

MEDDELELSER OM GRØNLAND

UDGIVNE AF

KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND

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lichens from West Greenland,  
collected chiefly by Th. M. Fries

BY

B. LYNGE

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WITH 1 MAP IN THE TEXT AND 10 PLATES

KØBENHAVN

C. A. REITZELS FORLAG

BIANCO LUNOS BOGTRYKKERI A/S

1937



## PREFACE

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Several years ago (1929) Dr. G. SAMUELSSON suggested to me to determine a large collection of lichens which Professor THEODOR M. FRIES, Upsala, had made in West Greenland during an expedition in 1871.

The collection had been preserved in the Botanical Museum, Upsala, stored in the original boxes which had been kept in a room above the conservatory. During the field work TH. FRIES had pressed and dried the lichens in blotters, also the greater part of the saxicolous lichens which he usually collected in very small pieces. The plants were fine and exquisite, hardly any lichenologist has chosen his herbarium specimens with greater care than TH. FRIES did. Evidently on account of the forced field work he had only quite exceptionally collected many plants of the same species at the same locality. The material was, accordingly, rather scarce, I might have desired a greater material of some species, in order to study the variability.

The collection had been kept during these many years in a dry and hot place. Insects had damaged only a few species which are especially susceptible to their attacks, such as certain *Caloplacae*, soil lichens, and the like. Some exterior colours had faded, but the colours of the inner parts of the apothecia which are so important to the taxonomist had been preserved quite wonderfully. The cortex of some Crustaceous lichens had crumbled a little, and a couple of mice had spent a happy honeymoon in one of the boxes, not to the benefit of the lichens. But apart from such details the plants were all right.

A much greater difficulty arose concerning the labelling. Everybody who has himself joined an Arctic expedition knows the forced work which is necessary during the short time at disposal, without any difference between day and night. Lots of plants, whole parcels, were only labelled with a date, without the indication of the locality, with others the inverse was the case, in others again I only found a mysterious letter, F, or D, or the like. At first no diary could be produced, but when all the labelling,

and the greater part of the determination, had been done, a very lapidary diary was detected, briefly stating his course.

It was then found, as was to be expected, that he often made excursions at two different localities in the same day. In summer there is no natural distinction ("night") between one day and the next day, and if the whole original label only consists of a date, found somewhere in the parcel, doubt may easily arise with respect to the locality.

TH. FRIES's spelling of the Eskimo names was not in accordance with the present official orthography which is based on a thorough knowledge of the intricate Eskimo language.

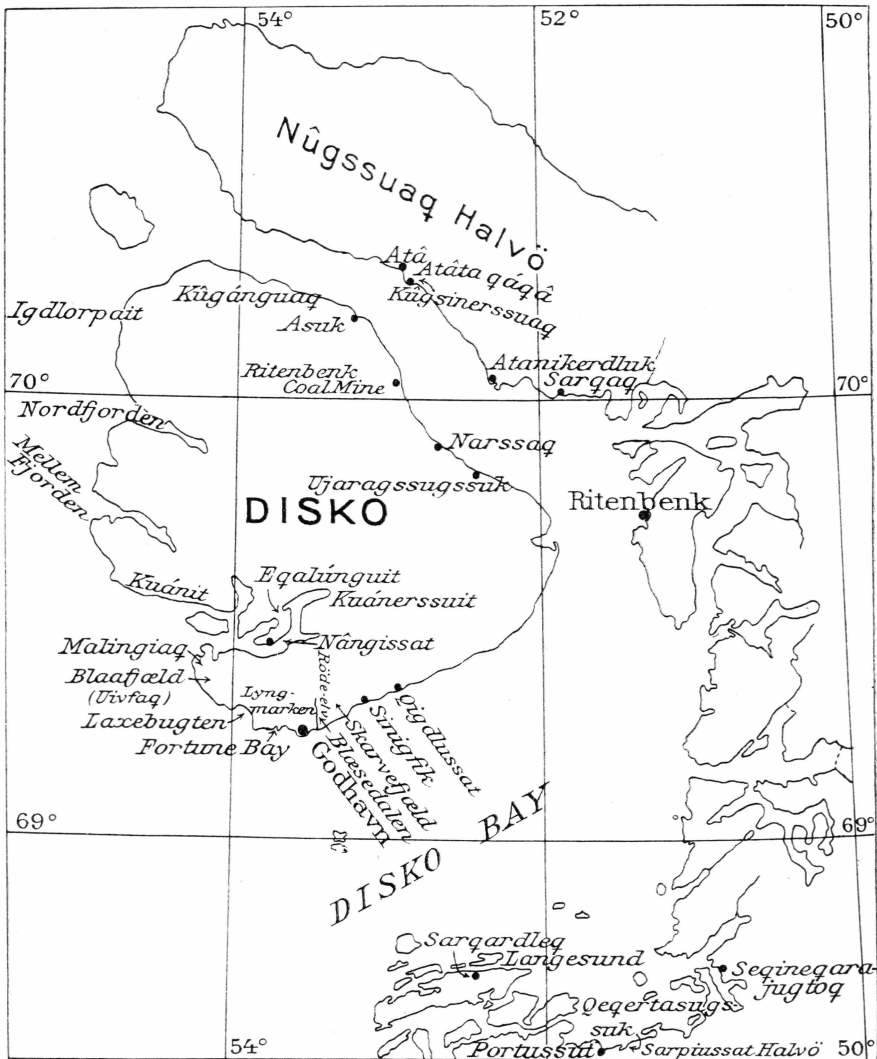
Such difficulties may account for some uncertainties, perhaps even mistakes, with respect to the labelling of the determined plants.

At the beginning of the work Professor G. SAMUELSSON and Dr. ERIK ASPLUND laboriously compiled some valuable information for me, after the labels of the Vascular plants, but that was far from sufficient.

I then applied to the Swedish Minister in Oslo, Dr. HÖJER, who with his wonted courtesy obtained some much appreciated information on the course of the expedition from the log-books of the Swedish navy, sent to him by the Swedish chief admiral at Karlskrona.

The Danish botanist, Dr. MORTEN P. PORSILD, director of the Danish scientific station at Disko, West Greenland, who knows everything about botany and research work in Greenland, was kind enough to give me much valuable information on the position and the correct spelling of the strange Eskimo names. — Similar information was obtained from members of the staff of the Botanical Museum of Copenhagen, I may especially mention Dr. JOHANNES GRØNTVED who has himself visited West Greenland.

The Swedish expedition of 1871 had two ships at its disposition, belonging to the Swedish navy, viz. the gunboat "Ingegerd" under the command of Baron, Capt. F. W. VON OTTER, and the brig "Gladan" under the command of Capt. P. M. v. KRUSENSTIERNA. The chief object of the expedition was to bring home to Sweden some blocks of iron, detected the year before by A. E. NORDENSKIÖLD at Uivfaq (TH. FRIES wrote Ovifak) at the foot of the mountain Blaa fjeld ("The Blue Mountain"). They were at first supposed to be of meteoric origin, but later on the Danish geologist Professor K. J. V. STEENSTRUP proved them to be of telluric origin. NORDENSKIÖLD was unable to load in his ship these blocks, some of which were very large, found on an exposed and dangerous coast. It was therefore resolved to send the two above mentioned ships in the next year, 1871. — VON OTTER sent a report on the expedition, written at Godhavn, and printed in the Swedish Post- och Inrikes Tidningar, 1871, No. 205 (perhaps also in the following numbers?).



Based on all these sources I am able to give the following information on TH. FRIES's course of travel:

June, 2nd: South coast of Greenland sighted.

June, 9th: Arrival at the skerries outside of Godthaab, fog. Excursions, i. a. to the Kok Islands, called Kitsigsut by the Eskimos. (According to PORSILD in lit. the name Kok is an Eskimo transformation of a Danish (Lollandic) dialect name "Koek", signifying a cake).

