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MACROLICHENS FROM  
CENTRAL WEST GREENLAND

COLLECTED ON  
THE BOTANICAL EXPEDITION IN 1958

BY

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WITH 4 FIGURES IN THE TEXT AND 5 PLATES

С РУССКИМ РЕЗЮМЕ

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## Abstract

The present paper deals with collections and studies of lichens, carried out by the author on a botanical expedition to the central parts of West Greenland in 1958.

In an introductory chapter a survey is taken of the most significant earlier collections of, and papers on, lichens from this part of Greenland.

In a list of the 44 localities visited by the expedition (fig. 1, p. 11), located between Sukkertoppen, ca. 65° lat. N., and the northeastern part of Disko Bugt, ca. 70° lat. N., various information is given of the individual localities, thus of their position, the number of lichens collected, the altitude above sea-level at which the collections were made, and the time for the stay of the collector. The localities investigated are situated in areas which differ greatly in an ecological and a floristic respect, and the localities are therefore grouped in districts in accordance to BÖCHER, HOLMEN & JAKOBSEN (1957, 1959).

During the expedition a greatly varying number of lichen samples, totalling ca. 1800, were collected in the majority of the 44 localities, and in addition ca. 500 lichens derived from the vegetation analyses made were brought home for identification. Only the macrolichens are dealt with in the present paper, for owing to the very limited time at our disposal in the various localities only comparatively few and scattered collections of microlichens were made.

In the systematic part of the paper all the localities in which the individual species were collected are given for each of the 108 species treated here, the localities being arranged according to their position in the five floristic districts. Information is likewise given of the altitude of the locality above the sea, and as to whether apothecia were found in the rarely fertile species. As for the majority of the taxa, brief particulars are given of other special biological conditions and of their distribution in Greenland previously known. The greater number of the species had formerly been reported from the region of Greenland dealt with here, but as to many of them the samples recorded here have caused a considerable shifting of their known distribution in West Greenland.

In the concluding chapters an account is given of some characteristic features of the lichen vegetation in some selected localities within the five floristic districts. As regards several lichen communities a relation to ecological factors, climatic as well as edafic, can be demonstrated. Finally, a survey is taken of species with a continental or oceanic, and a northern or southern distribution in West Greenland.

## INTRODUCTION

In the summer of 1958 the author participated in a botanical expedition to the central parts of West Greenland. The Carlsberg Foundation had granted financial aid to the expedition, whose leader was Professor T. W. BÖCHER, of the University of Copenhagen. The expedition had for its main objective to carry out floristic and ecological investigations in the area between Sukkertoppen and Disko Bugt in order to supplement the results arrived at by "Den Botaniske Expedition til Vestgrønland 1946" (cf. BÖCHER 1949, 1954). One of our main tasks was to try to delimit the various floristic districts north of the Søndre Strømfjord region. For this reason the expedition endeavoured to push as far eastward into the inland as possible in three different latitudes, viz. in Eghedsfjord, in Nørre Strømfjord, and in the eastern part of Disko Bugt. In the course of the summer a great many samples were collected and analyses of the vegetation were made in many localities distributed over a vast area; however, owing to the short arctic summer, the stay of the expedition in most of the localities was of rather short duration. The results of the investigations of vascular plants will be published by T. W. BÖCHER, while the collections of mosses were handed over to K. HOLMEN for identification.

The present author participated in the expedition in 1958 for the purpose of collecting lichens and studying the lichen vegetation. The investigations were made in the areas between Sukkertoppen in ca. 65° lat. N. and the northern part of Disko Bugt, ca. 70° lat. N. (fig. 1, p. 11).

The collections chiefly comprised macrolichens, for in few localities only did time permit the collecting of microlichens, and as the material of these latter cannot be regarded as representative, they are not dealt with in the present paper. Consequently only macrolichens are treated here, with a similar limitation to that employed e.g. by LYNGE (1938, 1940b). The number of samples collected amounts to ca. 1800, but to these are added records of the lichens found in the fairly large number of vegetation analyses made during the expedition, in the main by T. W. BÖCHER, totalling ca. 500 numbers.

As will appear from the list of the localities investigated, our stays in the localities were of highly varying duration, and in many cases, therefore, no far-reaching conclusions can be drawn from the missing record of a species from a particular locality. However, the lack of records, if any, in the local species lists is in some measure made up for by the large number of closely situated localities.

### Acknowledgments

The identification of the lichens was carried out at the Institute of Thallophyta, the University of Copenhagen, and the author wishes to express his best thanks to the leader of the Institute, Professor M. LANGE, Ph. D., for favourable working facilities. Cordial thanks are likewise due to Mr. M. SKYTTE CHRISTIANSEN, M.Sc., of the Botanical Museum of the University of Copenhagen, who offered valuable help in the determination of several critical species. To Professor T. W. BÖCHER, Ph.D., the author is indebted for a grant from the Danish State Research Foundation, which provided the economic basis for the author to commence the present work. Finally, the author wishes to thank Professor V. M. MIKKELSEN, Ph.D., for the interest he has taken in the work, which was finished at the Institute of Systematic Botany, the Royal Veterinary and Agricultural College, Copenhagen.

## EARLIER LICHENOLOGICAL COLLECTIONS AND PUBLICATIONS

Prior to the expedition the arctic herbarium of the Botanical Museum of the University of Copenhagen contained various scattered collections from the central parts of West Greenland, and a brief mention of the most important earlier collectors of lichens and authors of papers on lichens from the area described here will be given below.

In the first place, mention should be made of the Danish scientist J. VAHL, who travelled along the Greenland coasts in the years 1828—36, staying for the last few years of this period in the regions north of Godthåb. He bestowed much time and interest on the lichens, and his fairly large collections were published in several papers on arctic lichens. Thus, they constitute the basis of the first attempt at a total survey of the lichen flora of Greenland (BRANTH & GRØNLUND 1888). In addition, several of VAHL's records had previously been mentioned in the famous work "Lichenes Arctoi" (TH. M. FRIES 1860), and a minor number were also published by NYLANDER (1862).

In 1867 ROBERT BROWN collected some lichens in the regions around Disko Bugt, which collections were described by BROWN (1868) and by LINDSAY (1869).

In 1879 A. KORNERUP collected many lichens in parts of the regions around Holsteinsborg and Egedesminde. Some few lichens are also at hand from the regions around Jakobshavn, Christianshåb, and Egedesminde, collected by SYLOW in 1883, and occasional species from the vicinity of Holsteinsborg were brought home in 1884 by J. A. D. JENSEN (cf. JENSEN 1884). The Danish "Fylla Expedition" 1884 was joined by the botanists E. WARMING and Th. HOLM (cf. WARMING 1886). They, too, collected lichens from the area treated here. L. K. ROSENVINGE visited the central part of West Greenland in 1886, collecting several lichens (cf. ROSENVINGE 1887). All these collections of lichens were published, together with those collected by VAHL, in the aforementioned paper by BRANTH & GRØNLUND (1888).

Mention should next be made of N. HARTZ, who in 1889 collected lichens in various localities southward from Holsteinsborg, and in 1890

in the region around Disko Bugt (cf. HARTZ 1894). These finds were published by BRANTH (1892).

The most important collections in the 19th century were, however, made by the Swedish lichenologist TH. M. FRIES, who participated in an expedition to West Greenland in 1871. He spent the greater part of the time in Disko Bugt, but during the voyage along the west coast he also paid short visits to Holsteinsborg and Godthåb. From this expedition a large material of lichens was carried home to Uppsala, but it remained undescribed till it was handed over to B. LYNGE, who identified the whole collection (LYNGE 1937). TH. M. FRIES was chiefly interested in the crustaceous species, while the larger foliaceous and fruticose lichens, the macrolichens, were secured more at random. Thus, by far the greater part of his collections from West Greenland consists of microlichens, crustaceous, preferably saxicolous species. Some collections, composed for the most part of macrolichens and secured by JOHS. GRÖNTVED, who visited Disko Bugt in 1932, are included in LYNGE's paper (1937).

In 1927 some minor collections of lichens from Disko and Sukkertoppen were brought home by the "Godthaab Expedition". They were collected by G. SEIDENFADEN, and were identified and published by LYNGE (1932a).

Disko and the nearest areas of the mainland around Disko Bugt from rather early times constitute the part of West Greenland which has been most thoroughly investigated lichenologically, while the more extensive areas south thereof long remained quite unsatisfactorily investigated. On "Den Botaniske Expedition til Vestgrønland 1946", which operated especially in the continental regions of the inland at the head of Søndre Strømfjord, special importance was attached to the investigation of the lichen flora. Large collections of lichens are at hand from this region, secured by M. SKYTTE CHRISTIANSEN; however, the greater part of the material has not yet been finally worked up and published. Only the lichens which were collected in connection with the vegetation analyses are mentioned in the literature (BÖCHER 1954).

On a French expedition in 1949 a minor number of lichens were collected at l'Eqe in the northeastern corner of Disko Bugt (DE LESSE 1952).

Some special papers on arctic lichens, based on collections derived for the main part from Disko and its surroundings, were published by GELTING (1954, 1955, 1956).

Finally, some records of lichens should be mentioned, derived from vegetation analyses made in 1956 near Godhavn, in Nordre Isortoq, near Holsteinsborg, and around the head of Søndre Strømfjord (BÖCHER 1959), as also from analyses carried out in 1957 at Jakobshavn (FREDSKILD 1961).

References to other papers treating arctic and, in particular, West Greenland lichens will be made in the descriptions of the individual species.

## LIST OF LOCALITIES

The area investigated by the expedition in 1958 extends from the region around Sukkertoppen with the southernmost locality in  $65^{\circ}25' \text{lat. N.}$  to the northern part of Disko Bugt in  $69^{\circ}52' \text{lat. N.}$  The easternmost locality is situated in  $50^{\circ}18' \text{long. W.}$ , and the westernmost in  $53^{\circ}40' \text{long. W.}$  It will be seen that the area covers considerable distances in both a north-south and an east-west direction, and thus the collections from this part of West Greenland were secured in localities situated in regions with highly different climates and with a widely different development of their soil and vegetation. A division of Greenland into floristic provinces and districts was made by BÖCHER, HOLMEN & JAKOBSEN (1957, 1959), chiefly on the basis of the distribution of a number of vascular plants, whose limits were taken to be an expression of significant macro-climatic differences. On the consideration that similar types of distribution might be found among the lichen species, the 44 localities in the subjoined list are arranged into groups according to their location within the above-mentioned floristic districts. The area investigated comprises the midmost and northern parts of Southwest Greenland, abbreviated to SWm and SWn, respectively, and the southern, middle, and northern parts of the continental West Greenland, abbreviated to CWs, CWM, and CWN, respectively. In the subjoined survey, these five districts are dealt with in the order just mentioned, and within each district the localities investigated are arranged according to their increasing latitude. Furthermore, as for each locality the western longitude as well as a detailed description of its position, and the height interval within which lichens were collected, are stated. As regards the greater number of localities, this interval is limited to the lowland below 200 m a.s.l., and if so, it is not more precisely indicated. The number of lichen samples collected in each locality is likewise stated, as also whether vegetation analyses were made. Finally, the date for the investigation of the particular locality is given. From some localities, viz. localities 15, 20, 33, and 40 only lichens from the vegetation analyses were brought home, and from localities 8, 12, 14, 19, 39, and 41 no lichen samples are at hand. The distribution of the more thoroughly investigated localities over the five

floristic districts is rather ununiform, a fact which should be borne in mind on considering the number of records of a species from a district.

### District SWm.

Loc. 1. Sukkertoppen (65°25' lat. N., 52°55' long. W.).

The area just east of the town. Fifty-three samples from the lowland. September 2-4, 1958.

Loc. 2. Tasiussaq (65°35' lat. N., 52°46' long. W.).

A small bay in the continent northeast of Sukkertoppen. Thirty samples collected in the lowland area. July 1-2, 1958.

Loc. 3. Qôrnoq (65°39' lat. N., 53°02' long. W.).

Located on the north side of Hamborgerlandet, an island north of Sukkertoppen. Twenty-two samples plus records from analyses, all collected near sea-level. July 11, 1958.

Loc. 4. Hamborgersund (65°40' lat. N., 53°05' long. W.).

A locality on the north side of the sound north of Hamborgerlandet. Eighteen samples from the lowland. July 2, 1958.

Loc. 5. Naqerdloq (65°47' lat. N., 52°43' long. W.).

At the west side of the fjord Íkamiut Kangerdluarssuat on the mainland east of Sukkertoppen. Species reported from analyses, and 35 samples taken from sea-level to ca. 400 m above. July 9, 1958.

Loc. 6. Taserssuaq (65°48' lat. N., 52°40' long. W.).

At the east side of the fjord Íkamiut Kangerdluarssuat. Ninety-four samples as well as reports from analyses, taken at altitudes from sea-level to 900 m. July 7-11, 1958.

Loc. 7. Muslingebugt (65°50' lat. N., 53°03' long. W.).

A small bay at the south side of the mouth of Evighedsfjord. From the lowland below 100 m a.s.l., analyses and 59 samples of lichens. July 5-7, 1958.

Loc. 8. Kangâmiut (65°50' lat. N., 53°20' long. W.).

Loc. 9. Úmánat (65°52' lat. N., 53°23' long. W.).

A skerry north of Kangâmiut. Seven samples of lichens collected near sea-level. July 12, 1958.

Loc. 10. Igdlut (65°57' lat. N., 52°48' long. W.).

A locality on the north side of Evighedsfjord, in its midmost part. Analyses were made and 41 samples were collected from altitudes below 100 m a.s.l. July 2-3, 1958.

Loc. 11. Tâterât qâqât (66°00' lat. N., 52°34' long. W.).

Located in the middle part of Evighedsfjord. Eleven samples collected in the lowland on July 3, 1958.

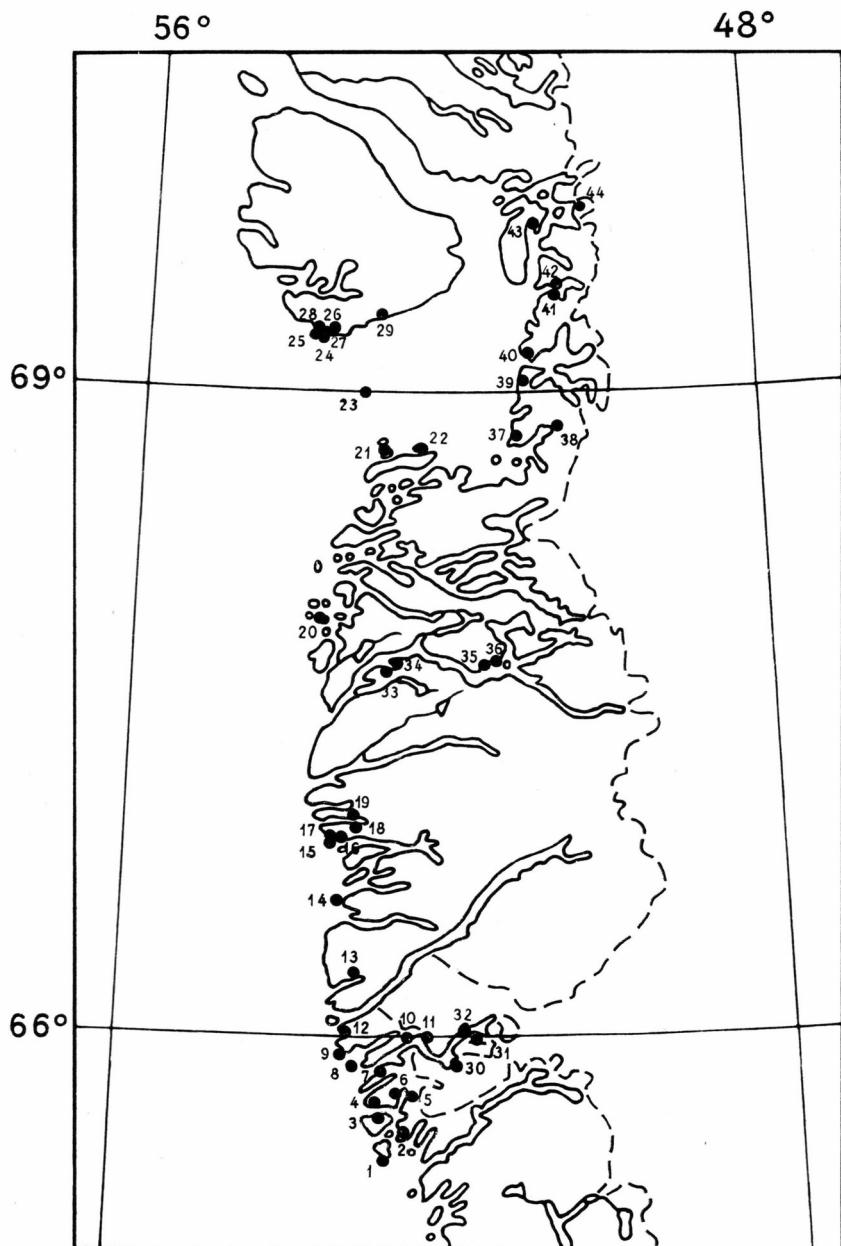


Fig. 1. Map of the central part of West Greenland, showing the position of the 44 localities visited on the expedition in 1958. Localities 1–14 are situated in district SWm, locs. 15–29 in SWn, locs. 30–32 in CWs, locs. 33–36 in CWM, and locs. 37–44 in CWN.

