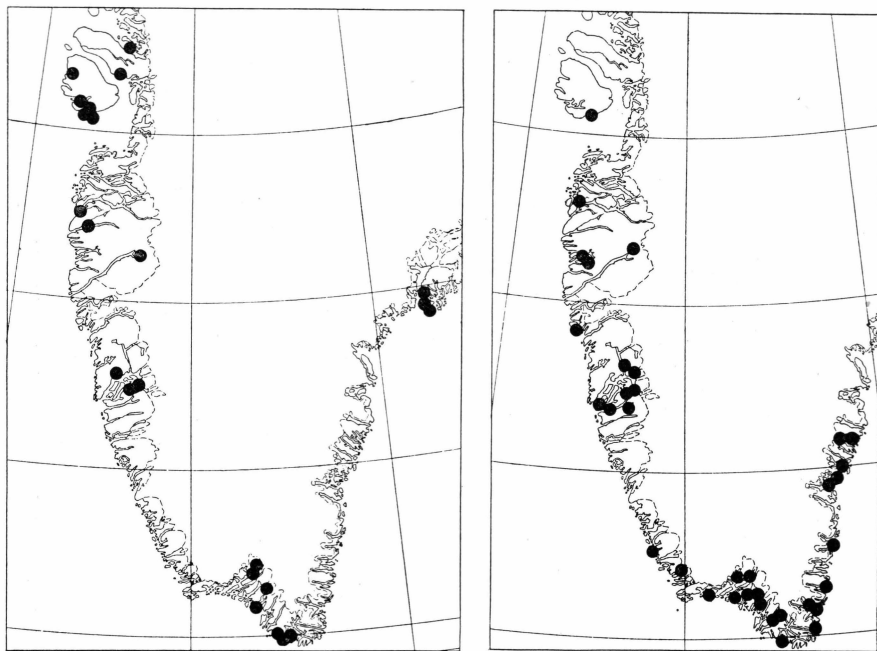


Fig. 25. Greenland ranges of *Alopecurus aequalis* (left) and *Carex canescens* (right).

p. 148; beautifully pictured in *Flora Danica* Tab. 2374 fig. 3)<sup>1</sup>. Characteristic by tall growth and gynoeandrous terminal spikes and 2—3 mm long perigynia. Two other *Carexes* from the same group of the genus have also gynoeandrous terminal spikes, viz. *C. capillaris* var. *Porsildiana* Polunin (Journ. Linn. Soc. LII 1943, p. 373) and *Carex capillaris* var. *Krausei* (Boeck.) Krantz (*C. Krausei* Boeckeler in Engler's Bot. Jahrb. 7, 1886, pp. 279—280). Both varieties can no doubt be referred to ssp. *robustior*, though several features suggest that they must be considered two independent subspecies, which I propose as *C. capillaris* ssp. *Krausei* (Boeck.) comb. nov. and *C. capillaris* ssp. *Porsildiana* (Polunin) comb. nov. The following survey shows the differences:

\* Terminal spikes always staminate..... *C. capillaris* L. (including several varieties)

\*\* Terminal spikes gynoeandrous (or rarely staminate).

0 Leaves about the same length as culms, perigynia 2.9—3.3 mm long, occasionally finely spinulose on the margin of the beak ..... *C. capillaris* ssp. *Krausei* (Boeck.)

00 Leaves shorter than culms, rarely with a few spines on the beak.

§ tall plant with 2—3 mm long perigynia ..... *C. capillaris* L. ssp. *robustior*  
(Lange ex Drejer)

§§ low plant with 1.3—1.8 mm long perigynia ..... *C. capillaris* L. ssp. *Porsildiana*  
(Polunin)

HULTÉN (1941—50, II p. 376) in mentioning *C. Krausei* writes that no Scandinavian specimens with gynoeandrous spikes were seen. Such plants do not seem to occur east of Iceland, where ssp. *Porsildiana* has been found. I have seen material

<sup>1</sup> LANGE was the first to give this type a distinct Latin name. If somebody would prefer to use the first word in DREJER's diagnosis the combination *Carex capillaris* ssp. *major* (Drej.) Böcher is proposed.

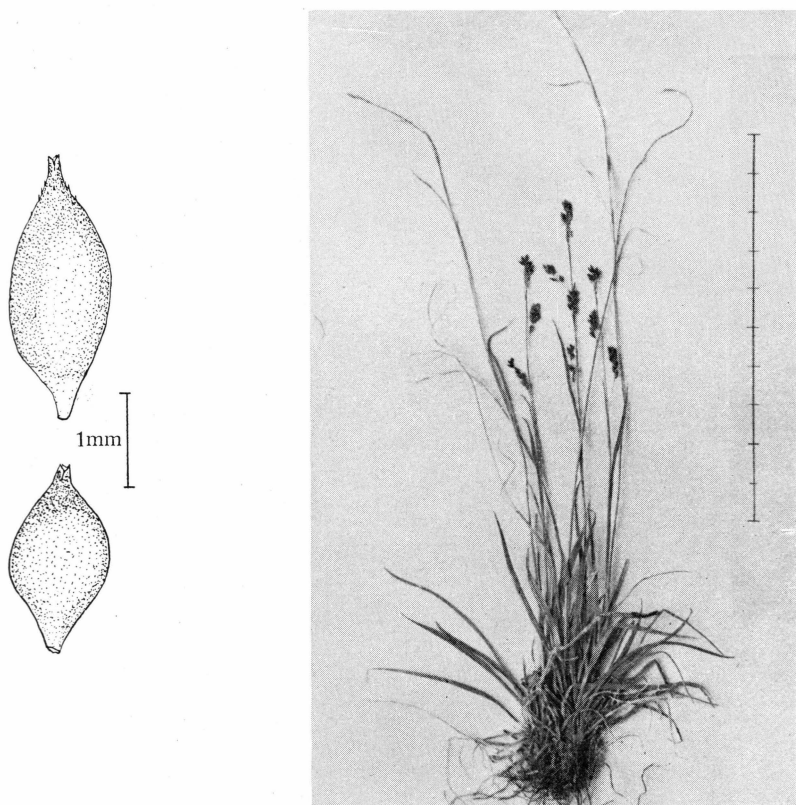


Fig. 26. *Carex capillaris* ssp. *robustior*. On the right, specimen from Itivdlinguaq (No. 924 collected July 24, 1946). Above on the left, perigynium from the same individual. Below on the left, perigynium of *C. capillaris* ssp. *Porsildiana* from Ranken Inlet, Hudson Bay (Macoun No. 79,007).

of this subspecies from Qagssiarssuk, Igaliko Fjord (Vahl 1828, Herb. Copenhagen). Furthermore it seems to occur in Hurry Inlet, from where the herbarium of Stockholm has 20 specimens collected by Dusén 1899. Of these, which are 3.5—6 cm in height, 50 per cent. are gynoeandrous. Thus it seems that the gynoeandrous character is not always capable of manifesting itself, even though the genetic basis of this property is present. Therefore the distinction must be made in the way that only plants with constantly staminate terminal spikes belong to *C. capillaris* s. str.

In my collections ssp. *robustior* occurs from three stations in the continental area, all from shores of salt lakes in the lowlands, where the soil is greatly alkaline. Nos. 918 and 923 correspond best to the figure in *Flora Danica*. They are 30 cm in height, with 2—2.5 mm long perigynia, while no. 924 from Itivdlinguaq is lower (20 cm), somewhat approaching to ssp. *Krausei* by having some teeth on the beak (cf. fig. 26). Other Greenland collections belonging to this subspecies occur in Herbarium Copenhagen from Prøven, 72°23' (M. P. Porsild), Qaumarujuk Fjord, 71°7' (M. P. Porsild), Nūgssuaq between Atanikerdluk and Atå (Grøntved no. 175), Atanikerdluk (Erlanson no. 3150), Ikerasak (E. Vanhöffen no. 119 (297)). On the

whole this indicates a Central West Greenland range ( $66^{\circ}30'$ — $72^{\circ}23'$ ). It does not seem to occur outside Greenland (cf. BOIVIN's survey and A. E. PORSILD 1951, p. 114) I have had an opportunity to study Professor Hultén's collections of *C. Krausei* and found there several plants approaching to the Greenland *robustior* type (e. g. the material from Glacier Bay, Kincaid June 13/6, 1899), but no typical ssp. *robustior* was found. I consider the latter to be a continental-low arctic, highly alkaliphilous subspecies.

160. *Carex capitata* L. Only at the head of Søndre Strømfjord; specimens 23—30 cm (No. 224) or 12—14 cm (no. 906), see details in BÖCHER 1950, pp. 8—10 and fig. 27.

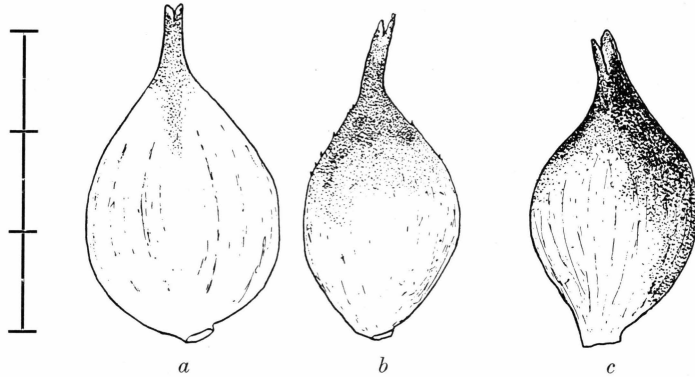


Fig. 27. Perigynia of *Carex capitata* (a; No. 224 from Loc. 3), *Carex capitata* ssp. *arctogena* (b; No. 903 from the margin of the inland ice, Loc. 1), and *Carex supina* ssp. *spaniocarpa* (c; No. 891 from Loc. 5). Scale: 3 mm.

161. *Carex capitata* ssp. *arctogena* (Harry Smith) comb. nov. Distributed both on the coastal mountains and at the head of Søndre Strømfjord. Details in BÖCHER, loc. cit. pp. 4—8. Difficulties of keeping *C. capitata* and ssp. *arctogena* apart, particularly in America (cf. RAYMOND), justify a reduction of the latter to being considered a subspecies.

162. *Carex glacialis* Mackenzie. Rare. In the interior, particularly alpine, at 500—600 m above sea level. Observed once at a height of 200 m in *Dryas integrifolia* heath near a salt lake on highly basic soil (pH 8.2). On the outer coast also close to sea level.

163. *Carex glareosa* Wahlenb. Rare. Found only in salt marsh vegetation at Umivit branch.