June, 10th: Continued to the harbour at Nûk (i. e. Godthaab). The other ship, the "Gladan" arrived a few hours before. Visits, hospitably received, festivals for the Eskimos.

June, 11th: Fine weather, excursion to the beach cliffs, new visits, new festivals.

June, 12th: Fine weather, short excursion, ships left Godthaab between the Kok Islands (Kitsigsut) and Kangeq.

June, 13th—15th: Under sail northwards through Davis Strait.

June, 16th: Arrival at Disko Island at 12.30, perhaps at Blaafield, I have seen plants, labelled Blaafield 16.6.71. — Excursion, left for Godhavn.

June, 17th—18th: Godhavn, visits, on the 17th excursion to Lyngmarken.

June, 19th: "At the stones" (FR. in diary), that is Blaafield where the first blocks were brought on board. The scientists made excursions, TH. FRIES mentions Malingiaq (he wrote Maligiak), and Nepisat (more correctly Nipisat) harbour. I have also seen plants from "Sartok", perhaps Satoq near Malingiaq.

June, 20th: Excursion in the neighbourhood of Nipisat. "Hills red from *Rhododendron*, mosquitos very annoying". Rowed to Kivitut, a fine waterfall, and next to Kuánerssuit (TH. FRIES wrote Qvanersoit), fine weather. Seen plants, labelled only "Eik.", from this date, not located.

June, 21st: Excursion in the Disko Fjord, fine weather (Disko Bay is the great bay between Disko in the north, Egedesminde in the south and Jakobshavn in the east).

June, 22nd: Long excursion near Kuánerssuit.

June, 23d: Arrived at "Ekalliut" (PORSILD suggests Eqaquínguit, 69°30').

June, 24th: Excursion along the "Lax-elfven" (the Salmon River).

June, 25th: Arrived at the "Eskimo Camp" (this name was found on the labels, the place could not be exactly located).

June, 26th: Arrived at Nāngisat, a trading place in the Disko Fjord.

June, 27th: Rowed to the "Utliggerstation" (an outlying trading place), and next to the south end of Storøen, excursion there.

June, 28th: Back to Malingiaq and next to Blaafield (Uivfaq).

June, 29th: Excursion at Blaafield, sailed to Godhavn, excursion to Lyngmarken.

June, 30th—July, 2nd: Godhavn.

July, 3d: Excursion to Blæsedalen.

July, 4th: Excursion to Lyngmarken.

July, 5th: Godhavn, and on the 6th (bad weather) preparations for a great excursion.

July, 7th: Left Godhavn in the "Ingegerd", dropped anchor at Malingiaq, in the evening short excursion at Laksebugten, arrival at Mellemfjorden.

July, 8th: Excursion in Mellemfjorden, left in the evening for Nordfjorden, excursion there on the 9th.

July, 10th: Left Nordfjorden, landed firstly at its northern promontory, sailed northwards, excursion at Igdlorpait (Th. FRIES wrote Igdlutjait), these plants were in part only labelled "A".

July, 11th: Sailed eastwards, landed at Kûgánguaq (Th. FRIES wrote Koogengoak), plants labelled "B". Left at 4 p. m. (16), landed at Asuk, plants labelled "C".

July, 12th: Left Asuk, stopped at Anertussuk (Argnertíssoq, not locatd), continued to Ritenbenk coal mine.

July, 13th: Botanized at the coal mine and on the adjacent mountains (lichens labelled "F"), a hot day, bathed in the sea. At 3 o. cl. (15) proceeded towards Ujaragssugssuk, landed at Narssaq (lichens labelled "E"), vegetation luxuriant, but not rich in species.

July 14th: Excursion in the vicinity of Narssaq, started for Ujaragssugssuk at 3 (15) o. cl., reached that place at 4.30 (16.30), excursion to the hills (lichens labelled "F"), fairly interesting vegetation.

July, 15th: Geological excursion, plant fossils in abundance. Crossed the Vaigat Strait to Atanikerdluk in Nûgssuaq Peninsula during the evening.

July, 16th: In the morning excursion to the low hills, in the afternoon to the higher hills, in the evening to a little promontory on the other side of the small bay, most luxuriant vegetation. Lichens labelled "G" (the author calls attention to the extremely rich harvest of lichens from this locality).

July, 17th: In the morning excursion around the camp, in the afternoon sailed to Sarqaq (Th. FRIES wrote Sakkak).

July 18th: Rowed all the day to Ritenbenk, arrived there at 6 (18) o. cl. in the evening.

July, 19th: Worked with the pressed plants, short excursion in the afternoon, left Ritenbenk in the evening.

July, 20th: Fog, rain, no wind, arrived at Jakobshavn, no lichens collected.

July 21st—22nd: Rain, fog, contrary winds, cruised for Godhavn, landed at Kuánit (Th. FRIES labelled his plants "Qvannersoit", a mistake, for Kuánerssuit is far off, in the Disko Fjord).

July, 23d: Arrived at Godhavn, excursion to Lyngmarken, prepared plants, cool weather, new-fallen snow in the mountains.

July 24th: Left Godhavn, sailed southwards, calm weather or contrary winds, gale or fog, arrived at Holsteinsborg July, 29th, violent rain.

July 31st—August 1st: Excursions in the neighbourhood of Holsteinsborg, left Holsteinsborg in the afternoon.

August 6th: Sighted Kap Farvel.

Dr. PORSILD has been kind enough to add: At Godhavn, in the Disko Fjord, at Sarqaq, Ritenbenk and Holsteinsborg there are gneissic rocks, at the two firstly mentioned places also basaltic rocks, at the other localities basaltic rocks, and also a soft, easily weathered sandstone. Everywhere there are granitic or gneissic boulders in abundance. Pure limestone is entirely lacking in the whole region, but the basalt contains some calcareous substance. The author thinks that this is of importance to the lichen vegetation.

After his return TH. FRIES wrote a popular book on his impressions of the country, its nature, flora, fauna, history, and its inhabitants and their life: *Grönland, dess Natur och Innevånare*, p. 1—176, Upsala 1872. His book gives no information on his course of travel.

It is evident from the present paper how rich TH. FRIES's collection was in Crustaceous lichens. It is necessary to have joined an Arctic expedition personally in order to appreciate fully the botanical field work, especially during the voyage around Disko Island. This excursion was heavily forced, on account of the short time at disposal. They had to be back at Godhavn as soon as possible, for fear of being left behind.

It does not discredit the memory of TH. FRIES to state that he was much less interested in the Macro-Lichenes, at least at that time. Compare the first part of *Lichenographia Scandinavica*, 1871, with the second part, the immortal masterpiece which he published in 1874. His Greenland collection was really poor in Fruticulose and Foliose lichens, much poorer than we might have expected from the collections of other botanists who had worked in West Greenland, although neither of them had the lichenological knowledge of TH. FRIES.

It was therefore highly satisfactory for me to receive a collection from the Danish botanist, Dr. JOHANNES GRØNTVED. Not being a lichenologist himself Dr. GRØNTVED had necessarily neglected the more inconspicuous Crustaceous lichens, but he collected so many Macro-lichenes that it meant a much appreciated addition to the other greater collection. And yet Dr. GRØNTVED wrote to me that he had only collected lichens more occasionally, at leisure hours, there were lichens in abundance, he was sorry that he did not collect much more.