Loc. 12. På (66°01' lat. N., 53°22' long. W.).

Loc. 13. Dragefjeldene (66°17' lat. N., 53°13' long. W.).

Mountainous area at the north side of the inner part of the fjord Kangerdluarssugssuaq north of Søndre Strømfjord. Lichens reported from analyses, and 124 samples collected from sea-level to altitudes of ca. 900 m. July 12–14, 1958.

Loc. 14. Sātut (66°36' lat. N., 53°30' long. W.).

### District SWn.

Loc. 15. Holsteinsborg (66°56' lat. N., 53°40' long. W.).

Lichens only reported from the vegetation analyses made. July 15–21, 1958.

Loc. 16. Ulkebugt (66°56' lat. N., 53°37' long. W.).

At the eastern part of the bay just north of Holsteinsborg. Thirty-one samples collected near the surface of the sea. July 18, 1958.

Loc. 17. Præstefjældet (66°58' lat. N., 53°34' long. W.).

The mountain north of Holsteinsborg. Thirty-six samples collected from the lowland to 200 m a.s.l. July 20, 1958.

Loc. 18. Nordre Kangerdluarssuk (67°05' lat. N., 53°25' long. W.).

The mountainous area south of the inner part of the fjord Nordre Kangerdluarssuk, located north of Holsteinsborg. Seventy-nine samples collected at altitudes from sea-level to ca. 1000 m, and further reported from analyses. July 21–23, 1958.

Loc. 19. Ungatdliup qáqai (67°06' lat. N., 53°25' long. W.).

Loc. 20. Agto (67°57' lat. N., 53°37' long. W.).

Lichens reported from vegetation analyses made by T. W. BÖCHER on September 3, 1958.

Loc. 21. Tupilak (68°42' lat. N., 52°55' long. W.).

A small island near Egedesminde. From this place 52 samples as well as analyses with lichens are at hand, all from the lowland. August 28–September 1, 1958.

Loc. 22. Akúnâp nunâ (68°44' lat. N., 52°25' long. W.).

Fifty-one samples from the lowland on the south side of this small island situated east of Egedesminde. August 28, 1958.

Loc. 23. Kronprinsens Ejland (69°01' lat. N., 53°19' long. W.).

A group of small low islands in the western part of Disko Bugt, 24 samples. July 27, 1958.

Loc. 24. Godhavn (69°16' lat. N., 53°30' long. W.).

The expedition had its headquarters at the Danish Arctic Station at Godhavn, Disko, from July 27–August 4, 1958, during which period excursions were made to neighbouring localities, which, however, will be treated separately. Five samples of lichens from the immediate vicinity of the Arctic Station are at hand, and many are reported from analyses, all of them collected near sea-level.

Loc. 25. Engelskmandens Havn (69°16' lat. N., 53°35' long. W.).

A small bay on the south side of Disko, west of Godhavn. Thirty-two samples from the lowland. August 3, 1958.

Loc. 26. Blæsedalen (69°16' lat. N., 53°30' long. W.).

From the southern part of this valley, located immediately east of Godhavn, 37 samples were secured, in addition to analyses. August 2, 1958.

Loc. 27. Skarvefjeld (69°17' lat. N., 53°27' long. W.).

Basalt plateau northeast of Godhavn. Seven samples of lichens from the south side and the top, from altitudes between 500 and 900 m a.s.l., made during a rapid climb on July 29, 1958.

Loc. 28. Lyngmarksfjeld (69°17' lat. N., 53°34' long. W.).

A basalt mountain northeast of Godhavn. From its top and its south-facing slope, 55 samples were collected at altitudes from 300–900 m a.s.l. Lichens are further reported from analyses. August 1, 1958.

Loc. 29. Marrait (69°22' lat. N., 52°48' long. W.).

A locality on the south side of Disko, near the sea. One lichen, collected by T. W. BÖCHER on August 21, 1958.

### District CWs.

Loc. 30. Kangiussaq (65°53' lat. N., 52°15' long. W.).

Located in the inner part of Evighedsfjord. From the camping site, few metres above sea-level, on the south side of the fjord, 28 samples as well as reports from analyses are at hand. July 3–5, 1958.

Loc. 31. Tapa (66°01' lat. N., 51°56' long. W.).

In the interior of Evighedsfjord, on its south side, six lichen samples were collected at altitudes of ca. 100 m a.s.l. by P. FRYDENBERG, on July 4, 1958.

Loc. 32. Sagdliarutsit (66°02' lat. N., 52°00' long. W.).

On the north side of the innermost part of Evighedsfjord 21 samples and analyses, derived from the lowland to altitudes of 400 m a.s.l. July 4, 1958.

### District CWM.

Loc. 33. Hyttefjeld (67°42' lat. N., 52°42' long. W.).

The mountain is situated on the south side of Nordre Strømfjord, central part. Lichens reported from analyses made in the lowland. July 24, 1958.

Loc. 34. Niaqorssuaq (67°43' lat. N., 52°43' long. W.).

A mountain on the south side of the middle part of Nordre Strømfjord. Analyses and 43 lichen samples, from sea-level to 500 m a.s.l. July 23–24, 1958.

Loc. 35. Spiret (67°44' lat. N., 51°56' long. W.).

A locality in the lowland on the north side of the interior of Nordre Strømfjord. Thirty-three samples of lichens. July 25, 1958.

Loc. 36. Nuerssorfiarqap avangnâtungâ (67°46' lat. N., 51°37' long. W.).

Inner part of Nordre Strømfjord, on the north side. A collection of 110 lichen samples and reports from analyses, from sea-level to 600 m a.s.l. July 24–25, 1958.

### District CWN.

Loc. 37. Christianshåb (68°49' lat. N., 51°10' long. W.).

The locality is situated in the lowland immediately south of the town. Lichens at hand from vegetation analyses and from 133 samples. August 8–10, 1958.

Loc. 38. Kangersuneq (68°50' lat. N., 50°43' long. W.).

The locality derives its name from a fjord in the south-eastern corner of Disko Bugt. Some members of the expedition, i. a. the present author, stayed from August 10–28, 1958, at a camp in the above-stated position at the innermost part of the fjord, whence 367 samples of lichens as well as reports from vegetation analyses are at hand. The area investigated extends from sea-level to altitudes of 400 m a.s.l.

Loc. 39. Claushavn (69°05' lat. N., 51°06' long. W.).

Loc. 40. Jakobshavn (69°13' lat. N., 51°07' long. W.).

South of the colony, eastern part of Disko Bugt. Lichens only reported from analyses made in the lowland. August 6–8, 1958.

Loc. 41. Sarfaq (69°30' lat. N., 50°45' long. W.).

Loc. 42. Pâkitsoq (69°31' lat. N., 50°45' long. W.).

Eastern side of Disko Bugt, north of Jakobshavn. Reports from analyses, and 87 samples taken near sea-level. August 6, 1958.

Loc. 43. Atâ (69°46' lat. N., 50°57' long. W.).

At the village Atâ on the east side of the island named Arveprinsens Ejland in the northeastern corner of Disko Bugt. Sixteen samples were collected near sea-level. August 5, 1958.

Loc. 44. Qapiarfik (69°52' lat. N., 50°18' long. W.).

Mountainous area on the mainland at the northeastern corner of Disko Bugt, bounded on the north, south, and east by the inland ice. From this half-nunatak lichens are reported from analyses and from 83 samples secured within a height interval from sea-level to its top at ca. 500 m a.s.l. August 5, 1958.

## SYSTEMATIC LIST OF THE SPECIES COLLECTED

This chapter contains records of all the collections of such lichens as are included under the term macrolichens, totalling 108 species. The genera, and the species and varieties belonging to these genera and described in the present paper, are enumerated in the systematic order usually employed. If not otherwise stated, the nomenclature is in accordance with that of HALE & CULBERSON (1960), provided that the species occurs within the area of North America which is comprised by that work. As to the other species, also, the International Code of Botanical Nomenclature of 1956 is followed.

For each of the taxa treated, all the localities whence they were collected during the expedition are given, and these are grouped according to their position within the five floristic districts.

If over 200 m, the altitude of the locality is stated in metres above sea-level, and the presence of apothecia is indicated by the abbreviated term c. ap., though only for such species as are rarely found to be fertile in arctic regions.

### **Sphaerophorus** PERS.

#### 1. *Sphaerophorus fragilis* (L.) PERS.

SWm: 1, 2, 6, 7, 13

SWn: 16, 17, 18 (700 m, 900 m), 21 (c.ap.), 22, 25

CWm: 34 (500 m), 35, 36 (< 200 m, 600 m)

CWn: 37, 38 (< 200 m, c.ap., 400 m), 42, 43, 44 (500 m, c.ap.).

*Sphaerophorus fragilis* was found to be commonly distributed throughout all the districts investigated with the exception of CWs, but quite likely it may also be found there, for it was met with farther northward in even more continental regions. It occurred preferably as dense, well bounded tufts on stones, often at great altitudes. The greater number of the plants were typical, but in many cases the identification of them was later confirmed through the demonstration of the reaction J-. Fertile specimens were found in a few localities only.

2. *Sphaerophorus globosus* (HUDS.) VAIN.

SWm: 1, 3, 6, 7, 13 (c. ap.)  
 SWn: 15, 16, 18 (< 200 m, 700 m, 900 m), 20, 21 (c. ap.), 22, 23 (f. *cong.*),  
 24, 25, 26  
 CWM: 34 (500 m), 35 (f. *cong.*), 36 (600 m)  
 CWN: 37, 38, 40, 42.

This species, too, was of very common occurrence in the greater number of localities, but like the preceding species, it was not found in the district CWs, which is, no doubt, likewise due to the comparatively few samples collected there. Some of the plants are referable to *f. congesta* LAMY, and the distinction between such forms and *Sph. fragilis* was always ascertained by the positive J-reaction in *Sph. globosus*. Rarely fertile, cf. the above records.

**Leptogium** (ACH.) S. GRAY1. *Leptogium saturninum* (DICKS.) NYL.

SWn: 17  
 CWM: 36.

*Leptogium saturninum* is a rare species in arctic regions, and only few records are available from Greenland, viz. one from Scoresby Sund (East Greenland) (BRANTH 1894) and some from fjords in Southwest Greenland (DAHL 1950). Like these, my finds are derived from places with a rather continental climate, and especially in locality 36 at the head of Nordre Strømfjord, well developed individuals were found, though none of them were fertile.

**Lobaria** SCHREB.1. *Lobaria scrobiculata* (SCOP.) DC.

SWn: 17  
 CWM: 36  
 CWN: 38.

*Lobaria scrobiculata* is not common in arctic regions, and locality 38 is the northernmost one hitherto recorded from Greenland, where it is only known from the west coast. It will be seen that the localities of the above finds, like those for earlier finds in Southwest Greenland, are situated in fairly continental regions. In locality 38 the species was found on a rock block in company with other continental species, e.g. *Physcia constipata*, *Leptogium saturninum*, and *Diploschistes scruposus*. No specimens with apothecia were found.

**Solorina Ach.**1. *Solorina crocea* (L.) Ach.

SWm: 2, 4, 5 (400 m), 6 (&lt; 200 m, 400 m, 900 m), 7, 13 (800 m)

SWn: 18 (700 m, 900 m, 1000 m)

CWs: 30, 32 (400 m)

CWM: 34 (500 m)

CWN: 38 (&lt; 200 m, 400 m).

*Solorina crocea* is associated with moist soil, and consequently it is commonest in oceanic regions, while in more continental districts it is principally found at fairly great altitudes in north-facing places with a long-lingering snow-covering and greater moisture. Apothecia were found to be well developed everywhere.

2. *Solorina saccata* (L.) Ach.

CWN: 44 (c.ap.).

The sample consists of some few specimens with many apothecia. These latter were studied microscopically, it being impossible to distinguish the species with certainty from the closely related *S. bispora* without employing spore characters. The asci contained four spores, averaging ca.  $50 \times 22 \mu$  in size. *Solorina saccata* is an eutrophic species, previously recorded from Tunugdliarfik Fjord in southern Greenland (DAHL 1950), from Disko (LYNGE 1937, GELTING 1955), and from the head of Søndre Strømfjord (BÖCHER 1954).

3. *Solorina octospora* ARN.

SWn: 28 (600 m, c.ap.).

Only one well developed specimen was found, at an altitude of ca. 600 m on a slope with a southward inclination of ca.  $30^\circ$ , where it occurred in company with *Solorina spongiosa*, *Stereocaulon alpinum*, *Cladonia pyxidata* var. *neglecta*, and var. *pocillum*. Like the other species of *Solorina*, e.g. *S. saccata*, *S. spongiosa*, and *S. bispora*, this species is an indicator of dry and rich soil, and it has only been found in few localities in Greenland (LYNGE & SCHOLANDER 1932, DAHL 1950, GELTING 1955). I counted, in each ascus, eight spores of an average size of ca.  $35 \times 14 \mu$ . These measurements agree well with records from other arctic regions, e.g. Northeast Greenland:  $29-42 \times 13-16 \mu$  (LYNGE & SCHOLANDER 1932) and Novaya Zemlya:  $29-35 \times 13-14 \mu$  (LYNGE 1928).

4. *Solorina spongiosa* (SM.) ANZI

SWn: 28 (600 m, c.ap.).

I found only one, though very typical, specimen of this species, which is not, evidently, common in Greenland and it was always very sparsely present in the highly scattered localities whence it is reported.

5. *Solorina bispora* NYL.

SWn: 29 (c.ap.).

Macroscopically *Solorina bispora* is indistinguishable from *S. saccata* and *S. octospora*, but both the number of spores in the ascus and their size were found to be in good accordance with statements in the literature, viz. ca.  $80 \times 30 \mu$ . From Northeast Greenland LYNGE & SCHOLANDER (1932) give the average of many measurements as  $86 \times 38 \mu$ .

**Nephroma ACH.**1. *Nephroma arcticum* (L.) TORSS.

SWm: 3, 6, 7, 13

SWn: 16, 17, 18

CWs: 32

CWM: 34, 35

CWN: 37, 38, 42.

Rather commonly distributed in all the districts investigated, often occurring in abundance, especially in the fairly luxuriant parts of the subcontinental dwarfshrub heaths. As a special characteristic of the species it may be mentioned that e.g. in locality 38 *Nephroma arcticum* often occurred in company with *Empetrum hermaphroditum* or *Cassiope tetragona*, cf. table 1, p. 53. Specimens with apothecia were not found.

2. *Nephroma expallidum* (NYL.) NYL.

SWn: 24

CWN: 38.

In the literature the species is reported to be rather common in the inner parts of southern Greenland (DAHL 1950), but from Disko, too, several finds are at hand (LYNGE 1937), and likewise from Jakobshavn (FREDSKILD 1961) and Søndre Strømfjord (BÖCHER 1954). It was somewhat surprising, therefore, to note the very scattered occurrence of the species, even in the fairly continental districts investigated here. Only in locality 38 was it seen in several places, but it was always sterile.

3. *Nephroma parile* (Ach.) Ach.

SWm: 10.

The species is common in the inner parts of South Greenland, but has not previously been reported to occur north of Godthåb (DAHL 1950).

***Peltigera* WILLD. emend. RABENH.**

As a basis for the taxonomic treatment of this genus THOMSON's monograph of the North American *Peltigera* species has been employed (THOMSON 1950, ubi syn.), modified in accordance with THOMSON (1955a) and the International Code of Botanical Nomenclature 1956.

1. *Peltigera aphthosa* (L.) WILLD.

In North America the species *Peltigera aphthosa* comprises three varieties, two of which are reported to be found on this expedition, viz. the species in its typical form called var. *aphthosa*, and var. *variolosa* (MASS.) THOMSON, while the collections contained no plants referable to var. *leucophlebia* NYL. However, the two varieties mentioned here were not always readily distinguishable from one another, and transitional forms occurred, too.

1a. *Peltigera aphthosa* var. *aphthosa*

SWm: 5 (400 m), 6, 7, 13 (&lt; 200 m, 800 m, c.ap.)

