

MEDDELELSER OM GRØNLAND

UDGIVNE AF

KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND

Bd. 104 · Nr. 7.

THE SCORESBY SOUND COMMITTEE'S 2ND EAST GREENLAND
EXPEDITION IN 1932 TO KING CHRISTIAN IX's LAND

LEADER: EJNAR MIKKELSEN

M O S S E S

BY

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WITH 11 FIGURES IN THE TEXT AND 1 PLATE

KØBENHAVN

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BIANCO LUNOS BOGTRYKKERIA/S

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INTRODUCTION

The present work furnishes a list of mosses collected by T. BÖCHER in Christian IX's Land, in the summer of 1932.

It further gives a summary of the principal communities of plants, in which the mosses are grouped and, as far as the material permits, an account of the ecological and sociological conditions.

SURVEY OF THE LOCALITIES

Mosses have been collected from 16 localities situated between lat. 69°30' and lat. 65°37' N.

Fjord North of Cape Dalton, lat. 69°30' N.

Vegetation, resembling herb-field, in winter covered by snow. The following mosses were found:

Pohlia nutans, *Lophozia quinqueidentata*, *Anthelia Juratzkana* and *Scapania scandica*, of which the last-mentioned is previously only recorded from three localities in Greenland.

Cape Dalton, lat. 69°25' N.

Luxuriant herb-field with a rich vegetation of mosses, the species identified being more particularly: *Asterella Ludwigii*, *Brachythecium albicans* var. *groenlandicum*, *Encalypta rhabdocarpa* and *Bryum purpurascens*. Other species recorded were: *Drepanocladus uncinatus*, *Aulacomnium palustre* and *Polytrichum alpinum* with var. *septrionale*.

In the mountain large moss-moors with a dense vegetation consisting of *Paludella squarrosa*, *Aulacomnium palustre*, *Drepanocladus exannulatus* var. *brachydictyus* fo. *orthophylla* and *Polytrichum juniperinum*; among these grew: *Dicranum fuscescens* var. *congestum*, *Pohlia nutans*, *Cinclidium hymenophyllum* and *Lophozia quinqueidentata*. *Cinclidium hymenophyllum*, which has an arctic distribution is previously only known from two localities in West Greenland, viz. Upernivik and Klaushavn.

Further, collections have been made on an alluvial fan ("new soil") with heath vegetation, rather sparsely covered by mosses and consisting of: *Drepanocladus revolvens*, *Dicranum scoparium* var. *orthophyllum*, *Rhacomitrium canescens*, *Conostomum tetragonum*, *Aulacomnium turgidum*, *Timmia bavarica* and *Polytrichum alpinum* var. *septrionale*. *Timmia bavarica* seems to be sparsely represented in Greenland; on the east coast it is recorded from Scoresby Sound.

Cape Ewart, lat. 69°20' N.

Open *Cassiope*-heath with cushions of *Rhacomitrium canescens*. In the heath furthermore occurred *Drepanocladus uncinatus*, *Dicranum scoparium* and *Scapania mucronata*, which is new to East Greenland.

Special interest attaches to the find of *Sauteria alpina*, which is here characteristic of the moving soil, an area, which is otherwise very nearly devoid of plants.

Knighton Bay, lat. 69°18' N.

The collections of mosses were here made round a hot spring (about 50° C.) and comprise a number of interesting finds:

Sphagnum quinquefarium fo. *ano-orthoc'ada coerulescens*, *Drepanocladus lycopodioides*, *D. uncinatus* var. *subjulaceus* fo. *orthophylla*, *Calliergon stramineum*, *Hylocomium proliferum*, *Aulacomnium palustre* and among these *Dicranum Sendtneri*, *Cinclidium subrotundum* and *Polytrichum gracile* var. *anomalum*, which is new to the Greenland flora.

Cape Barclay, lat. 69°15' N.

From here only a single sample: *Andreaea Blyttii* on basalt rocks; new to East Greenland: recorded from three localities in West Greenland round the island of Disko and otherwise known from Spitzbergen and Arctic North-America.

Barclay Bay, lat. 69°15' N.

Open heaths with *Cassiope tetragona* and *Vaccinium uliginosum*. Only a few samples of mosses: (*D*₃) *Aulacomnium palustre*.

Also here, on moving soil *Sauteria alpina*, in company with *Bryum inclinatum*.

D'Aunay Bay, lat. 69°05' N.

Samples of mosses collected in rather moist *Salix*-heath with depressions of the nature of snow-patches, where also *Anthelia Juratzkana* occurs together with *Blepharostoma trichophyllum*, *Lophozia Kunzeana*, *Cephaloziella* sp. and *Oncophorus virens*; also, *Pohlia nutans*, *Bryum cirratum*, *Aulacomnium palustre* and *Polytrichum juniperinum* were collected.

Cape Beaupré, lat. 68°48' N.

A few samples of mosses taken near a hot spring (38° C.). The samples contained *Aulacomnium palustre* with *Lophozia Hatcheri*, which was somewhat irregularly developed, and this also holds good of *Mniobryum albicans* var. *glaciale*; furthermore, *Marchantia polymorpha* var. *alpestris* was represented by a great number of specimens.

Cape Daussy, lat. 68°43' N.

The country was covered by heaths, chiefly on moving soil, whereas herb-fields were lacking. *Anthelia Juratzkana* and *Blepharostoma trichophyllum*, which have been found here, suggest a snow cover of long duration, and together with these were found *Drepanocladus revolvens*, *Dicranum Sendtneri*, *Pohlia nutans* var. *angustirete*, *Bryum purpurascens*, *Polytrichum alpinum* and *Rhacomitrium Jensenii*, which until then were only known from Serketnoua in south-eastern Greenland.

Rhacomitrium canescens formed cushions in heaths on the mountain.

In moss-moors on the mountain *Sphagnum plumulosum* was found, being accompanied by *Camptothecium trichoides*, *Drepanocladus uncinatus*, *Philonotis* sp. and *Lophozia quinqueidentata*.

In the lowlands numerous samples were taken from moss-moor in connection with melting (perennial?) snowdrifts. Nearest the snow the soil was very wet, and the mosses taken here were: *Sphagnum plumulosum*, *Drepanocladus revolvens* and *Calliergon stramineum*. This formation gradually passed into a heath-like vegetation, which in its turn passed into lichen-heath and then into moss-tuft vegetation (figs. 9 and 10). Between the tufts the following species were taken: *Paludella squarrosa*, *Calliergon turgescens*, *C. stramineum*, *C. sarmentosum*, *Drepanocladus revolvens*, *Oncophorus Wahlenbergii*, *Fissidens osmundoides* and *Blepharostoma trichophyllum*. The tufts consisted of *Sphagnum plumulosum*, *Paludella squarrosa*, *Aulacomnium palustre*, *A. turgidum* with *Drepanocladus badius*, *Calliergon stramineum*, *Dicranum scoparium* var. *orthophyllum*, *Pohlia nutans*, *Polytrichum juniperinum*, *Lophozia Kunzeana* and *Cephalozia connivens*.

In dried-up moors were found *Drepanocladus revolvens*, *Calliergon turgescens*, *C. sarmentosum* and *Oncophorus Wahlenbergii*; the most common higher plants were *Salix herbacea* and *Equisetum arvense* fo. *riparia*.

Fjord north of Cape Ravn, lat. 68°31' N.

Here a number of interesting mosses were collected from various areas of vegetation.

In the moss-moors *Sphagnum plumulosum* and *Aulacomnium palustre* were again met with, being accompanied by *Drepanocladus lycopodioides*, *Cratoneurum glaucum*, *Philonotis calcarea* (which is new to Greenland) and *P. seriata*; all of these are new to the east coast; further, *Pohlia nutans*, *Dicranum fuscescens*, *Polytrichum alpinum* and the following hepatics: *Lophozia lycopodioides*, *L. barbata*, *Scapania hyperborea* and *Riccardia pinguis* (fig. 11).

A few samples from moist willow vegetation contained *Dre-*

panocladus uncinatus, *Camptothecium trichoides*, *Philonotis calcarea*, *Pohlia nutans* and *Lophozia quinquedentata*.

In wet and clayey soil in Scirpetum the following species were found: *Drepanocladus lycopodioides*, *Bryum cirratum*, *Philonotis tomentella*, *Aulacomnium palustre*, *Nardia scalaris*, *Scapania hyperborea* and *Cephaloziella* sp.

In the herb-field there was a rich vegetation of hepatics consisting of *Asterella Ludwigii*, *Aplozia sphaerocarpa* var. *nana*, *Lophozia quadri-loba*, *Scapania hyperborea* and *Cephaloziella Starkii*.

Along the rivers: *Calliergon sarmentosum*, *Pohlia nutans*, *Mniobryum albicans* and *Philonotis calcarea*.

And finally there is some very sparse material from a nunatak behind the glaciers at the head of the fjord, containing *Drepanocladus uncinatus*, *Mniobryum albicans* and *Philonotis calcarea*.

Kangerdlugssuak.

Mikis Fjord, lat. 68°10' N.

Mosses from a "terminal moraine island" ("new soil"): *Drepanocladus revolvens* and *Polytrichum* sp. (sample lacking).

In snow-patches *Polytrichum sexangulare* covered large areas (fig. 7).

Drepanocladus exannulatus formed a thick covering in the river at the head of the fjord.

From ruin of Eskimo house (snow-patch) a sample was taken with *Polytrichum alpinum* var. *microdontium*.

Outer Kangerdlugssuak, lat. 68°—68°10' N.

Moist heath at Uttental Sound with *Sphagnum plumulosum* and *Aulacomnium palustre* (as to the other vegetation see T. BÖCHER).

From the snow-patches several samples were taken containing *Anthelia Juratzkana*, *Gymnomitrum corallioides* and *Lophozia alpestris* among *Drepanocladus revolvens*, *D. intermedius* and *Pohlia nutans* (fig. 8).

Along a river were taken: *Drepanocladus exannulatus* var. *brachydictyus*, *Brachythecium glaciale*, *Dicranum fuscescens* var. *congestum*, *Pohlia nutans*, *Pohlia commutata*, *Mniobryum albicans*, *Polytrichum alpinum* and *Lophozia lycopodioides*.