These two collections, in addition to the former collections by J. VAHL, and others, make Disko Island and the especially interesting west coast of Nûgssuaq Peninsula one of the best explored regions all over the Arctic, with respect to the lichen flora. We must, however, admit that even here much is still to be done. To judge from my own Arctic experience I have especially missed many ornithocoprophilous lichens. There is no suggestion of a visit to a bird-cliff in TH. FRIES's diary. Let us not forget that this side of lichen biology was little noticed at that time. Bird-life in West Greenland is not supposed to be

so rich as it is in Spitsbergen and in Novaya Zemlya. But Disko and Nûgssuaq are far from "empty", and the droppings from the birds cannot fail to influence the lichen vegetation much more than we can read out of the present collections.

In 1932 Dr. GRØNTVED visited the following localities, the greater part of which will be found on the map. From some of them there were but a few lichens.

Disko Island: Qigdlüssat, Sinigfik, Skarvefjeld, Godhavn, Blæsedalen with Røde Elv (Red River), Fortune Bay and Kuánit.

Nûgssuaq Peninsula: Atâ, Atâta qâqâ and Kugsinerssuaq.

South of Disko Bay: Sarqardleq Island in Langesund, Portussut, Qeqertasugssuq, Sarpiussat Island and Seqíneqarajugtoq.

South of the map: Kisarfik, 68°31' n., 51°55' w.

In addition to these two main collections I also received a few scattered contributions, e. g. from the Swedish Rev. Lagerkrantz (Disko), and a few occasional finds made by Danish botanists, chiefly south of the Disko region.

Where no other statement is found in the text the find is due to TH. FRIES.

All the lichens, collected by Professor Fries and by the Rev. Lagerkrantz, belong to the Swedish Naturhistoriska Riksmuseet in Stockholm, Dr. GRØNTVED's plants and the other Danish collections to Botanisk Museum in Copenhagen. Either institution allowed me to keep the first duplicate set for the herbarium of the Oslo Botanical Museum, a favour for which I am very thankful.

During the work it was often found desirable to consult the great Greenland lichen herbarium in Copenhagen. I have repeatedly visited it, always received with the greatest courtesy. A part of my studies there (on the Macro-Lichenes) were utilized for a paper published by Dr. SCHOLANDER and myself: Lichens from North East Greenland collected on the Norwegian Scientific Expeditions in 1929 and 1930, Skr. om Svalbard og Ishavet, No. 41, Oslo 1932.

The most important part of the Copenhagen herbarium is due to the field work by JENS VAHL during the years 1828—1836, a most noteworthy contribution to Arctic botany. The Greenland lichens were chiefly determined by the Rev. J. S. DEICHMANN BRANTH who published his Grønlands Lichen-Flora, in cooperation with CHR. GRØNLUND, Meddel. om Grønland, vol. III, Copenhagen 1887 (1888).

It is often difficult to locate the places, visited by JENS VAHL. In Meddel. om Grønland, vol. III there is a list of these places. Some of them are, perhaps, little known, and the names are not entered on the maps at my disposal. But the chief difficulty is that several names were mis-

spelt, at least they are not in conformity with the present orthography, used on the Danish maps. The Danish institution "Grønlands Styrelse" was kind enough to check the orthography of all the Vahlian names. The work which must necessarily have required much time, was done by Dr. W. THALBITZER, Professor at the University of Copenhagen. I am glad to express my profound gratitude to "Grønlands Styrelse", and to Professor THALBITZER, for this much appreciated assistance.

To my knowledge DEICHMANN BRANTH never visited the Arctic himself. His limitation of the species was, unfortunately, so wide as to efface all real units, and he evidently was of opinion that all lichens could be determined habitually, the microscope being only an accessory aid. His determinations are much in need of a revision on modern lines. For several genera I have attempted a revision of that kind, the results of which will be found in the present paper. The task would, however, have swelled too much if it should have comprised the whole Greenland lichen herbarium. A special attention was devoted to some important genera, such as *Lecidea* (with the exception of the sections *Elaeochroma* and *Macrocarpa*). Other genera were left quite out of consideration, such as the especially interesting and difficult subgenus *Aspicilia*.

The author is fully aware of many deficiencies in the present paper, and my colleagues will detect other mistakes which have escaped my attention. Yet it is to be hoped that it may serve as an introduction to a more comprehensive Greenland Lichen Flora. For that purpose I have also worked out Keys to all the larger Crustaceous genera, with the exception of the Pyrenocarpous lichens.

Much other introductory work is to be done before such a difficult task can be attacked. The determination of the very large Norwegian material from the east coast must firstly be finished (LYNGE 1929, SCHOLANDER 1930 and 1932). This work will now be pushed on, supported by my friends Dr. F. SCHOLANDER and a younger colleague, Mr. EILIF DAHL.

It is, perhaps, a still greater difficulty to the large synthetic work that our knowledge of the lichen flora in South West Greenland (the Julianehaab to the Godthaab districts) is so sorely insufficient. It is much to be hoped that a trained lichenologist can be given an opportunity to investigate these regions which are supposed to be the richest in Greenland.

I have often felt it necessary to lend types and well determined plants from the old Scandinavian centres of lichenology, Stockholm and Upsala in Sweden, and Helsingfors (herb. NYLANDER) and Åbo (herb. VAINIO) in Finland. And I have constantly had to ask the advice and to prey on the immense knowledge of my Swedish colleagues, the Doctors MALME and MAGNUSSON. I have also received valuable information from the German lichenologist, Dr. H. SANDSTEDÉ.

If there is any value in the present paper it is largely due to the (sometimes exceptional!) favours which the directors of the said institutions, and my lichenological friends, have bestowed upon me. I really do not know how I should have been able to finish my task without them.

And last, but not least I am indebted to Miss LILY MONSEN, our University photographer, for the many habitus photos, and to Dr. SCHOLANDER for the micro-photo (and the microtome section) of *Fernaldia Scholanderi*, named in honour of him.

In some cases it was found that the contrasts between the different parts of a lichen, or between the lichen itself and its substratum, was insufficient to allow of a photo of the usual kind. My geological friends recommended a method, developed by the palaeontologists, but formerly never used in lichenology. The lichen was suffused with the vapours of a white and very fine-grained ammonium salt. This method throws into relief many minute details, otherwise concealed, and the whitened surface is a better object, from a photographic point of view, than some unclear grey and brown colours, which are so common in many Crustaceous lichens. The loss of the method is that all natural colours disappear, on account of the white cover, such as all colour contrasts between a disk and its thallus. The covering salt rapidly evaporates, leaving no damage to the plant.

This paper was ready from my hand on May 5th, 1936, but financial difficulties delayed the printing until April 1937. During this time the manuscript has been in constant use, as a support for other works on arctic lichens.

The delay has been a great benefit to it. It enabled me to have the work under constant observation, to consider some difficult questions over and over again, to add something here and there, and to exclude other things, which is often more important.

It became particularly valuable that I found time to test the whole material with the new reagent of Asahina, paraphenyldiamin. In many genera it is excellent for specific distinction, in others not. On the whole I found it very useful, and lichenology is much in debt to Professor ASAHINA for this discovery.

*Farmasøitisk institutt, Blindern, Oslo, 10. 3. 1937.*

B. LYNGE.

## VERRUCARIACEAE.

### *Verrucaria* (WIGG.) TH. FR.

#### 1. *Verrucaria aethiobola* WBG.

Disko Island: Mellemfjorden, Kuánerssuit and Storøen, at the latter place rather plentiful.

The spores are variable in size, as is usual in this species:  $25-36 \times 12-14 \mu$ . The thallus is very thin, hardly visible to the un-armed eye, accordingly the perithecia must be prominent, they are about 0.3 mm in diam.

#### var. *verruculifera* VAIN.

VAINIO Lich. Fenn. I, 1921, p. 30. — LYNGE Lich. Nov. Zemlya, 1928, p. 12.

Disko: Narssaq, on basaltic rocks.