SWn: 17, 18, 28

CWs: 31 (c.ap.)

CWM: 34 (&lt; 200 m, 500 m), 35, 36 (&lt; 200 m, 400 m)

CWN: 38, 42.

1b. *Peltigera aphthosa* var. *variolosa* (MASS.) THOMSON

SWn: 24, 26, 28 (900 m)

CWs: 31

CWN: 37, 38.

2. *Peltigera venosa* (L.) BAUMG.

SW: 15 (c.ap.).

*Peltigera venosa* is generally regarded as widely distributed in Greenland, and it is no doubt because of its having been overlooked that it is only reported from a single locality here. The specimens found were rather small, but typical and richly fertile.

3. *Peltigera scutata* (DICKS.) DUBY

CWn: 38.

The species seems to be one of the rarest *Peltigera* species in Greenland, being previously only reported from southernmost Greenland (DAHL 1950, BÖCHER 1954) and from Disko (GELTING 1956). It was found in locality 38, growing in company with *Peltigera malacea* and *Nephroma arcticum*.

4. *Peltigera pulverulenta* (TAYL.) NYL.syn. *P. scabrosa* TH. FR.

SWm: 7 (c.ap.), 9 (c.ap.), 13 (c.ap.)

SWn: 18 (c.ap.), 20.

CWm: 34, 35

CWn: 37, 38 (c.ap.), 42.

*Peltigera pulverulenta* occurred in most cases in large well developed specimens, and commonly with apothecia. The species had previously been reported from many places in West Greenland, and in the districts investigated in 1958 it was of a fairly continental type of distribution, occurring particularly on and among mosses in the more luxuriant portions of the dwarf shrub heaths. Thus, in locality 34 in the interior of Nordre Strømfjord it was found in an analysis together with *Peltigera aphthosa* var. *aphthosa*, *Dactylina arctica*, and *Nephroma arcticum*, and in locality 35 in a vegetation type with i.a. *Peltigera aphthosa* var. *aphthosa*, *P. malacea*, and *Nephroma arcticum*. In this locality, *Diploschistes scruposus*, which is characteristic of areas with a continental climate, was also met with.

5. *Peltigera polydactyla* (NECK.) HOFFM.5a. *Peltigera polydactyla* var. *polydactyla*

SWm: 4 (c.ap.), 7 (c.ap.).

*Peltigera polydactyla* in its typical form, here termed var. *polydactyla*, is a southern plant in Greenland. The greater number of records of *P. polydactyla* from arctic regions have reference to the succeeding variety, var. *crassoides* GYEL. However, in localities 4 and 7 some individuals occurred which are, no doubt, var. *polydactyla*, with a flatly expanded thallus with distinct, dark, retiform veins on the under side and between these clearly visible light patches. Apothecia were present on several upright digitate lobes, with a chestnut-brown disc and recurvate sides. Spores slightly curved, quinque-septempartite, average size, measured on plants from locality 4,  $60 \times 4 \mu$ , while on specimens from locality 7 it was  $70 \times 4.5 \mu$ . A plant from locality 4 is reproduced on plate I, figs. 1-2.

5b. *Peltigera polydactyla* var. *crassoides* GYEL.

SWm: 5 (400 m), 7, 10

SWn: 18

CWN: 37, 38 (c. ap.), 42.

This variety differs from var. *polydactyla* by having a smaller but thicker and stiffer thallus, often with somewhat involute edges of the darker lobes. The nerves of the under side are almost entirely confluent, as in *P. malacea*, with interstices absent or diminutive and obscure. Var. *crassoides* is a northern variety and had formerly been recorded from Greenland (sub syn. *P. polydactyloides* NYL.).

6. *Peltigera malacea* (Ach.) FUNCK

SWm: 6 (400 m), 10

SWn: 18, 23

CWS: 30, 32 (400 m)

CWM: 33, 34 (&lt; 200 m, 500 m), 35, 36

CWN: 37, 38 (c. ap.), 44 (&lt; 200 m, 500 m).

One of the commonest species of *Peltigera*. In the localities in the three continental districts it was particularly frequent and occurring in large numbers, though rarely fertile. In the driest places it is represented by rather small individuals with highly involute edges.

7. *Peltigera lepidophora* (NYL.) VAIN.

SWn: 17, 25

CWM: 34

CWN: 38, 44 (500 m).

All the specimens found were rather small, always sterile, and often faintly developed, so they were easily overlooked. This is perhaps the reason why the species has rarely been reported from the districts in question. Thus, the literature on West Greenland contains only few records from the Julianehåb region (DAHL 1950), from the interior of Søndre Strømfjord (BÖCHER 1954), from Disko (GELTING 1955), and from Jakobshavn (FREDSKILD 1961).

8. *Peltigera canina* (L.) WILLD.8a. *Peltigera canina* var. *canina*

SWm: 10 (c. ap.), 13

SWn: 17, 18 (900 m), 26, 28

CWN: 38 (c. ap.).

The typical form of *Peltigera canina* is here termed var. *canina* in accordance with the International Code of Botanical Nomenclature

1956. Plants referable to this variety were not particularly common in these northern districts of West Greenland.

8b. *Peltigera canina* var. *rufescens* (WEIS.) MUDD

SWm: 6 (400 m), 10 (c.ap.), 13 (800 m)  
 SWn: 17, 24, 25, 28 (300 m, c.ap.; 900 m, c.ap.)  
 CWM: 34, 35, 36 (400 m)  
 CWN: 37, 38 (c.ap.), 44 (500 m).

In the districts investigated here, var. *rufescens* was found to be commoner than the closely related var. *canina*, which is a more southerly plant. Var. *rufescens* was found in many localities at great altitudes, and here often as fertile and well developed individuals.

8c. *Peltigera canina* var. *spuria* (ACH.) SCHAER. f. *sorediata* SCHAER.  
 syn. *Peltigera erumpens* VAIN.

SWm: 10, 11, 13  
 SWn: 28 (900 m)  
 CWs: 30, 32  
 CWM: 34, 36  
 CWN: 37, 38, 44.

The variety *spuria* (ACH.) SCHAER. in its sorediate form, f. *sorediata* SCHAER., turned out to be a rather common lichen in all the districts investigated, and quite likely it is even more frequent than is indicated by the localities mentioned here, for owing to its most often diminutive size it is readily overlooked. The plants vary somewhat in size, from 0.5 to 2 cm, and likewise differ greatly in the degree of mattedness of the upper side. Quite glabrous specimens, formerly generally called f. *leptoderma* most frequently with a very small and thin thallus, seemed to be commonest in the most continental regions, thus they were found in localities 28, 32, 36, 37, and 38, while plants with a more or less extensive matted layer on the upper side seem to develop most vigorously in rather oceanically marked localities. However, transitions from one form to the other were met with, but all were typically sorediate. Fertile plants were nowhere found.

9. *Peltigera membranacea* (ACH.) NYL. emend. THOMSON

SWm: 6 (400 m)  
 CWN: 38.

THOMSON (1950) followed NYLANDER, giving this taxon the rank of a separate species, though formerly it was generally placed as a variety

of *P. canina*. Only, few plants referable to this species were found in my collections from the two above-mentioned localities.

**Baeomyces PERS.**

1. *Baeomyces rufus* (HUDS.) RABENH.

SWm: 1 (c. ap.), 13 (c. ap.).

A southern species, from Greenland reported only from the southern-most regions near Julianehåb (DAHL 1950).

**Cladonia (HILL.) VAIN.**

1. *Cladonia rangiferina* (L.) WEB.

SWm: 1, 5, 6, 7, 13

SWn: 17, 18 (< 200 m, 900 m), 20, 21, 22, 26

CWs: 32

CWm: 34 (500 m), 36

CWn: 37, 38, 40, 42, 44.

*Cladonia rangiferina* was found to be commonly distributed over the districts investigated, and in many places, especially in fairly continental regions, it constituted a considerable proportion of the lichen mass in the dwarf shrub heaths, cf. fig. 2, p. 50. All the plants collected were tested with Pd, and all showed a positive reaction

2. *Cladonia mitis* SANDST.

SWm: 1, 3, 4, 5 (< 200 m, 400 m), 6, 7, 10, 13 (< 200 m, 800 m, 900 m)

SWn: 17, 18 (< 200 m, 900 m), 21, 22, 23, 24, 25, 26, 28 (300 m, 400 m)

CWs: 30, 32

CWm: 34 (< 200 m, 500 m), 35, 36 (< 200 m, 600 m)

CWn: 37, 38, 40, 42, 44 (< 200 m, 500 m).

*Cladonia mitis* was the dominant *Cladonia* species, and it was found, often in great abundance, in all the localities in which a large number of samples were collected, cf. fig. 2, p. 50. No reaction with Pd in any of the plants collected.

3. *Cladonia alpestris* (L.) RABENH.

SWm: 6, 7

SWn: 16, 17, 21

CWs: 32

CWn: 37, 38, 42.

Chiefly distributed in the lichen heaths of the fairly continental district, but never in quantity. Most often it occurs in the rather luxuriant

types of heaths, dominated by *Empetrum* or *Cassiope*, cf. e.g. fig. 4, p. 52. All the samples showed a negative reaction with Pd.

4. *Cladonia coccifera* (L.) ZOPF

SWm: 1, 2, 3, 4, 5 (400 m), 7, 10, 13 (< 200 m, 800 m)  
 SWn: 16, 17, 23, 24, 25, 26, 28 (600 m, 900 m)  
 CWs: 30, 32 (400 m)  
 CWM: 34 (< 200 m, 500 m), 35, 36 (< 200 m, 400 m)  
 CWN: 37, 38, 40, 42, 43, 44 (< 200 m, 500 m).

This species, *Cl. coccifera* s. ang., was of common occurrence in almost all the localities in which rather thorough investigations were made, in particular in the three continental districts, and well developed red apothecia were commonly present.

5. *Cladonia pleurota* (FLÖRKE) SCHÄER.

SWm: 1, 6 (< 200 m, 400 m), 7, 9, 10, 13 (< 200 m, 800 m)  
 SWn: 18 (< 200 m, 900 m), 21, 22  
 CWs: 30  
 CWM: 36 (< 200 m, 400 m)  
 CWN: 37, 38, 42.

This species, too, was collected in a great many localities, but unlike *Cl. coccifera*, it seems to be most abundant in more southerly localities with an oceanic climate.

6. *Cladonia deformis* (L.) HOFFM.

SWm: 2, 4, 5 (400 m), 6, 7, 9, 10, 13  
 SWn: 16, 17, 18, 20, 21, 22, 23, 26  
 CWs: 30, 32  
 CWM: 33, 36  
 CWN: 37, 38, 42.

*Cladonia deformis* is rather commonly distributed throughout the area treated here, though in the inland it is chiefly restricted to north-facing rather moist places near snow-patches and similar localities. Large typical individuals were often met with, but apothecia were never found to have developed.

7. *Cladonia bellidiflora* (Ach.) SCHÄER.

SWm: 1, 2, 3, 4, 5 (400 m), 6, 7, 9, 13  
 SWn: 16, 18 (< 200 m, 900 m), 21, 22, 23  
 CWM: 34 (500 m), 35  
 CWN: 37, 38, 42.

In West Greenland *Cladonia bellidiflora* has almost the same distribution as *Cl. deformis*, and was frequently found in the same places as this latter. Apothecia commonly present.

8. *Cladonia amaurocraea* (FLÖRKE) SCHÄER.

SWm: 1, 2, 4, 5 (400 m), 6, 7, 13  
SWn: 16, 17, 18 (< 200 m, 900 m), 22, 26  
CWs: 30, 32 (400 m)  
CWM: 34 (< 200 m, 500 m), 35, 36  
CWN: 37, 38 (c.ap.), 40, 42 (c.ap.), 44 (c.ap.).

9. *Cladonia uncialis* (L.) WEB.

SWm: 2, 3, 5 (400 m), 6 (< 200 m, 400 m), 7, 10, 11, 13  
SWn: 16, 17, 18  
CWs: 30  
CWM: 36  
CWN: 37, 38.

10. *Cladonia crispata* (Ach.) FLOT.

SWm: 1, 5 (400 m), 6, 10, 13  
SWn: 16, 18  
CWs: 32  
CWN: 37, 38.

*Cladonia crispata* was found in a number of different forms which it was difficult to refer definitely to special varieties. One of the common types is seen in plate II, fig. 2.

11. *Cladonia delessertii* (NYL.) VAIN.

SWm: 1, 6, 7  
CWN: 38.

The species was not common in the localities mentioned, but the majority of the plants present were rather typical, see plate II, fig. 1.

12. *Cladonia squamosa* (Scop.) HOFFM.

SWm: 1, 7, 9, 13  
SWn: 17, 18, 20, 22, 26  
CWs: 30, 32 (400 m)  
CWM: 34  
CWN: 37, 38, 42

*Cladonia squamosa* was found in several localities and in all districts. In locality 38, in particular, a great many plants like that shown in plate I, fig. 3, were collected.

13. *Cladonia cenotea* (Ach.) SCHAER.

CWm: 36

CWn: 38.

*Cladonia cenotea* is a rare species in Greenland. Only few records of it are found in the literature, namely, from West Greenland, from Julianehåb and Godthåb (DAHL 1950) and from Disko (LYNGE 1937), and from Northeast Greenland (LYNGE & SCHOLANDER 1932).

In locality 36, at the inner part of Nørre Strømfjord, *Cl. cenotea* grew in one place among *Empetrum* in a dense lichen patch dominated by *Cl. mitis*, and in another place in the same locality among *Betula nana* and *Ledum palustre* ssp. *decumbens* in company with *Cl. deformis*, *Cl. cornuta*, *Cl. pleurota*, and *Cl. fimbriata*. Specimens of *Cl. cenotea* from this place are seen on plate I, fig. 5. *Cladonia cenotea* was found under almost the same conditions in locality 38, growing as scattered individuals in a vegetation of *Betula* and *Ledum*.

14. *Cladonia cariosa* (Ach.) SPRENG.

SWn: 17 (c.ap.), 21

CWm: 34 (c.ap.), 36

CWn: 38, 44 (500 m, c.ap.).

A very inconspicuous species, in arctic regions most often occurring without, or with diminutive or poorly developed, podetia. It is a typically continental species, and is probably commoner in the inner parts of West Greenland than indicated by these few finds.

15. *Cladonia alpicola* (FLOT.) VAIN.

SWm: 2, 5 (400 m), 6, 7, 43

SWn: 16, 17, 21, 22, 28 (700 m)

CWs: 30, 32

CWm: 36

CWn: 37, 38, 42.

*Cladonia alpicola* seemed to be rather common throughout all the districts investigated. The majority of the plants collected were finely developed and typical, often with vigorous and fertile podetia, as seen in plate II, fig. 3.

16. *Cladonia gracilis* (L.) WILLD.16a. *Cladonia gracilis* var. *chordalis* (FLÖRKE) SCHÄER.

SWm: 1, 2, 3, 4, 5 (400 m), 6, 10, 11, 13 (&lt; 200 m, 800 m, 900 m)

SWn: 16, 18 (&lt; 200 m, 900 m), 21, 22, 23, 24, 25, 26, 28 (300 m)

CWs: 30, 32

CWM: 33, 34 (&lt; 200 m, 500 m), 35, 36

CWN: 37, 38, 42, 44.

*Cladonia gracilis* var. *chordalis* is one of the commonest species of *Cladonia* in these parts of West Greenland, and was collected in almost all the localities in which lichens were secured, cf. the above records. It was often met with at very great altitudes, and in the lowland *Cl. grac.* var. *chord.* commonly formed a significant component of the lichen heaths.

17. *Cladonia ecmocyna* (Ach.) NYL.

SWm: 1, 2 (c.ap.), 3 (c.ap.), 4, 5 (400 m), 6 (&lt; 200 m, 900 m), 7, 10, 13 (&lt; 200 m, c.ap., 800 m, c.ap.)

SWn: 17, 18 (&lt; 200 m, 900 m), 21 (c.ap.), 28 (400 m)

CWM: 34, 35

CWN: 37, 38 (c.ap.).

*Cl. ecmocyna* was rather commonly distributed in the districts SWm and SWn. It prefers moist localities near snow-patches and similar places, so it was according to expectations that it was rather sparse or entirely absent in the most continental localities in the CW districts.

18. *Cladonia cornuta* (L.) SCHÄER.

SWm: 6

SWn: 18

CWs: 30

CWM: 36

CWN: 37.

*Cladonia cornuta* is not common so far northward in West Greenland, and only few records from these districts are found in the literature: Egedesminde (BRANTH & GRØNLUND 1888), Blæsedalen, Disko (LYNGE 1937), and Jakobshavn (FREDSKILD 1961). Some plants from coll. no. 703, loc. 36, Nuerssorfiarqap avangnâtungå are seen on plate II, fig. 4.