Cape Deichmann, about lat. 68° N.

Fertile southern slope on the west side of the mouth of Kangerdlugssuak with a rich vegetation of hepatics: *Sauteria alpina* and *Lophozia Hatcheri* among *Eurhynchium strigosum* and *Bartramia ityphylla*.

Head of Watkins Fjord, lat. 68°15' N.

Moss-tuft vegetation in mountain 440 m above sea-level, consisting of *Sphagnum plumulosum*, *Aulacomnium palustre*, *A. turgidum*, *Polytrichum juniperinum* and *Lophozia ?ventricosa*. The most important phanerogams were: *Vaccinium uliginosum*, *Salix glauca* and *Carex rigida*; further, the following species were found: *Empetrum nigrum*, *Polygonum viviparum*, *Pedicularis hirsuta*, *Phyllodoce coerulea* and *Carex scirpoidea*.



Fig. 1. Moss-moor in outer Kangerdlugssuak. The light parts are open water.
(After photo taken by Böcher.)

In the dried-up holes *Cassiope hypnoides*, *Salix herbacea* and *Polygonum viviparum*.

In a lake, "Divers' Lake", the bottom was covered by *Drepanocladus aduncus* var. *aquatica*.

East Coast of Kangerdlugssuak, midway of fjord, about lat. 68°20' N.

Moist *Salix*-heath (*Salix glauca*, *S. herbacea*) with depressions of the nature of snow-patches. The mosses found there were: *Aulacomnium palustre*, *Pohlia nutans*, *Oncophorus Wahlenbergii*, *Polytrichum juniperinum*, *Lophozia alpestris* and *Cephalloziella Starkii*.

In dry heath cushions of *Racomitrium hypnoides*.

In river-bed were collected: *Drepanocladus revolvens*, *D. exannulatus*, *D. uncinatus*, *Oncophorus Wahlenbergii*, *Philonotis seriata*, *Pohlia nutans*, *Polytrichum alpinum*, *Cephalozia connivens* and *Cephaloziella* sp.

On a boulder in a mountain lake was found *Calliergon sarmentosum* var. *fontinaloides* which is new to Greenland.

Tugtulik (Lake Fjord), lat. 66°20' N.

Only a single sample of moss was found between the roots of some phanerogams from this locality, the latter containing *Philonotis tomentella* and *Pohlia nutans*.

Tasiusak, lat. 65°37' N.

In moor behind the Angmagssalik settlement *Drepanocladus exannulatus* var. *brachydictyus* was found; *Drepanocladus aduncus* was collected in very moist strand-meadow with *Carex glareosa* and *Stellaria humifusa*.

The vegetation near a pond ("Sparganium Pond") was subjected to detailed investigations; in the pond were found *Drepanocladus aduncus* fo. *pseudofluitans*. In the marginal area of the pond a *Carex rariflora*-Association was found, very rich in mosses and with *Sphagnum Girgensohnii*, *S. plumulosum*, *S. riparium*, *Paludella squarrosa*, *Polytrichum commune* var. *minus*, *P. juniperinum*, *Dicranum scoparium* var. *spadiceum*, *Kiaeria Blyttii* and *Lophozia Kunzeana*; this marginal area passed gradually into a formation resembling high moor, where *Sphagnum Girgensohnii* dominated, accompanied by *Paludella squarrosa*, *Polytrichum commune* var. *minus*, *Cynodontium strumiferum*, *Calliergon stramineum*, *Lophozia porphyroleuca* and *Cephalozia ?bicuspidata*.

This formation passed gradually into lichen-heath with *Dicranum fuscescens*, *Polytrichum juniperinum* and *Lophozia Kunzeana*.

LIST OF THE SPECIES FOUND AND THEIR DISTRIBUTION IN GREENLAND

The total number of samples taken is 116, representing 81 species, of which 24 Hepaticae, 4 Sphagna and 53 Bryales.

New to Greenland are: *Sphagnum quinquefarium*, *Sphagnum plumulosum*, *Philonotis calcarea* and *Polytrichum gracile* var. *anomalum*; new to the east coast are *Riccardia pinguis*, *Scapania mucronata*, *Andreaea Blyttii*, *Cinclidium hymenophyllum*, *Philonotis seriata*, *Cratoneurum glaucum* and *Drepanocladus lycopodioides*.

HEPATICAЕ

1. *Sauteria alpina* NEES.

Cape Ewart on moving soil (c. fr.); Barclay Bay on moving soil (c. fr.) and Cape Deichmann among *Lophozia Hatcheri* and *Eurhynchium strigosum* (sterile).

In West Greenland recorded in a few localities from Upernivik to Kugssuk in Baals Revier; on the east coast known from Cape Seaforth (74°30'), Canning Land (71°45'), Scoresby Sound (about 70°) and Kangerdluluk (61°05').

2. *Asterella Ludwigi* (SCHWÄGR.) UNDERW.

Cape Dalton in herb-field facing south (c. fr.); Cape Ravn in herb-field (c. fr.).

In West Greenland recorded from Upernivik, Sarkak, Godhavn, Aulatsivik Fjord and Egedesminde; on the east coast recorded from Little Pendulum Island (74°30'), Clavering Island, Cape Mary (74°10'), Scoresby Sound, Kakasuak (66°05'), Kangerdluarsikajik (65°57'), Tunok (65°53') and Elvbakker (65°37').

3. *Marchantia polymorpha* L.

Cape Beaupré in hot spring (38° C.) var. *alpestris* NEES (sterile). Occurs here and there in Greenland, on the west coast from Eka-

luarsuit to the southernmost part; on the east coast from Cape Seaforth (74°30') and southwards.

4. **Riccardia pinguis** (L.) GRAY.

Cape Ravn in moss-moor (sterile).

Seems to belong to the species requiring more heat, and hitherto only recorded from the west coast: Prøven, Jacobshavn, Sandbugten and Klaushavn; further, I have found it myself in Engelskmandens Harbour at Godhavn.

5. **Gymnomitrium corallioides** NEES.

Kangerdlugssuak in snow-patch behind the houses (sterile).

This circumpolar species is for West Greenland recorded from Ritenbenk and Godhavn; on the east coast from several localities between 73°30' and 65°37'.

6. **Nardia scalaris** (SCHRAD.) GRAY.

Cape Ravn in *Scirpetum* (see T. BÖCHER) sterile.

Hitherto not recorded from the west coast; on the east coast found on Jern Island (65°37').

7. **Aplozia sphaerocarpa** (HOOK.) DUM.

Cape Ravn in herb-field, var. *nana* (NEES) K. MÜLL., sterile.

Hitherto only recorded from the east coast: Hold-with-Hope (73°30'), Nordost Bay (71°17'), Hurry Inlet (70°51') and Scoresby Sound.

8. **Lophozia Hatcheri** (EVANS) STEPH.

Cape Beaupré in hot spring (38° C.) among *Aulacomnium palustre*; the leaves slightly irregular, with two, three and four lobes (sterile); Cape Deichmann (sterile, c. gon.) among *Eurhynchium strigosum*, several samples.

Found in a few localities in West Greenland: Hackluyt Island (77°24', c. fr. et gon., HARMSSEN and SEIDENFADEN 1932) and Egedesminde; on the east coast in several localities between 74°30' and 65°31'.

9. **Lophozia lycopodioides** (WALLR.) COGN.

Fjord north of Cape Ravn in moss-moor among *Dicranum fuscescens* (sterile); Kangerdlugssuak in river near House 1 among *Dicranum fuscescens* var. *congestum* (sterile).

Here and there in West Greenland between Godhavn and the southern point; on the east coast recorded from Scoresby Sound, but the latter species must undoubtedly be classed with *L. Hatcheri*, seeing that it bears gemmæ; further, it is recorded from Tasiusak and Nenese.

10. **Lophozia quinquedentata** (HUDS.) COGN.

Fjord north of Cape Dalton (sterile); Cape Dalton in mountain moor among *Dicranum fuscescens* (sterile); Cape Daussy in moss-moor 300 m above sea-level (sterile); fjord north of Cape Ravn in moist willow vegetation (sterile).

In West Greenland in several localities between Uvdle (76°35') and the southern point; also on the east coast between 74°30' and 66°58'.

11. **Lophozia quadriloba** (LINDB.) EVANS.

Cape Ravn in herb-field (sterile).

Hitherto not found in West Greenland, but recorded from Nordost Bay, Hurry Inlet and Scoresby Sound in East Greenland.

12. **Lophozia Kunzeana** (HÜB.) EVANS.

D'Aunay Bay in *Salix*-heath (sterile, c. gon.); Cape Daussy in tufts in moor among *Aulacomnium palustre* (sterile); Tasiusak in lichen-heath among *Dicranum fuscescens* and in a formation resembling high-moor among *Dicranum scoparium* and *Kiaeria Blyttii* (sterile).

Previously recorded from Scoresby Sound, Cape Dalton, Ingmikertorajik (65°54'), Tunok (65°53') and Tasiusak on the east coast.

13. **Lophozia barbata** (SCHMID.) DUM.

Fjord north of Cape Ravn in moss-moor among *Drepanocladus lycopodioides* (sterile).

In West Greenland recorded from Hackluyt Island (77°24'), Björling's Island (76°43') and a few localities in the southern part; not previously found in East Greenland.

14. **Lophozia ventricosa** (DICKS.) DUM.

In a sample from moss-tuft vegetation at the head of Watkins Fjord a sterile *Lophozia* species has been found; this species I have, although with some hesitation, referred to this species; among *Aulacomnium palustre*.

It is distributed over the greater part of Greenland.

15. **Lophozia porphyroleuca** (NEES) SCHIFFN.

Tasiusak in a formation resembling high-moor among *Cynodon-
strumiferum* (c. coles. et gon.).

Recorded from Røhss Fjord (72°40'), Scoresby Sound and Ingmikertorajik; as this species is frequently classed as a variety of *L. ventricosa*, no precise information can be given as to its distribution.

16. **Lophozia alpestris** (SCHLEICH.) EVANS.

East coast of Kangerdlugssuak, midway of the fjord in moist heath and in snow-patch (sterile).

Common in West Greenland; less common towards the east.

17. **Scapania mucronata** BUCH.