164. *Carex gynocrates* Wormskj. Fairly rare, but easily overlooked. In damp moss, particularly near running water. Found in two places on Hassells Fjeld, east of Keglen in Sandflugtdalen, and around Vandfaldskløften. There are remarkably few findings of this species between  $68^{\circ}$  and  $61^{\circ}30'$  in West Greenland. Besides at the three stations at the head of Søndre Strømfjord only at Eqaluit in Ameragdla in the Godthaab region (see fig. 34).

165. *Carex holostoma* Drej. Rather common at Itivdlínguaq. At the head of Søndre Strømfjord observed in the alpine zone on Hassells Fjeld and Nákajanga ridge between 430 and 550 m above sea level on the banks of small pools. The specimens collected are 20—30 cm in height. The occurrence around Søndre Strømfjord marks the southern limit of the species in Greenland; cf. map fig. 32. For total range see RAYMOND (1950a, fig. 11).

166. *Carex Lachenalii* Schkuhr. Very rare. Found only in alpine localities on Nákajanga ridge, in snow-patch vegetation often associated with *Oxyria* in front of north-facing walls of rocks 500 m above sea level.

167. *Carex maritima* Gunn. (*C. incurva* Lightf.). Very common in the river valleys right up to the inland ice and near the innermost northern creek of the fjord. Furthermore on shores of salt lakes, where it may be dominant and often is associated with *C. capillaris robustior* and *Primula stricta*. The species is very rare south of Søndre Strømfjord and seems to be missing from Godthaabsfjord. In Greenland the species has a distinct northern main range. Therefore it is remarkable that in Søndre Strømfjord it was not observed in the highlands above 250—300 m above sea level. The cause may be that it can find sufficiently basic soil only in the lowlands.

168. *Carex microglochin* Wahlenb. Rare and very selective. ERLANSON mentions it as growing in mud of seeping stream. I found it partly at the head of the northern branch as dominant species on the clayey beach associated with *Triglochin*, *Juncus arcticus* and *castaneus* (pH 7.6), partly associated with the same *Juncus* species and *Saxifraga aizoides* on the beach below Vandfaldskløften on seepage clay. An extremely high phosphoric acid value in the soil was found in the former place (Böcher 1949b, p. 43).

169. *Carex misandra* R. Br. Found at a height of 600 m above sea level on Nákajanga ridge in *Dryas-Rhododendron-Vaccinium* heath, at a height of 470 m on Hassells Fjeld and at a height of 150 m at Itivdlínguaq in *Cassiope tetragona* heath. The species has been collected from both areas before, Porsild having found it at Itivdleq Qíngua, 66°29', and Hagerup at the head of Søndre Strømfjord. The areas mentioned, together with Naujarssuit Qeqertalik Fjord, 66°46' (Porsild), form the southern limit of the species in Greenland (cf. the map fig. 57 in SEIDENFADEN & SØRENSEN (1937) and fig. 123 in Böcher (1938); on the latter the Itivdleq Qíngua locality, however, is misplaced).

170. *Carex nardina* Fr. Extremely common in the highlands, rarer in the lowlands, where it is especially common in sand-drift areas. 23 cm high specimens collected there.

171. *Carex norvegica* Retz. ssp. *inserrulata* Kalela (see KALELA 1944). Very common on moist ground both in the highlands and in the lowlands. 35—45 cm high specimens collected in the lowlands. The typical *C. norvegica* was only collected in South Greenland (see Table 1).

172. *Carex rariflora* (Wg.) Sm. Generally distributed in wet moss (often *Sphagnum*) near lakes and streams.

173. *Carex rupestris* All. Common at Itivdlínguaq, rarer at the head of Søndre Strømfjord, where it is alpine, growing on dry barren land, but also found on north-facing rocks and along rivulets in the lowlands. We searched for it in vain at Godthaab, from where it has previously been recorded (Böcher 1938, pp. 234—235). Itivdlínguaq therefore is the southernmost station of the species in West Greenland. RAYMOND (1950b) writes that *C. rupestris* "d'après Böcher ce serait une espèce à tendance océaniques." He must here by mistake have written *océaniques* instead of *continentales*.

174. *Carex saxatilis* L. Very common on lake shores. In all my material (18 collections) the lower female spikelet is more or less stalked and the fruits have two styles (rarely a single fruit has three styles). The species otherwise varies considerably and often reaches heights of 50 cm or more. Some of the material with

short-stalked female spikelets and long bracts resembles *C. rotundata* in habit, but has two styles. The same applies to most of the material which in Herb. Copenh. has previously been referred to *C. rotundata*. The latter species perhaps is not found in Greenland (see SØRENSEN 1933, A. E. PORSILD 1943), or rather, there is in Greenland a character gradient or a cline which covers nearly what in Scandinavia is represented by *C. saxatilis* and *C. rotundata*; for these are here considered distinct, i. a. in respect of the number of styles and in their ecological conditions (calciophilous—calcifugous). And in Greenland *C. saxatilis* occurs both on basic and moderately acid soil. It is remarkable that several of my collections from acid soil in respect of certain morphological characters approach to *C. rotundata* (e. g. no. 1081, from the Menyanthes lake, no. 1082, from the shore of the lake Taserssuatsiaq, and no. 746 from Sandflugtdalen), while the most typical specimens of *C. saxatilis* originate from shores of lakes with alkaline water. The *rotundata* characters clearly increase towards the south in Greenland taken as whole. In the herbarium of Stockholm I have seen material from Ivigtut collected by Lagercrantz and A. Berlin and from Julianehaab and Frederiksdal collected by Berlin which very closely resembles the Scandinavian *C. rotundata*. A single sheet in Herb. Copenh. from Tasermiut collected by Hartz (called *C. vesicaria* var. *alpigena*) perhaps is a typical *C. rotundata* (three stigmas, a long bract, lower female spike nearly sessile). This increase towards the south might be connected with the fact that the soil in the southernmost regions rich in precipitation is mostly acid.

175. *Carex scirpoidea* Michx. Rather frequent in the continental area. In the interior it seems to be more selective, particularly it is more closely associated with wet-soil communities there (river banks, meadows) and therefore perhaps somewhat rarer than on the coastal mountains.

176. *Carex supina* Willd. ex Wg. ssp. *spaniocarpa* (Steud.) Hultén. Very important from sea level to the highest peaks in the continental area on dry, preferably not too basic soil. Specimens up to 30 cm (no. 891) observed.

In Stockholm and Uppsala I have studied the variation of the species and Professor Hultén has kindly shown me his map of the range of the species. Ssp. *spaniocarpa* is more arctic than the main form. It is distinguished best morphologically through the more prolonged, more evenly tapering perigynia (fig. 27) than through the colour of the perigynia, as material from e. g. Brandenburg and Jakutsk has dark brown perigynia.

The very sporadic occurrence of ssp. *spaniocarpa* in North America is of great interest. Apart from small areas in Alaska and near Great Bear Lake it has scattered stations, only three in the Canadian eastern arctic (POLUNIN 1940, p. 118). The wide Greenland range (fig. 127 in BÖCHER 1938) in this connexion looks very interesting, as a postglacial immigration from East America is quite improbable. The species is not high arctic but low arctic and its range will evidently support the theory of the survival of a not typically arctic floral contingent during the last Glacial Age.

177. *Carex ursina* Dewey. Found only on the beach below Vandfaldskløften (Loc. 9). This locality together with Itivneq near Holsteinsborg (Vahl, Warming and Holm) marks the southern limit of the species in Greenland.

178. *Eriophorum angustifolium* Honckeney. Frequent in the whole of the area, but with evident preference for acid bogs and meadows.

179. *Eriophorum Scheuchzeri* Hoppe. Widely distributed in the whole area and in contrast to the preceding species also frequent near alkaline water, where it even may be dominant, e. g. on the beach of a lake northwest of Strømfjordshavn.

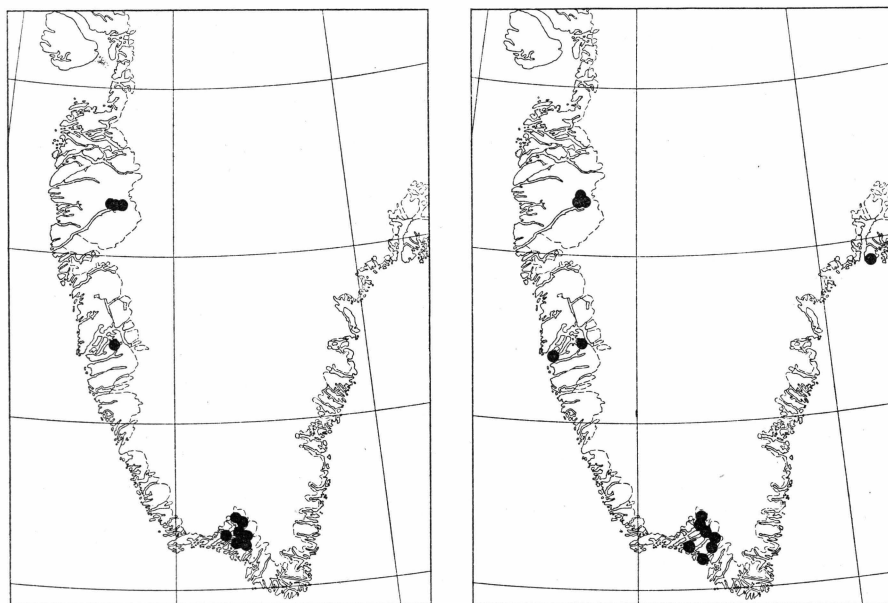


Fig. 28. Greenland ranges of *Juncus alpinus* ssp. *nodulosus* (left) and *Galium Brandergei* (right).

180. *Kobresia myosuroides* (Vill.) Fiori & Paol. Very common and a very important element in the vegetation on dry soil in the whole of the continental area. From sea level to 650 m above sea level on Nákajanga ridge.

181. *Kobresia simpliciuscula* (Wg.) Mack. Not rare on moist, calciferous soil near lakes and streams. Often very vigorous (no. 251 from the southern slope of Hassells Fjeld 30 cm in height). On range in Greenland and possible races see BÖCHER 1951b.

182. *Heleocharis acicularis* (L.) R. Br. Found only on the shore of the lake Taserssuatsiaq (western part). 2 cm high with 2—3 mm long spikelets. In Greenland the species has previously been found north of 68° and at a station in the interior of Godthaabsfjord. The finding in Søndre Strømfjord makes the Greenland area considerably more continuous (fig. 20).

183. *Scirpus caespitosus* L. ssp. *austriacus* (Palla) Broddeson. Very rare. In the interior found only on Nákajanga ridge at a height of 650 m above sea level in a few about 7 cm high tufts, which were poor as compared with the vigorous, about 20 cm high plants of the coastal mountains.

184. *Scirpus pauciflorus* Lightf. Found on the shores of three lakes with basic water rich in salt. Often forming extensive patches. On the isolated northern occurrence at the head of Søndre Strømfjord see BÖCHER 1950, map fig. 11b.