19. *Cladonia degenerans* (FLÖRKE) SPRENG.

SWm: 6 (&lt; 200 m, 400 m), 10, 13

SWn: 18 (900 m), 25, 28 (300 m)

CWs: 30 (c.ap.)

CWm: 34, 36  
 CWn: 37, 38, 44 (< 200 m, 500 m).

The finds from all these localities reacted Pd +.

20. *Cladonia lepidota* NYL.

SWm: 1, 6 (< 200 m, 400 m), 13 (< 200 m, 800 m)  
 SWn: 22, 23  
 CWm: 36  
 CWn: 37, 38 (< 200, 400 m), 42.

Plants from all these localities were tested with Pd, and all of them showed a positive reaction.

21. *Cladonia subcervicornis* (VAIN.) DU RIETZ

CWn: 37, 38, 42.

22. *Cladonia macrophyllodes* NYL.

SWm: 2, 3, 4, 5 (400 m), 6 (< 200 m, 400 m), 10, 13  
 SWn: 17, 25  
 CWn: 38.

The majority of the localities of *Cladonia macrophyllodes* are seen to be found in the district with the most oceanic climate; this agrees with the fact that the species generally occurs in snow-patches, often in company with *Cl. ecmocyna*.

23. *Cladonia chlorophaea* (FLÖRKE) SPRENG.

SWm: 6, 13 (< 200 m, 800 m)  
 SWn: 18 (900 m), 24, 26  
 CWm: 36.

A positive Pd-reaction was found in all the above-mentioned collections.

24. *Cladonia pyxidata* (L.) FR.

24a. *Cladonia pyxidata* var. *neglecta* (FLÖRKE) MASS.

SWm: 1  
 SWn: 28 (600 m)  
 CWs: 30  
 CWm: 36  
 CWn: 37, 38.

All the plants collected reacted positively to Pd.

24b. *Cladonia pyxidata* var. *pocillum* (Ach.) Flot.

SWm: 13

SWn: 26, 28 (600 m, 900 m)

CWM: 34, 36

CWN: 38, 42, 44.

*Cl. pyxidata* var. *pocillum* is one of the smallest species of *Cladonia* and is probably more widely distributed than the rather few localities recorded would seem to show. No doubt it was overlooked in several places, especially since the variety most frequently occurs in more or less markedly "pachythallina" forms with no or with poorly developed podetia. The collections seem to show that var. *pocillum* is a more continental variety than var. *neglecta* and the related species *Cl. chlorophaea*, which was only found in one of the rather continentally marked localities. All the samples of var. *pocillum* shows a positive reaction to Pd.

25. *Cladonia fimbriata* (L.) Fr.

SWm: 1, 4, 10

SWn: 17, 21, 26

CWS: 30, 32

CWM: 34, 36 (&lt; 200 m, 400 m)

CWN: 37, 38, 44 (500 m).

All the plants collected gave the reaction Pd +. The greater number of individuals are referable to f. *minor*, but all the plants from localities 38 and 44 as well as from locs. 34, 36, and 37 are more likely f. *prolifera*.

26. *Cladonia carneola* Fr.

SWm: 5, 6, 7 (c.ap.), 13 (c.ap.)

CWN: 42.

The localities recorded for this species show that it has a southern distribution in Greenland, and all earlier records from the west coast are, in fact, from the southernmost parts (DAHL 1950) with the exception of some few from Jakobshavn (DAHL l.c., FREDSKILD 1961) and one from Disko (BÖCHER 1959). A fertile specimen is seen in plate I, fig. 4.

27. *Cladonia cyanipes* (SOMMERF.) VAIN.

SWm: 13

SWn: 17, 18, 26

CWM: 34

CWN: 37, 38.

**Stereocaulon (SCHREB.) HOFFM.**1. *Stereocaulon botryosum* ACH.SWm: 13 (800 m, 900 m, v. *dissolutum*)

SWn: 18

CWM: 34 (500 m)

CWN: 38 (+ v. *dissolutum* c. ap.).

The species was found to be distributed throughout the whole area treated here, with the exception of district CWs, but it was never abundant in the localities given above. The variety *dissolutum* MAGN. was only found in two localities, as stated above.

2. *Stereocaulon vesuvianum* PERS.syn. *St. denudatum* FLÖRKE incl. *St. arcticum* LYNGE

SWm: 1, 2, 3, 5 (400 m), 6, 7, 13

SWn: 18 (700 m, 900 m), 21, 22, 25, 28 (700 m)

CWM: 34

CWN: 38, 42, 44 (500 m).

3. *Stereocaulon paschale* (L.) HOFFM.

SWm: 2, 5 (400 m), 6 (c. ap.), 7, 9, 13

SWn: 16, 17 (c. ap.)

CWs: 30, 32 (&lt; 200 m, 400 m)

CWM: 34 (500 m), 35, 36

CWN: 37, 38, 42.

*Stereocaulon paschale* is a rather common species as far north in West Greenland as the present investigations were made. From the localities listed above it will be seen that it occurred in both the continental and the oceanic districts, though perhaps most frequently and most abundantly in the subcontinental localities. The species seems to be restricted in some measure to the lowland, and was rarely found at altitudes up to 500 m a.s.l. Typical, well developed individuals, though rarely with apothecia, were of common occurrence.

4. *Stereocaulon alpinum* LAUR.

SWm: 2, 6 (&lt; 200 m, c. ap., 400 m, c. ap.), 10 (c. ap.), 13 (c. ap.)

SWn: 16 (c. ap.), 17 (c. ap.), 18 (< 200 m, 900 m), 23, 24, 25, 27 (900 m),  
28 (600 m, c. ap.)

CWs: 30 (c. ap.)

CWM: 34 (&lt; 200 m, c. ap., 500 m), 36 (400 m)

CWN: 37, 38 (c. ap.), 42 (c. ap.), 44 (c. ap.).

In the part of West Greenland dealt with here, this species is the dominant *Stereocaulon* species. It was found and collected in almost all the localities in which time permitted a careful investigation. It is an important constituent of lichen heaths of many different types, and is particularly abundant in the subcontinental regions. Generally it spreads to greater altitudes than *St. paschale*, and it was often fertile. Typical individuals were met with everywhere, and were readily distinguishable from *St. paschale* and *St. rivulorum*, in particular if apothecia were present.

5. *Stereocaulon rivulorum* MAGN.

SWm: 6 (400 m, c.ap.), 13 (< 200 m, c.ap., 900 m)

SWn: 21, 25, 26 (c.ap.), 28 (300 m, c.ap., 900 m, c.ap.)

CWn: 38, 44 (500 m).

*Stereocaulon rivulorum* is a more northern species than the preceding ones, and was most commonly distributed and most abundant in the northernmost two districts. In many places it occurred at great altitudes, especially in the southernmost localities, and in more continental areas the occurrence of the species is for the most part limited to moist soil at great altitudes. Apothecia were often well developed in large numbers.

**Agyrophora** (NYL.) NYL.

1. *Agyrophora leiocarpa* (DC.) GYEL.

SWm: 10.

*Agyrophora leiocarpa* must be a very rare species in the western hemisphere, whence, according to LLANO (1950), it has only been recorded from three places, viz. Inglefield Land in North Greenland, North Somerset Island in the Canadian arctic archipelago, and the Antarctic continent. My collection includes one single specimen only, cf. plate III, figs. 1-2.

2. *Agyrophora lyngei* (SCHOLANDER) LLANO

SWn: 28

CWn: 37, 38, 42, 44 (500 m, c.ap.).

It will appear from the above records that the species was only found in the northernmost localities visited, all situated in Disko Bugt, and the investigations thus confirm that *Agyrophora lyngei* is a northern species in West Greenland. I found many fine specimens, and was delighted to find, also, two apothecia on one of them, for this species is rarely fertile. Previously it had been recorded from Disko (LYNGE 1937) and from some few other localities north thereof (LLANO 1950). South of my loc. 37 only one record is available, namely from the Julianehåb district (DAHL 1950).

A fine, typical specimen from locality 28, Lyngmarksfjeld, is figured in plate III, fig. 3.

### **Omphalodiscus SCHOLANDER**

#### 1. *Omphalodiscus krascheninnikovii* (Sav.) SCHOLANDER

SWn: 28 (300 m).

This species was only found in one locality, where it grew on blocks of rock in company with i.a. *Umbilicaria cylindrica*, *U. hyperborea*, and *Neuropogon sulphureus*. Not very many specimens were found, but they were fine and richly fertile (plate IV, fig. 1). It is a northern species, which is not recorded from West Greenland south of Disko, while isolated finds are available from Northwest and Northeast Greenland (LYNGE & SCHOLANDER 1932, LLANO 1950) and one from Southeast Greenland (DAHL, LYNGE & SCHOLANDER 1937).

### **Umbilicaria HOFFM.**

#### 1. *Umbilicaria arctica* (Ach.) NYL.

SWm: 3, 6, 7, 10, 11

SWn: 16, 17, 22, 23, 25

CWs: 31

CWm: 35, 36

CWn: 37, 38, 42, 44 (500 m)

*Umbilicaria arctica* is a common species all over the west coast of Greenland, and I found it to be equally frequent within all the districts in localities presenting a sufficient birdlife for such an ornithocoprophilous species. In such places it is very conspicuous, and may attain a diameter of up to 10 cm, and it is often densely covered with apothecia.

#### 2. *Umbilicaria cylindrica* (L.) DEL.

SWm: 1, 2, 4, 5 (400 m), 6 (< 200 m, 400 m), 10, 13 (< 200 m, 800 m)

SWn: 17, 18 (700 m, 900 m), 21, 23, 25, 26, 27 (900 m), 28 (300 m, 700 m)

CWs: 32 (400 m).

CWn: 37, 38, 42, 43.

A very common species in the greater number of the many above-mentioned localities whence it was collected. Only in the most continental regions, as in the interior of Evighedsfjord and Nordre Strømfjord, was it rare or entirely absent. The majority of the plants collected are rather small, only a couple of centimetres in diameter, though always fertile.

3. *Umbilicaria deusta* (L.) BAUMG.

CWn: 42.

*Umbilicaria deusta* has a distinctly southern distribution in Greenland. Thus, from the west coast, many records are at hand from the Julianehåb and Frederikshåb districts (DAHL 1950), while only few finds are recorded from more northerly districts, namely from Sukkertoppen, leg. VAHL (LYNGE 1937), Holsteinsborg, leg. VAHL (DAHL 1950), and Disko, Lyngmarken, leg. TH. FRIES (LYNGE 1937). *U. deusta* is probably rare in these northern districts, and the single find made by me consists of some few very small and sterile specimens.

4. *Umbilicaria havaasii* LLANO

SWm: 7, 13 (900 m)

SWn: 18 (900 m).

Only few specimens were found in the above-mentioned three localities. A specimen from locality 7 is seen in plate IV, figs. 2-3.

5. *Umbilicaria hirsuta* (Sw.) ACH.

CWn: 42.

*Umbilicaria hirsuta* has a very scattered distribution in the western hemisphere (LLANO 1950), and the few finds previously recorded from Greenland are from the interior of the Julianehåb district in southernmost Greenland (DAHL 1950). It is, no doubt, a very rare species in the districts investigated here; I found it only once, on a rather steep south-facing rock wall, at 25 m a.s.l., where it grew in company with other species of *Umbilicaria*, i. a. *U. cinereorufescens*. Several of the plants were rather big, but all of them without apothecia.

6. *Umbilicaria hyperborea* (Ach.) HOFFM.

SWm: 1, 2, 4, 5 (400 m), 6, 7, 10, 13 (&lt; 200 m, 900 m)

SWn: 16, 17, 18 (900 m), 21, 23, 25, 27 (900 m), 28 (300 m, 700 m)

CWs: 30, 31

CWM: 36

CWn: 37, 38, 42, 43, 44 (500 m).

*Umbilicaria hyperborea* seems to be the commonest *Umbilicaria* species in these districts. It was found in all the localities in which it was looked for, and a great many plants were collected. Only in the most continental parts of CWs and CWM was it rather sparse, while in other districts it was dominant in many places, and in several localities in the mountains it was met with to the greatest altitudes at which collections were made. Apothecia were commonly present.

7. *Umbilicaria proboscidea* (L.) SCHRAD.

SWm: 2, 6, 13 (800 m, 900 m)  
 SWn: 18 (700 m, 900 m), 21, 27 (900 m)  
 CWs: 30  
 CWn: 37, 44 (< 200 m, 400 m).

The species does not seem to be particularly common, and in most of the localities mentioned only few plants were found, often only at the greatest altitudes. All the plants collected were fertile.

8. *Umbilicaria torrefacta* (LIGHTF.) SCHRAD.

SWm: 1 (+ v. *erosa*), 2 (v. *erosa*), 6 (v. *erosa*), 10 (v. *erosa*, v. *pachyd.*)  
 SWn: 16 (v. *erosa*), 21, 22 (v. *erosa*), 28 (700 m, v. *erosa*)  
 CWn: 37, 38.

From other parts of Greenland *Umbilicaria torrefacta* is reported to be very common, and it was surprising, therefore, that it was sparse and scattered in the districts dealt with here. The greater number of the plants collected are referable to the variety *erosa* (WEB.) LYNGE, which was the commonest form in the southernmost, most oceanic regions, while it was not encountered in the inland localities. In districts CWs and CWm, *Umbilicaria torrefacta* was not collected at all, but it may have been overlooked there. One of the specimens from locality 10 was referable to var. *pachydermata* LLANO. Plate V, figs. 1–2 show a typical var. *erosa*, while the specimen seen in figs. 3–4 was referred to var. *pachydermata*.

9. *Umbilicaria vellea* (L.) ACH.

SWm: 11  
 CWm: 36 (400 m)  
 CWn: 37, 38, 44 (500 m).

10. *Umbilicaria cinereorufescens* (SCHAER.) FREY

CWm: 36  
 CWn: 38, 42.

It may sometimes be difficult to distinguish *Umbilicaria cinereorufescens* from *U. vellea*, but in the above-mentioned three localities several plants were collected which were altogether typical *U. cinereorufescens*, and it was expected beforehand that the species would occur precisely in these places within the most continental districts. The plants were normally plurifoliate, rather small, and all of them sterile. In locality 36 it was found to grow on a large isolated rock block 100 m a.s.l. in company with other species with a continental distribution, e.g. *Physcia constipata*, *Diploschistes scruposus*, *Leptogium saturninum*, *Lobaria scrobiculata*, and *Cladonia cariosa*. The habitat was moreover af-

fected in some measure by bird excrements, for *Xanthoria candelaria*, *Parmelia infumata*, and *Umbilicaria arctica* also grew on the rock. In locality 38 it was found in several places, i.a. on a bird stone together with *Xanthoria candelaria*, *Physcia dubia*, *Ph. caesia*, *Parmelia infumata*, *P. saxatilis*, and *Umbilicaria arctica*. *U. cinereorufescens* has not hitherto been reported from very many places in the western hemisphere (LLANO 1950), and from Greenland it has only been recorded from some few localities on the southern part of the west coast (DAHL 1950).

### **Parmelia** ACH.

#### 1. *Parmelia bitteriana* ZAHLBR.

CWn: 38.

The literature contains no earlier records of *Parmelia bitteriana* from Greenland, where it is evidently a very rare species. The sample was tested with Pd, and showed a negative reaction in the medulla and the soredia. No apothecia present.

#### 2. *Parmelia austrodes* NYL.

SWn: 26

CWm: 36

CWn: 37, 38, 44 (< 200 m, 500 m).

It is characteristic that this species was not found in the most oceanically influenced part of the area investigated, while, on the other hand, typical specimens with very short, but distinctly diffuse-sorediate isidia on the central parts of the upper side of the thallus surface were collected in several places, especially in district CWn. No apothecia were found.

#### 3. *Parmelia intestiniformis* (VILL.) ACH.

SWm: 6, 13

SWn: 18 (700 m), 26

CWm: 36

CWn: 37, 38 (< 200 m, 400 m), 44 (500 m).

*Parmelia intestiniformis* was found to be commonest in the northern parts of the area investigated, thus it was rather common especially in locality 38, while it was obviously more sparsely present south of Disko. Typical specimens with a negative Pd reaction were commonly found, but apothecia were nowhere observed.

#### 4. *Parmelia alpicola* TH. FR.

SWm: 2, 7

SWn: 16 (c. ap.), 18 (700 m, c. ap.), 21 (c. ap.), 22, 25 (c. ap.), 26

CWn: 37, 38, 44 (500 m).