Cape Ewart in heath among *Dicranum scoparium* var. *orthophyllum* (c. gon.). Hitherto only known from two localities on the west coast: Upernivik and Manitsok at Egedesminde.

18. **Scapania scandica** (ARNELL et BUCH) MACVICAR.

Fjord north of Cape Dalton (sterile).

Like the preceding species only found in a few localities in Greenland; on the west coast: Pandora Harbour (78°14') and Frederikshaab towards the south (61°); on the east coast: Gaasefjord in Scoresby Sound (70°).

19. **Scapania hyperborea** JØRGENSEN.

Cape Ravn in *Scirpetum*, herb-field and moss-moor; all sterile.

Somewhat more frequent than the preceding species; on the west coast: Pandora Harbour, Frederikshaab and Ameralik; on the east coast: Danmark's Island and Hekla Harbour in Scoresby Sound.

20. **Blepharostoma trichophyllum** (L.) DUM.

D'Aunay Bay in *Salix*-heath (sterile); Cape Daussy in heath on moving soil and in moss between the tufts (sterile).

Rather common in Greenland.

21. **Anthelia Juratzkana** (LIMPR.) TREVIS.

Fjord north of Cape Dalton; d'Aunay Bay in *Salix*-heath (c. fr.); Cape Daussy in heath on moving soil; Kangerdlugssuak in snow-patch.

The two *Anthelia* species are distributed over the greater part of Greenland.

A. Juratzkana is not recorded on the west coast, which is presumably due to its having been mistaken for *A. julacea*; on the east coast it has been found between 74°10' and 65°47'.

22. **Cephalozia bicuspidata** (L.) DUM.

In a formation resembling high moor at Tasiusak a *Cephalozia* species has been found, which in all essentials agrees with *C. bicuspidata*, but deviates from it by having well developed under-leaves; perhaps var. *Lammersiana*?

The species is widely distributed in West Greenland; in East Greenland it is known between 72°30' and 65°57'.

23. **Cephalozia connivens** (DICKS.) SPRUCE.

Cape Daussy in tufts in moor among *Aulacomnium palustre*; the east coast of Kangerdlugssuak, midway of fjord in river-bed (sterile in both places).

In Greenland hitherto only found at Scoresby Sound.

24. **Cephaloziella Starkii** (FUNCK) SCHIFFN.

Cape Ravn in herb-field (sterile); the east coast of Kangerdlugssuak, midway of fjord in moist heath (var., c. coles).

Distributed over the greater part of Greenland.

SPHAGNALES

25. **Sphagnum riparium** ÅNGSTR.

Tasiusak, in marginal area of a formation resembling high-moor, near "Sparganium Pond" (sterile).

Has a southern distribution in Greenland; in the west it only occurs at Kangigdle Kingua, in the east in four localities between 66°05' and 65°33' (Ikerasausak, Norsit, Tunok and Amakâ).

26. **Sphagnum quinquefarium** (LINDB.) WARNST.

Knighton Bay in very hot spring (about 50° C.), fo. *ano-orthoclada coeruleascens* (sterile).

Not previously found in Greenland. Distributed in sub-arctic and temperate parts of Europe and North-America; also in Japan. Of frequent occurrence on the Faroe Islands, but not recorded from Iceland.

27. **Sphagnum plumulosum** RÖLL.

Cape Daussy, partly in the very moist part of moor near melting snow-drift, partly as forming tufts in the drier part; also found in moss-moor 300 m above sea-level. Fjord north of Cape Ravn in moss-moor, var. *versicolor* WARNST.; outer Kangerdlugssuak in moist heath (figs. 2 and 3, T. BÖCHER); head of Watkins Fjord in mosstuft vegetation; Tasiusak in marginal area at "Sparganium Pond", var. *purpurea* (SCHIMP.) WARNST., all sterile.

New to Greenland; in Europe it is particularly widely distributed in the sub-arctic and temperate regions; rare in North-America; also found on the Azores, with a few scattered occurrences in Asia and South-America. Frequent on the Faroe Islands and Iceland.

28. **Sphagnum Girgensohnii** RUSS.

Taiusak, in the marginal area at "Sparganium Pond" and dominating in a formation resembling high-moor, fo. *squarrosula*, in both places sterile.

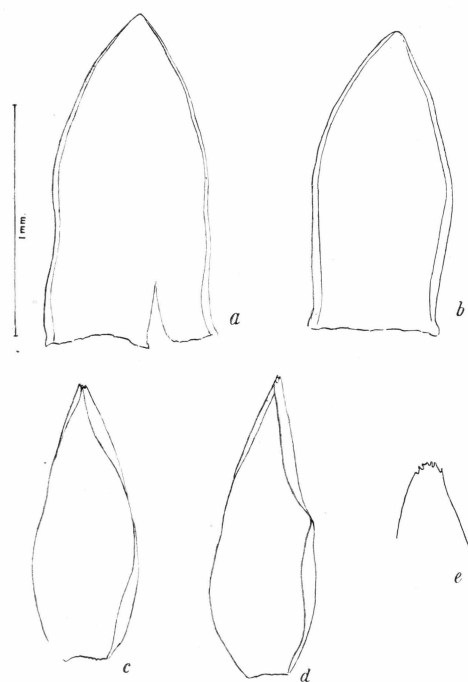


Fig. 2. *Sphagnum plumulosum* (114, Kangerdlugssuak). *a* and *b*, stem-leaves; *c* and *d*, branch-leaves; *e*, apex of a branch-leaf (L. Harmsen del.).

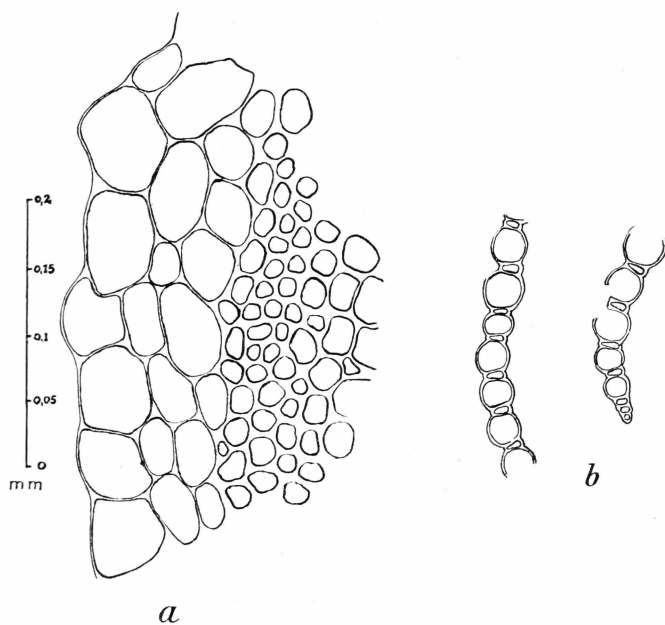


Fig. 3. *Sphagnum plumulosum* (114, Kangerdlugssuak). *a*, part of cross-section of stem; *b*, cross-section of branch-leaf (L. Harmsen del.).

Rather common in West-Greenland from Upernivik to the south point; on the east coast recorded from several localities between $71^{\circ}17'$ and $65^{\circ}37'$.

BRYALES

29. *Andreaea Blyttii* BR. EUR.

Cape Barclay on basalt rocks.

Hitherto only found in three localities in West Greenland: Nugsuak Peninsula, Arveprinsens Island and Jacobshavn.

Furthermore, it is recorded from Spitzbergen, from Arctic North-America and the northern parts of Norway and Sweden.

30. *Fissidens osmundoides* (SW.) HEDW.

Cape Daussy, in the dried-out localities between tufts in moss-moor, among *Oncophorus Wahlenbergii*, a very slender form with leaf-cells somewhat smaller than normal (fig. 4), sterile.

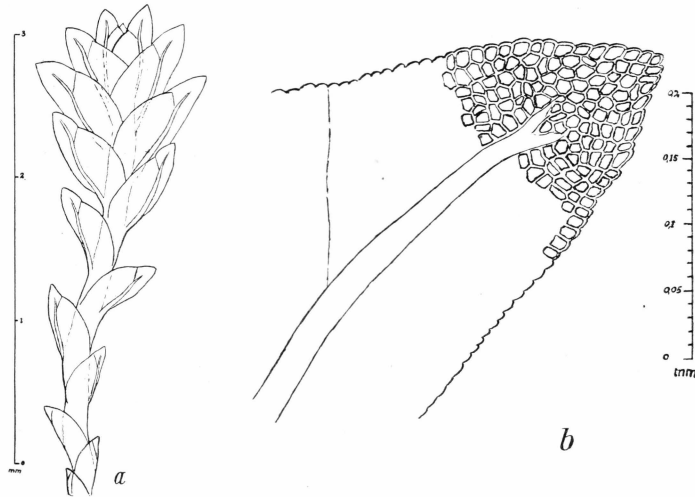


Fig. 4. *Fissidens osmundoides*. a, the entire plant; b, apex of leaf (L. Harmsen del.).

Recorded from some localities in West Greenland, between Upernivik and the southern point and from Nordost Bay on the east coast ($71^{\circ}17'$) var. *microcarpus* BR. EUR. Northern limit on Spitzbergen; circumpolar.

31. *Cynodontium strumiferum* (EHRH.) DE NOT.

Tasiusak in a formation resembling high-moor (c. fr.).

Recorded from southern Greenland, along both coasts; only in a few localities. Northern limit in Norway at about 70° .

32. *Dicranoweisia crispula* (HEDW.) LINDB.

Cape Dalton (c. fr. juv. figs. 5 and 6).

Of common occurrence in Greenland; northern limit on Spitzbergen.