In this plant the verrucae are entirely scattered, small, about 0.30—0.35 mm in diam. The perithecia are of corresponding size. The spores are  $15-18 (-20) \times 9-10 \mu$ . The plant agrees well with my Novaya Zemlya plants which VAINIO referred to var. *verruculifera*. VAINIO's limitation of *Verrucaria aethiobola* is very wide, the present plant might well deserve the rank of a proper species.

#### 2. *Verrucaria arctica* LYNGE.

LYNGE Lich. Nov. Zemlya, 1928, p. 14.

Disko Island: Asuk, on a calcareous rock.

Perithecia diam. circ. 0.5—0.55 mm. Excipulum integrum, fuliginum, amphithecium dimidiatum, fuliginum. Asci satis angusti,  $50-55 \times 12 \mu$ , sporae parvae,  $12-15 \times 6 \mu$ , octonae, subuniseriatae. — Stratum gonidiale circ.  $125 \mu$  altum, gonidia dense congesta, haud distincte seriata.

The verrucae of the thallus are more or less confluent, the intervals between them is filled with minute argillaceous grains. After that it must be a fresh-water lichen, at least it must have grown in a place which was frequently irrigated by fresh-water. The black tops of the perithecia are very conspicuous, under a good binocular lens ( $\times 32$ ) they quite resemble shining domes.

The nucleus is surrounded by an entirely black and not a little fragile excipulum, and this again by an equally fuliginous amphithecium in its upper half part. On an ordinary section the two strata are not separated, but a clearing by chlorale hydrate will often loosen the amphithecium.

It can hardly be doubted that this species belongs to the sect. *Aethiobola*. It is distinct from most other species of its section by its small spores. In the type plant I measured broader spores, 8—12 (—14)  $\times$  (6—) 8—10  $\mu$ . In the present Greenland plant the spores were generally young, perhaps not fully ripe. But its perithecia are larger, in the type I measured 0.25—0.4 mm.

### 3. *Verrucaria ceuthocarpa* WBG.

Godthaab. — Disko Island: Lyngmarken.

It is the commonest marine *Verrucaria* in the Arctic. It was expected also in this collection. — In East Greenland I did not find it in the Franz Josef Fjord system. Perhaps I could have found it on the islands of the outer coast, or is the mechanic abrasion of the ice on the beach line too heavy there to allow of maritime lichens?

### 4. *Verrucaria rupestris* SCHRAD.

Disko Island: Narssaq. — Nûgssuaq Peninsula: Atanikerdluk.

Found on calcareous rocks. The thallus is endolithic, only here and there a very faint, hardly perceptible suggestion of a white thallus. The perithecia are about 0.3 mm in diam., rarely they attain 0.35 mm. In the Disko plant they are but quite exceptionally immersed into the rock, which is composed of rather scattered quartz grains, conglutinated by a very soft calcareous substance. This has obviously been weathered away during the life-time of the individual perithecia, leaving them sometimes quite pedicellated. — In the Nûgssuaq plant the perithecia are a little more immersed.

The amphithecium is dimidiated, the excipulum itself uncoloured at the base. The spores are 20—25  $\times$  10—12  $\mu$ .

## **Thelidium** MASS.

### 1. *Thelidium pyrenophorum* (ACH.) MUDD.

Disko: Blæsedalen and Storøen, on hard, siliceous rocks. — Nûgssuaq Peninsula: Atanikerdluk, on a calcareous sandstone.

In the last mentioned plant the thallus was very thin, almost lacking, whitish, seen around the perithecia only. The perithecia were about 0.4—0.5 mm in diam., spores one-septated, not always well developed, I measured 28—30  $\times$  13—14  $\mu$ , agreeing well with the spores of my Novaya Zemlya plants (LYNGE, Lich. Nov. Zemlya, 1928, p. 20). — In the plants from Storøen I measured 25—26  $\times$  12—13  $\mu$ , from Blæse-

dalen  $20-24 \times 10-12 \mu$ . Also in the latter plants the thallus was very thin, almost lacking.

2. *Thelidium papulare* (FR.) ARN.

Disko: Asuk. — Nûgssuaq Peninsula: Atanikerdluk. The plants were collected on calcareous rocks.

Thallus evanescens. — Perithecia diam. 0.5—0.7 mm, vertice prominentia. Amphithecium carbonaceum, dimidiatum, excipulum basi albidum. Sporae incoloratae, semper tri-septatae, suboblongae vel magis apiculatae, majusculae,  $35-40 \times 15-17 \mu$ . Nucleus J e caeruleo rubescens.

Most probably these two species of *Thelidium* are additions to the lichen flora of Greenland. They are not mentioned in DEICHMANN BRANTH and GRÖNLUND Grønlands Lichen-Flora — no *Thelidium* is mentioned there! — and I found no *Thelidium* in the Copenh. Greenland herb.

### Polyblastia LÖNNR.

1. *Polyblastia bryophila* (NYL.) LÖNNR.

Disko: Nordfjorden, very many plants. — One plant from Malingiaq possibly belongs to this species, but it was too destroyed by moulds to be determined with certainty.

It is hardly possible to separate this species from *Polyblastia Sendtneri* after their habitus, it is necessary to study their spores. According to ZSCHACKE *Verrucariaceae*, in RABENHORST Kryptogamenflora, 1933, p. 461 the spores of the latter species are  $15-30 \times 9-14 \mu$ , and in *Polyblastia bryophila*  $25-46 \times 14-28 \mu$  (l. c. p. 462). Accordingly I had to measure the spores of the entire material, and I found no plant that could be referred to *Polyblastia Sendtneri*. The number of septa is, perhaps, quite as good as a distinctive character, in *Polyblastia Sendtneri* there are but a few longitudinal septa, 1—2, rarely 3, the transversal septa are up to 7 in the larger spores. In normal spores of *Polyblastia bryophila* I found 3—5 longitudinal septa, and 7—14 transversal septa.

The spores are often corrugated and badly developed. In order to study the septa it might be recommended to swell and clear up the spores with chlorale hydrate, wash with water and stain with chlorzinkiodide.

The spore size in the Greenland plants was found to be (20—)  $25-30$  ( $-42$ )  $\times 14-17$  ( $-25$ )  $\mu$ ,  $25-30 \mu$  being the usual length, spores longer than  $35 \mu$  are very rare and seen only in few sections. These spores of  $25-30 \mu$  are quite intermediate in length between the two species, and it is often very difficult, if possible, to distinguish between them in Arctic collections. I have made the same observation in a very large Spitsbergen material, now under determination (TH. FRIES 1868, LYNGE 1926).

2. *Polyblastia septentrionalis* LYNGE.

LYNGE Lich. Nov. Zemlya, 1928, p. 27.

Disko Island: Storøen.

The substratum is a hard rock, giving no CO<sub>2</sub> with HCl. The perithecia are small, about 0.2 mm in diam., the spores pauciloculated, 1 longitudinal, often oblique septum, and generally 3 transversal septa. The spores are 20—25 × 11—12 (—13) μ, in the centre of the asci sometimes a little larger, up to 28 μ. The spores are somewhat larger than in *Polyblastia intermedia* which is a calcicolous species.

3. *Polyblastia hyperborea* TH. FR.

Disko Island: Narssaq, Asuk and Nordfjorden, on calcareous rocks, evidently not scarce.

Nordfjorden: Thallus evanescens. Perithecia parva, 0.2—0.4 mm lata, supra thallus vertice nitido hemisphaerico elevata, amphithecium dimidiatum, parte inferiore divergens, excipulum integrum, parte inferiore incoloratum aut fuscum, sporae (saepe male evolutae, corrugatae) incoloratae, murales, septa transversalia circiter 5—7, longitudinalia circiter 3, magnit. 24—30 (—33) × 14—16, vel (25—) 28—35 × 16—20 μ.