*Parmelia alpicola* does not seem to be particularly common in any of the localities whence it is recorded here, and it was not found at all in the most continental inland areas. Apothecia were often present. In East Greenland the species is commonest along the south coast (DAHL, LYNGE & SCHOLANDER 1937), and the same is evidently the case on the west coast, where it is very common in the Julianehåb district (DAHL 1950).

5. *Parmelia stygia* (L.) ACH.

SWn: 26

CWn: 38, 42.

6. *Parmelia centrifuga* (L.) ACH.

SWm: 7, 10

SWn: 21 (c. ap.)

CWn: 37, 38, 42 (c. ap.).

7. *Parmelia incurva* (PERS.) FR.

SWm: 13

SWn: 25

CWm: 36

CWn: 37, 38, 43.

*Parmelia incurva* is presumed to have a southwestern distribution in Greenland. It is common in the Julianehåb district (DAHL 1950), but occasional finds were formerly reported from Disko (LYNGE & SCHOLANDER 1932, LYNGE 1937). Unfortunately, on the expedition in 1958 the species was, no doubt, often overlooked, at any rate in the southern localities, and my scattered samples consist for the most part of small individuals, always sterile, but with typical soredia.

8. *Parmelia olivacea* (L.) ACH.

CWn: 38.

Only a single and rather small, but richly fertile, specimen was found on a twig. It is a more southern species, not formerly reported from regions north of Godthåb (DAHL 1950).

9. *Parmelia panniformis* (NYL.) VAIN.

CWn: 38.

*P. panniformis* was found in locality 38 in a couple of places only, growing as very dense, caespitose plants several centimetres broad, with upright, very narrow lobes in the centre and more adpressed and imbricate broader lobes towards the periphery, all of them sterile. *P. panniformis* is a continental species, previously reported from Greenland from some few places, only, on the southernmost part of the west coast (DAHL 1950).

10. *Parmelia disjuncta* ERICHs.

CWM: 36

CWN: 37, 38 (c. ap.), 42.

*Parmelia disjuncta* prefers dry habitats well exposed to the light, and it is in good accordance herewith that it was only found in continental districts. It was especially abundant in locality 38, often growing on stones on south-facing slopes, and in locality 42, where it occurred on a steep rock wall with a southern exposure, in company with *Umbilicaria cinereorufescens*, *U. hirsuta*, and *Agyrophora lyngei*. Apothecia were found on one plant only.

11. *Parmelia infumata* NYL.

CWM: 36

CWN: 38.

*P. infumata* is a typical ornithocoprophilous species, which e.g. in locality 36 was found on a rock block quite close to, and partially overgrowing, *Xanthoria candelaria*, and in locality 38 it was often seen in a well developed condition on bird stones, here, too, sometimes densely intergrown with i.a. *Xanthoria candelaria*, *Parmelia saxatilis*, and various species of *Physcia*.

12. *Parmelia saxatilis* (L.) ACH.

SWM: 1, 2, 5 (400 m), 6, 10, 11, 13

SWN: 17, 21, 22

CWM: 36

CWN: 37 (c. ap.), 38, 42, 43.

13. *Parmelia omphalodes* (L.) ACH.

SWM: 1, 6, 10, 13

SWN: 15, 16, 18 (900 m), 20, 26

CWM: 35, 36

CWN: 37, 38 (&lt; 200 m, 400 m), 42, 44 (&lt; 200 m, 500 m).

14. *Parmelia sulcata* TAYL.

SWM: 3, 6, 10, 13 (800 m)

CWM: 35, 36

CWN: 37, 38.

**Cetraria ACH.**1. *Cetraria islandica* (L.) ACH.

SWM: 1, 5 (&lt; 200 m, 400 m), 6 (&lt; 200 m, 400 m), 7, 10, 11, 13

SWN: 15, 17, 18 (&lt; 200 m, 700 m, 900 m), 20, 21, 22, 23, 24 (c. ap.), 26, 28 (300 m, 400 m)

CWs: 30, 32 (400 m)  
 CWM: 34 (< 200 m, 500 m), 36  
 CWN: 37, 38, 40, 42, 43, 44 (< 200 m, 500 m).

All the samples of *Cetraria islandica* recorded here gave a positive reaction with Pd.

2. *Cetraria crispa* (Ach.) NYL.

SWM: 6, 7, 10, 13 (< 200 m, 800 m)  
 SWN: 17, 21, 22 (c. ap.), 24  
 CWs: 30, 32 (< 200 m, 400 m)  
 CWN: 37, 38, 42.

Negative reaction with Pd in all the above-mentioned samples.

3. *Cetraria delisei* (BORY) TH. FR.

SWM: 1, 3, 5 (400 m), 6, 13  
 SWN: 16, 20, 21 (c. ap.), 22 (c. ap.), 23, 24, 26  
 CWN: 38 (< 200 m, c. ap., 400 m), 42, 44.

*Cetraria delisei* is associated with moist soil near e.g. snow-patches, and accordingly it is most abundantly distributed in the oceanic districts, while it was not collected in the two most continental districts CWs and CWM.

4. *Cetraria nivalis* (L.) Ach.

SWM: 1, 3, 4, 6 (c. ap.), 7 (c. ap.), 13 (< 200, c. ap.; 800 m, 900 m, c. ap.)  
 SWN: 15, 17, 18 (< 200 m, 700 m, 900 m), 20, 21, 22, 23, 24, 25, 28  
 (300 m, c. ap.)  
 CWs: 30  
 CWM: 34 (< 200 m, 500 m), 36 (< 200 m, 400 m)  
 CWN: 37, 38 (c. ap.), 43, 44 (< 200 m, 500 m).

*Cetraria nivalis* is very common throughout the area, and was often found up to the greatest altitudes investigated. It frequently occurs in large continuous patches in the lichen heaths, and was occasionally found with apothecia.

5. *Cetraria cucullata* (BELL.) Ach.

SWM: 5, 6, 13  
 SWN: 17, 18, 22, 24, 26  
 CWs: 30, 34  
 CWM: 34 (< 200 m, c. ap., 500 m), 35, 36 (< 200 m, c. ap., 400 m)  
 CWN: 37, 38 (c. ap.), 42, 44 (< 200 m, c. ap., 500 m).

In most parts of Greenland this species is less common than *Cetraria nivalis*, and it is rarely abundant in a locality. It seems to be commonest

in the most continental districts, where, in addition, it is sometimes fertile, as stated above.

6. *Cetraria commixta* (NYL.) TH. FR.

SWm: 1 (c. ap.), 5 (400 m, c. ap.).

*Cetraria commixta* is a southern species in West Greenland and is only commonly distributed in the southernmost parts (DAHL 1950). In 1958 I only found it in the two localities mentioned above, but several plants, especially from locality 1, were rather big and well developed, and all had apothecia.

7. *Cetraria hepaticozon* (ACH.) VAIN.

SWm: 1, 2, 4, 5 (400 m), 6 (c. ap.), 10, 13 (c. ap.)

SWn: 17 (c. ap.), 18 (700 m), 21 (c. ap.), 22, 23, 25 (c. ap.) 28 (700 m)

CWn: 37, 38 (c. ap.), 42, 43.

8. *Cetraria nigricans* (RETZ.) NYL.

SWm: 2, 5 (400 m), 7, 13 (< 200 m, 900 m)

SWn: 18 (700 m, 900 m, 1000 m), 21, 22, 24

CWn: 37, 38 (< 200 m, 400 m), 42.

Very fine, vigorous, caespitose plants were often found in abundance, especially at great altitudes, but no fertile individuals were seen.

**Cornicularia** (SCHREB.) ACH.

1. *Cornicularia aculeata* (SCHREB.) ACH.

SWm: 3, 6 (< 200 m, 400 m), 13

SWn: 15, 18 (700 m, 900 m), 21, 22, 23, 24, 25, 26, 28 (300 m, 700 m)

CWs: 30, 32 (400 m)

CWm: 34, 35, 36 (600 m)

CWn: 37, 38, 40, 42, 44.

2. *Cornicularia divergens* ACH.

SWm: 1, 10

SWn: 21, 22

CWm: 36

CWn: 37, 38 (< 200 m, 400 m), 42, 44 (< 200 m, 500 m).

The greater number of the samples from the above-listed localities were fine and typical, but apothecia were looked for in vain.

**Dactylina NYL.**1. *Dactylina arctica* (RICHARDS.) NYL.

SWm: 13 (&lt; 200 m, 800 m)

SWn: 18

CWM: 34 (&lt; 200 m, 500 m)

CWN: 38.

*Dactylina arctica* has a distinctly northwestern distribution in Greenland and is unknown south of Godthåbs Fjord. In the above-listed localities 18, 34, and 38, fine vigorous plants in fairly large numbers were found in several places in the most luxuriant parts of the dwarf shrub heaths, very often in company with *Cassiope tetragona*.

2. *Dactylina ramulosa* (HOOK.) TUCK.

CWN: 44 (500 m).

Like *Dactylina arctica*, *D. ramulosa* is a clearly northern species in Greenland, thus it is not recorded from the west coast south of Disko, and I found it only in the northernmost locality investigated, viz. locality 44, in the northeastern corner of Disko Bugt, where it grew on a mountain top at an altitude of ca. 500 m near the inland ice. Many typical individuals occurred here, but all of them were sterile.

**Alectoria ACH.**1. *Alectoria chalybeiformis* (L.) RÖHL.

SWm: 3, 7

SWn: 16, 17, 22, 23

CWM: 34 (500 m), 35, 36

CWN: 37, 38, 42, 44 (&lt; 200 m, 500 m).

The samples referred here to *A. chalybeiformis* exhibited some morphological variation, but soredia were found on all the plants, though in somewhat varying number and size. The most highly sorediate individuals showed a positive Pd-reaction, particularly distinct in the soredia, while no Pd-reaction was demonstrated in the faintly sorediate plants.

2. *Alectoria lanea* (EHRH.) VAIN.

SWm: 2, 6, 7, 13

SWn: 15, 16, 17, 18 (900 m), 21, 22, 24, 25, 26

CWM: 34 (&lt; 200 m, 500 m), 35, 36 (&lt; 200 m, 600 m)

CWN: 37, 38, 40, 42, 44.

A positive Pd-reaction was found in plants from samples collected in all the above-mentioned localities.

3. *Alectoria nigricans* (Ach.) NYL.

SWm: 1, 5, 6, 7, 10, 13  
 SWn: 15, 16, 18 (< 200 m, 900 m), 20, 21, 22, 23, 24, 25, 26, 28 (300 m)  
 CWs: 30  
 CWm: 34 (500 m), 35, 36  
 CWn: 37, 38 (< 200 m, 400 m), 42, 44 (500 m).

4. *Alectoria ochroleuca* (EHRH.) NYL.

SWm: 2, 5 (< 200 m, 400 m), 6, 7, 10, 13 (< 200 m, 800 m, 900 m)  
 SWn: 17, 18 (900 m), 20, 21, 22, 24  
 CWs: 30, 32 (400 m)  
 CWm: 34 (< 200 m, 500 m), 35, 36 (< 200 m, 600 m)  
 CWn: 37, 38 (< 200 m, 400 m), 40, 42, 43, 44 (< 200 m, 500 m).

The commonest *Alectoria* species in these parts of West Greenland, often found up to the greatest altitudes at which samples were collected.

5. *Alectoria vexillifera* (NYL.) STIZENB.

SWn: 18 (700 m)  
 CWm: 36  
 CWn: 44 (500 m).

6. *Alectoria pubescens* (L.) HOWE

SWm: 1 (c. ap.), 2, 5 (400 m), 6, 7, 10 (c. ap.), 13 (c. ap.)  
 SWn: 16, 17, 18 (900 m, c. ap.), 21 (c. ap.), 22 (c. ap.), 23, 24, 25 (c. ap.), 26, 28 (700 m)  
 CWs: 30, 32 (400 m)  
 CWn: 37 (c. ap.), 38 (c. ap.), 42, 44 (500 m, c. ap.).

7. *Alectoria minuscula* NYL.

SWn: 25 (c. ap.)  
 CWs: 30  
 CWm: 36  
 CWn: 38, 42.

**Neuropogon** NEES & FLOT.1. *Neuropogon sulphureus* (KÖNIG) HELLB.

SWn: 27 (500 m, 900 m), 28 (300 m).

The species was found in quantity in the above-mentioned two localities on Disko, especially at altitudes above 300 m a.s.l., where the individuals generally attained a height of 3–5 cm. Thus in locality 27,

at the top of Skarvefjeld at an altitude of 900 m, the species was very frequently met with on loose blocks of basalt, most often together with *Umbilicaria cylindrica*, *U. hyperborea*, and *U. proboscidea*. In locality 28, at an altitude of 300 m, it grew in company with i.a. *Umbilicaria cylindrica*, *U. hyperborea*, and *Omphalodiscus krascheninnikovii*.

**Xanthoria (Fr.) Th. Fr.**

1. *Xanthoria candelaria* (L.) ARN.

SWm: 43

CWn: 36, 37, 38 (c. ap.).

A typical ornithocoprophilous species, which is probably more commonly distributed in the area than these few samples indicate. It was most frequently found on bird stones together with other nitrophilous species as e.g. *Parmelia infumata*, *P. saxatilis*, *Umbilicaria arctica*, *Physcia dubia*, and *Ph. caesia*.

**Physcia ACH.**

*Physcia dubia* (HOFFM.) LETT.

SWm: 41

CWm: 36 (400 m)

CWn: 38.

2. *Physcia caesia* (HOFFM.) HAMPE

CWn: 37, 38.

3. *Physcia sciastra* (ACH.) DU RIETZ

CWm: 35, 36

CWn: 37, 43, 44 (500 m).

4. *Physcia muscigena* (ACH.) NYL.

CWm: 34, 36 (c. ap.)

CWn: 38 (c. ap.), 42 (c. ap.), 44 (500 m, c. ap.).

5. *Physcia constipata* (NYL.) NORRL. & NYL.

CWm: 36

CWn: 38.

*Physcia constipata* is no common lichen in Greenland. It is only recorded from some localities in Northeast Greenland (LYNGE & SCHOLANDER 1932) and from the markedly continental area at the head of Søndre Strømfjord (BÖCHER 1954). Further, from the most recent years a few finds are at hand from the eastern part of the Canadian arctic

archipelago, thus one from the northern Baffin Island (HALE 1954) and another from Ellesmere Island (THOMSON 1959).

*Physcia constipata* is a typical continental species, thus in locality 36 it was found on a loose-lying rock in a community with other lichens of the same type of distribution, e.g. *Diploschistes scruposus*, *Cladonia cariosa*, *Lobaria scrobiculata*, and *Umbilicaria cinereorufescens*. In locality 38 it was found in company with i.a. *Peltigera canina* var. *spuria*, *Cladonia cariosa*, and *Cl. pyxidata* var. *pocillum*, all of them species with a likewise continental distribution. In the last-mentioned place it grew partially intermixed with *Physcia muscigena*, but in both localities pure populations of plants with upright, narrow, caespitose lobes also occurred. No apothecia were found.

### Lichenes Imperfeci.

#### **Thamnolia ACH.**

##### 1. *Thamnolia subvermicularis* ASAHI

SWm: 6

SWn: 18 (< 200 m, 900 m), 24, 26, 28 (300 m)

CWm: 34, 35, 36

CWn: 37, 38, 44 (< 200 m, 500 m).

None of the plants collected from the above-stated localities showed a distinct reddish colour reaction with Pd, and they were therefore all of them referred to *Th. subvermicularis*.

## THE LICHEN VEGETATION IN THE DISTRICTS

In the systematic part of the paper the localities recorded for each individual species are gathered in groups according to their position in the floristic districts suggested by BÖCHER, HOLMEN & JAKOBSEN (1957, 1959), in order to demonstrate characteristic features, if any, in the distribution of the species. This was feasible for a great many species, some of which turned out to be more or less common in some districts, while others were entirely absent. These facts will, of course, reveal themselves in the floristic composition of the lichen vegetation in the various districts. In this chapter an attempt will be made to demonstrate, through some examples, characteristic features of the lichen vegetation in some localities within the five districts.

### District SWm.

On the basis of the vegetation of vascular plants, this district may be characterised as a low-arctic and relatively oceanic region, as is also confirmed by the qualitative and quantitative composition of the lichen vegetation.

Thus, in locality 1, Sukkertoppen, i.a. *Cetraria delisei* and *Cladonia bellidiflora*, both of which are preferably associated with moist habitats, were noted as common species.

In locality 2, Tasiussaq, the widely distributed snow-patch vegetation, frequently dominated by i.a. *Salix herbacea*, *Loiseleuria procumbens*, *Lycopodium alpinum*, and *L. selago*, was often found to harbour oceanic lichens, e.g. *Cladonia ecmocyna* and *Cl. macrophyllodes*, sometimes forming continuous tufts.