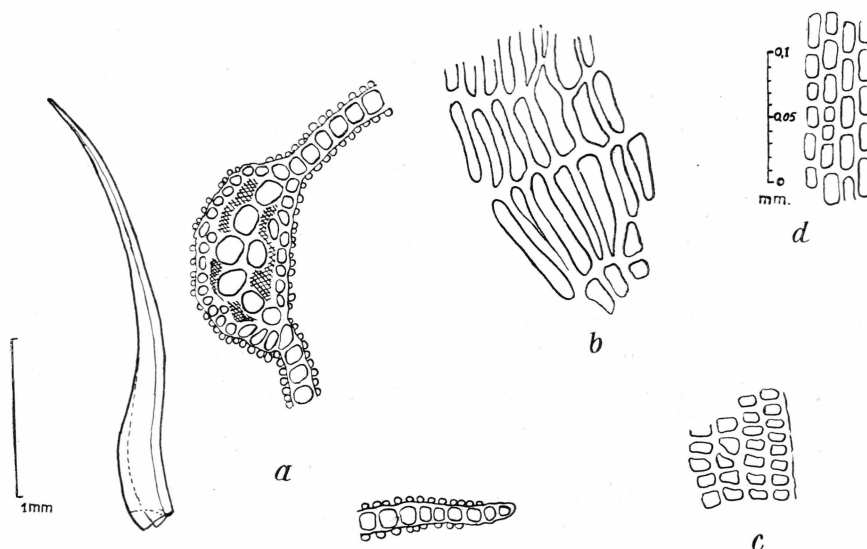


Fig. 5. *Dicranoweisia crispula*. Leaf (L. Harmsen del.).

Fig. 6. *Dicranoweisia crispula*. a, cross-section of leaf; b, cells from auricle; c, cells from the narrow part of leaf; d, cells from the broad part of leaf. (L. Harmsen del.).

33. *Oncophorus Wahlenbergii* BRID.

Cape Daussy in dried-up moor (T. BÖCHER); also among tufts in moss-moor (c. fr.); east coast of Kangerdlugssuak, midway of fjord in moist heath (sterile) and several samples from river-bed (partly c. fr.).

Of common occurrence in West Greenland; on the east coast recorded from Sabine Island and southwards to Tasiusak.

34. *Oncophorus virens* (Sw.) BRID.

D'Aunay Bay in moist *Salix*-heath (sterile).

Found here and there in West Greenland from about 70° to the southern point; on the east coast it has been found in Scoresby Sound and on Falkefjæld at Kingorsuak (66°07').

35. *Kiaeria Blyttii* (SCHIMP.) BROTH.

Tasiusak in the marginal area at "Sparganium Pond" (c. fr.).

Recorded from several localities in West Greenland from Upernivik and southwards; on the east coast only found in the southern part.

36. *Dicranum Sendtneri* LIMPR.

Knighton Bay in very hot spring.

Not found in West Greenland, but recorded from Scoresby Sound. Northern limit in Arctic North-America (76°30').

37. *Dicranum fuscescens* TURN.

Cape Dalton in moor in mountain, var. *congestum* (BRID.) HUSN., with *Lophozia quinquedentata* (sterile); fjord north of Cape Ravn in moss-moor (sterile); outer Kangerdlugssuak in river-bed near House 1, var. *congestum* (sterile); Tasiusak in lichen-heath with *Lophozia Kunzeana* (sterile).

Of common occurrence in the greater part of Greenland.

38. *Dicranum scoparium* (L.) HEDW.

Cape Dalton on alluvial fan near the lagoon, var. *orthophyllum* BRID. (sterile); Cape Ewart in heath, var. *orthophyllum* (sterile); Cape Daussy, tufts in moss-moor, var. *orthophyllum* (sterile); Tasiusak in marginal area near "Sparganium Pond", var. *spadiceum* BOUL. (c. fr.) together with *Lophozia Kunzeana*.

Occurs here and there in West Greenland from Upernivik and southwards, and on the east coast from Scoresby Sound and southwards.

39. *Encalypta rhabdocarpa* SCHWÄGR.

Cape Dalton on moist southern slope among *Polytrichum juniperinum* (sterile).

Rather common in West Greenland between Upernivik and the southern point, especially on basalt; on the east coast recorded from Sabine Island, Clavering Island (74°10'), Hold-with-Hope and Scoresby Sound.

40. *Rhacomitrium Jensenii* KINDB.

Cape Daussy in heath on moving soil (sterile).

Only found once before at Serketnoua on the south-eastern coast (about 61°).

41. *Rhacomitrium hypnoides* (L.) LINDB.

Outer Kangerdlugssuak in heath (sterile).

Of common occurrence in Greenland.

42. *Rhacomitrium canescens* (TIMM.) BRID.

Cape Dalton on alluvial fan at the lagoon (sterile); Cape Ewart in heath (sterile); Cape Daussy in heath 325 m above sea-level.

Rather rare, but distributed over the greater part of Greenland.

43. **Pohlia nutans** (SCHREB.) LINDB.

Fjord north of Cape Dalton (sterile); Cape Dalton in moor in mountain (sterile); d'Aunay Bay in several samples from *Salix*-heath (sterile); Cape Daussy in tufts in moor (c. fr.) and on moving soil, var. *angustirete* H. WINT. (sterile); fjord north of Cape Ravn in moss-moor (sterile); in river-bed (sterile) and in moist willow copse (T. BÖCHER); outer Kangerdlugssuak in river-bed at House 1 (sterile) and in snow-patch (T. Böcher), east coast of Kangerdlugssuak, midway of fjord in moist heath and in river-bed (sterile); Tugtulik (sterile).

Common in Greenland.

44. **Pohlia commutata** (SCHIMP.) LINDB.

Outer Kangerdlugssuak in river-bed at House 1 (c. bulb.).

Occurs here and there in West Greenland from Upernivik as far as the southern point, and on the east coast from Hold-with-Hope to the southern point.

Northern limit on Spitzbergen.

45. **Mniobryum albicans** (WAHL.) LIMPR.

Cape Beaugré in hot spring (38° C.), var. *glaciale* (SCHLEICH.) LIMPR. Leaf-teeth few and undeveloped; fjord north of Cape Ravn in river-bed (attacked by a fungus — *Penicillium*?) and on a nunatak behind the glaciers at the head of the fjord; outer Kangerdlugssuak in river-bed near House 1, all sterile.

Rather common in Greenland, both west and east.

46. **Bryum purpurascens** (R. BR.) BR. EUR.

Cape Dalton, several samples from moist southern slope, partly c. fr.; Cape Daussy in heath on moving soil (c. fr.).

Occurs here and there in West Greenland; on the east coast recorded from Kingorsuak (66°05'), Ingmikertorajik (65°54') and Queen Louise's Island (60°).

47. **Bryum inclinatum** (SW.) BR. EUR.

Barclay Bay on moving soil (c. fr.) heteroicous.

Recorded from some localities in West Greenland between Uvdle (76°35') and the southern point; on the east coast from Cape Jacques (77°40') and southwards.

48. **Bryum cirratum** HOPP. et HORNSCH.

D'Aunay Bay in *Salix*-heath (c. fr.); fjord north of Cape Ravn in *Scirpetum* (c. fr.).

On the west coast in the region round Disko and southwards to Kobbefjord; on the east coast from Franz Joseph Fjord (about 73°) and south-wards to Kangerdluarsikajik (65°57').

49. **Cinclidium subrotundum** LINDB.

Knighton Bay in very hot spring (sterile and sparse).

On the west coast recorded from several localities between Upernivik and the southern point, on the east coast from Scoresby Sound.

50. **Cinclidium hymenophyllum** (BR. EUR.) LINDB.

Cape Dalton in moor in mountain (sterile).

Rare in Greenland; previously only found on the west coast at Upernivik and Hollænder Bay at Klaushavn; furthermore, known from Spitzbergen, Siberia, Fennoscandia and Arctic North-America.

51. **Aulacomnium palustre** (L.) SCHWÄGR.

Cape Dalton in moor in mountain and from a damp southern slope (sterile); Knighton Bay in very hot spring (sterile); Cape Barclay (mosses from D₃, T. BÖCHER, sterile); d'Aunay Bay in rather moist *Salix*-heath (sterile); Cape Beaupré in hot spring (38°C.), sterile; Cape Daussy in tufts in moor (sterile); fjord north of Cape Ravn in moss-moor and in *Scirpetum* (sterile); outer Kangerdlugssuak in moist heath (T. BÖCHER, sterile) head of Watkins Fjord in moss-tuft vegetation with *Lophozia ?ventricosa* (sterile); east coast of Kangerdlugssuak, midway of fjord in moist heath (sterile).

Of common occurrence in Greenland; judging by the collections made in these parts *A. palustre* seems more common in East Greenland — at any rate in the area visited by the expedition — than *A. turgidum*, which in West Greenland is most frequent within a similar area.

52. **Aulacomnium turgidum** (WAHL.) SCHWÄGR.

Cape Dalton on alluvial fan near the lagoon (sterile); Cape Daussy, tufts in moor (sterile); head of Watkins Fjord; moss-tuft vegetation on southern slope (sterile).

Of common occurrence in Greenland; increases in frequency in a northern direction.

53. **Paludella squarrosa** (L.) BRID.

Cape Dalton in moor in mountain (sterile); Cape Daussy, in tufts in moor and in very moist moss vegetation in moor near melting snow-drift (sterile); Tasiusak in a formation resembling high-moor (sterile).

On the west coast known from Disko to the southern point; on the east coast from between Nordost Bay (71°17') and Elvbakker (65°37').

54. **Bartramia ityphylla** (HALLER) BRID.

Cape Deichmann (sterile) among *Eurhynchium strigosum*.

Widely distributed in West Greenland; on the east coast recorded from Sabine Island to Adloe (65°31').

55. **Conostomum tetragonum** (DICKS.) LINDB.

Cape Dalton on alluvial fan near the lagoon (sterile).

Common in West Greenland; on the east coast found between Sabine Island and Tasiusak.

56. **Philonotis tomentella** MOL.

Fjord north of Cape Ravn in *Scirpetum* (sterile); Tugtulik (sterile); furthermore, a pauper form has been found at Cape Daussy in moss-moor 300 m above sea-level, which may perhaps be referred to this species.

Found in a couple of localities in North Greenland and on the east coast; northern limit 82°29'.

57. **Philonotis seriata** (MITT.) LINDB.

Fjord north of Cape Ravn in moss-moor (sterile); the east coast of Kangerdlugssuak, midway of fjord in river-bed (sterile).

Previously only found in North Greenland: Pandora Harbour (10).

58. **Philonotis calcarea** (BRUCH et SCH.) SCH.