In a plant from Narssaq the white thallus was better developed. The number of longitudinal septa was 1, rarely 3, transversal septa from 3—5. These spores are not so multiloculated as they generally are in *Polyblastia hyperborea*. Their size, 25—32 × 15 μ, is decidedly too great for *Polyblastia intermedia* TH. FR. (14—21 × 7—10 μ). The determination *Polyblastia hyperborea* is open to objections, but I could not propose a new species on account of the suggested differences, for the spores were young, many of them still undivided.

4. *Polyblastia theleodes* (SOMRFT.) TH. FR.

Disko: Nordfjorden, very many plants.

5. *Polyblastia Sommerfeltii* LYNGE.

LYNGE Lichens from Nov. Zemlya, 1928, p. 33.

Disko: Nordfjorden and Storøen, several plants.

I am obliged to confess that I was much in doubt when I ventured to propose this species. The uncoloured spores might have been young spores. In the present collection one or two perithecia were examined in each herb. specimen, and all the plants with uncoloured spores were reexamined, but not one of them gave me dark spores. This is in support of the specific distinction.

At Atâ in the Nûgssuaq Peninsula GRØNTVED collected a lichen (not to be determined) with a parasitic fungus which Dr. KEISSLER was kind enough to determine for me: *Adelococcus alpestris* THEISS. et SYD. It much resembles a *Polyblastia*.

**Staurothele** NORM.1. *Staurothele fissa* (TAYL.) ZWACKH.

ZSCHACKE Verrucariaceae, in RABENHORST Kryptogamenflora, 1933, p. 524, ubi syn.

Nûgssuaq Peninsula: Atanikerdluk, on a calcareous rock.

The thallus is brown, rather thin, warted and areolated, with rather discrete areolae. The top of the perithecia is visible like a shining, small protuberance at the centre of these warts. The spores are dark, muriform, two in each ascus,  $37-48 \times 15-22 \mu$ , the hymenial gonidia are short, stoutish,  $4-5$  ( $-6 ?$ )  $\times 3-4 \mu$ .

After the completion of the present paper I have studied a very large material of *Staurothele fuscocuprea* from North East Greenland. Having there observed the great variability of the gonidia hymenialia I reexamined the present plant. I again found its gonidia to be cubical, or nearly so, and the few gonidia which were slightly longer were supposed to be in division. I can only refer the present plant to the section with short gonidia, but habitually it hardly differs from *Staurothele fuscocuprea*.

Next comes the difficult question *Staurothele catalepta* or *St. fissa*. MALME refers the latter species to the species with "verrucae fertiles elevatae" in his paper on the Swedish *Staurothele* (Svensk Bot. Tidskr., XIII, 1919, p. 199). The thallus of the present plant is not thicker than in MALME Lich. Suec. No. 672 (not seen by ZSCHACKE), or in NORRL. & NYL. Herb. Lich. Fenn. No. 398, referred to *Staurothele fissa* by ZSCHACKE (RABH. Krypt.-Flora, 1935, p. 512). Plants of *Staurothele catalepta* from Central Europe (leg. ERICHSEN) in our Oslo herb. have a much thicker thallus. — A plant from Disko: Blæsedalen, possibly belongs to the same species, but the gonidia were not well enough developed to justify a reliable determination.

2. *Staurothele perradiata* LYNGE, n. sp. (Plate I, fig. 4).

Disko: Asuk, on a basaltic rock.

Thallus tenuissimus, circulos parvos formans, diam. 5—6 mm, striato-plicatus, plicis ambitum versus bene discretis, divergente furcatis, centrum versus magis confluentibus. Thallus opacus, obscure fusco-nigrescens.

Perithecia numerosa usque congesta, diam. 0.2—0.3 mm, verrucosoglobosa, protuberantia, ad basin solum thallo immersa, vertex thallo concolor, amphithecium crassum, fuliginium, nucleus dimidia parte inferiori excipulo pallido circumdatus. Sporae binae, primo incolratae, demum obscuratae, oblongae, apicibus late rotundatae,  $30-50$  ( $-62$ )  $\times 14-22 \mu$ , murales, septa longitudinalia 3—5, septa transversalia 9—11. Gonidia hymenialia subrecta, 5—8 ( $-10$ )  $\times 2-2.5 \mu$ .

*Staurothele perradiata* distinctly belongs to the *Staurothele fuscocuprea* section, characterized by a thin thallus, geminated spores, often at last dark brown, and more or less cylindrical hymenial gonidia. — Its perithecia are smaller than those of *Staurothele fuscocuprea* itself where they are 0.4—0.6 mm in diam., and more prominent, on account of the very thin thallus. The structure of its perithecia would, perhaps, not distinguish it from *Staurothele fuscocuprea*, but it can hardly be identified with that species, on account of its radiating thallus. *Staurothele fuscocuprea* forms a thin, but distinct, continuous or somewhat cracked, slightly nitidous crusta. Such is ARNOLD Lich. Exsic. No. 1591 (s. n. *Sphaeromphale areolata*, cfr. ZSCHACKE, l. c., 1933, p. 519). Such are also other plants of *Staurothele fuscocuprea* in our herb., e. g. a plant from Engadin in Switzerland, collected and determined by MAGNUSSON.

My *Staurothele septentrionalis* from Novaya Zemlya has a thallus which is still thinner, effuse, with a hardly discernible limitation, but thin as it is, it is distinctly continuous, with irregular cracks. In the type plant I found the spores to be  $24-32 \times 11-15 \mu$  (Lich. Nov. Zeml., 1928, p. 35). I have again checked this observation, and found fine spores  $30 \times 15 \mu$ ,  $25 \times 14 \mu$ , and the like, agreeing perfectly with my former results. These rather small spores are evidently characteristic of *Staurothele septentrionalis*.

Habitually *Staurothele perradiata* resembles some of the *Aspicilia* species with radiating, furcated lobes. This has been expressed by its name.

### 3. *Staurothele arctica* LYNGE n. sp.

Nûgssuaq Peninsula: Atanikerdluk, on calcareous rocks.

Thallus verrucosus; cinereo-fuscescens, hinc inde circum perithecia visus, vel plus minusve — saepe omnino — evanescens.

Perithecia diam. circiter  $500 \mu$ , haud foveolata, vertice atro prominenti, supra saxam adnata, basi tantum crusta innata. Amphithecium subhemisphaericum, carbonaceum, nucleus in parte inferiori excipulo incolorato vel pallido circumdatus. Sporae binae, primo incoloratae, deinde mox obscuratae, murales, septa transversalia 10—15, septa longitudinalia 5—7, sporae apice late rotundatae, magnae,  $32-48$  (—65)  $\times$   $12-18 \mu$ . — Gonidia hymenialia vulgo brevia, (5—) 7—8  $\times$   $4 \mu$ , sed etiam longiora vidimus, usque ad  $12 \mu$  longa.

*Staurothele arctica* is found on a calcareous rock, or perhaps better on a quartz sand, conglutinated by a calcareous substance. Its perithecia are not immersed into foveolae in the rock. It is especially distinguished by its thallus which is almost lacking, or here and there developed as rather small verrucae around and near the prominent perithecia. The structure of the perithecia does not differ much from those of *Staurothele*

*perradiata*. The latter species is, however, found on basaltic rocks, and its radiating striate thallus is very characteristic.

It is not quite certain that this species can be distinguished specifically from *Staurothele fuscocuprea*. There is hardly any thallus, apart from the fertile verrucae. The species of *Staurothele* are very particular with respect to their substratum, and *Staurothele fuscocuprea* is typically a plant from hard rocks.

#### 4. *Staurothele fuscocuprea* (NYL.) ZSCHACKE.

Disko: Mellemfjorden, very scarce.