185. *Juncus alpinus* Vill. ssp. *nodulosus* (Wg.) Lindm. Found together with the preceding species, but also near the lake Taserssuatsiaq, which has neutral oligotrophic water. The plants from there are 2—3 cm in height, while those from the beaches of basic lakes are a little taller (about 3—6 cm) and may belong to var. or f. *alpestris* (Hartm.) Hyl. The finding of this species near Søndre Strømfjord shifts its northern limit considerably northward. Between Søndre Strømfjord and South Greenland only one station is known, viz. in Godthaabsfjord; see fig. 28.

186. *Juncus arcticus* Willd. Very frequent in the river valleys and on the beaches of the alkaline lakes. Individuals 72—76 cm in height have been collected in wet sand among dunes in Sandflugtdalen.

187. *Juncus biglumis* L. Rare in the interior, at the head of Søndre Strømfjord seen only in a place near a lake at a height of 400 m above sea level.

188. *Juncus castaneus* Sm. Frequent in the whole of the continental area on the beaches of pools and lakes, both in the lowlands and in the highlands, particularly near alkaline water.

189. *Juncus ranarius* Perr. & Song. (*J. bufonius* var. *halophilus* Buchen. & Fern.). Dr. N. Hylander, Uppsala, has kindly studied my collections (nos. 305—307), which according to him belong to *J. ranarius*. The species was found first by Erlanson on wet mud of a seepage stream. Mature plants one to two cm in height. My material corresponds to his. I found the species on the beach of Lille Saltso as 0.5 cm high individuals and on wet rocks on the southern slope of Hassells Fjeld as plants with mature capsules 0.5—4 cm high. The most striking range of *J. bufonius* coll. in Greenland appears from fig. 13 in BÖCHER 1950 and is discussed *ibid.* pp. 36—37.

[*Juncus subtilis* E. Meyer is mentioned by ERLANSON. The material has, however, been redetermined by me; see no. 38].

190. *Juncus triglumis* L. var. *Copelandi* Buchen. (*J. albescens* (Lge.) Fern. cp. SØRENSEN 1933, pp. 159—161). Sporadically on moist basic soil. On the southern slope of Hassells Fjeld, forming small patches of vegetation around seeping water. Near Store Saltso together with *Gentiana detonsa* on soil with pH 9.1.

191. *Luzula arctica* Bl. (*L. nivalis* (Laest.) Beurl.). Not uncommon in the highlands, rarer in the lowlands. Observed in the whole of the continental area from Itivdlinguaq to the head of Søndre Strømfjord, mostly on alpine heaths (*Cassiope tetragona*) and in meadows in the lowlands. Itivdlinguaq forms the southern limit of the species in Greenland (fig. 29).

192. *Luzula confusa* (Hartm.) Lindeb. Common. At the head of Søndre Strømfjord most abundant in alpine situations on north-facing heaths and in the river valleys. No. 862 from På on the outer coast approaches *L. arcuata*.

193. *Luzula groenlandica* BÖCHER. Very common around the head of Søndre Strømfjord (see details in BÖCHER 1950, fig. 6 and pp. 21—23). Not observed at Itivdlinguaq. According to kind information from Dr. A. E. Porsild and M. Raymond this species has a wide distribution in arctic Canada.

194. *Luzula multiflora* (Retz.) Lej. ssp. *frigida* (Buch.) Samuels. This species has not been found in the most continental area. However, there is a great chance that it will be possible to find it at any rate at Itivdlinguaq, where it was noticed but not collected. On the outer coast it was found at På, see maps in BÖCHER 1950 figs. 4—5.

195. *Luzula spicata* (L.) D. C. Rare in the continental area, which is also corroborated by the fact that ERLANSON does not mention it. It was found in moist sand near the inland ice (Loc. 1), on moist soil on the southern slope of Hassells Fjeld near a cleft (Loc. 3), and on wet rocks on Ravneklippen (Loc. 7). Thus it is evidently very sensitive to conditions of humidity and in the continental area associated with rather moist soil. On the outer coast it is found in widely different communities, often in dry, heath-like sociations rich in lichens (e. g. a *Luzula spicata*-*Cladonia mitis-gracilis-bellidiflora* sociation at Kangamiut).



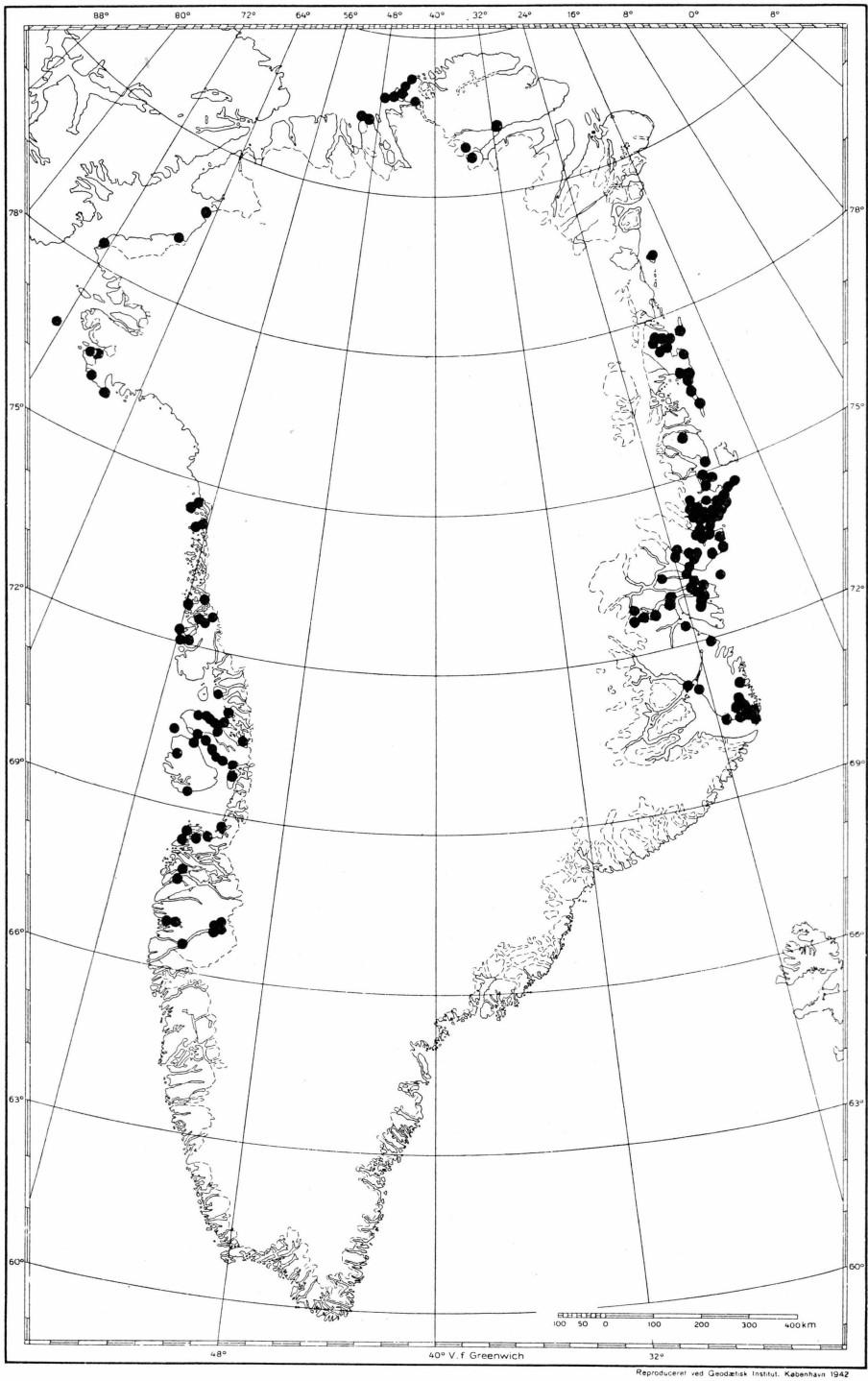


Fig. 29. Greenland range of *Luzula arctica*.

196. *Tofieldia coccinea* Richards. Found only at Itivdlinguaq at a height of 150 m above sea level and on the top of Nákajanga ridge at a height of 600—700 m above sea level. These two localities are the southernmost in Greenland. The southern limit of the species is shifted from Nordre Strømfjord ( $67^{\circ}42'$ ) to Itivdlinguaq ( $66^{\circ}30'$ ). The Greenland area comes to remind of that of *Luzula arctica*'s.

197. *Tofieldia pusilla* (Michx.) Pers. (*T. palustris* Huds., *T. minima* (Hill.) Druce). Common in the whole of the continental area.

198. *Sisyrinchium montanum* Greene (*S. angustifolium* sensu Bicknell). Only on the southern slope of Hassells Fjeld, where water seeps out. Associated there with a great many other rarities. The material must probably be referred to var. *crebrum* Fern., cp. FERNALD (1946). A transplant specimen cultivated in Copenhagen, however, had pale blue flowers. Its chromosome number was counted by BÖCHER & LARSEN (1950), who found  $2n = 32$ . Further details in BÖCHER 1948.

199. *Corallorrhiza trifida* Châtelain. Collected by ERLANSON in a lake meadow with withered flowers July 13. Found farther north on Disko and at N. Isortoq ( $67^{\circ}15'$ , Vahl), farther south in Godthaabsfjord, at Ivigtut (*Salix* scrub, July 15, 1946, flowering; cf. Table 1), and at Igaliko- and Tunugdliarfik Fjord.

200. *Orchis rotundifolia* Banks ex Pursh. Collected on August 21, when it had ceased flowering, on a *Dryas-Rhododendron* heath along the river below Vandfaldskløften (Loc. 9), no doubt the same place in which Erlanson found it in 1927. Otherwise only at Ameragdla,  $64^{\circ}09'$ , and in South Greenland (Tunugdliarfik, Igaliko Fjord).

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#### 4. THE PLANT-GEOGRAPHIC POSITION OF THE CONTINENTAL AREA

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Previously (Böcher 1949b) the special climatic and edaphic conditions in the continental area have been discussed and certain plant-geographic main features have been brought out. The detailed floral treatment in the preceding chapter enable the following more thorough-going considerations.