Fjord north of Cape Ravn in moss-moor, fo. *orthophylla*, c. fr.; in river-bed (sterile); mountain behind the glaciers at the head of the fjord (Nunatak), sterile.

New to Greenland and upon the whole rare in arctic regions; in Fennoscandia it has its northern limit in Norway at 68°47'.

59. **Timmia bavarica** HESSL.

Cape Dalton, on alluvial fan near the lagoon (sterile).

Only known from the east coast: Cape Borlase Warren (74°15') and Scoresby Sound: The species has its northern European limit in Norway at 70°25'.

60. **Cratoneurum glaucum** (LAM.).

Fjord north of Cape Ravn in moss-moor (sterile).

Hitherto only found in West Greenland, viz. at Tasiusak and Frederikshaab. It has its principal distribution in temperate and sub-arctic regions; northern limit in Norway at 70°40'.

61. **Drepanocladus uncinatus** (HEDW.) WARNST.

Cape Dalton on moist southern slope; Cape Ewart in heath; Knigh-ton Bay in very hot spring, partly var. *subjulaceus* (BR. EUR.) WARNST. fo. *orthophylla* WARNST.; Cape Daussy in moss-moor 300 m above sea-level; fjord north of Cape Ravn in moist willow vegetation and at the head of the fjord on nunatak behind the glaciers, the east coast of Kangerdlugssuak, midway of fjord in river-bed; everywhere sterile.

Common throughout West Greenland; on the east coast found at Hold-with-Hope, Scoresby Sound and Serketnoua.

62. **Drepanocladus revolvens** (SW.) WARNST.

Cape Dalton on alluvial fan near the lagoon; Cape Daussy in heath on moving soil; in dried-up moor and in moss-moor between the tufts; the interior part of Mikis Fjord, on terminal moraine island; outer Kangerdlugssuak in snow-patch (T. Böcher); east coast of Kangerdlugssuak, midway of fjord in river-bed; everywhere sterile.

Occurs here and there in West Greenland; on the east coast recorded from Hvalros Island, Sabine Island, Hold-with-Hope, Nordost Bay and Scoresby Sound.

63. **Drepanocladus intermedius** (LINDB.) WARNST.

Outer Kangerdlugssuak in snow-patch, sterile.

In West Greenland found between Foulke Fjord and Sukkertopen; on the east coast only known from Scoresby Sound.

64. **Drepanocladus exannulatus** (GÜMB.) WARNST.

Cape Dalton in mountain var. *brachydictyus* (REN.) MÖNKEM. fo. *orthophylla* MÖNKEM.; in river at head of Mikis Fjord; outer Kangerdlugssuak in river at House 1, var. *brachydictyus*; east coast of Kangerdlugssuak, midway of fjord in river-bed; moor behind the Angmagssalik settlement, var. *brachydictyus*; all sterile.

Of common occurrence in West Greenland and rather common on the east coast between Scoresby Sound and Tasiusak.

65. **Drepanocladus badius** (HARTM.) ROTH.

Cape Daussy in tufts in moor (sterile).

Found in some localities between Upernivik and the southern point; on the east coast at Scoresby Sound.

66. **Drepanocladus aduncus** (HEDW.).

Head of Watkins Fjord in "Divers Pond" fo. *aquatica*; Tasiusak

in pond at a depth of two thirds of a metre, fo. *pseudofluitans integerrima*; Angmagssalik in moist strand-meadow behind the settlement.

In West Greenland known from Umanak round Disko Bay and Tunugdliarfik. On the east coast at Cape Borlase Warren and Scoresby Sound.

67. **Drepanocladus Sendtneri** (SCHIMP.) WARNST.

Cape Daussy in heath on moving soil (sterile).

Hitherto only recorded from the east coast in Nordost Bay, Ryder's Valley (70°51') and Scoresby Sound.

68. **Drepanocladus lycopodioides** (SCHWÄGR.) WARNST.

Knighton Bay in very hot spring; fjord north of Cape Ravn in moss-moor and in *Scirpetum*; all sterile.

Formerly only found in West Greenland: Sarpiussak, Manetsok at Egedesminde and Natdluarssuk at Jacobshavn.

69. **Calliergon turgescens** (TH. JENS.) KINDB.

Cape Daussy, in the dried-out part between the tufts in moss-moor (sterile).

In several localities along the west coast between Umanak and the southern point, towards east in a few places between 71°17' and the southern point.

70. **Calliergon stramineum** (DICKS.) KINDB.

Knighton Bay in very hot spring; Cape Daussy in very wet moss-moor near melting snow-drift and in tufts in moss-moor; Tasiusak in a formation resembling high-moor; everywhere sterile.

Common in West Greenland; scattered occurrences between about 71° and the southern point of the east coast.

71. **Calliergon sarmentosum** (WAHLENBG.) KINDB.

Cape Daussy among tufts in moss-moor, in very moist moss-moor and in a dried-up moor; fjord north of Cape Ravn in river-bed; the east coast of Kangerdlugssuak, midway of fjord; on boulder in mountain lake, var. *fontinaloides* (BERGGR.) BROTH.

Widely distributed in West Greenland; on the east coast recorded from Sabine Island and southwards.

Var. *fontinaloides* new to Greenland; it has been found in two localities in Norway and two localities in Finland.

72. **Camptothecium trichoides** (NECK.).

Cape Daussy in moss-moor 300 m above sea-level; fjord north of Cape Ravn in moist willow vegetation.

Found here and there in West Greenland and on the east coast from Sabine Island to Kingorsuak (66°05').

73. **Brachythecium albicans** (NECK.) BR. EUR.

Cape Dalton in fertile herb-field, var. *groenlandicum* C. JENSEN.

The main species has been found on the west coast at Holsteinsborg and Sukkertoppen, on the east coast at Cape Wandel (66°18'). Var. *groenlandicum* is only recorded from two localities on the east coast, viz. Hold-with-Hope and Scoresby Sound, and from Sweden.

74. **Brachythecium glaciale** BR. EUR.

Outer Kangerdlugssuak in river-bed at House 1.

Occurs here and there on the west coast and on the east coast at Scoresby Sound.

75. **Eurhynchium strigosum** (HOFFM.) BR. EUR.

Cape Deichmann (sterile) together with *L. Hatcheri* and *Sauteria alpina*.

Hitherto only found in two localities in Greenland; on Disko at Godhavn with var. *diversifolium* and at Scoresby Sound, here only the variety. The main species has its northern limit in Norway (67°), whereas the variety is also recorded from Spitzbergen.

76. **Hylocomium proliferum** (L.) LINDB.

Knighon Bay in very hot spring, fo. *brevifolia laticuspis* (sterile).

Rather common in West Greenland from Upernivik to the southern point; on the east coast it has been found at Scoresby Sound, at Cape Wandel, Kingorsuak and the southern mouth of Kangerdluarak.

77. **Polytrichum alpinum** L.

Cape Dalton, fo. *laxa* (sterile); on moist southern slope together with var. *septentrionale* (Sw.) LINDB., a form with practically smooth lamels; also var. *septentrionale* was found on alluvial fan near the lagoon, the latter form also occurring at Cape Daussy in heath on moving soil; in fjord north of Cape Ravn in moss-moor; in ruin of Eskimo house north-east of Mikis Fjord var. *microdontium* KINDB. with undeveloped lea-teeth, most frequently one-celled; outer Kangerdlugssuak in river-bed at House 1; east coast of Kangerdlugssuak, midway of fjord in river-bed, var. *integerrima* HARMSSEN (10).

In West Greenland of very common occurrence between 77° and 60°; on the east coast rather common from Scoresby Sound and southwards.

78. **Polytrichum gracile** MENZ.

Knighton Bay in very hot spring, var. *anomalum* (MILD.) HAG.

New to Greenland. Of frequent occurrence in Fennoscandia; northern limit in Norway 70°25'; the variety is also known from Fennoscandia.

79. **Polytrichum commune** L.

Tasiusak in marginal area at "Sparganium Pond", var. *minus* Weis fo. *brevifolia*; also found in a formation resembling high-moor (var. *minus*).

In West Greenland found between Holsteinsborg and the southern point; on the east coast along the distance from Clavering Island to Tasiusak.

The variety is hitherto unrecorded in Greenland, but has been found in Fennoscandia.

80. **Polytrichum sexangulare** FLÖRK.

Cape Dalton (sterile); northeast of Mikis Fjord (T. BÖCHER) in snow-patches (fig. 7), sterile.

Not rare in West Greenland from Ritenbenk to the southern point; on the east coast found between Sabine Island and the southern point.

81. **Polytrichum juniperinum** WILD.

Cape Dalton in moor in mountain (sterile), on moist southern slope (sterile); d'Aunay Bay in *Salix*-heath (sterile); Cape Daussy in tufts in moor (sterile); head of Watkins Fjord in moss-tuft vegetation (sterile); east coast of Kangerdlugssuak, midway of fjord in moist heath (sterile); Tasiusak in marginal area at "Sparganium Pond" and in lichen-heath (sterile).

Of common occurrence all over West Greenland; on the east coast recorded from 74°15' to the southern point.

LIST OF MOSSES
RECORDED FROM THE AREA INVESTIGATED,
BUT NOT COLLECTED BY THE EXPEDITION

Peltolepis grandis LINDB.
Preissia quadrata (SCOP.) NEES.
Gymnomitrium concinnatum (LIGHTF.) CORDA.
Marsupella condensata (ÅNGSTR.) KAAL.
— *aquatica* (SCHRAD.) SCHIFFN.
Eucalyx obovatus (NEES) BREIDL.
Sphenolobus minutus (CRANTZ) STEPH.
Lophozia Floerkei (WEB. et MOHR) SCHIFFN.
— *Binsteadii* KAAL.
— *Wenzelii* (NEES) STEPH.
— *Jensenii* K. MÜLL.
— *excisa* (DICKS.) DUM.
— *incisa* (SCHRAD.) DUM.
Gymnocolea inflata (HUDS.) DUM.
Scapania irrigua (NEES) DUM.
— *uliginosa* (SW.) DUM.
— *subalpina* (NEES) DUM.
— *cuspiduligera* (NEES) K. MÜLL.
Chandonanthus setiformis (EHRH.) MITT.
Ptilidium ciliare (L.) DUM.
Cephalozia pleniceps (AUST.) LINDB.
Pleuroclada albescens (HOOK.) SPRUCE.
Hygrobiella laxifolia (HOOK.) SPRUCE.
Cephaloziella papillosa (DOUIN.) SCHIFFN.