Thallus tenuis vel tenuiusculus, limitatus, ambitu non radiatus, fuscocupreus, verrucosus. Verrucae interdum (thallus tenuis) subdiscretæ, sed vulgo magis contiguæ, si thallus optime evolutus est fere rimoso-areolatus, areolae tum irregulares, saepe angulosæ. Areolae steriles parvae vel minutæ, diam. 0.2 mm raro superantes, verrucae fertiles multo majores, diam. 0.35—0.45 mm, subglobosæ et basi constrictæ vel obtuse conicæ, semper supra thallum bene elevatae.

Perithecia plus minusve alte parte thallina superne tenui obducta, apice anguste prominente. Sporae binae, mox vel demum nigricantes, murales, magnitudine variantes, 30—50 × 15—20  $\mu$ . Gonidia hymenialia vulgo oblonga, 7—8 (—10) × 3—4  $\mu$ , sed etiam subcylindrica, apice rotundata, subrecta vel leviter arcuata, saepe 10—15  $\mu$  longa, rarius vidimus usque ad 20  $\mu$  longa.

This species was also found in a collection from South East Greenland (DAHL, LYNGE and SCHOLANDER, manuscript, in print), and also in LYNGE's collection from North East Greenland (1929, unpublished). In North East Greenland the species is extremely abundant, and the above description is chiefly based on that material. It is there found in almost every brooklet where it was looked after. It is very characteristic of rocks and stones in depressions which are constantly or at least very often irrigated by very cold water from melting snow and ice (Norwegian "smeltevannsbekk").

It must be admitted that the thickness of the thallus is very variable. In some plants it is so thin that we would hardly be able to detach a fragment from the stone for sectioning, in others fairly thick, in some plants so thick that it is irregularly rimose rather than verrucose. In LYNGE's very large material it would hardly be possible to distinguish between the present species and *Staurothele clopima* after the thickness of the thallus alone, a distinction can only be based on the much larger and very elevated fertile verrucae of *Staurothele fuscocuprea*. The structure of the perithecia, the size of the spores and the gonidia hymenialia is very much the same in the two species.

The proportion between the rather short, oblong gonidia hymenialia

and the longer, more cylindrical ones is very variable. In some plants the latter are very scarce, and we have to search after them, in others they are more abundant, but hardly ever so numerous as the oblong gonidia.

*Staurothele fuscocuprea* has a hard time during the great inundations in the early summer. Fine detritus may then entirely cover the fissures between the sterile verrucae, and even these verrucae themselves, leaving only the fertile verrucae free.

### **Microglaena** KOERB.

#### 1. *Microglaena sphinctrinoides* (NYL.) LÖNNR.

Godthaab or Nûk, several plants. Kok Islands or Kitsigsut, a few plants.

Sporae murales, interdum apiculatae,  $27-42 \times 8-14 \mu$ , paraphyses persistentes.

Several of the above mentioned *Verrucariaceae* are additions to the lichen flora of Greenland. But it is impossible to give detailed information on that point without checking the determinations of the previous records.

## **DERMATOCARPACEAE.**

### **Dermatocarpon** (ESCHW.) TH. FR.

#### 1. *Dermatocarpon cinereum* (PERS.) TH. FR.

Disko: Blæsedalen and Nordfjorden.

According to ZSCHACKE *Dermatocarpaceae*, in RABENH. Kryptog.-Flora, 1934, p. 595—6 *Dermatocarpon cinereum* is a *Catopyrenium*: "Gehäuse überall schwarz", whereas *Dermatocarpon daedaleum* is an *Endopyrenium*: "Gehäuse hell, nur am Scheitel dunkel". In Lich. Fenn. I, 1921, p. 25, VAINIO wrote on the former species: "Perithecium apice fuscescens rufescensve, ceterum maculis obscuratis plus minusve latis", and l. c. p. 23 on the latter species: "Perithecium albidum aut testaceo-pallidum, margine ostiolarum nigricante". — Habitually the present plants agree entirely with *Dermatocarpon cinereum*. They have the thin, entirely appressed thallus with the characteristic cracks. The excipulum was brown and equally dark all over.

#### 2. *Dermatocarpon lachneum* (ACH.) A. L. SM.

Disko: Blæsedalen, several plants.

The Arctic plants are often found in places which are at times irrigated by water from the melting snow. They are then more or less covered with detritus. The squamules are often more discrete than in our country. Such fine plants as those, distributed by MALME in Lich. Suec. No. 540

are hardly ever seen in the Arctic. But in these Greenland plants the margin of the squamules is so distinctly free from the substratum that *Dermatocarpon hepaticum* should be out of the question.

Curiously enough *Dermatocarpon miniatum* was not found in the collections. It has repeatedly been collected on the west coast of Greenland, also in Disko Island (by VAHL).

#### **Endocarpon** (HEDW.) ZAHLBR.

##### 1. *Endocarpon pulvinatum* TH. FR.

Disko Island: Mellemfjorden and "Eskimo Camp", very scarce.

### SPHAEROPHORACEAE.

#### **Sphaerophorus** PERS.

I have tested the two species of *Sphaerophorus* with paraphenylenediamine, without detecting any staining.

##### 1. *Sphaerophorus fragilis* PERS.

Disko: Godhavn and Seqineqarajugtoq (GRØNTVED).

It was not found in TH. FRIES's collection, but to judge from the material in the Copenhagen herb. it cannot be rare in West Greenland. Reduced plants often resemble *Sphaer. globosus*, but in case of doubt the reaction with J easily decides the question.

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

Disko: Godhavn (Porsild 1927) and Blæsedalen (GRØNTVED).

It has not been much collected in West Greenland, there are not so many plants in the Copenhagen herb., as we might have expected. I cannot believe that it should be less common in West Greenland than it is in all other Arctic regions investigated.

#### **Diploschistes** NORM.

##### 1. *Diploschistes scruposus* (L.) NORM.

Disko: Blæsedalen.

On stone, only a few plants. Evidently a scarce plant in Greenland. In the Copenhagen herb. there are plants from Holsteinsborg (VAHL), Godthaab: Ameralik (VAHL), Julianehaab: Tunugdliarfik (VAHL), and from East Greenland: several places in Scoresby Sound (HARTZ). It is supposed to be a rather southerly species, the find from Disko is the northernmost one on the west coast, and it was not found by the Norwegian expeditions to North East Greenland north of Scoresby Sound in 1929 and 1930.

## GYALECTACEAE.

**Gyalecta** (ACH.) ZAHLBR.

1. *Gyalecta foveolaris* (ACH.) TH. FR.

Disko: Kuánerssuit, very scarce.

No species of *Gyalecta* was found in the Greenland herb. in Copenhagen. — The genus *Ionaspis* which was so well represented in my Novaya Zemlya collection was not detected in the present Greenland material, and DEICHMANN BRANTH and GRÖNLUND make no mention of it in their Grønlands Lichen-Flora.

## EPHEBACEAE.

**Ephebe** E. FR.

1. *Ephebe lanata* (L.) VAIN.

Disko: Godhavn.

The internodes are short, as was to be expected in Arctic plants, giving them a somewhat hispidous appearance. I have compared the plants with well identified plants of *Ephebe lanata*, such as MAGNUSSON Lich. Scand. No. 77, and found morphological agreement. Unfortunately the Greenland plants were sterile. As is known the generic difference between the genera *Ephebe* and *Ephebeia* with its northern species *Ephebeia hispidula* (ACH.) NYL. is to be found in the paraphyses which are distinct in the latter species and not in the former. But small though they are the Greenland plants are so much coarser than *E. hispidula* that we cannot think of referring them to that species.

To judge from DEICHMANN BRANTH and GRÖNLUND Grønlands Lichen-Flora, p. 513 *E. lanata* must be common along the south and west coast of Greenland as far north as Disko.

**Polychidium** (MASS.) A. ZAHLBR.

1. *Polychidium muscicola* (SM.) S. GRAY.