##### A. Lowland and Highland-Flora.

A survey of the sparse data available as regards floristic and vegetational differences in a vertical direction in Greenland is found in Böcher 1938, pp. 306—309. The area at the head of Søndre Strømfjord (Loc. 1—9) is suitable for a more thorough study of this zonation. Measurements of temperature from the bottom of the valley in Loc. 3 point to subarctic climatic conditions and the extremely low precipitation to a greatly continental climate. As Greenland from the north to the south comprises at least three plant geographical zones (the high arctic, the low arctic, and the subarctic zone) one might expect that on the mountains at the head of Søndre Strømfjord there were three vertical zones corresponding to the plant geographical zones mentioned. Indeed, this seems to be the case, but these zones are difficult to define. The low alpine zone is characterized by the presence of a distinctly subarctic element, which is absent in the high alpine zone, and by predominance of low arctic species. In the high alpine zone a number of high arctic and widely distributed arctic species appear, which are absent or rare on the lower parts of the mountains. The highest mountains reach a height of about 700 m above sea level. On a rough estimate I should put the limit of the subalpine zone, which is restricted to slopes with southern exposure, at 200 m above sea level, and the limit of the low alpine zone at 450—500 m above sea level.

In the following survey I shall disregard species with a doubtful placing and species which seem to be equally or nearly equally frequent in the highlands and the lowlands.

(1) **Exclusive highland species.** Here belongs in the first place a snow-patch element including *Salix herbacea*, *Ranunculus pygmaeus*, *Cardamine bellidiflora*, *Saxifraga rivularis*, *Poa pratensis* var. *rigens*, *Carex Lachenalii*, and *Lycopodium Selago*. The existence of these plants depends on the streaks or patches of snow which along north-facing rocks in the high alpine zone hold out into the late spring. According to information from the archives of aerial views of the Danish Geodetic Institute all snow has disappeared in the middle of June, while at that time there is ice on the large lakes. *Lycopodium annotinum* and *Scirpus caespitosus* ssp. *austriacus* as well are attached to soil which in the winter half-year must be supposed to be snow-covered. Perhaps this also applies to *Taraxacum umbrinum*. There are only three high arctic species, viz. *Carex misandra*, *Tofieldia coccinea*, and *Draba lactea*, while *Juncus biglumis*, *Hierochloa alpina* and *Diapensia lapponica* are widely distributed arctic species. Finally *Carex holostoma*, if anything, is low arctic and seems to be missing both on the highest mountain ridges and in the lowlands (found between 400 and 550 m above sea level).

(2) **Species with their main distribution in the highlands.** Widely distributed arctic species are: *Oxyria digyna*, *Papaver radiculatum*, *Draba nivalis*, *Saxifraga oppositifolia* and *S. nivalis*. High arctic are: *Melandrium affine*, *Lesquerella arctica*, *Saxifraga foliolosa*, *Potentilla nivea*, *Cassiope tetragona*, *Pedicularis lanata*, *Campanula uniflora*, *Antennaria Ekmaniana*, *Arnica alpina*, *Poa arctica*, *Carex nardina*, *C. rupestris*, and *Luzula arctica*, while *Carex glacialis* approaches a low arctic distribution.

Groups (1) and (2) together include 35 species or just under 18 per cent. of the flora. There is no doubt that particularly Group (1) is actually somewhat larger as it is bound to be the group which requires the greatest exertions to be based on sufficient empirical material. ERLANSON, who must mainly have operated in the lowlands, found no species from Group (1), but 10 from Group (2).

(3) **Species of low alpine occurrence.** These species are missing from the high alpine and subalpine zones. As they are particularly southern species, their absence from the lowlands must be connected with the drought in the deeply depressed systems of valleys. The group is small but interesting:

*Montia lamprosperma*  
*Ranunculus pedatifidus*  
*Epilobium davuricum* var. *arcticum* × *palustre*  
— *palustre*  
*Angelica Archangelica*  
*Galium Brandegei*  
*Carex canescens*

Out of these only the race of *Ranunculus pedatifidus* and the first component of the *Epilobium* hybrid may be relatively northern species, and the crowfoot has also been found in a bog and in deep shade in a rock cave in the lowlands. The others are southern wet-soil species.

(4) **Exclusive lowland species.** This group of course includes a number of psammophilous and maritime species, such as *Elymus mollis*, *Honckenya*, *Arabis arenicola*, *Taraxacum lacerum*, *Potentilla Egedii*, *Carex glareosa*, *C. ursina*, and others. As, however, edaphic factors must be considered decisive for these species, we shall otherwise disregard them and only discuss such species in the case of which a climatic factor may be supposed to be greatly contributory to their occurrence in the lowlands. This gives a small assembly of species including *Juniperus communis* var. *montana*, *Arabis Holboellii*, *Halimolobos mollis*, *Ranunculus Cymbalaria*, *Rorippa islandica*, *Potentilla palustris*, *Arctostaphylos Uva-ursi*, *Gentiana aurea*, *Sparganium hyperboreum*, *Triglochin palustre*, *Alopecurus aequalis*, *Agrostis canina*, *Roegneria violacea*, *Carex microglochin*, *Scirpus acicularis*, *Juncus ranarius*, *Sisyrinchium montanum*, and *Orchis rotundifolia*. These species, with the exception of the low arctic *Carex microglochin* are southern species and *C. microglochin* is a soil specialist, which, if anything, must be omitted like the maritime species. A similar case is that of *Triglochin* and *Ranunculus Cymbalaria*, which, however, are missing from the highest salt lakes. Among the others there is reason to note *Arctostaphylos Uva-ursi*, which, in accordance with experiences from Norwegian mountains, ought to be able to ascend rather high into the mountains. This, in connection with its otherwise deviating ecological attitude, seems to indicate that it belongs to a particular biological race, more southerly and more calciphilous than Scandinavian races. In accordance with experiences from Scoresbysund (HARTZ, 1895, p. 275) *Arabis Holboellii* as well would be supposed to be able to ascend higher into the mountains.

(5) **Species with their main distribution in the lowlands.** This group is larger, especially if it is allowed to include also species with equal frequency in the subalpine and the low alpine zones. Important species are particularly some aquatic and paludal plants, viz. all the *Potamogeton* species, *Myriophyllum spicatum* ssp. *exalbescens*, *Ranunculus reptans*, *Cardamine pratensis*, *Menyanthes trifoliata*, *Scirpus pauciflorus*, and *Juncus alpinus* ssp. *nodulosus*. To these should be added a number of species found near salt lakes: *Braya linearis*, *Torularia humilis*, *Gentiana detonsa*, *G. tenella*, *Lomatogonium rotatum*, and *Primula stricta*. Other wet-soil plants are *Equisetum scirpoides*, *Calamagrostis neglecta*, *C. canadensis* ssp. *Langsdorffii*, *Carex capitata*, and *Luzula groenlandica*.

There are few dry-soil plants: *Draba aurea*, *D. lanceolata*, *Potentilla tridentata*, *Euphrasia arctica*, and *Antennaria affinis*. Furthermore two species greatly selective in the continental area: *Bartsia alpina* and *Thalictrum alpinum* belong to this group. Among the heath plants *Pedicularis labradorica* and *Calamagrostis lapponica* var. *groenlandica* may be mentioned. Group (5) naturally also particularly consists of southern species. None are high arctic, the rather northerly occurrence in Greenland of *Braya linearis* no doubt in the first place being due to a demand for continentality and basic soil.

All things considered, there is so great a difference between the highlands and the lowlands that it is very justifiable to operate with vertical zones. The same evidently holds good of Godthaabsfjord, from where TRAPNELL (1933) has made a survey. The interior of Godthaabsfjord also has *Cassiope tetragona*, *Diapensia*, *Potentilla nivea*, and *Carex nardina* in alpine localities, to which should be added *Saxifraga foliolosa* and a number of snow-patch species, such as *Phippsia algida* and *Cerastium cerastoides*, which are missing from the head of Søndre Strømfjord. Among lowland plants there are *Alnus crispa* and many others.

### B. Floristic Differences Between the Inland at Søndre Strømfjord and the Areas North, West, and South of it.

The head of Søndre Strømfjord is situated 110 km from the coastal mountains at the mouth of the Strømfjord. In a northerly direction there is a distance of 190 km to the coastal mountains on Sydostbugten and in a southerly direction a distance of 220 km to the interior of Godthaabsfjord. A comparison of the flora of these areas with that at the head of Søndre Strømfjord shows some interesting conditions, which are brought out in the types of distribution discussed below. Floristic notes on the coastal mountains and Godthaabsfjord are found in WAR-MING (1886), HARTZ (1894), KRUUSE (1898), and PORSILD (1920, 1935).

The purpose of floristic comparisons is not only an ascertainment of the size of the difference, but also an elucidation of its cause, and therefore an attempt must be made at distinguishing between climatic-edaphic and historical causes of the differences. As it is not possible to do so by exact methods, I have chosen to restrict myself to treating greatly isolated findings of plants apart, since it especially applies to these that historical factors may play an important part.

### I. Species which are absent or rare and selective at the head of Søndre Strømfjord.

This group includes both northern and southern species. Only species reaching Sydostbugten in the north or Godthaabsfjord in the south are mentioned. Disko, which floristically holds a special position, thus by harbouring advanced northern occurrences of southern species, is left out of consideration. The northern limits mentioned therefore apply to the Greenland mainland only. The species of Group I may be subdivided as follows:

I (1) Northern, particularly high arctic species which in the south are exclusively or preferably found on the coastal mountains:

*Ranunculus sulphureus*; map fig. 46 in BÖCHER 1938

— *navalis*.

*Draba alpina*; map fig. 47 in BÖCHER 1938. Note: Isolated on I. A. D. Jensen's nunataks farther south.

*Potentilla hyparctica* (*P. emarginata*); goes inland to Pingo Fjeld and Kûgssuaq; see further fig. 58 in SEIDENFADEN & SØRENSEN (1937).

*Erigeron eriocephalus*; southern limit 66°55' (alpine), M. P. PORSILD 1920, p. 149.

*Arctagrostis latifolia*; see M. P. PORSILD 1935, p. 79.

*Alopecurus alpinus*; map fig. 112 in BÖCHER 1938.

*Dupontia Fisheri*; M. P. PORSILD 1935, pp. 78—79

*Carex stans*; M. P. PORSILD 1935, p. 79.

*Antennaria angustata* Greene, (*A. glabrata*); see M. P. PORSILD 1920, p. 150, A. E. PORSILD 1950, pp. 8, 11—12, a middle arctic species found in West Greenland between 66° and 72° lat. N.

The following widely distributed arctic species, which, indeed, occur in alpine localities in the interior of Southwest Greenland, but which have not got many chances on the dry heights at the head of Søndre Strømfjord, are closely related to this section. As far as we know, the three species first mentioned are missing there, while the two species last mentioned are very rare and alpine:

*Phippsia algida*.

*Sagina intermedia* (found at Ivfat and Holsteinsborg on the outer coast).

*Erigeron unalaschensis*.

*Juncus biglumis*, map fig. 129 in BÖCHER 1938.

*Cardamine bellidifolia*.