Sphagnum cuspidatum EHRH.
var. *Kruusei* C. JENS.
— *Warnstorffii* RUSS.
— *rubellum* WILS.

- Sphagnum Russowii* WARNST.
— *fimbriatum* WILS.
— *teres* (SCHIMP.) ÅNGSTR.
-
- Andreaea petrophila* EHRH.
Ditrichum zonatum (BRID.) LIMPR.
Ceratodon purpureus (L.) BRID.
Distichium montanum (LAM.) HAG.
Blindia acuta (HUDS.) BR. EUR.
Cynodontium polycarpum (EHRH.) SCHIMP.
Dicranoweisia cirrata (L.) LINDB.
Kiaeria Starkei (WEB. et MOHR) HAG.
— *glacialis* (BERGGR.) HAG.
Dicranum elongatum SCHLEICH.
— *Mühlenbeckii* BR. EUR.
— *spadiceum* ZETT.
— *Bonjeani* DE NOT.
Tortella tortuosa (L.) LIMPR.
Desmatodon latifolius (HEDW.) BR. EUR.
Tortula ruralis (L.) EHRH.
Cinclidotus minor (L.) LINDB.
Grimmia alpestris SCHLEICH.
— *alpicola* SW.
Racomitrium fasciculare (SCHRAD.) BRID.
Leptobryum pyriforme (L.) WILS.
Pohlia cruda (L.) LINDB.
— *cucullata* (SCHWÄGR.) BRUCH.
— *rutilans* (SCHIMP.) LINDB.
— *gracilis* (SCHLEICH.) LINDB.
— *proliger* LINDB.
Bryum neodamense ITZIGS.
— *ventricosum* DICKS.
— *teres* LINDB.
— *elegans* NEES.
Mnium orthorhynchum BRID.
— *cinclidioides* (BLYTT) HÜBEN.
Bartramia crispa SW.
Philonotis caespitosa WILS.
— *fontana* (L.) BRID.
Timmia austriaca HEDW.
Orthotrichum Killiasii C. MÜLL.
— *Blyttii* (SCHIMP.) LINDB.

Climacium dendroides (L.) WEB. et MOHR.
Myurella julacea (VILL.) BR. EUR.
 — *tenerrima* (BRID.) LINDB.
Pseudoleskea filamentosa (DICKS.) BROTH.
Campylium stellatum (SCHREB.) BRYHN.
 — *polygamum* (BR. EUR.) BRYHN.
Drepanocladus Berggrenii (C. JENSEN) BROTH.
Calliergon cordifolium (HEDW.) KINDB.
Brachythecium erythrorhizon BR. EUR.
 — *reflexum* (STARK.) BR. EUR.
Plagiothecium denticulatum (L.) BR. EUR.
Hypnum revolutum (MITT.) LINDB.
Pogonatum urnigerum (L.) PALIS.
Polytrichum strictum BANKS.
 — *piliferum* SCHREB.

LIST OF SPECIES NEW TO THE AREA INVESTIGATED

Sauteria alpina NEES.
Riccardia pinguis (L.) GRAY.
Aplozia sphaerocarpa (HOOK.) DUM.
Lophozia quadriloba (LINDB.) EVANS.
 — *barbata* (SCHMID.) DUM.
Scapania mucronata BUCH.
 — *scandica* (ARNELL et BUCH) MACVICAR.
 — *hyperborea* JÖRGENSEN.
Cephalozia connivens (DICKS.) SPRUCE.

Sphagnum quinquefarium (LINDB.) WARNST.
 — *plumulosom* RÖLL.

Andreaea Blyttii BR. EUR.
Fissidens osmundoides (SW.) HEDW.
Cynodontium strumiferum (EHRH.) DE NOT.
Dicranum Sendtneri LIMPR.
Encalypta rhabdocarpa SCHWÄGR.
Rhacomitrium Jensenii KINDB.
Cinclidium subrotundum LINDB.
 — *hymenophyllum* (BR. EUR.) LINDB.

Philonotis tomentella MOL.

— *seriata* (MITT.) LINDB.

— *calcareae* (BRUCH et SCH.) SCHIMP.

Timmia bavarica HESSL.

Cratoneurum glaucum (LAM.) BROTH.

Drepanocladus uncinatus (HEDW.) WARNST.

— *revolvens* (SW.) WARNST.

— *intermedius* (LINDB.) WARNST.

— *badius* (HARTM.) ROTH.

— *aduncus* (HEDW.)

— *Sendtneri* (SCHIMP.) WARNST.

— *lycopodioides* (SCHWÄGR.) WARNST.

Calliergon turgescens (TH. JENS.) KINDB.

Brachythecium glaciale BR. EUR.

Eurhynchium strigosum (HOFFM.) BR. EUR.

Polytrichum gracile MENZ.

SOME REMARKS ON THE COMMUNITIES OF PLANTS WHICH THE MOSSES FORM OR MAKE PART OF.

In the course of the collection notes were constantly taken of the communities of plants in which the mosses occurred; for the detailed description of these see the work of BÖCHER.

Willow-copse.

The moss vegetation in the willow-copses has unfortunately not been subjected to investigation, but KRUSE records the following mosses from the copses at Angmagssalik: *Dicranum fuscescens*, *D. Mühlenbeckii*, *Brachythecium reflexum*, *Peltolepis grandis*, *Philonotis fontana*, *Bartramia ityphylla*, *Cephalozia pleniceps*, *Plagiothecium denticulatum* var. *Dohnii*, *Climacium dendroides*, *Lophozia Hatcheri*, *L. alpestris* and *Marchantia polymorpha* var. *alpestris*.

Herb-Field.

In fjord north of Cape Dalton and at Cape Dalton a *Taraxacetum crocei* (BÖCHER) was found, in which community *Asterella Ludwigii* is particularly characteristic; further, in this locality the following species were found: *Brachythecium albicans* var. *groenlandicum*, *Encalypta rhabdocarpa*, *Pohlia nutans*, *Bryum purpurascens*, *Aulacomnium palustre*, *Drepanocladus uncinatus*, *Polytrichum alpinum*, *Lophozia quinqueidentata*, *Anthelia Juratzkana* and *Scapania scandica*.

A form of herb-field which is particularly luxuriant and rich in lichens is to be found against the steep wall, at the foot of which the herb-field has developed.

In this soil which is always moist and warm, the latter owing to its great insolation, conditions are always good for the growth of plants; a wealth of ferns is developed, and sometimes a willow vegetation, however, without forming a proper copse. In a fjord north of Cape Ravn mosses were collected from such a locality: *Drepanocladus uncinatus*, *Camptothecium trichoides*, *Philonotis calcarea*, *Pohlia nutans* and

Lophozia quinquedentata. From such herb-field associations at Angmagssalik, rich in mosses, a number of species are recorded (KRUUSE): *Philonotis fontana*, *Pohlia gracilis*, *P. proligera*, *P. cruda*, *Desmatodon latifolius*, *Swartzia montana*, *Myurella tenerrima*, *Climacium dendroides*, *Marchantia polymorpha* var. *alpestris*, *Preissia quadrata*, *Asterella Ludwigii*, *Cephaloziella Starkii*, *Lophozia Hatcheri*, *L. alpestris* and *Eucalyx obovatus*.

Grass-field.

In the grass-field (KRUUSE) or *Caricetum rigidae* (BÖCHER), a xerophilous community of plants, the moisture of which is entirely dependent upon the precipitation and not the melting of the snow, no mosses were collected by the expedition, but KRUUSE records from here: *Polytrichum alpinum*, *Rhacomitrium fasciculare* and *Pohlia commutata* as well as a number of lichens.

Heath.

Moist heath, rich in species.

Heath rich in *Salix*, *Empetrum nigrum* and *Vaccinium uliginosum*; with this may be classed the heath investigated at d'Aunay Bay, where the mosses: *Aulacomnium palustre*, *Polytrichum juniperinum*, *Pohlia nutans* and *Bryum cirratum* occurred; in depressions in the heath other mosses were the dominating ones, more particularly hepatics, and upon the whole they made the impression of being covered by snow for a longer period than the other part of the heath. The mosses were: *Anthelia Juratzkana*, *Blepharostoma trichophyllum*, *Lophozia Kunzeana*, *Cephaloziella* sp. and *Oncophorus virens*.

The *Salix*-heath on the east coast of Kangerdlugssuak (*Salix glauca* and *S. herbacea*) is of exactly the same kind. The mosses which have been taken here are: *Aulacomnium palustre*, *Polytrichum juniperinum*, *Pohlia nutans*, *Oncophorus Wahlenbergii*, *Lophozia alpestris* and *Cephaloziella Starkii*, which correspond entirely with the preceding.

Scirpetum caespitosi (BÖCHER) in fjord north of Cape Ravn; a very moist *Empetrum nigrum*-*Vaccinium uliginosum*-heath, where the following species dominated: *Scirpus caespitosus*, *Empetrum nigrum* and *Vaccinium uliginosum* (the latter, however, somewhat repressed and lichenized); frequent were also *Toffieldia palustris*, *Pedicularis flammea* and *Pinguicula vulgaris*; of lichens *Cladonia mitis* was almost the dominating species. The mosses recorded from this locality were: *Aulacomnium palustre*, *Philonotis tomentella*, *Drepanocladus lycopodioides* and *Bryum cirratum* as well as the hepatics: *Nardia scalaris*, *Scapania hyperborea* and *Cephaloziella* sp.

Dry *Empetrum nigrum*-*Vaccinium uliginosum*-heath was found at Cape Daussy on slowly moving soil with the mosses: *Drepano-*

cladus revolvens, *Dicranum Sendtneri*, *Pohlia nutans* var. *angustirete*, *Bryum purpurascens*, *Polytrichum alpinum* and *Rhacomitrium Jensenii*, as well as the snow-patch mosses *Anthelia Juratzkana* and *Blepharostoma trichophyllum*.