Disko: Skarvfjeld (GRÖNTVED), Mellemfjorden and Nipisat (TH. FR.).

There were but a few plants. No mention of this species was made in DEICHMANN BRANTH and GRÖNLUND Grønlands Lichen-Flora, but HARTZ collected a miserable plant in Røde Ø (Red Island) in Scoresby Sound. It is evidently correctly determined. — In the Danish herb. there are several finds from Iceland, in all 6, it is also common in Jan Mayen.

## PYRENOPSISIDACEA.

**Pyrenopsis** NYL.

1. *Pyrenopsis pulvinata* (SCHAER.) HELLB.

On soil: Disko Island: Godhavn, Lyngmarken, Blæsedalen and Mellemfjorden.

On stones: Disko Island: Mellemfjorden, Malingiaq and Nipisat Harbour, perhaps *Lecanora granatina* SOMRFT.

The number of plants was quite considerable. The appressed apothecia are frequent, a great number of them was examined, spores were very rare, I only detected a few ones, rather small,  $10-12 \times 5.5-6.5 \mu$ . The disk is dark brown. The asci alone are stained blue by J, the upper part of the hymenium yellow by KOH.

The genus *Pyrenopsis* is much in need of a monograph. — The two species, *Pyrenopsis subfuliginea* and *Pyr. grumulifera* have urceolated, small apothecia with a dark disk.

## COLLEMACEAE.

### *Leciophysma* TH. FR.

#### 1. *Leciophysma finmarkicum* TH. FR.

Disko: Godhavn, Mellemfjorden and Blaa fjeld (Uivfaq), leg. TH. FR.  
— Nûgssuaq Peninsula: Atâ (GRØNTVED).

The number of localities is not quite inconsiderable, but there were very few plants.

It is the first record from Greenland, and the only finds from West Greenland. In East Greenland it was found by the present writer in 1929 at several localities in Eirik Raudes Land, N.E. Greenland.

### *Collema* (HILL.) ZAHLBR.

#### 1. *Collema rupestre* (Sw.) RABH.

Disko: Blæsedalen and Kuánerssuit.

The specimens are thicker than they usually are in Norwegian plants, and more microphylline. But the lobes are rounded in the characteristic manner, with laminar isidia. The isidia are short and papilliform. A certain concentration in volume is a common feature in Arctic lichens.

#### 2. *Collema*, cfr. *pulposum* (BERNH.) ACH.

Disko: Mellemfjorden.

The few plants are quite sterile, and the determination is not unobjectionable. But I have ventured it on account of the thick, "pulposus" thallus. The plants were found between mosses.

#### 3. *Collema arcticum* LYNGE.

Disko: Mellemfjorden and Blaa fjeld (Uivfaq).

There were but a few plants. It is an addition to the lichen flora of West Greenland, in East Greenland there are several finds between Cape Wynn and Holmsvika (LYNGE and SCHOLANDER Lich. from N.E. Greenland, 1932, p. 23).

**Arctomia** TH. FR.1. *Arctomia delicatula* TH. FR.

Disko: Blaafjæld (Uivfaq), very scarce, only a few plants were found in the collection.

The spores were 5—7 septated, it is accordingly this species and not *A. interfixa*.

This is the first find of the species in Greenland, and so far it is the only find from West Greenland. — In East Greenland it was found by the present writer in 1929 at Landingsdalen in Eirik Raudes Land, the only find from East Greenland (LYNGE and SCHOLANDER Lichens from N.E. Greenland, 1932, p. 22).

**Leptogium** S. GRAY.1. *Leptogium scotinum* (ACH.) FR.

Disko: Nordfjorden, very scarce.

The distinct cortex excludes a *Collema*. The thallus is not pulvinate, but more expanded over the mossy substratum. The lobes are short, thick, rounded, smooth, hardly wrinkled, without isidia. The numerous apothecia are rather small, 0.6—1.0 mm in diam., urceolated with a thick margin, of the same colour as the thallus. The muriform spores are somewhat apiculated, little variable in size,  $25-27 \times 12-17 \mu$ , with 2—4 longitudinal and about 7 transversal septa.

The plants agree well with MALME Lich. Suec. No. 803, only that the lobes are a little more compact, shorter and thicker, an aberration that was to be expected in Arctic material. MALME's plant has the same spores, with about 7 transversal septa. — In MAGNUSON's excellent Flora över Skand. busk- och bladlavar 3 transversal septa are attributed to this species.

I was astonished to find *L. pulvinatum* lacking in the collections. It is otherwise the commonest *Leptogium* in the Arctic. It differs in the more pulvinate habitus, as expressed in the species name, its apothecia are very rare, at least in the Arctic.

**HEPPIACEAE.****Fernaldia** LYNGE, gen. nov.*Fernaldia* LYNGE, gen. nov.

Thallus crustaceus, hypothallo cyaneo impositus, gomphillo destitutus, omnino fere plectenchymaticus, non gelatinosus, ecor-ticatus, rhizinis destitutus, gonidia: Nostoc, in glomerulis infra superficiem superiorem disposita (thallus heteromericus).

Apothecia sessilia, non immersa, hypothecium incoloratum, para-

physes indivisae, asci octospori, sporae simplices, incoloratae, tenuiter limbatae.

1. *Fernaldia Scholanderi* LYNGE n. sp. (Plate V, fig. 2).

Disko: Kuánerssuit, ad rupes graniticas.

Thallus valde inconspicuus, oculo nudo visus cum saxo subconfusus, sub lente visus ( $\times 32$ ) crustam format granulosa, centrum versus rimis profundis quasi in areolis divisam, peripheriam versus tamen lobis subradiantibus, granulosis vel torulosis, irregularibus, tenuibus, circ.  $30 \mu$  crassis. Thallus fuscus, sorediis isidiisque destitutus, substrato plus minusve stricte adnatus (ut in genere *Pannaria*).

Apothecia haud numerosa, dispersa, e centro areolarum enata, primum urceolata, deinde magis expansa, rotundata, parva: diam. 0.3 mm haud superantia. Discus ater, epruinosis, scabrosus ( $\times 32$ ), margine prominenti, concolori, integro cinctus. Excipulum in parte exteriori hyphis flabelliformiter radiantibus et pulcherrime smaragdulis formatum, in parte interiori incoloratum, plectenchymaticum. Hypothecium incoloratum. Hymenium superne smaragdulum, praeterea incoloratum, circ.  $80 \mu$  altum videtur, sed sine limite distincto in hypothecium transiens. Paraphyses arcte cohaerentes, saltem in epithecio, indivisae, clavatae, superne  $5 \mu$  crassae. Asci (raro evoluti) saccati, e. g.  $30 \times 10 \mu$ , octospori. Sporae globosae, incoloratae, diam.  $5-7 \mu$ .

Pycnides frustra quaesivimus.

Thallus tenuis vel tenuissimus, circ.  $125 \mu$  crassus, omnino plectenchymaticus, ecorticatus, hypothecio cyaneo impositus et eo substrato affixus. Gonidia Nostocacea, glomerulis dispersis formantia.

Hymenium J flavescens, asci et sporae rubescentes, KOH immutatum,  $\text{HNO}_3$  partes smaragdulae magis in coerulescentem colorantur.

This species is characterized by a brown thallus with a granular surface, it must be called crustaceous, in spite of its small, spreading, marginal lobes. The thallus is plectenchymatous all through, neither an upper nor a lower cortex is developed. The lower part of the thallus is smaragdine, I have interpreted it as a hypothallus.

Its habitus quite suggested a very small *Pannaria*, and the structure of its apothecia is conformous with several *Pannariaceae*, cfr. the figure in the present paper with ZAHLBRUCKNER's figure in ENGLER-PRANTL, 1926, fig. 89, B (*Placynthium nigrum*).