I (2) Southern, sub-, low or middle arctic species with a more or less oceanic tendency, found most frequently or

exclusively in a curve round the continental area at Søndre Strømfjord and in the less continental Godthaabsfjord area frequently reaching the innermost branches of the fjord:

*Lycopodium alpinum*; going inland to Eqaluarssuit in Nordre Strømfjord, M. P. PORSILD 1920, p. 28.

— *annotinum*; very rare at the head of Søndre Strømfjord; cf. p. 18; map fig. 25 in BÖCHER 1938 lacks two dots at the head of Søndre Strømfjord.

*Salix herbacea*; cf. p. 19.

*Koenigia islandica*; map in GELTING 1934 fig. 46.

*Cerastium cerastioides*; map fig. 36 in BÖCHER 1938.

*Minuartia biflora*.

*Arabis alpina*; map fig. 48 in BÖCHER 1938.

*Draba crassifolia*; see map fig. 35 in GELTING 1934; a middle arctic species, missing south of Godthaabsfjord and north of 75° lat. N.

— *rupestris*; see p. 28.

*Sedum Rosea*; map fig. 54 in BÖCHER 1938; goes inland to Itivdlínguaq.

*Potentilla Crantzii*; map fig. 68 in BÖCHER 1938, to which should be added one station at the head of Søndre Strømfjord; see p. 31.

*Sibbaldia procumbens*; BÖCHER, 1938 p. 137; probably also missing or alpine in the interior of Godthaabsfjord.

*Chamaenerium angustifolium*; BÖCHER 1938, p. 142, map fig. 75.

*Cornus suecica*; BÖCHER 1938, p. 149, map fig. 80. Still found only at one place on the coast north of 66° lat. N.

*Cassiope hypnoides*; BÖCHER 1938, map fig. 84; seems to be absent from Sydostbugten (M. P. PORSILD 1935).

*Loiseleuria procumbens*; BÖCHER 1938, map fig. 88.

*Phyllodoce coerulea*; BÖCHER 1938, map fig. 89.

*Gentiana nivalis*; if anything, it belongs here, although it has been found in the interior of Nordre Strømfjord (fig. 93 in BÖCHER 1938).

*Veronica alpina*; according to M. P. PORSILD 1920 surprisingly scarce in the interior of Nordre Strømfjord. Probably missing completely farther south near Søndre Strømfjord.

*Bartsia alpina*; map fig. 8 in BÖCHER 1933. Very rare at the head of Søndre Strømfjord; see p. 37.

*Antennaria canescens*; not observed at all in the interior of the Søndre Strømfjord area. Is said to be absent from many places in Sydostbugten.

*Taraxacum croceum* coll.; as the preceding species.

*Agrostis borealis*; map fig. 110 in BÖCHER 1938, to which should especially be added one station at the head of Søndre Strømfjord (cp. *Potentilla Crantzii*).



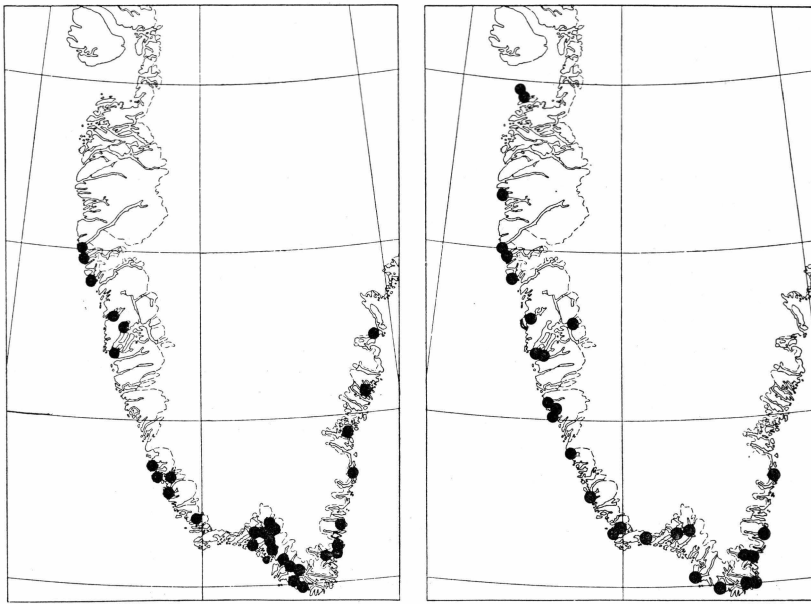


Fig. 30. Greenland ranges of *Carex deflexa* (left) and *Minuartia groenlandica* (right).

*Carex Macloviana*; map fig. 121 in BÖCHER 1938.

*Scirpus caespitosus* ssp. *austriacus*; map fig. 128 in BÖCHER 1938, to which should be added one alpine station in the interior (Loc. 8; cf. p. 57).

*Juncus trifidus*; very rare in Nordre Strømfjord and Nordre Isortoq; not found in the continental area around Søndre Strømfjord.

*Luzula multiflora* ssp. *frigida*; figs. 4—5 in BÖCHER 1950.

I (3) Southern, particularly subarctic species found south and west of the head of Søndre Strømfjord, i.e. species with an oblique northern limit from the interior of Godthaabsfjord in the direction of Holsteinsborg; cf. BÖCHER 1949 b.

*Botrychium lunaria*; BÖCHER 1938, map fig. 17, to which should be added the locality Pá (66°).

*Dryopteris austriaca* coll.

*Thelypteris Dryopteris* (*Dryopteris Linnaeana*); BÖCHER 1938, map fig. 21.

*Polystichum Lonchitis*; BÖCHER 1938, map fig. 22.

*Minuartia groenlandica*; see fig. 30.

*Sagina Linnaei*; BÖCHER 1938, map fig. 37.

*Stellaria calycantha*.

*Coptis trifolia*; BÖCHER 1938, map fig. 40, to which should be added localities 10, 12, 14.

*Saxifraga stellaris*; BÖCHER 1938, map fig. 57. One dubious station in Nordre Strømfjord (acc. to M. P. PORSILD, 1920, p. 93).

*Alchemilla alpina*; BÖCHER 1938, map fig. 60.

— *glomerulans*; BÖCHER 1933, map fig. 10.

— *filicaulis*; BÖCHER 1938, map fig. 64.

*Epilobium anagallidifolium*; BÖCHER 1938, map fig. 77.

— *Hornemannii*.

*Pirola minor*; BÖCHER 1938, map fig. 83.

*Ledum groenlandicum*; see p. 33 and fig. 14.

*Thymus Drucei*; BÖCHER 1938, map fig. 95, 1949b, fig. 5.

*Veronica fruticans*; BÖCHER 1938, map fig. 100.

*Antennaria Hansii* (= *A. groenlandica*).

*Erigeron uniflorus*.

*Gnaphalium norvegicum*; Northern limit on the mainland at 66°, Pá, Loc. 12; cf. Table 1. Rare in the interior of Godthaabsfjord (Kaumarnit valley, LANGE 1886, p. 148).

— *supinum*; maps fig. 54 in SEIDENFADEN & SØRENSEN 1937 and fig. 108 in BÖCHER 1938.

*Hieracium groenlandicum*.

— *hyparcticum*.

*Deschampsia alpina*; map fig. 114 in BÖCHER 1938, to which should be added the localities Pá and Kangâmiut.

— *flexuosa*; fig. 115 in BÖCHER 1938, to which should be added the locality Pá.

*Phleum commutatum*; map fig. 118 in BÖCHER 1938.

*Carex brunnescens*.

— *deflexa*; see fig. 30. Northern limit at Pá (see Table 1).

— *rufina*; see fig. 125 in BÖCHER 1938 and M. P. PORSILD (1946, p. 26).

*Luzula parviflora*; see BÖCHER 1951 c, p. 378.

*Leuchorchis albida* ssp. *straminea*.

*Platanthera hyperborea*.

I (4) Species found in the interior of the Godthaabsfjord (or Søndre Isortoq) area, but absent from the head of Søndre Strømfjord:

*Thelypteris Phegopteris*, *Botrychium boreale*, *Equisetum silvaticum*, *Lycopodium clavatum*, *L. complanatum*, *Salix Uva-ursi*, *Alnus crispa*, *Draba incana*, *Sedum annuum*, *Viola labradorica*, *Myriophyllum alterniflorum* (fig. 32). *Epilobium lactiflorum* (also on Disko), *Veronica Wormskjoldii*, *Rhinanthus groenlandicus*, *Zostera marina*, *Luzula multiflora*, *Festuca vivipara hirsuta*, *Vahlodea atropurpurea*, *Roegneria Doniana* var. *virescens* (cf. maps in BÖCHER 1938 and 1950, MELDERIS 1950, fig. 5).

I(5) Species found south of Søndre Strømfjord and from Disko Bugt northwards, but so far not between these areas: *Arenaria humifusa*; isolated in South Greenland according to POLUNIN 1943.

*Sagina caespitosa*; Godthaab (Tab. 1), Godthaabsfjord and southwards.

I(6) Species like I(5), but not found south of Disko Bugt: *Minuartia stricta*; map in GELTING 1934, fig. 32.

Groups I(1)—I(6) include 95 species. A very considerable part of the Greenland flora thus evades the continental Søndre Strømfjord area or is very rare there. The majority of the species mentioned have a connected range in Greenland. Thus it seems most probable that climatic differences are decisive of this evasion of the most continental part of West Greenland. There is a greatly oceanic climate at the mouth of Søndre Strømfjord (see BÖCHER 1949b, p. 8) and a much less oceanic influence at Holsteinsborg only 100 kilometres farther north. Group I(3) is stopped there, partly by a colder, partly by a more continental climate. Group I(4) may probably be stopped by the drought and the winter cold at the head of Søndre Strømfjord. For this group, however, historical factors may also be of importance (see p. 77). The southern limit of Group I(1) is nearly identical with the northern limit of Group I(3). The two groups together encircle the same area as is encircled by Group I(2).

I(7) Isolations on the coastal mountains west of the head of Søndre Strømfjord.