A similar type of heath was found in the mountain, but here the moss vegetation changes its appearance entirely; *Rhacomitrium canescens* becomes the dominating species and forms large cushions, accompanied by *Polytrichum alpinum*.

Open *Cassiope tetragona*-heath, rich in *Vaccinium uliginosum* and *Salix arctophila* $\times$ *glauca*, was found at Cape Ewart, in slowly moving soil; it was very rich in lichens, more particularly *Cetraria Delisei* and *Stereocaulon alpinum*. Among the mosses *Rhacomitrium canescens* dominated, with great cushions. In this locality were further found *Drepanocladus uncinatus*, *Dicranum scoparium* and *Scapania mucronata*.

There is a gradual transition between the heath on slowly moving soil, and on the moister and more rapidly moving soil; whereas the flowering plants and lichens decrease, the mosses increase in frequency. Here *Polytrichum alpinum*, *Drepanocladus revolvens*, *Oncophorus Wahlenbergii*, *Pohlia nutans* and *Blepharostoma trichophyllum* were found.

Where the soil becomes still more moist, also the mosses disappear, with the exception of *Sauteria alpina*, sometimes accompanied by *Bryum inclinatum*.

Snow-Patches.

The snow-patch vegetation changes according to the duration of the cover of snow, and so it is possible to distinguish between various types.

In Mikis Fjord, in localities with a snow cover of long duration a *Cerastietum trigyni* (Böcher) had developed with the dominants *Oxyria digyna* and *Cerastium trigynum* (= *C. cerastioides*); here *Polytrichum sexangulare* occurred in great quantities, and sometimes in such a manner that a *Polytrichetum sexangularis* (Böcher) was formed (fig. 7). In places where the snow-cover was of shorter duration a *Sibbaldietum* (Böcher) had developed with the dominants *Sibbaldia procumbens* and *Oxyria digyna*; also here *Polytrichum sexangulare* occurred, but not so dense as in the preceding.

In a *Cerastietum trigyni* in outer Kangerdlugssuak *Drepanocladus intermedius* and *Pohlia* sp. were found; they covered the ground, frequently broken up in fragments which were now dry, but in early summer the soil must have been very moist.

In another snow-patch moss-covered fragments contained *Anthelia Juratzkana*, *Gymnomitrium corallioides* and *Drepanocladus revolvens*,

accompanied by the less important *Pohlia nutans* and *Lophozia alpestris*; the vegetation was characterized by *Cerastium trigynum* and *Carex lagopina* (fig. 8).

Anthelia Juratzkana was further found in a *Salicetum herbaceae* (Böcher) on the east coast of Kangerdlugssuak; the dominants

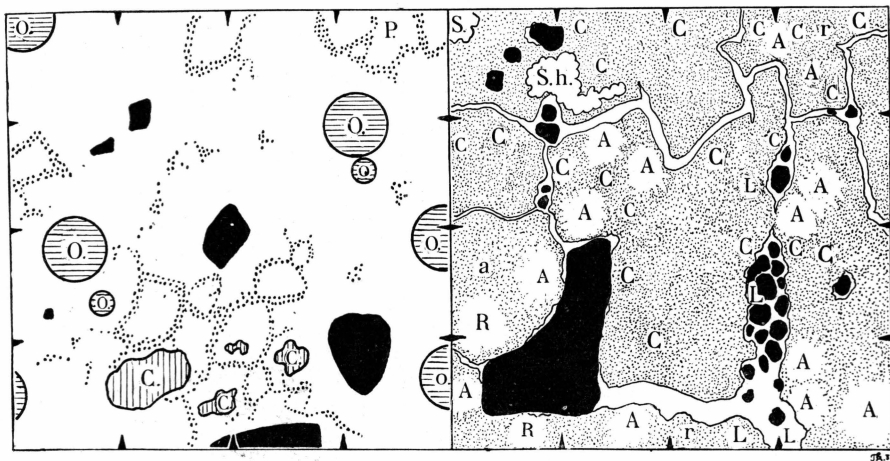


Fig. 7.

Fig. 8.

Fig. 7. 1 m² of a snow-patch in Mikis Fjord. The black dots *Polytrichum sexangulare*, which here more particularly grow round the incipient cracks in the polygon soil (draining phenomenon). O = *Oxyria digyna*; C = *Cerastium trigynum*; P = *Poa alpina*; the vegetation has a character somewhat resembling that of *Polytrichetum sexangulare*. (After Böcher).

Fig. 8. 1 m² large investigation square of snow-patch between low rocks in Outer Kangerdlugssuak. The moss-cover is dotted (*Anthelia Juratzkana*, *Gymnomitrium corallioides* and *Drepanocladus revolvens* etc., see the text); C = *Cerastium trigynum*; A = *Carex lagopina*; R = *Ranunculus glacialis*; S = *Salix arctophila* × *glauca*; S. h. = *Salix herbacea*; L = *Luzula confusa*; a = *Alsine biflora*, and r = *Saxifraga rivularis*. (After Böcher).

were here *Salix herbacea*, *Polygonum viviparum* and *Carex rigida*; furthermore, many fungi (Agaricaceae) and lichens were found.

In the valley northwest of Cape Daussy there was a curious transition type between snow-patch-associations and moor-associations; on a level, clayey surface, near a small water hole, two associations were found, farthest away from the water a *Salicetum herbaceae* (Böcher) with the dominants *Salix herbacea* and *Equisetum arvense* var. *rivulare*; furthermore, *Drepanocladus revolvens* dominated, *Oncophorus Wahlenbergii* and *Polytrichum alpinum* being of less frequent occurrence; also *Calliergon turgescens* and *C. sarmentosum* occurred. Nearest the water-

hole there was a *Equisetetum arvensis* (Böcher) with *E. arv.* var. *rivulare* and *Koenigia islandica* dominating; of mosses *Onchophorus Wahlenbergii* dominated, whereas *Drepanocladus revolvens* was of less frequent occurrence; furthermore, *Calliergon turgescens* and *C. sarmentosum* occurred.



Fig. 9. Moss-tuft vegetation at Cape Daussy; compare fig. 10. In the background the snow-drift is to be seen; in the centre 20—30 cm high moss-tufts.
See the text. (After photograph taken by Böcher).

Moor Vegetation.

The associations connected with the moors are, as far as the mosses are concerned, by far the richest in species as well as in individuals. The mosses as a rule occur in great quantities; though they are not always dominating, one may, however, often speak of a *Paludella squarrosa*-Association, and *Aulacomnium palustre*-Association, a *Sphagnum*-Association etc.

Collections of mosses have been made in many places, and therefore I will content myself with giving a few examples; besides the moor vegetation is often rather monotonous.

At Cape Daussy moor vegetation in connection with a melting snow-drift was made subject to thorough investigation; there was a very distinct formation of zones from the very wet soil nearest the snow and outwards (fig. 9).

Nearest the snow there was a *Sphagnum plumulosum*-*Calliergon stramineum*-Association with *Drepanocladus revolvens*; the next zone was moist heath, passing into lichen-heath; the last zone was a moss-tuft vegetation (fig. 10) with tufts 20—30 cm in height, the top of which consisted of a *Sphagnum plumulosum*-*Aulacomnium palustre*-Association, whereas the sides consisted of a *Paludella squarrosa*-Association which passed gradually into a *Calliergon*

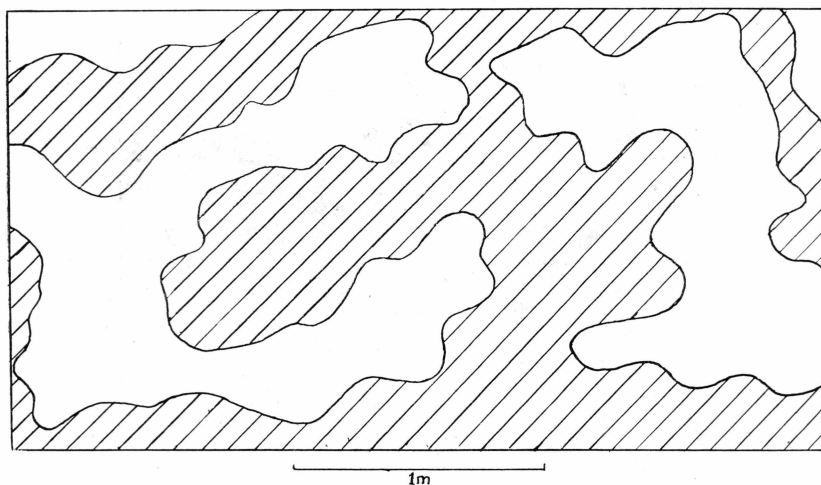


Fig. 10. Tuft vegetation in moss-moor at Cape Daussy (L. Harmsen del. after sketch by T. Böcher). The hatched parts are 20—30 cm high tufts; the white parts are moss vegetation which is wet in spring; see the text.

stramineum-Association in the hollows; here and there in the hollows there were also associations of *Oncophorus Wahlenbergii*. The dominating phanerogams on the tufts were: *Salix herbacea*, *Carex rigida* and *Polygonum viviparum*; further *Empetrum nigrum*, *Vaccinium uliginosum*, *Salix arctophila* × *glauca* were found and in scattered occurrence *Pedicularis hirsuta* and *P. flammea*. The chief species found in the hollows were *Equisetum arvense* var. *rivulare* and scattered specimens of *Carex rigida*. As to further details see the description of localities (p. 6).