Locality 3, Qôrnoq. Here, too, the vegetation was dominated by hygrophytic vascular plants such as *Salix herbacea*, *Loiseleuria procumbens*, *Phyllodoce coerulea*, *Harrimanella hypnoides*, *Lycopodium alpinum*, and *L. selago*, among which the following lichens were particularly noted: *Cladonia ecmocyna*, *Cl. macrophyllodes*, and *Cetraria delisei*.

Locality 4, Hamborgersund, was likewise characterised by comparatively southern and oceanic species. Thus, an analysis revealed *Solorina crocea*, *Cladonia ecmocyna*, *Cl. macrophyllodes*, and *Cl. fimbriata*.

Further, *Cl. deformis* and *Cl. bellidiflora* were of common occurrence. Of southern lichens, *Peltigera polydactyla* var. *polydactyla* (plate I, figs. 1-2) was met with.

Locality 5, Naqerdloq, lies near the head of a deep fjord, and the vegetation bore the stamp of being dependent on a less marked oceanic climate. Thus, the chionophilous lichen species were here most abundant at some altitude above the sea. On a plateau 400 m a.s.l., i.a. the following lichens were found in a snow-patch dominated by *Salix herbacea*: *Solorina crocea*, *Cladonia mitis*, *Cl. ecmocyna*, *Cl. macrophyllodes*, *Cl. bellidiflora*, and *Cl. crispata*.

Similar conditions prevailed in the nearby locality 6, Taserssuaq, where i.a. the following features were noted: A rather steep talus cone was found to harbour, up to ca. 400 m a.s.l., large patches of *Solorina crocea*, *Cladonia mitis*, and *Cetraria islandica*, and further, though less abundantly, i.a. *Stereocaulon rivulorum*, *Cladonia ecmocyna*, *Cl. macrophyllodes*, *Peltigera canina* var. *rufescens*, and *P. membranacea*. *Solorina crocea* was also commonly met with at 900 m a.s.l., while the lowland heaths at 100 m altitude were characterised by i.a. *Nephroma arcticum* and *Cladonia alpestris*.

Locality 7, Muslingebugt. The vegetation in this locality bore evidence of precipitation and snow-cover, especially in north-facing biotopes. In an analysis of a small area some few metres above sea-level and with a northward inclination of 30° the commonest species among dominant *Empetrum hermaphroditum* were *Cladonia alpestris* and *Cl. deformis*, and further, in minor quantities, *Nephroma arcticum*, *Cladonia bellidiflora*, *Cl. pleurota*, *Cl. coccifera*. Another patch analysed, 6 m<sup>2</sup>, 50 m a.s.l., inclined 40° to the north, contained the following dominant species: *Empetrum hermaphroditum*, *Salix herbacea*, *Solorina crocea*, *Nephroma arcticum*, *Peltigera pulverulenta*, *Cladonia deformis*, *Cl. bellidiflora*, *Cl. pleurota*, *Cl. delessertii*, *Cl. squamosa*, *Cl. ecmocyna*, and *Cl. carneola*. On horizontal surfaces exposed to the wind the lichen vegetation was entirely different. Thus, at an altitude of 100 m, on an open stony and gravelly plain among rocks, size 1 m<sup>2</sup>, the following species were collected: *Cetraria nivalis*, *C. nigricans*, *C. crispa*, *Alectoria ochroleuca*, *A. nigricans*, *A. lanea*, *Cladonia rangiferina*, *Sphaerophorus globosus*, and *Sph. fragilis*.

At locality 10, Igdlut, in the middle part of Evighedsfjord, the main features of the lichen vegetation were clearly different. Extensive patches of *Stereocaulon alpinum* were commonly found in the lowland, intermixed in the pattern of various typus of dwarf-shrub heaths, and the beginning continentality was also obvious from the finding here of *Nephroma parile*.

In locality 13, Dragefjeldene, some characteristic communities had developed over fairly large areas on the sloping sides of a terrace,

ca.  $15 \times 30$  m, of outwash deposits, coarse sand and gravel. On the west side, with an inclination of  $40^\circ$ , there occurred, few metres above sea-level, a rather open vegetation dominated by *Salix glauca* ssp. *callicarpaea* and *Silene acaulis*, and among them the following species of lichens were found: *Solorina crocea* and *Stereocaulon rivulorum*, and, less abundantly, *Cetraria crispa*, *Peltigera canina* var. *spuria*, and *Psoroma hypnorum*. On the east side, inclined ca.  $30^\circ$ , the vegetation was dominated by *Empetrum hermaphroditum*, while the predominant lichens were *Stereocaulon alpinum* intermixed with *Peltigera pulverulenta*, *Cladonia mitis*, *Cl. bellidiflora*, *Cl. crispata*, *Cl. ecmocyna*, *Cl. carneola*, and *Psoroma hypnorum*, a vegetation generally marked by a comparatively oceanic climate.

### District SWn.

In this floristic district the climate is less markedly oceanic than in district SWm. This is evident already in locality 17, Præstefjeldet, situated in the southern part of the district. On the south side of this mountain, at ca. 200 m a.s.l., in a place inclined ca.  $45^\circ$  to the south, several species which may be characterised as rather continental, occurred: *Leptogium saturninum*, *Lobaria scrobiculata*, and *Cladonia cariosa*.

In locality 18, Nordre Kangerdluarssuk, i.a. a large level plateau of gravel with scattered larger or smaller blocks, at an altitude of ca. 700 m a.s.l., was investigated. Here the commonest lichens were: *Sphaerophorus fragilis*, *Stereocaulon botryosum*, *St. vesuvianum*, *Umbilicaria cylindrica*, *U. proboscidea*, *Parmelia alpicola*, *P. intestiniformis*, *Cetraria nivalis*, *C. nigricans*, *C. hepaticoides*, and *Alectoria vexillifera*. At an altitude of 900 m a long sharp mountain ridge extended in an east-west direction and on its steep shaded north side i.a. *Solorina crocea*, *Cladonia pleurota*, *Cl. bellidiflora*, and *Cl. ecmocyna* were collected. At the top of the mountain, at an altitude of ca. 1000 m, only few species occurred, the most conspicuous of which were *Solorina crocea* and *Cetraria nigricans* growing among tufts of *Silene acaulis*.

From locality 26, Blæsedalen, the following few examples of types of lichen vegetation may be mentioned: Patches of *Salix glauca* ssp. *callicarpaea*, *Vaccinium uliginosum* ssp. *microphyllum*, and *Betula nana* were found, often surrounding tufts of *Cetraria nivalis*, and in heaths of *Cassiope tetragona*, typical growth of *Cetraria delisei* were often seen together with scattered individuals of *Vaccinium ulig. microphyllum*. From a slightly southward-sloping face of basaltic gravel and sand the following lichens were noted, occurring among *Papaver radicatum*, *Dryas integrifolia*, and *Chamaenerion latifolium*: *Alectoria lanaea*, *A. ochroleuca*, *Cetraria nivalis*, *C. cucullata*, *Sphaerophorus globosus*, *Cornicularia aculeata*, and *Thamnolia subvermicularis*.

In locality 27, Skarvefjeld, the frequently occurring growths of *Neuropogon sulphureus* were particularly noted, thus e.g. at ca. 900 m a.s.l. it occurred on loose basalt blocks together with i.a. *Umbilicaria proboscidea*, *U. hyperborea*, and *U. cylindrica*. *Neuropogon sulphureus* was also seen at 500 m and 800 m a.s.l. However, at these altitudes the lichen vegetation seemed to be rather poor; it was chiefly dominated by *Stereocaulon alpinum* and *Alectoria ochroleuca*, and to a somewhat less degree by *Cetraria nivalis* and *C. cucullata*.

In locality 28, Lyngmarksfjeld, the lichen vegetation presented similar conditions. A community of *Dryas integrifolia* and *Vaccinium uliginosum* ssp. *microphyllum* at an altitude of 300 m was found to contain i.a. *Alectoria nigricans*, *Cladonia mitis*, *Cl. gracilis* var. *chordalis*, *Cl. degenerans*, *Cetraria nivalis*, and *Thamnolia subvermicularis*, and in snow-patch communities with *Salix herbacea* and *Equisetum arvense*, or on open moist soil on sloping plains 300—400 m a.s.l., typical snow-patch lichens such as *Solorina crocea*, *Stereocaulon rivulorum*, and *Peltigera canina* var. *rufescens* were seen. From a place ca. 600 m a.s.l., sloping 30° towards the south, the following species may be mentioned: *Salix glauca* ssp. *callicarpa*, *Silene acaulis*, *Stereocaulon alpinum*, *Solorina octospora*, *S. spongiosa*, *Cladonia pyxidata* var. *neglecta*, *Cl. pyx.* var. *pocillum*, and *Cl. coccifera*.

The flat plateau of Lyngmarksfjeld at ca. 800—900 m altitude consists over vast stretches of moist soil affected by solifluction with stones and gravel arranged in irregular polygons or stripes with scattered patches of snow. The commonest plants found here were highly scattered individuals of *Ranunculus nivalis*, *R. sulphureus*, *R. pygmaeus*, *Saxifraga rivularis*, and *Oxyria digyna*, and in the very poor lichen vegetation chiefly *Peltigera canina* var. *rufescens*, *Cladonia coccifera*, *Cl. pyxidata* var. *pocillum*, and *Stereocaulon rivulorum* were noted.

### District CWs.

During the very short stay of the expedition in this district, only three localities were visited. However, this was sufficient to give us an impression of a decidedly initial continental character of the vegetation here in the inner parts of Evighedsfjord.

Thus, in locality 30, Kangiussaq, none of the oceanic snow-patch plants, as e.g. *Salix herbacea*, was found in the lowland. Characteristic of the vegetation was coppice of *Alnus crispa* and *Salix glauca* in the most luxuriant and most sunny places, while otherwise the vegetation was chiefly dominated by communities of *Empetrum hermaphroditum*, *Ledum palustre* ssp. *decumbens*, or *Stereocaulon* species. From a patch, 0.5 m<sup>2</sup> in size, in an *Empetrum* heath the following lichens may be men-

tioned: *Stereocaulon alpinum*, *St. paschale*, *Cladonia gracilis* var. *chordalis*, *Cl. squamosa*, *Cl. mitis*, and *Cl. degenerans*, and in a *Ledum* heath on a south-facing slope i.a. *Alectoria ochroleuca*, *A. nigricans*, *Cetraria cucullata*, *C. nivalis*, *Cladonia cornuta*, *Cl. mitis*, *Peltigera malacea*, and *P. canina* var. *spuria* were found.

Farther towards the interior of Evighedsfjord, in locality 32, Sagdliarutsit, the lichen vegetation up to an altitude of ca. 400 m was investigated. At such altitudes, near a glacier, some hygrophytic species were found, e.g. *Salix herbacea*, *Harrimanella hypnoides*, *Saxifraga oppositifolia*, and some characteristic snow-patch lichens, e.g. *Solorina crocea*.

### District CWM.

While the vegetation in the localities investigated within district CWs may most correctly be characterised as subcontinental, in Nordre Strømfjord, in localities situated within district CWM, both subcontinental and continental plant communities were met with.

Thus in locality 34, Niaqorssuaq, in the outer part of Nordre Strømfjord, the lowland was characterised by extensive heaths of *Empetrum hermaphroditum*, *Betula nana*, *Ledum palustre* ssp. *decumbens*, and *Vaccinium uliginosum* ssp. *microphyllum*, and the lichens most commonly met with were *Cetraria cucullata*, *Cladonia mitis*, *Cl. rangiferina*, *Nephroma arcticum*, *Dactylina arctica*, and various species of *Alectoria*. At greater altitudes, ca. 350 m a.s.l., a rather continentally marked vegetation with e.g. *Artemisia borealis*, *Saxifraga tricuspidata*, *Potentilla tridentata*, and *Woodsia ilvensis* still occurred on steep slopes with a southern exposure, while on a stony plateau at ca. 500 m altitude, a great many other phanerogams, principally *Silene acaulis*, *Salix herbacea*, *Sedum rosea*, *Papaver radicatum*, *Hierochloë alpina*, and *Luzula confusa* were noted. In between occurred lichen communities of varying composition, of which the following community may be mentioned as an example: on 1 m<sup>2</sup> of polygon soil almost entirely covered by vegetation, *Sphaerophorus globosus*, *Stereocaulon alpinum*, and *Alectoria chalybeiformis* were found to be dominant, while the following species were of scattered occurrence: *Peltigera malacea*, *Cetraria cucullata*, *Alectoria ochroleuca*, *A. nigricans*, and *Cladonia coccifera* as well as scattered individuals of *Salix herbacea*, *Polygonum viviparum*, *Luzula confusa*, and *Hierochloë alpina*. From a carpet, size ca. 10 m<sup>2</sup>, of *Rhacomitrium* the following lichens were noted as dominants: *Alectoria ochroleuca*, *A. nigricans*, and *Cetraria cucullata*, on a gravelly flat, 4 m<sup>2</sup> in size and inclined 20° to the north, grew *Alectoria lanae* in abundance, intermixed with a great many *Sphaerophorus fragilis* and some *Solorina crocea*, *Stereocaulon botryosum*, and the phanerogams *Draba nivalis* and *Hierochloë alpina*.

Of the localities investigated in district CWM, the vegetation in locality 36, Nuerssorfiarqap avangnâtungå in the interior of Nordre Strømfjord, was found to be that most distinctly influenced by the continental climate. Extensive patches of *Betula nana*, *Ledum palustre* ssp. *decumbens*, *Vaccinium vitis-idaea* ssp. *minus* were dominant in the lowland, and in some places also *Empetrum hermaphroditum* and *Vaccinium uliginosum* ssp. *microphyllum* occurred.

As examples of the different conditions under which the lichens were found, the following particulars noted down may be mentioned here:

In a *Betula* patch, 10 m a.s.l., horizontal:

*Cladonia rangiferina*, *Cl. mitis*, *Cetraria cucullata*,  
*Cornicularia divergens*.

Among *Betula* and *Ledum*, 10 m a.s.l., southern exposure 10°:

*Cladonia deformis*, *Cl. pleurota*, *Cl. fimbriata*, *Cl. cornuta*, *Cl. cenotea*.

In a *Ledum* patch, 50 m a.s.l., southern exposure 10°:

*Cladonia rangiferina*, *Cl. alpicola*, *Cl. pyxidata* var. *neglecta*,  
*Cetraria islandica*.

Among *Empetrum* shrubs, 10 m a.s.l., horizontal:

*Cladonia mitis* dominant, and scattered individuals of other species of *Cladonia*: *Cl. pleurota*, *Cl. coccifera*, *Cl. deformis*, *Cl. amaurocraea*, *Cl. lepidota*, *Cl. gracilis* var. *chordalis*, *Cl. cenotea*, *Cl. pyxidata* var. *neglecta*, and further, *Alectoria ochroleuca*, *A. lanea*, and *Cetraria cucullata*.

On larger, level, southwardly exposed rock-blocks typical continental lichen communities, often with a large number of species, were found. The following examples may be mentioned:

Almost bare level rock surface, 10 m a.s.l., southern exposure 10°: dominants: *Saxifraga tricuspidata*, *Stereocaulon paschale*, *Alectoria lanea*. Scattered: *Cl. mitis*, *Cl. amaurocraea*, *Cl. gracilis* var. *chordalis*, *Cl. coccifera*, *Cl. pyxidata* var. *pocillum*, *Peltigera malacea*, *Parmelia saxatilis*, *Physcia muscigena*.

Level rock surface, 25 m<sup>2</sup>, 50 m a.s.l., exposure 20° south: dominants: *Cladonia rangiferina*, *Cl. mitis*, *Stereocaulon paschale*, *Cetraria cucullata*. Scattered: *Cladonia uncialis*, *Saxifraga tricuspidata*, *Campanula rotundifolia*, *Luzula confusa*.

Under very similar conditions the following more or less typically continental lichens were found on a block of rock 100 m a.s.l.: *Leptogium*



Fig. 2. Vegetation pattern of lichen growths among dwarf shrubs, chiefly *Betula nana* and *Ledum palustre* ssp. *decumbens*, and tufts of *Hierochloë alpina*. The dominant lichen species are *Cladonia rangiferina*, *Cl. mitis*, and *Stereocaulon paschale*.

Locality 38, Kangersuneq. Phot. by the author, August 24, 1958.

*saturninum*, *Lobaria scrobiculata*, *Cladonia cariosa*, *Umbilicaria cinereorufescens*, *Parmelia austerodes*, *Physcia constipata*, *Ph. sciastra*, and *Diploschistes scruposus*.