In the Holsteinsborg region there is quite a number of isolated findings, viz. *Cerastium arvense* (WARMING 1886, 1888, p. 31), *Ranunculus acer* (fig. 47 in BÖCHER 1938), *Anemone Richardsonii* (see discussion and map in BÖCHER 1951 c, on which one station in Southwest Keewatin should be added (A. E. PORSILD 1950 in Nat. Museum of Canada; Bulletin 118), *Potentilla Vahliaana* (map fig. 37 in GELTING 1934), *Antennaria intermedia* and *Linnaea borealis* (map in SEIDENFADEN 1933, fig. 23, on which one station in Godthaabsfjord should be added (BÖCHER 1952b)), *Hieracium ivigtutense*, *Pirola secunda* (the latter is otherwise found in Disko and according to TRAPNELL, 1933, at Irsiutalik in Godthaabsfjord) and *Carex praticola* (Qeqertalik, Naujarssuit, 66°44', see M. P. PORSILD 1920, p. 50). Among these *Potentilla Vahliaana* occurs in alpine localities (Table 2) and as the examination of mountain peaks farther north is very defective, it is not excluded that alpine stations may be found which connect the Holsteinsborg locality with the stations farther north. If these 9 species are added to those mentioned above as found

only on the outer coast (in Groups I(1)—I(3)), we get an absolute floristic decline from the coast towards the inland of 73 species, to which, if we are to consider a decreasing frequency towards the continental area, should be added still more, viz. *Salix herbacea* and similar species mentioned under Groups I(2)—I(3) and such species as *Poa alpina*, *Luzula spicata*, *Diapensia lapponica*, *Ranunculus pygmaeus*, and *Thalictrum alpinum*, about 15 species in all.

## II. Species absent or very rare on the coastal mountains outside or southwest of the Strømfjord inland area.

In Sydostbugten the continental inland around the Strømfjords is connected with relatively continental coastland and farther north with the Nûgssuaq area. A number of species seem to be distributed in the regions around Disko Bugt and Umanak Fjord and from there penetrate into the pocket between the inland ice and the maritime coastal mountains from 66° lat. N. to Egedesminde. Other species are found only in the pocket and others again only in the pocket and the innermost part of Godthaabsfjord. The distribution of *Pedicularis labradorica* (fig. 19) offers a particularly good picture of a species which nearly fills in the whole of the area encircled by the species mentioned in the preceding section, Groups I(1), (2), and (3). A similar case is that of the distribution of *Draba lanceolata* (fig. 31). However, there are also southern species which north of Godthaabsfjord become distinct inland species, presumably because they require great summer heat. This is evidently the case of *Menyanthes trifoliata*, fig. 17. There are also several species with an extremely small area in the interior of the Søndre Strømfjord area. Starting from these very small isolated continental areas we shall, like HULTÉN, try to arrange the areas of the species progressively until we reach such species as have their main distribution in the continental area, but which reach the coastal mountains.

II (1) Species isolated in the continental area of the Strømfjords:

*Torularia humilis*; see BÖCHER 1950, fig. 10.

*Potentilla* sp. ad *Hookeriana*; see p. 30.

*Arctostaphylos Uva-ursi*; see BÖCHER 1951c, fig. 5.

*Utricularia intermedia*; see fig. 33; head of Nordre Strømfjord—Arfersiorfik Fjord.

*Carex amblyorhyncha* (excluding ssp. *pseudolagopina* (Th. Sör.)), see BÖCHER 1952a. Only at the head of Søndre Strømfjord.

— *capitata* (excluding ssp. *arctogena* (H. Smith)), see BÖCHER 1950, fig. 1. Only at the head of Søndre Strømfjord.

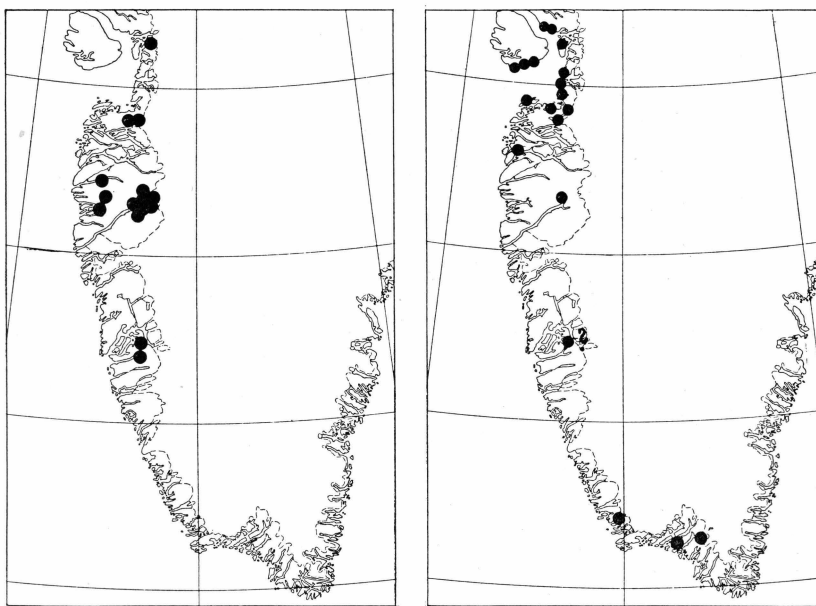


Fig. 31. Greenland ranges of *Draba lanceolata* (left) and *Potamogeton pusillus* ssp. *groenlandicus*.

II (2) Species like II (1), but also found a little farther north or south in the continental area of West Greenland.

*Ranunculus Cymbalaria*; Søndre Strømfjord—Godthaabsfjord.

*Gentiana tenella*; see p. 37 and SEIDENFADEN & SØRENSEN (1937, map fig. 51). Also in Northeast Greenland.

*Taraxacum umbrinum*; the head of Søndre Strømfjord—the head of Evighedsfjord.

*Sisyrinchium montanum*; Søndre Strømfjord—Godthaabsfjord.

II (3) Species like II (1) which, with rather wide distribution northwards to Disko Bugt or Umanak Fjord, are very rare or completely absent south of 66° lat. N.

*Draba lanceolata*; fig. 31; found in Godthaabsfjord.

*Primula stricta*; map fig. 15 in BÖCHER 1950; found in Godthaabsfjord.

*Pedicularis labradorica*; fig. 19; found in Godthaabsfjord.

*Luzula groenlandica*; map. fig. 6 in BÖCHER 1950; found in Godthaabsfjord.

*Ranunculus pedatifidus*; fig. 7 above and fig. 40 in BÖCHER 1938. If the northern types within this complex are considered as an independent species, the type found in the Strømfjord area will belong to group II (1).

*Braya linearis*; see pp. 25—26; also in Northeast Greenland.

*Epilobium davuricum* var. *arcticum*. Rare and only found as component of a hybrid, cf. p. 32.

*Myriophyllum spicatum* ssp. *exalbescens*; fig. 32.

*Utricularia ochroleuca*; fig. 33.

*Puccinellia deschampsoides*; see SØRENSEN 1953.

*Carex holostoma*; fig. 32. Reaches the outer coast at Egedesminde.

— *capillaris* ssp. *robustior*; see p. 53.

II (4) Species like II (3), but furthermore occurring in the interior of Godthaabsfjord and sometimes in the interior of the large South Greenland fjords and often—although with reduced frequency—reaching the coastal mountains outside the Strømfjords.

*Ranunculus lapponicus*; fig. 4 in BÖCHER 1951c.

*Arabis Holboellii*; fig. 49 in BÖCHER 1938.

*Halimolobos mollis*; fig. 8 in BÖCHER 1951c.

*Ledum palustre* ssp. *decumbens*, see map fig. 14.

*Artemisia borealis*; fig. 4 in BÖCHER 1951c.

*Kobresia simpliciuscula*; fig. 3 in BÖCHER 1951c.

*Calamagrostis lapponica* ssp. *groenlandica*.

*Carex norvegica* ssp. *inserrulata*, see KALELA 1944, pp. 8—29.

— *microglochin*; fig. 122 in BÖCHER 1938, to which should be added two stations from the head of Søndre Strømfjord.

— *supina*; fig. 127 in BÖCHER 1938, where the whole inland at Søndre Strømfjord ought to be full of dots.

— *glacialis*; fig. 124 in BÖCHER 1938, supplemented by stations in Table 1. One maritime station at Godthaab.

— *bicolor*; not found in the coastal mountains south of 67°57' lat. N.

*Juncus castaneus*; fig. 130 in BÖCHER 1938, supplemented by stations in Table 1.

*Potamogeton pusillus* ssp. *groenlandicus*; fig. 31; not typical in this group.

*Heleocharis acicularis*; fig. 20; not typical in this group.

II (5) Arctic plants reaching the Thule district and sometimes Peary Land and receding from the outer coast in the area between Disko Bugt and Evighedsfjord:

(a) Not found south of Evighedsfjord:

*Dryopteris fragrans*; map fig. 18 in BÖCHER 1938 and Table 1.

*Melandrium affine*; southern limit Itivdlínguaq, cf. Table 1.

*Draba cinerea*; southern limit Itivdleq, see EKMAN 1929, p. 486.

*Lesquerella arctica*; southern limit: Ørkendalen.

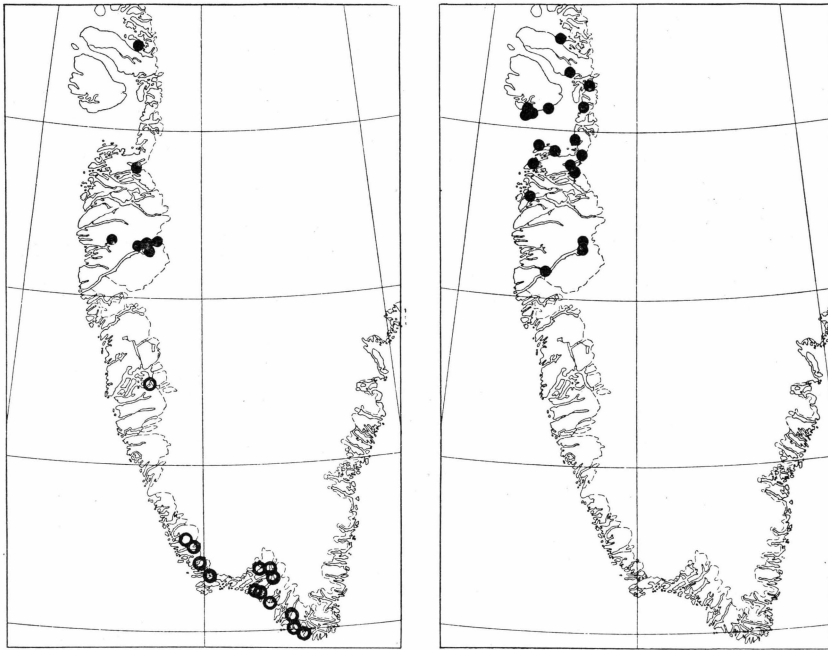


Fig. 32. Greenland ranges of *Myriophyllum spicatum* ssp. *exalbescens* (left, solid dots), *Myriophyllum alterniflorum* (left, open rings), and *Carex holostoma* (right).

*Potentilla Chamissonis*; southern limit Itivdlínguaq (doubtful specimen collected by Wormskjold at Sukkertoppen).

— *pulchella*; southern limit Ravneklippen in Loc. 7.

*Pedicularis lanata*; map fig. 19, Table 1.

*Antennaria Ekmaniana*; map in A. E. PORSILD 1950, p. 8, supplemented by the stations in Table 1.