The vegetation in the rather great moors at Tasiusak formed a *Caricetum rariflorae* (Böcher), an essential constituent with tufts about 10 cm high and 80—150 cm long, divided by hollows about 25 cm in width; on the tufts grew *Carex rariflora*, *Polygonum viviparum* and

Salix herbacea, between the tufts only *Carex rariflora*; the tufts chiefly consisted of *Sphagnum Girgensohnii*, accompanied by *Polytrichum commune*; further *Cynodontium strumiferum*, *Lophozia porphyroleuca* and *Cephalozia bicuspidata* were found. Between the tufts the vegetation consisted of *Paludella squarrosa* and *Calliergon stramineum*. At the banks of "Sparganium Pond", a similar vegetation occurred; here, besides

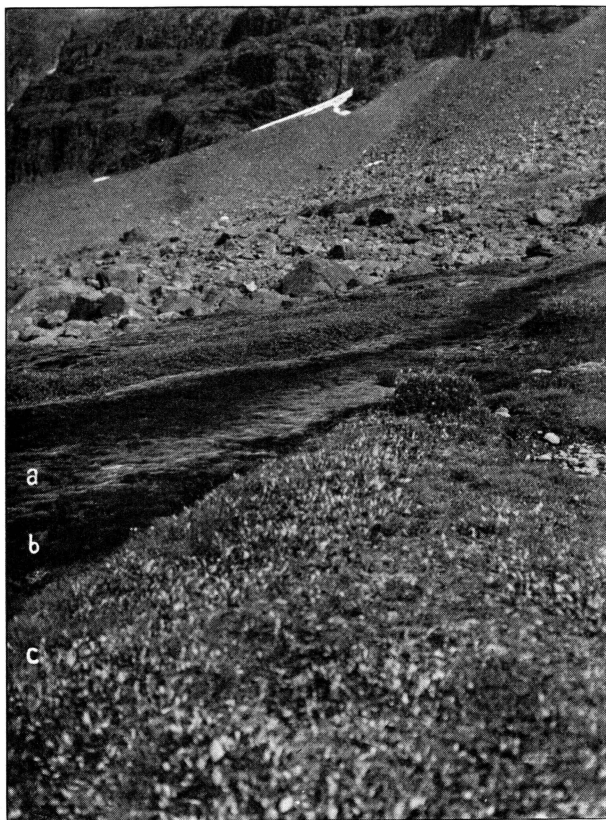


Fig. 11. Moss-moor at Cape Ravn. *a*, *Mniobryum albicans*-Association; *b*, *Drepanocladus lycopodioides*-Association; *c*, Marginal area, where *Salix arctophila* $\times$ *glauca* dominates. (After photograph taken by Böcher).

Carex rariflora, only *Potentilla palustris* dominated; the dominating mosses were the *Sphagna* species, *S. Girgensohnii*, *S. plumulosum* and *S. riparium*, accompanied by *Polytrichum commune*, *Dicranum scoparium*, *Lophozia Kunzeana* and *Paludella squarrosa*.

In a fjord north of Cape Ravn, round a little water-course (5°—6° C.) 75 m above sea-level, a rich moss vegetation (fig. 11) had developed, being distinguished by its contents of southern species. Nearest the water-course a dense association of *Mniobryum albicans* had developed,

in company with *Philonotis calcarea*, *P. seriata* and *Calliergon sarmenosum*; this association passed gradually into the marginal area with the mosses *Drepanocladus lycopodioides*, *Cratoneurum glaucum*, *Riccardia pinguis*, *Scapania hyperborea*, *Lophozia Kunzeana* and *L. barbata*; further, the following species were found: *Aulacomnium palustre*, *Sphagnum plumulosum*, *Dicranum fuscescens*, *Polytrichum alpinum* and *Pohlia nutans*. How to explain the occurrence of *Cratoneurum glaucum* in company with *Sphagnum plumulosum* must, pending further investigations, be left an open question. As southern species must be classed: *Riccardia pinguis*, *Sph. plumulosum* and *Philonotis calcarea*, perhaps also *Lophozia barbata* which is, however, recorded from Hackluyt Island and Björling's Island in northwestern Greenland (lat. 77°24' and 76°43' N., 10). The phanerogam flora was also richly developed; according to BÖCHER the following species were found in the moss near the water:

<i>Alchemilla filicaulis</i>	<i>Phleum alpinum</i>
<i>Cardamine pratensis</i> (in bloom),	<i>Poa alpina</i> var. <i>vivipara</i> ,
<i>Carex Lachenalii</i>	<i>Poa arctica</i>
<i>Carex rigida</i>	<i>Polygonum viviparum</i>
<i>Cerastium trigynum</i>	<i>Saxifraga nivalis</i>
<i>Epilobium anagallidifolium</i>	<i>Saxifraga rivularis</i>
<i>Epilobium lactiflorum</i>	<i>Taraxacum croceum</i>
<i>Equisetum arvense</i>	<i>Agaricaceae</i>
<i>Juncus biglumis</i>	

in the marginal vegetation (also in moss), besides the chief species, *Salix arctophila* × *glaucula*:

<i>Antennaria alpina</i>	<i>Salix herbacea</i>
<i>Arabis alpina</i>	<i>Sibbaldia procumbens</i>
<i>Cassiope hypnoides</i>	<i>Vaccinium uliginosum</i>
<i>Empetrum nigrum</i>	<i>Veronica alpina</i>
<i>Oxyria digyna</i>	<i>Veronica fruticans</i>

At Angmagssalik there was a strand-meadow vegetation, a *Carietum glareosae* (BÖCHER) with *Carex glareosa* and *Stellaria humifusa* dominating; various sociations had developed, and all were rich in mosses, particularly in *Drepanocladus aduncus*.

The Vegetation of the Lakes.

In the shallow lakes a bottom-association was found, consisting of *Hypnaceae*.

Thus, in a lake at the head of Watkins Fjord there was an as-

sociation of *Drepanocladus aduncus* fo. *aquatica*, rich in algae and diatoms.

On the east coast of Kangerdlugssuak in a small water-hole between the rocks *Calliergon sarmentosum* var. *fontinaloides* had developed on the boulders.

"Sparganium Pond" at Tasiusak also sheltered an association of *Drepanocladus aduncus* fo. *pseudofluitans*, which covered the whole of the bottom; the other plants were *Sparganium affine*, *Callitriche hamulata* (*anceps*?) and *Hippuris vulgaris*; of these *Sparganium* likewise was to be found everywhere.

In the more slowly moving part of the rivers *Drepanocladus exannulatus* was found, e. g. in Mikis Fjord. On the banks of the rivers the vegetation approaches that of moss-moors.

As to the mosses near the hot spring, see the description of localities, p. 5.

Vegetation on Rocks.

As to moss association on rocky walls only a single one is recorded, viz. the *Andreaea Blyttii*-Association on basalt rocks at Cape Barclay.

I have attempted an investigation of the life-forms of the mosses represented by the collection placed before me, but as far as several of these are concerned, it has not been possible to arrive at a definite result on the strength of the material at hand.

BIBLIOGRAPHY

The following are the chief works used in the compilation of this article; as to other works used see HARMSSEN and SEIDENFADEN, 1932, where a detailed list is given.

1. ARNELL, H. W.: Levermossor, in HOLMBERG: Skandinavians Flora, Stockholm, 1928.
2. BARNES, CHR. R.: Analytic Keys to the Genera and Species of North American Mosses. — Bull. of the Univ. of Wisconsin, Sc. Ser. Vol. 1, Nr. 5, 1897.
3. BERGGREN, S.: Undersökning af Mossfloran vid Disko-Bugten och Auleitsivik-fjorden i Grønland. — Kongl. Sv. Vet.-Akad. Handl. Bd. 13 No. 8, 1875.
4. BROTHÉRUS, V. F.: Die Laubmoose Fennoskandias. Helsingfors 1923.
5. — Bryales in: ENGLER und PRANTL: Die natürl. Pflanzenfam. 1924—25.
6. BUCH, H.: Die Scapanien Nordeuropas und Sibiriens II. Systematischer Teil. Helsingfors 1928.
7. BØCHER, T.: Studies on the Vegetation of the East Coast of Greenland between Scoresby Sound and Angmagssalik (Christian IX's Land). — Medd. om Grønland, København 1933 (in press).
8. DIXON, H. N.: The Student's Handbook of British Mosses. Eastbourne 1924.
9. HAGEN, J. and PORSILD, M.: Description de quelques nouvelles espèces de bryacées recoltées sur l'île de Disko. — Medd. om Grønland, Bd. XXVI, København 1904.
10. HARMSSEN, L. and SEIDENFADEN, G.: The Godthaab Expedition 1928. The Mosses. — Medd. om Grønland, Bd. 82, No. 2, København 1932.
11. HESSELBO, A.: List of the Andreaeales and Bryales found in East-Greenland between 74°15' and 65°30' N. lat. — Medd. om Grønland, Bd. XXX, No. IX. Kbhvn. 1907.
12. — Mosses from North-East-Greenland (N. of 76° N. lat.) collected by the "Danmark-Expedition 1906—1908". — ibid. Bd. XLIII, 1. Afdl., Kbhvn. 1910.
13. — The Bryophyta of Iceland. — Botany of Iceland, Vol. I. Kbhvn. 1918.
14. — Some Mosses from N.W. Greenland (Wolstenholme Sound and Inglefield Gulf). — Medd. om Grønland, LXIV, København 1923.
15. — Mosses collected on the North Coast of Greenland by the late Dr. TH. WULFF, — ibid. Bd. LXIV, København 1923.
16. JENSEN, C.: Mosser fra Øst-Grønland 1897. — Medd. om Grønland, Bd. XV, København 1898.
17. — List of the Hepaticae and Sphagnales found in East-Greenland between 75° and 65°35' lat. N. in the years 1898—1902. — ibid. Bd. XXX, No. VIII, Kbhvn. 1906.

18. JENSEN, C.: Hepaticae and Sphagnaceae from North East Greenland. (N. of 76° N. lat.) collected by the "Danmark-Expedition 1906—1908". — *ibid.* Bd. XXX, Kbhvn. 1910.
 19. — Danmarks Mosser I—II. Kbhvn. 1915—23.
 20. KRUSE, CHR.: Rejser og botaniske Undersøgelser i Øst-Grønland. Medd. om Grønland, Bd. XLIX, Kbhvn. 1912.
 21. LANGE, JOHAN, and JENSEN, C.: Conspectus Florae Groenlandicae, Pars 2. Grønlands Mosser. — *ibid.* Bd. III, Kbhvn. 1887.
 22. MACVICAR, S. M.: The Student's Handbook of British Hepatics. Eastbourne 1926.
 23. MÜLLER, KARL: Die Lebermoose in RABENHORST: Kryptogamenflora 1906—1916.
 24. PAUL, H.: Sphagnaceae in ENGLER und PRANTL: Die natürl. Pflanzenfam. 1924.
 25. VERDOORN, FR.: Manual of Bryology. The Hague 1932.
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