#### District CWN.

The localities investigated within this district are situated in an area whose vegetation may be characterised as lowarctic-subcontinental, and to illustrate this, the following description of some plant communities from locality 38, Kangersuneq, may be given, special regard being taken to the lichens. The locality comprises the areas east of the innermost part of the fjord Kangersuneq, and includes many different forms of landscape at altitudes up to 400—500 m a.s.l. The camp was established on a level terrace ca. 50 m a.s.l., whose vegetation was dominated by extensive growths of various dwarf shrub species. The dominant species, *Betula nana*, covered rather large areas with a continuous carpet interspersed with patches of *Ledum palustre* ssp. *decumbens*, *Vaccinium uliginosum* ssp. *microphyllum*, and *Salix glauca*, some tufts of *Hierochloë alpina*, and, as sharply delimited patches, some pure growths of fruticose lichens. Fig. 2 shows such a patch, whose lichen spe-



Fig. 3. Detail-picture of well defined lichen mats of *Cladonia mitis*, *Cl. rangiferina*, and *Stereocaulon paschale*. Locality 38, Kangersuneq. Phot. by the author, August 24, 1958.

cies, according to a Hult-Sernander analysis, presented the following degrees of covering:

- 5: *Cladonia rangiferina*
- 2: *Cl. mitis*, *Stereocaulon paschale*
- x: *Peltigera malacea*, *Cladonia ecmocyna*, *Cl. squamosa*, *Cetraria cucullata*, *C. delisei*.

At the edge of lichen patches like those mentioned above, a community of the following scattered species occurred, bordering on and partially growing under shrubs of *Betula nana*: *Cladonia pleurota*, *Cl. deformis*, *Cl. amaurocraea*, *Cl. squamosa*, *Cl. gracilis* var. *chordalis*, *Cl. cenotea*, *Cetraria cucullata*, and *C. nivalis*.

Fig. 3 gives another example of a similar lichen carpet, here with the following quantitative composition, according to a Hult-Sernander analysis:

- 5: *Cladonia mitis*
- 3: *Cl. rangiferina*, *Stereocaulon paschale*.

The lichen patch is here surrounded by *Betula nana* and *Hierochloë alpina*.



Fig. 4. Vegetation pattern of tufts of *Cassiope tetragona* with *Cladonia alpestris* (lighter patches, e. g. in the centre) interspersed with *Empetrum hermaphroditum*. Locality 38, Kangersuneq, 300 m a.s.l., northward inclination 20°–30°. Phot. by the author, August 25, 1958.

In a community dominated by *Vaccinium uliginosum* ssp. *microphyllum* the following quantitative composition of the vegetation was found:

- 4: *Vaccinium ulig. microphyllum*
- 3: *Stereocaulon paschale*
- 2: *Cladonia mitis*, *Cl. rangiferina*
- 1: *Cl. alpestris*
- x: *Sphaerophorus globosus*, *Cladonia bellidiflora*, *Cl. amaura-*  
*craea*, *Cl. alpicola*, *Alectoria lanae*.

In the lower-lying moister places, among shrubs of *Empetrum hermaphroditum*, large patches of *Cetraria delisei* or, on more open ground, groups of *Cladonia alpicola* or *Cl. deformis* often occurred.

The dominant lichens in this subcontinental dwarf shrub heath composed in the main by *Betula nana* were, as shown above, quite distinctly *Cladonia mitis*, *Cl. rangiferina*, and *Stereocaulon paschale*.

On north-facing slopes entirely different plant communities were met with. Thus, a characteristic community, covering an area with a northward inclination of ca. 20–30°, was found at an altitude of 300 m. As will be seen from fig. 4, it consisted of a very regular mosaic of

tufts of *Cassiope tetragona* with *Cladonia alpestris*, among which grew *Empetrum hermaphroditum* with *Nephroma arcticum*, *Cladonia bellidiflora*, and some *Cetraria crispa*. On the same slope, but more scattered, occurred some other hygrophytes, e.g. *Lycopodium selago*, *Salix herbacea*, *Loiseleuria procumbens*, and *Tofieldia pusilla*. From another north-facing slope with *Cassiope tetragona* at 200 m altitude the following lichens may be mentioned: *Nephroma arcticum*, *Peltigera pulverulenta*, and *Cladonia delessertii*. As further examples of common types of vegetation, mention may be made of the analyses carried out by the Hult-Sernander method and tabulated in table 1, in which here only vascular plants and macrolichens are included:

Table 1.

Analysis no. ....	1	2	3	4
Altitude in metres a.s.l. ....	100	50	200	50
Exposure and inclination ....	NW. 40°	NW. 40°	N. 30°	NW. 20°
<i>Empetrum hermaphroditum</i> ....	5	5	3	2
<i>Nephroma arcticum</i> ....	3	4	1	..
<i>Cassiope tetragona</i> ....	..	..	5	2
<i>Cladonia alpestris</i> ....	..	..	1	4
<i>Betula nana</i> ....	1	..	..	1
<i>Ledum pal. decumbens</i> ....	..	..	1	..
<i>Salix herbacea</i> ....	..	..	×	..
<i>Cladonia bellidiflora</i> ....	..	..	×	..

In steep places exposed to the north pure snow-patch communities were also found to have developed; thus, the following lichens were seen in a vegetation dominated by *Salix herbacea*: *Cladonia ecmocyna*, *Cl. bellidiflora*, and *Cetraria islandica* f. *platyna*.

At greater altitudes, about 400 m a.s.l., the vegetation of the plateaus was most often dominated by *Vaccinium ulig. microphyllum* with scattered cushions of *Diapensia lapponica*, between which a good deal of *Cladonia alpestris* and some *Dactylina arctica* were seen. On north-facing slopes, communities of *Salix herbacea*-*Harrimanella hypnoides* with *Solorina crocea* commonly occurred.

On a wind-exposed mountain top, 200 m a.s.l., *Alectoria lanaea* was noted as the dominant lichen, growing among *Rhododendron lapponicum*, *Silene acaulis*, *Diapensia lapponica*, and *Dryas integrifolia*. On a south-facing slope with a rather open vegetation the following degrees of covering were found:

2: *Alectoria lanaea*

1: *Rhododendron lapponicum*, *Silene acaulis*, *Vaccinium ulig. microphyllum*.

This locality likewise offered several distinct examples of an ornithocoprophilous lichen vegetation. On large free-lying rocks serving as resting and outlook places for various birds, the following species were of very common occurrence: *Umbilicaria arctica*, *Parmelia infumata*, *P. saxatilis*, *Xanthoria candelaria*, *Physcia dubia*, and *Ph. caesia*.

On south-facing warm places typical representatives of a continental lichen flora occurred. Thus, in a place ca. 25 m a.s.l. the following species occurred together: *Nephroma expallidum*, *Cladonia cariosa*, *Cl. pyxidata* var. *pocillum*, *Peltigera canina* var. *spuria* f. *sorediata*, *Umbilicaria cinereorufescens*, *Parmelia panniformis*, *Physcia constipata*, and *Ph. muscigena*, and in other places the likewise continental species *Lobaria scrobiculata*, *Peltigera scutata*, *P. lepidophora*, and *Parmelia australodes* were found.

In locality 42, Pâkitsoq, several continental species were likewise collected in warm places, e.g. on a south-facing rock wall with an inclination of ca. 60°, 25 m a.s.l., *Umbilicaria hirsuta* was collected together with *U. cinereorufescens*, *U. hyperborea*, *Agyrophora lyngei*, *Parmelia disjuncta*, *Cladonia coccifera*, and *Alectoria minuscula*.

Locality 44, Qapiarfik, is the northernmost locality investigated, and is situated quite close to the inland ice. In the lowland the dominant lichens were various species of *Alectoria*, in particular *A. ochroleuca* and *A. lanea*, and further *Cetraria cucullata* and *C. nivalis*, but also *Thamnolia subvermicularis* was remarkably common. At an altitude of 500 m *Alectoria lanea* was the commonest lichen in a vegetation of i.a. the following phanerogams: *Papaver radicatum*, *Dryas integrifolia*, *Rhododendron lapponicum*, *Salix glauca*, *Silene acaulis*, *Saxifraga oppositifolia*, and *S. tricuspidata*. On the top of the mountain some lichens with a northern distribution in Greenland were encountered, thus, *Dactylina ramulosa* and *Agyrophora lyngei*, and of species with a continental distribution in Greenland, *Peltigera lepidophora*, *Cladonia cariosa*, and *Parmelia australodes* may be mentioned.

## TYPES OF DISTRIBUTION IN WEST GREENLAND

The finds recorded in the systematic part of the present paper together with earlier records furnish a certain basis for a valuation of the types of distribution of many species in West Greenland. As regards many vascular plants, it is possible to distinguish between species with a southern or a northern, an oceanic or a continental distribution in West Greenland, and on this basis it was attempted to divide the area into floristic districts (BÖCHER, HOLMEN & JAKOBSEN 1957, 1959). One of the main objects of these lichenological studies was to find out whether the division would be supported by the existence of similar types of distribution within the lichens, and a survey of these shows it to be possible as far as many species are concerned.

Thus, a number of species were exclusively found in localities around the inner parts of the deep fjords, where the precipitation is inconsiderable and the soil often very dry and loess-like, or they occurred, in addition, in dry biotopes with a southern exposure, located nearer the shore.

As the most characteristic continental lichens, the following species, which were only found in the CW-districts, may be mentioned:

- Peltigera scutata*
- Cladonia cenotea*
- Umbicilaria hirsuta, U. cinereorufescens*
- Parmelia panniformis, P. disjuncta*
- Physcia sciastra, Ph. constipata.*

A tendency to a continental distribution is likewise exhibited by the following species, which, however, besides in the CW-districts, were also, or only, found in the inner, driest, parts of the SW-districts:

- Leptogium saturninum*
- Lobaria scrobiculata*
- Nephroma expallidum, N. parile*
- Peltigera lepidophora*
- Cladonia cariosa, C. pyxidata v. pocillum*
- Parmelia austerodes*
- Umbilicaria vellea.*

Another group of lichens is associated with moist biotopes. Such lichens are most commonly distributed in the coastal regions with abundant precipitation and a long-lingering snow-cover, but similar biotopes may also be met with in the inner parts of West Greenland at great altitudes, in particular on north-facing mountain sides, where owing to the slow and late melting of the snow the soil will remain moist till rather late in the summer and thus provide a possibility for the development of snow-patch communities. Characteristic of these biotopes is a group of lichens whose distribution is, thus, in the main oceanic:

*Solorina crocea*  
*Cladonia ecmocyna, Cl. macrophyllodes*  
*Cetraria delisei.*

These species are of common occurrence in the SW-districts, though in the more continental regions they were also found in the snow-patch communities on high mountains.

A number of lichens were found to have a distribution which in West Greenland may be characterised as northern. To this group the following species may be referred; they were found more or less frequently in the northernmost localities around Disko Bugt, but not, or rarely, south thereof:

*Agyrophora lyngei*  
*Omphalodiscus krascheninnikovii*  
*Dactylina arctica, D. ramulosa*  
*Neuropogon sulphureus.*

The northern distribution of these species may be due to climatic factors, but may also be ascribed to the calcareous, basaltic, or sedimentary rocks found in these regions.

Similarly, a number of lichens of a southern type of distribution were found. To these may be referred the following species, which in West Greenland were found to have their northern limit within the area treated here, namely:

*Lobaria scrobiculata*  
*Nephroma parile*  
*Cladonia carneola*  
*Baeomyces rufus.*  
*Umbilicaria deusta, U. hirsuta, U. cinereorufescens*  
*Parmelia olivacea, P. panniformis*  
*Cetraria commixta.*

Several of these species are also mentioned under the group of continental species, evidently they are dependent on a fairly warm and dry summer.

Only one species is stated to be new to the lichen flora of Greenland, viz.

*Parmelia bitteriana.*

## РЕЗЮМÉ

Настоящая работа посвящена проведенным автором сбору и изучению лишайников во время ботанической экспедиции в центральные районы Западной Гренландии в 1958 году.

В вступительной главе приводится исторический обзор более значительных и ранее состоявшихся сборов лишайников из этой части Гренландии и публикаций о них.

В списке посещенных экспедицией 44 мест (фиг. 1, стр. 11), которые расположены между „Суккертоппен“, прибл. на 65° сев. широты, и северо-восточной частью бухты Диско, прибл. на 70° сев. широты, о каждом из этих мест даются сведения об их расположении, о числе произведенных сборов лишайников, на какой высоте над уровнем моря они производились, а также о времени пребывания на этих местах. Исследованные места расположены в районах, являющихся в экологическом и флористическом отношении весьма различными и, в соответствии с этим, эти места сгруппированы по районам согласно BÖCHNER, HOLMEN & JAKOBSEN (1957, 1959).

Во время экспедиции производилось весьма различное число сборов лишайников, всего прибл. 1800 наименований, в большинстве из названных 44 мест; кроме того, прибл. 500 лишайников из произведенных анализов вегетации были взяты с собой для детального изучения. В настоящую работу включены лишь макро-лишайники, так как из-за ограниченности времени в большинстве мест были произведены относительно немногие и разбросанные сборы микро-лишайников.

В систематической части по каждому из обсуждаемых в настоящей работе 108 видов указаны все места, откуда они собраны, причем места распределены по своему расположению в пяти флористических районах. Кроме того, даны сведения о высоте места сбора над уровнем моря, а также о том, были ли, возможно, найдены апотеции у редких фертильных видов. В отношении большинства таксисов приводятся, кроме того, краткие сведения о других специальных биологических условиях и о ранее известном распространении в Гренландии. Большинство из этих видов ранее

приводились из той области Гренландии, которая обсуждается в настоящей работе, однако, в отношении многих из этих видов при указанных у нас сборах произошли значительные перемещения в их уже известном распространении в Зап. Гренландии.

В заключительных главах излагаются некоторые характеристики в вегетации лишайников на выбранных местах в пяти флористических районах. В отношении нескольких групп лишайников можно установить связь с экологическими факторами, как климатическими, так и эдафическими. В заключение приводится обзор видов, имеющих континентальное или океанское, северное или южное распространение в Зап. Гренландии.

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## PLATES

All the species figured were collected and photographed by the author, and all of them are magnified two times their natural size.

## Plate I.

Figs. 1-2. *Peltigera polydactyla* (NECK.) HOFFM. var. *polydactyla*. Coll. no. 40, loc. 4, Hamborgersund. July 2, 1958. Fig. 1: upper side ( $\times 2$ ). Fig. 2: under side ( $\times 2$ ).

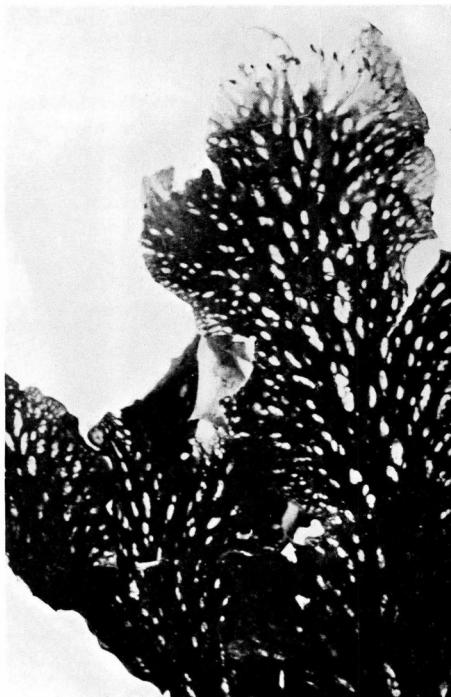
Fig. 3. *Cladonia squamosa* (SCOP.) HOFFM. Coll. no. 1335, loc. 38, Kangersuneq. August 13, 1958. ( $\times 2$ ).

Fig. 4. *Cladonia carneola* FR. Coll. no. 197, loc. 7, Muslingebugt. July 6, 1958. ( $\times 2$ ).

Fig. 5. *Cladonia cenotea* (Ach.) SCHÄER. Coll. no. 704, loc. 36, Nuerssorfiarqap avangnâtungâ. July 25, 1958. ( $\times 2$ ).



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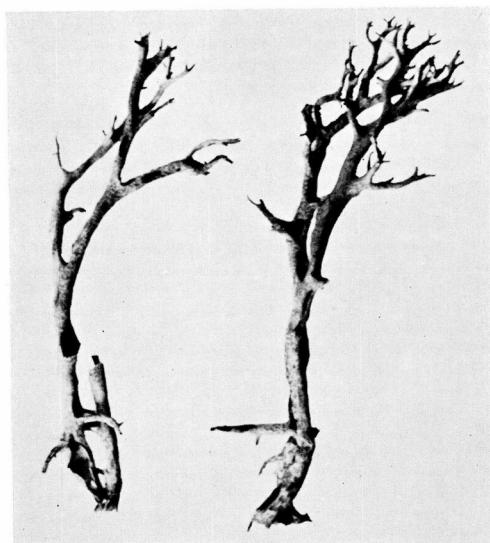
## Plate II.