*Calamagrostis purpurascens*; southern limit probably Itivdlínguaq.

*Carex rupestris*; cf. p. 55.

— *ursina*; cf. p. 56.

— *misandra*; cf. p. 55.

*Luzula arctica*; see map fig. 29.

*Tofieldia coccinea*; map fig. 135 in BÖCHER 1938, to which two stations in Søndre Strømfjord should be added.

(b) Southern limit south of Evighedsfjord:

*Melandrium triflorum*; southern limit in the region about Sukkertoppen (Hollbøll), probably in the interior of one of the fjords.

*Draba hirta*.

*Potentilla nivea*; south of Evighedsfjord very rare in the coastal moun-

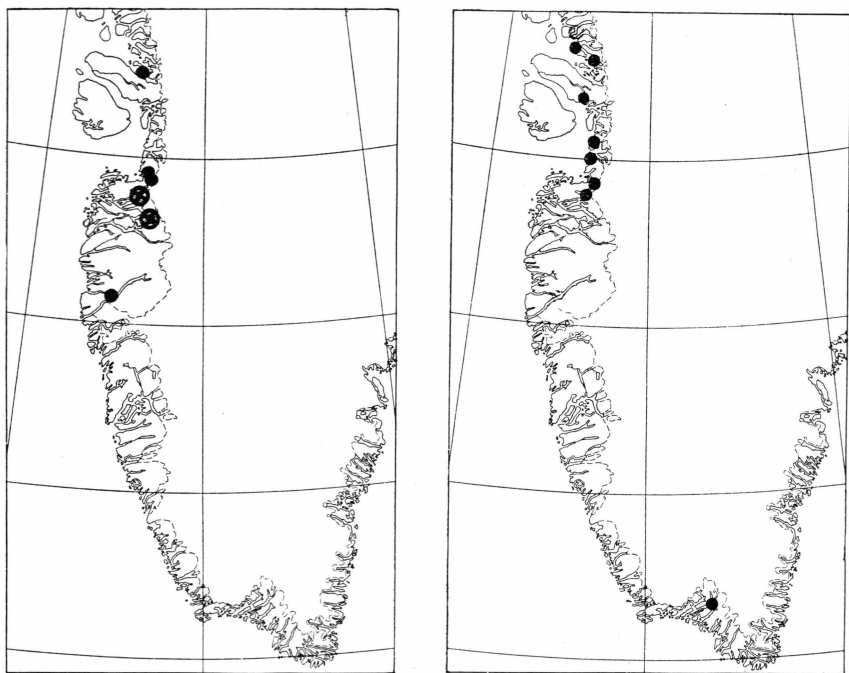


Fig. 33. *Utricularia* in Greenland. To the left: *U. ochroleuca* (small solid dots), *U. intermedia* (rings with cross). On the right: *U. minor*.

tains (Tovkusak,  $64^{\circ}52'$ , and Ivigtut). HULTÉN's map (1945 p.143) lacks many stations in Godthaabsfjord.

*Saxifraga tricuspidata*; maps in GELTING 1934, fig. 38, BÖCHER 1938, fig. 58.

*Cassiope tetragona*; map fig. 12 in BÖCHER 1933, supplemented by i. a. stations in Table 1.

*Arnica alpina*; map fig. 11 in BÖCHER 1933, supplemented with later findings.

*Erigeron compositus*; map fig. 106 in BÖCHER 1938 and material in Table 1.

*Taraxacum lacerum*; several stations in the interior of the large South Greenland fjords; in the coastland not found south of the Holsteinborg region. Perhaps missing in Godthaabsfjord (cf. Group II (7)).

The last two groups form a contrast to Group I(3). The majority of the species show only a decreasing frequency from the inland towards the coast and do not contribute much to the absolute floristic decline from the inland towards the coast. This amounts to 29 species (Groups II(4)—II(3) and 7 species in Groups II(4)—II(5)), to which should be added the following groups, which cannot be arranged progressively.



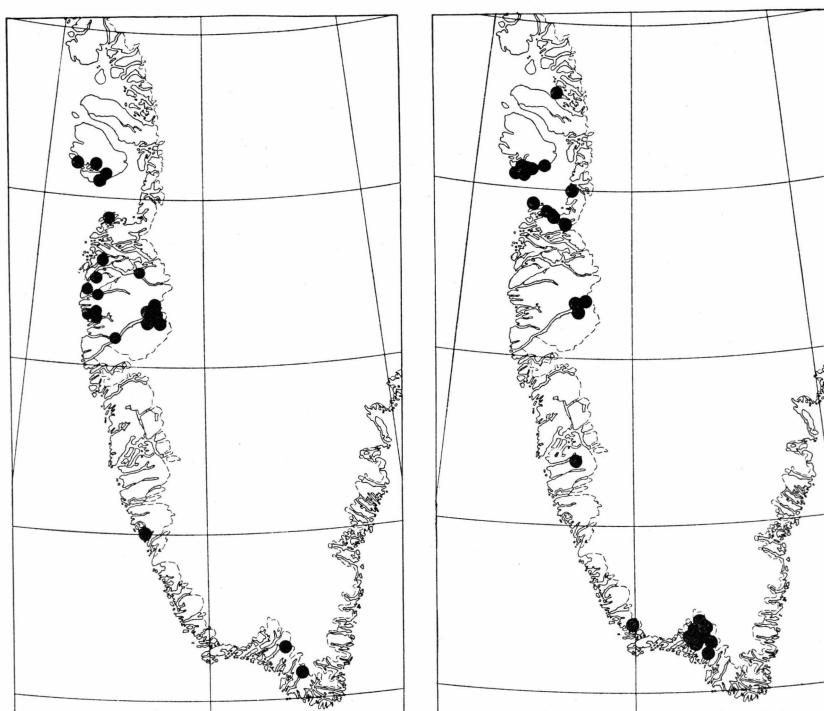


Fig. 34. Greenland ranges of *Equisetum scirpoides* (left) and *Carex gynocrates* (right).

II (6) Species in the inland around the Strømfjords which are also found in South Greenland and occasionally in Godthaabsfjord as well:

Not found in Godthaabsfjord:

*Rorippa islandica*; see p. 29.

*Potamogeton gramineus*; fig. 22.

*Roegneria violacea*; MELDERIS 1950 and fig. 11 in BÖCHER 1950.

*Scirpus pauciflorus*; fig. 11 in BÖCHER 1950.

*Gentiana detonsa*; fig. 12 in BÖCHER 1950; very rare in Northeast Greenland

*Juncus ranarius* (*J. bufonius* var. *halophilus*); fig. 13 in BÖCHER 1950; very rare in Northeast Greenland.

Found in Godthaabsfjord:

*Menyanthes trifoliata*; fig. 17.

*Galium Brandegei*; fig. 28.

*Potamogeton alpinus* ssp. *tenuifolius*; fig. 22.

*Agrostis canina*.

*Juncus alpinus* ssp. *nodulosus*; fig. 28.

*Orchis rotundifolia*.

*Menyanthes trifoliata* is a good example of a species which in a northward direction recedes more and more from the outer coast. In the northernmost part of the area of distribution *Potentilla palustris* and *Juniperus communis* var. *montana* behave in a similar way; see BÖCHER 1938, maps figs. 69 and 27.

II (7) Species in the inland around the Strømfjords, otherwise both in South Greenland and on Disko-Umanak Fjord, but not in Godthaabsfjord or very rare there:

*Equisetum scirpoides*; fig. 34. One station at Kangårssuk south of Fiske-næsset.

*Arabis arenicola*; fig. 9. Also in Northeast Greenland.

*Gentiana aurea*; fig. 14 in BÖCHER 1950.

*Utricularia minor*; fig. 33. Only around the innermost branches of Arfersiorfik Fjord.

*Antennaria affinis*; fig. 20.

*Carex gynocrates*; fig. 34. One station on Ameralik Fjord in the Godthaab region.

To this group *Carex maritima* may further be referred, although it has three scattered maritime stations south of 66° lat. N. It occurs inland in South Greenland and reaches 79°47' in North Greenland but was never found in the Godthaab region.

Both Group II(6) and Group II(7) participate in the floristic decline towards the coast. This may then be taken to involve 47 species, as against 73 species in the opposite direction. If we consider the decrease in frequency in the two directions, there will be a very considerable floristic difference, as in the direction towards the inland we get about 88 species and towards the coast about 77 species, i. e. that a total of 165 species or more than one third of the whole flora of Greenland participates in forming this plant-geographic boundary.

#### Species missing south of Søndre Strømfjord.

This group is in contrast to Group I(4), which has its northern limit about the great firn east of Evighedsfjord at 66° lat. N. In the first place they are northern species: Group II(5)a (p. 72) or low-arctic continental species (several species within Group II(3)) to which, however, should be added such southern species as *Utricularia ochroleuca* (fig. 33), *Myriophyllum spicatum* ssp. *exalbescens* (fig. 32), and the isolated occurrences mentioned under II(1).

There is a very large number of peculiarities about the floristic boundary which coincides with the mentioned firn near Evighedsfjord. North of it we find e. g. *Arctostaphylos Uva-ursi* in a small isolated area,

and south of it *A. alpina*, which according to GELTING (1934, fig. 34) is tricentric in Greenland. This boundary seems largely to be conditioned by historical conditions, e. g. isolation during the last Glacial Age of a number of species north of the firn, which then must have had a much wider extension. The firn, on the other hand, also produces a great climatic contrast between the two inland areas north and south of it. It must be supposed to stop depressions coming from the south, so the inland north of it becomes much more continental from a climatic point of view.

Differences in frequency north and south of the firn with great certainty point to the great climatic contrast between Godthaabsfjord and Søndre Strømfjord. A comparison between localities 1—10 in Table 1 and localities 2—7 in the table in M. P. PORSILD (1935, pp. 58—61) shows e. g. the following differences expressed in percentage occurrence within all localities and frequency in the localities:

	Godthaabsfjord	Søndre Strømfjord
<i>Lycopodium annotinum</i> .....	50 (very common)	20 (rare, alpine)
<i>Potentilla Crantzii</i> .....	100 (very common)	10 (very rare)
<i>Ledum groenlandicum</i> .....	100 (very common)	30 (rare)
<i>Bartsia alpina</i> .....	80 (common)	40 (rare)
<i>Carex Lachenalii</i> .....	80 (common)	10 (rare, alpine)
<i>Luzula spicata</i> .....	100 (common)	30 (rare)
<i>Ledum palustre</i> ssp. <i>decumbens</i> .....	50 (common)	100 (abundant)
<i>Pedicularis labradorica</i> .....	10 (common)	80 (very common)
<i>Artemisia borealis</i> .....	50 (common)	100 (abundant)
<i>Ranunculus lapponicus</i> .....	20 (common)	100 (very common)
<i>Carex supina</i> ssp. <i>spaniocarpa</i> .....	50 (rare-common)	100 (abundant)

### C. Floristic Provinces and Districts in the Central and Southern Part of Greenland.

In (1933) I pointed out the occurrence of a floristic boundary in East Greenland at about 68°30', and later, more thorough investigations (1938, p. 294) further supported the importance of this boundary. Material from the Kangerdlugssuaq area in East Greenland collected by Dr. H. G. Wager which I have recently had an opportunity to determine, shows that a still greater number of species than previously known participates in the formation of this floristic main boundary in East Greenland.

A fairly large number of the species forming the East Greenland boundary about 68°30' are the same as those forming the above-mentioned West Greenland boundary. Among them are such species as

*Polystichum Lonchitis*, *Thymus Drucei*, *Pirola minor*, *Alchemilla alpina*, *Phleum commutatum*, *Scirpus caespitosus* ssp. *austriacus*, which have northern limits here and e. g. the following which have southern limits: *Dryas octopetala* ssp. *punctata*, *Stellaria crassifolia*, *Draba alpina*, *D. Gredinii*, *Ranunculus sulphureus*, *R. pedatifidus*, *Potentilla nivea*, and *Calamagrostis purpurascens*, to which should be added south-going frequency limits of e. g. *Cassiope tetragona* and *Arnica alpina*.

In BÖCHER 1938 (p. 305) an attempt has been made at drawing a plant-geographical map of Greenland. A dotted line marks a southern coastal zone with predominance of oceanic species and a northern zone which in the south wedges in behind the coastal zone and which is characterized by continental species. This line nearly coincides with the northern limit of Group I(3) and the southern limit of Group II, particularly Subgroups (4)—(5); but it seems that it should be shifted somewhat towards the northeast so that it crosses the innermost part of Godthaabsfjord and reaches the coast at Holsteinsborg. In the same way Regions e and f should meet a little farther north, at Holsteinsborg (these regions correspond to Subgroups I(1) and I(3) mentioned above). But on the whole the schematic survey map of 1938 is in agreement with experiences reaped during the Botanical Expedition of 1946, only that the subarctic area must be extended northwards to the lowlands in the innermost parts of the country around 67° lat. N. (cf. BÖCHER 1949b, p. 21).

Fig. 35 is an attempt at a division of the southern and central part of Greenland into floristic provinces. It is based on the existing material of distribution.

As for West Greenland, there is a well-defined floristic boundary at Cape Thorvaldsen dividing South Greenland (S) from Southwest Greenland (SW). Both provinces have an oceanic tendency, as even the innermost branches of the South Greenland fjords have a predominance of species with an oceanic tendency; but South Greenland has a very great independent contingent of species (e. g. *Juncus squarrosus*, map in BÖCHER 1938, fig. 130, *Carex Lyngbyei*, *C. Goodenoughii*, *Hierochloa odorata* (GRØNTVED 1937), *Potamogeton natans* (POLUNIN 1943), *Lathyrus maritimus* (map fig. 71 in BÖCHER 1938), *Drosera rotundifolia*, and *Cornus canadensis*). Within the province SW there are clear subsections: a southern district, SWs, has a suitable boundary at the Frederikshaab Isblink, which marks the northern limit of *Juncus filiformis*, *Carex stylosa*, *C. atrata*, *Hieracium alpinum*, and *Dryopteris Filix-mas*, and the southern limit of *Juncus castaneus* (maps in BÖCHER 1938, figs. 20, 109, 120, 123, 130, 131). SWm is well demarcated by numerous northern limits (cf. Subgroup I(3)) and several southern limits (cf. Subgroup I(1)). The northern coastal section, SWn, is a strange mixed area for high

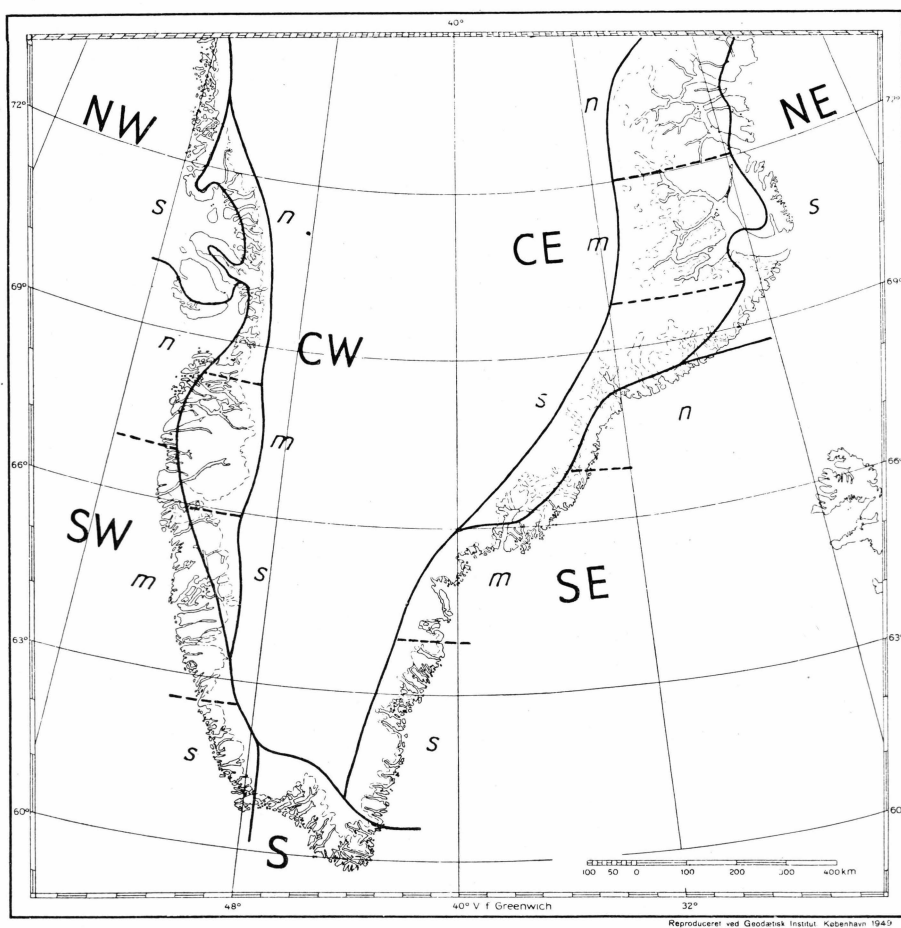


Fig. 35. Map of the central and southern part of Greenland showing floristic provinces and districts (see text).

arctic and subarctic plants, as a number of southern species with their northern limits nearly at Holsteinsborg on the mainland also occur farther north, in South Disko, and a number of northern species reach both South Disko and Egedesminde Skærgård (e. g. *Carex stans*, *Ranunculus sulphureus*).

Behind the SW province and the southern part of the NW province we then find the central West Greenland floristic province with its continental tendency, in the heart of which the continental parts of the Søndre Strømfjord area are situated. This province has been called CW and has a well-defined southern district (CWs), which comprises the innermost part of the country south of the great firn near Evighedsfjord and which is floristically separated from the northern district by the northern limit of the I(4)-species and the southern limit of the

species mentioned above on p. 76 (see also the map for *Luzula arctica*, fig. 29). The central district CWm has been sufficiently illustrated through the plant-geographical account above. The boundaries of the northern district CWn have been drawn to the best of my judgment on the basis of our present knowledge. A more detailed account of these regions must be left to Dr. P. Gelting, who is working in the Disko area, and Mr. Knud Jakobsen, M. Sc., who is working up the flora of CWn and NWs.

The work at dividing Greenland into plant-geographical provinces naturally coincides with the detailed floristic work, and the division into districts and provinces therefore in spite of our present rather comprehensive knowledge of the flora of Greenland is not definitive, but may be expected to be changed here and there according as more floristic analyses of details become available.

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## SUMMARY

### (1) Species or subspecies new to Greenland:

*Selaginella rupestris*; see BÖCHER 1948.

*Taraxacum umbrinum*; see p. 43.

— *campylodes*; see p. 43.

*Carex amblyorhyncha* ssp. *amblyorhyncha*; see BÖCHER 1952 a.

### (2) New systematic combinations and units:

*Salix glauca* L. ssp. *callicarpaea* (Trautv.); see p. 19.

*Viscaria alpina* (L.) G. Don. f. *chrysochloa*; see p. 22.

*Draba cinerea* Adams, ssp. *groenlandica* (Ekman); see p. 27.

*Empetrum nigrum* L. ssp. *hermaphroditum* (Hagerup); see p. 35.

*Bartsia alpina* L. f. *rosea*; see p. 38.

*Potamogeton pusillus* ssp. *groenlandicus* (Hagstr.); see p. 44.

*Poa pratensis* L. var. *gelida* (Roemer & Schultes); see p. 48.

*Carex Bigelowii* Torr. ssp. *hyperborea* (Drej.); see p. 50.

— *capillaris* L. ssp. *robustior* (Lange ex Drejer); see p. 51.

— *capillaris* L. ssp. *Krausei* (Boeck.); see p. 52.

— *capillaris* L. ssp. *Porsildiana* (Polunin); p. 52.

— *capitata* L. ssp. *arctogena* (H. Smith); see p. 54.

*Luzula groenlandica*; see previous account in BÖCHER 1950.

### (3) Range extensions:

Northern limit shifted: *Ranunculus Cymbalaria*, *Galium Brandegei*, *Erigeron boreale*, *Gnaphalium norvegicum*, *Carex deflexa*, *Scirpus pauciflorus*, *Juncus alpinus* ssp. *nodulosus*, *Sisyrinchium montanum*.

Southern limit shifted: *Lesquerella arctica*, *Potentilla hyparctica*, *Epilobium davuricum* var. *arcticum* (only as component in a hybrid; see p. 32), *Pedicularis lanata*, *Utricularia ochroleuca*, *Antennaria Ekmaniana*, *Carex holostoma*, *Luzula arctica*, *Dryopteris fragrans*.

Filling-in of gaps: *Epilobium palustre*, *Gentiana aurea*, *Potamogeton pusillus* ssp. *groenlandicus*, *Carex bicolor*, *Heleocharis acicularis*.

- (4) The continental area around Søndre Strømfjord harbours nearly 200 species of vascular plants. There is a great difference between the highland and the lowland flora, of which the latter has a subarctic-continental tendency. There is a great floristic decline from the coastal mountains towards the inland and *vice versa* and a rather great decline from the interior of Godthaabsfjord to Søndre Strømfjord or *vice versa*. On the basis of the available floristic material the southernmost and central Greenland is divided into floristic provinces, which, again, are subdivided into districts.
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