Fig. 1. *Cladonia delessertii* (NYL.) VAIN. Coll. no. 266, loc. 6, Taserssuaq. July 10, 1958. ( $\times 2$ ).

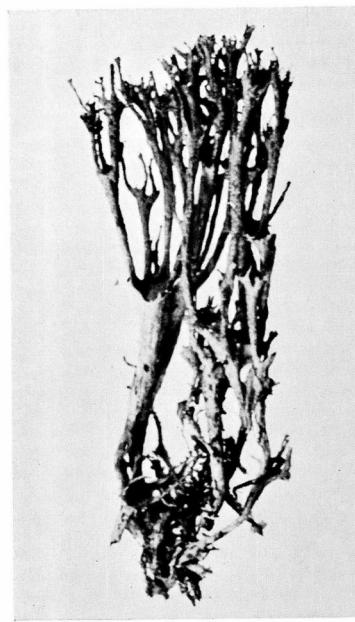
Fig. 2. *Cladonia crispata* (Ach.) FLOT. Coll. no. 76, loc. 10, Igdlut. July 2, 1958. ( $\times 2$ ).

Fig. 3. *Cladonia alpicola* (FLOT.) VAIN. Coll. no. 296, loc. 6, Taserssuaq. July 10, 1958. ( $\times 2$ ).

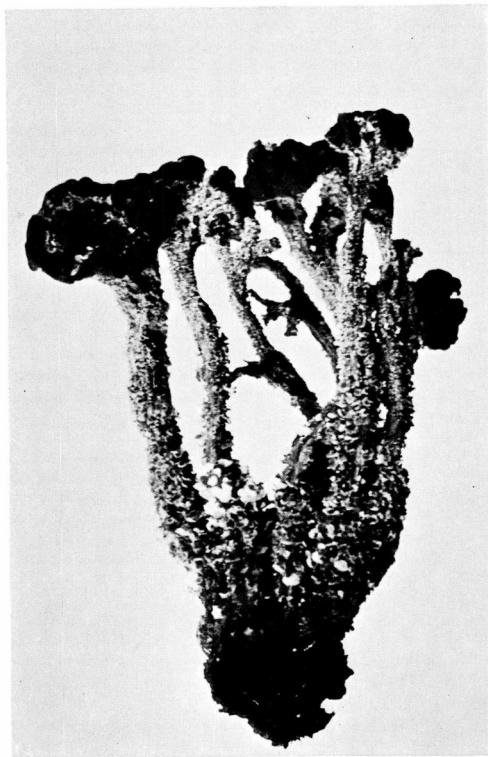
Fig. 4. *Cladonia cornuta* (L.) SCHAER. Coll. no. 703, loc. 36, Nuerssorfiarqap avang-nâtungâ. July 25, 1958. ( $\times 2$ ).



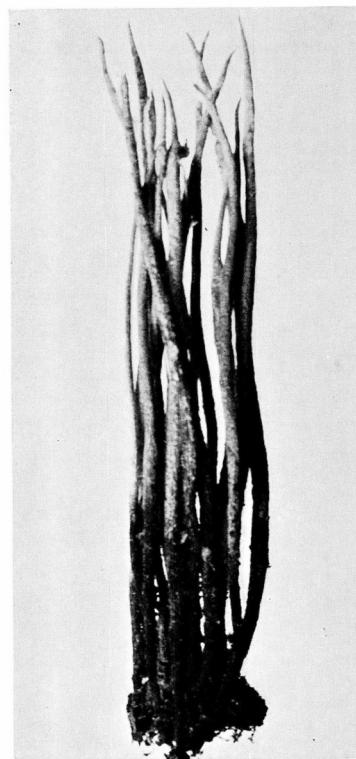
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3



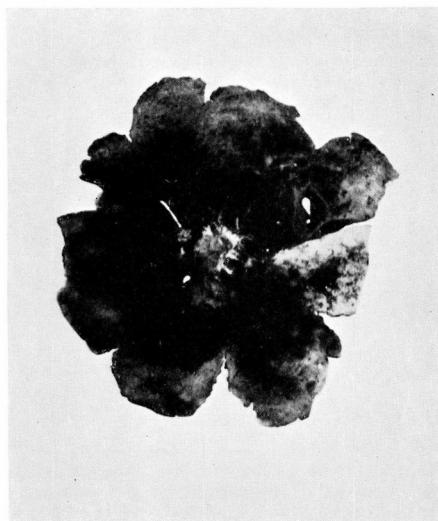
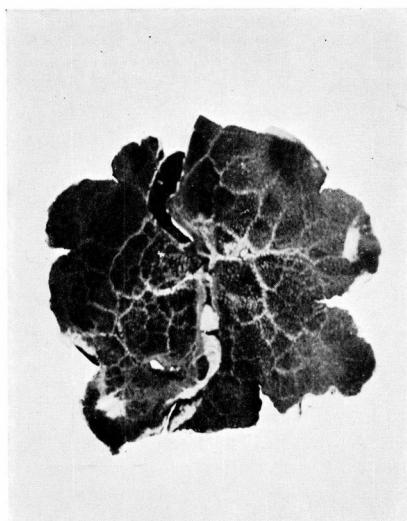
4

0 10 mm

### Plate III.

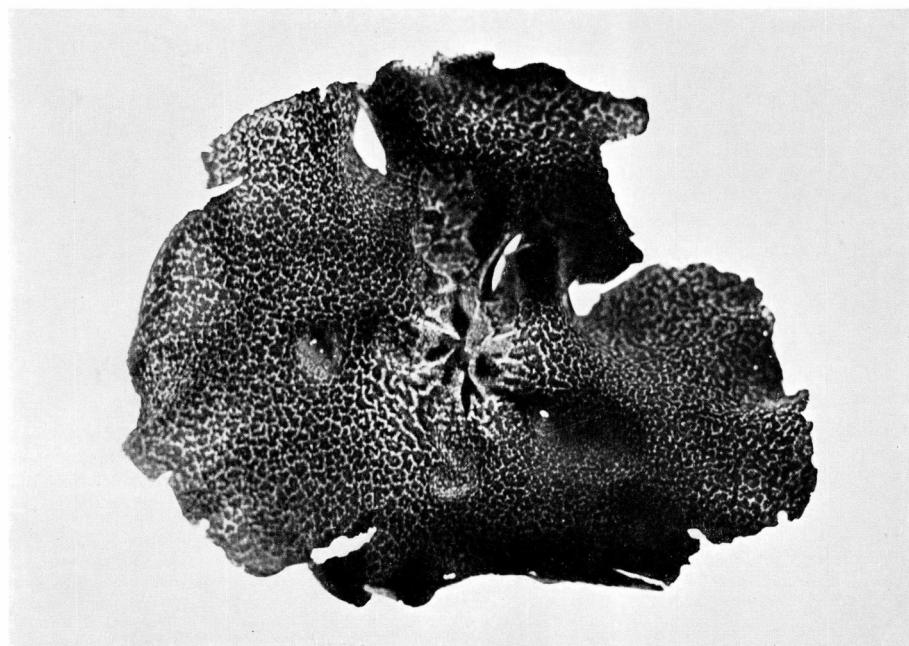
Figs. 1-2. *Agyrophora leiocarpa* (DC.) GYEL. Coll. no. 55, loc. 10, Igdlut. July 2, 1958. Fig. 1: upper side ( $\times 2$ ). Fig. 2: under side ( $\times 2$ ).

Fig. 3. *Agyrophora lyngei* (SCHOLANDER) LLANO. Coll. no. 867, loc. 28, Lyngmarksfjeld. August 1, 1958. Upper side ( $\times 2$ ).



1

2



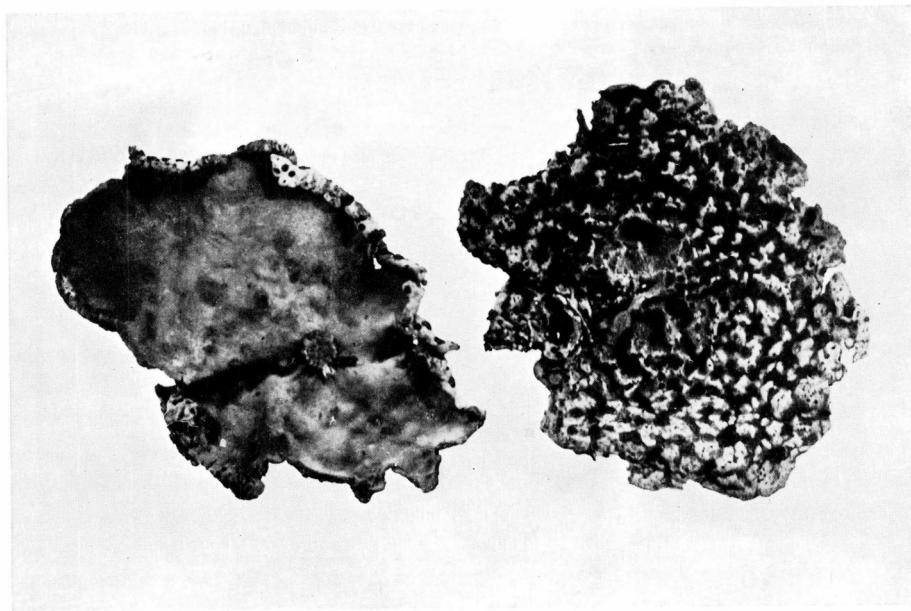
3

0 1 2 cm

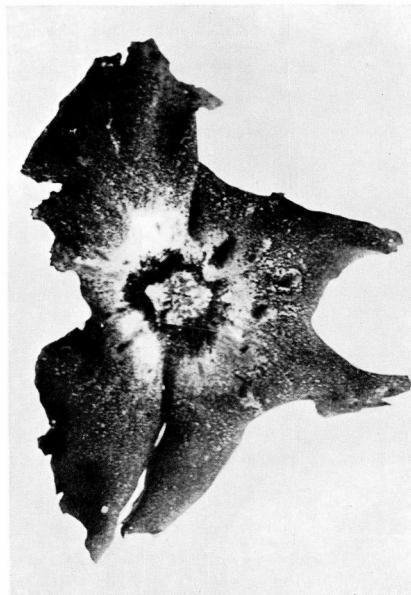
#### Plate IV.

Fig. 1. *Omphalodiscus krascheninnikovii* (SAV.) SCHOLANDER. Coll. no. 882, loc. 28, Lyngmarksfjeld, altitude 300 m a.s.l. August 1, 1958. Left: under side, right: upper side. ( $\times 2$ ).

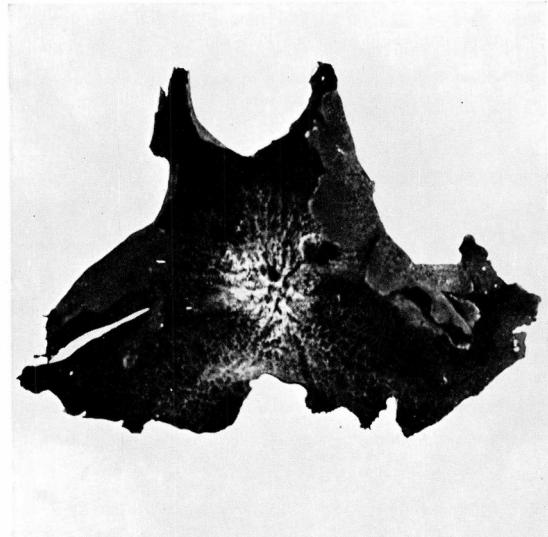
Figs. 2–3. *Umbilicaria havaasii* LLANO. Coll. no. 186, loc. 7, Muslingebugt. July 6, 1958. Fig. 2: upper side ( $\times 2$ ). Fig. 3: under side ( $\times 2$ ).



1



3



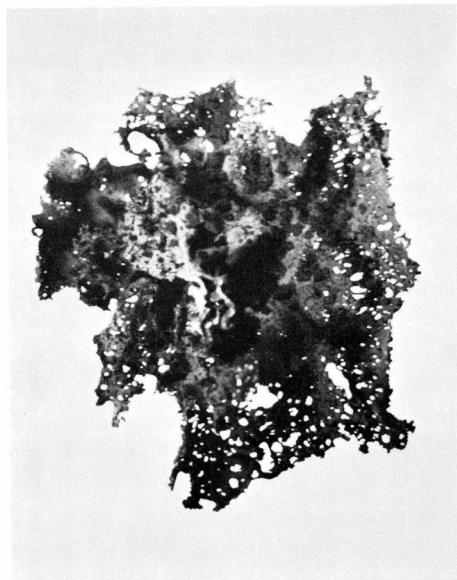
2

0 1 2 cm

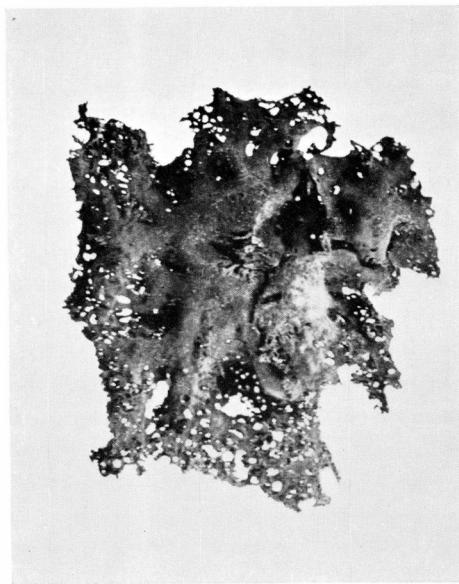
## Plate V.

Figs. 1-2. *Umbilicaria torrefacta* (LIGHTF.) SCHRAD. var. *erosa* (WEB.) LYNGE. Coll. no. 71, loc. 10, Igdlut. July 2, 1958. Fig. 1: upper side ( $\times 2$ ). Fig. 2: under side ( $\times 2$ ).

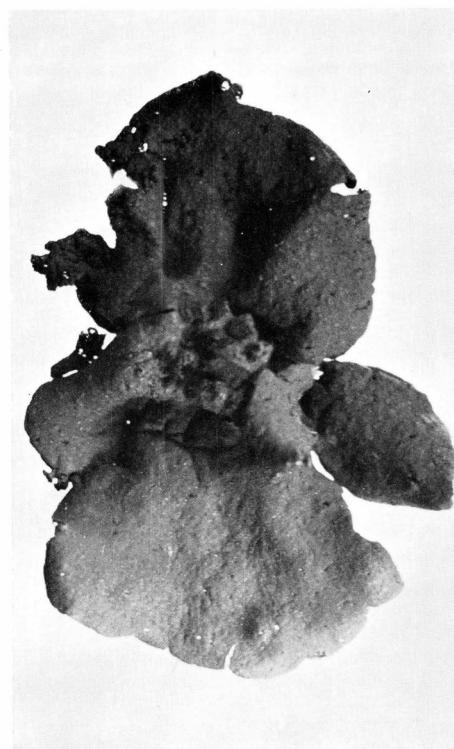
Figs. 3-4. *Umbilicaria torrefacta* (LIGHTF.) SCHRAD. var. *pachydermata* LLANO. Coll. no. 69, loc. 10, Igdlut. July 2, 1958. Fig. 3: upper side ( $\times 2$ ). Fig. 4: under side ( $\times 2$ ).



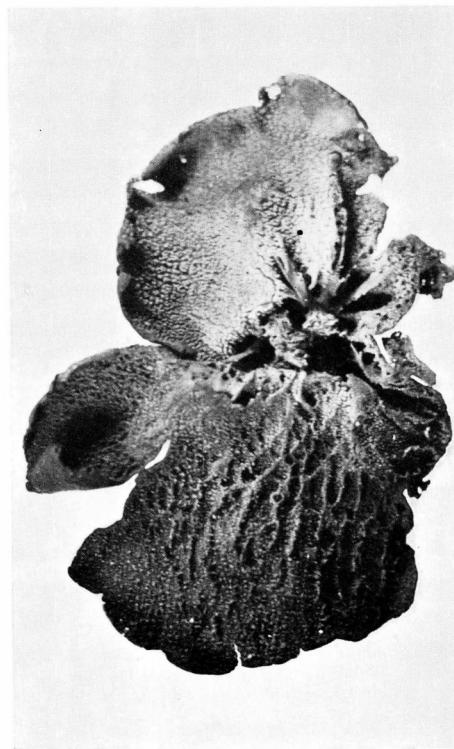
1



2



3



4

0 1 2 cm