There was some difficulty about the identification of the gonidia in this old plant. The microtome sections gave no clear picture, a few scattered glomeruli of gonidia were seen just below the surface of the granules. A "Quetsch-Präparat" proved more successful, it was studied together with our algologist, Professor HENRIK PRINTZ, and we agreed upon an unobjectionable identification of a *Nostoc*. The microtome section

had happened to cut collapsed gonidia, and these collapsed glomeruli quite suggested a *Trentepohlia* with small cells.

A *Peltigeracé* or a *Stictacé* is here quite out of the question, our plant must be a *Heppiace* or a *Pannariacé*. After ZAHLBRUCKNER the distinction between the latter two families can be thus expressed:

1. "Markschicht fehlend, Lager ganz oder zum grössten Teil paraplectenchymatisch" . . . . . 1. *Heppiaceae*.
2. "Markschicht gut entwickelt, Lager nur oberseits paraplectenchymatisch berindet, Unterseite des Lagers unberindet oder aus wagenrecht verlaufenden, oft aufgelösten Hyphen gebildet. 2. *Pannariaceae*.

If this distinction holds good, I can only refer the present plant to the Heppiaceae. In this family ZAHLBRUCKNER'S Clavis either suggests a *Neoheppia*, a tropical genus, impossible on account of its homoeomerical thallus, or the genus *Heppia* itself.

I have compared the Greenland plant with all the species of *Heppia* at my disposal, but I cannot find it identical with any of them. And the thallus of the species of *Heppia* is so essentially different from that of the present plant that it is really difficult, if possible, to include it in that genus, which has a "Lager schuppig bis kleinstrauchig" (ZAHLBRUCKNER, l. c.). I have therefore ventured to propose a new genus, named in honour of the eminent American botanist M. L. FERNALD, Professor of botany at Harvard university.

## PANNARIACEAE.

### *Placynthium* S. GRAY.

1. *Placynthium asperellum* (ACH.) TREV.

Disko: Godhavn, Lyngmarken, Nordfjorden, Mellemfjorden, Kuánerssuit and two localities which I was unable to locate: Narssaq and the "Eskimo camp".

The number of plants and of localities is great enough to suggest quite a common species. It is often fertile. — It is an excellent substratum for some other lichens, such as *Caloplacae*, *Candelariella placodizans*, and the like.

These plants were the first finds from Greenland, but there are a few former records, from North Greenland: Floeberg Beach (TH. FR. Lich. Engl. Polar Exp., 1879, p. 367), Low Point and Centrum Island (LYNGE, Lich. coll. on the North Coast of Greenl. by the late Dr. TH. WULFF, 1923, p. 287), and a find from East Greenland in herb. Copenh.: Scoresby Sound: Taagefjorden, leg. HARTZ, det. DEICHMANN BRANTH: *Lecothecium coralloides*. — It is well represented in my collection from East Greenland, 1929 (unpublished). There is every reason to suppose that it is

common and widespread in Greenland, at least in the northern regions of the large island.

### **Pannaria** DEL.

#### 1. *Pannaria Hookeri* (BORR.) NYL.

Disko: Godhavn, Blæsedalen, Lyngmarken, and Blaa fjeld (Uivfaq).

There were several plants in TH. FRIES's collection. — Formerly we only had one find, from Tasermiut in South Greenland, Julianehaab district. I have so far not identified it in my own East Greenland collections from 1929. — Should it really be so rare in Greenland? Otherwise it is common enough in Arctic regions.

#### 2. *Pannaria elaeina* (WBG.) NYL.

Disko: Godhavn, Lyngmarken, Mellemfjorden, Kuánerssuit and Malingiaq.

There were not many plants, but it is evidently quite common in Disko Island. In the Copenh. herb. there is a considerable number of plants from the Faeroes and from Iceland, but nothing from Greenland. It is supposed to be an addition to the lichen flora of Greenland.

#### 3. *Pannaria pezizoides* (WEB.) LIGHTF.

Disko: Godhavn, only a few plants were collected.

It cannot be rare in West Greenland, for there are very many plants from West Greenland in the Copenh. herb. It is supposed to be equally common in East Greenland, HARTZ collected it in Scoresby Sound, and I in numerous localities as far north as Cape Wynn.

### **Psoroma** (ACH.) NYL.

#### 1. *Psoroma hypnorum* (DICKS.) HOFFM.

Godthaab: Kokøerne (Kitsigsut). — Disko: Godhavn and Lyngmarken (TH. FR.), Blæsedalen (GRØNTVED), Blaa fjeld (Uivfaq), leg. TH. FR.

An ubiquitous lichen, common all over Greenland, from the farthest south to the farthest north.

### **Parmeliella** MÜLL. ARG.

#### 1. *Parmeliella lepidiota* (SOMMERF.) VAIN.

Disko: Godhavn, scarce.

I have compared the plants with SOMMERFELT's type and with plants from Spitsbergen, Bell Sound, determined by TH. FRIES, and found good agreement. The squamules are brown, not black which suggests the typical species, not its var. *tristis* TH. FR. Lich. Arct., p. 74.

Its spores are not a little variable. In SOMMERFELT Plant. Crypt. Norv. No. 135 ("in muscis destructis Nordlandiae") I only found a few

spores, and they were rather small, 15—18  $\mu$  long. Another plant, collected by SOMMERFELT "Saltdalen in rupib. soli expos." had larger spores: 17—22  $\mu$ . In the present Greenland plants the spores were exceptionally small: 13—15  $\mu$ .

*Parmeliella arctophila* (TH. FR.) MALME was to be expected in the collection. It was described by TH. FRIES in his *Nya laf-arter*, Bot. Not., 1863, p. 8 from "Grönland och Labrador" (Greenland and Labrador), collected by missionaries, locality not given. This species was well represented in TH. FRIES's collection from Bear Island, 1868, and some remarks on it are found in my paper on the lichens of that expedition, p. 48. Its spores agree well with those of *P. lepidiota*, in his first description TH. FRIES wrote 16—20  $\times$  8—12  $\mu$ , in the Bear Island plants I found 15—17  $\times$  7—10  $\mu$ . It is distinguished by its "thallus obsoletus, minute granulosus" (TH. FRIES l. c.), "thallus minutissime granulosus vel evanescens" (Nyl. Lapp. orient., p. 124). A plant from Blaafjeld (Uivfaq) in the present collection might belong here, its squamules are really small, but the squamules are so worm-eaten and badly damaged, that I do not venture to determine it with certainty.

DEICHMANN BRANTH and GRÖNLUND record *P. lepidiota* from some Greenland localities: Ameralik in West Greenland and Julianehaab in South Greenland, to which localities can be added Danmark Island in Scoresby Sound, East Greenland, leg. HARTZ, referred to *Pannaria brunnea* and to *P. microphylla* by DEICHMANN BRANTH (herb. Copenh.), and Low Point, North Greenland, leg. WULFF (LYNGE WULFF lichens, 1923, p. 286).

## 2. *Parmeliella oblongata* LYNGE n. sp.

Disko: Godhavn, on mosses.

Thallus ut videtur late expansus, aterrimus, haud squamulosus et verrucoso-incrassatus ut in *P. tristi*, sed minute coralloideo-granulosus.

Apothecia numerosa vel numerosissima, rotundata, diam. usque ad 0.7—0.8 mm, supra thallum elevata, mox alte convexa, margine excluso. Discus aterrimus, epruinosis. Apothecia biatorina, hyphae excipulares in centro satis arcte contextae et in omnes partes currentes, in parte exteriori subcaerulescentes, magis pachydermaticae, paralleles, superficiei perpendiculares. Hypothecium (in vivo?) plus minusve rubescens, etiam cum hymenio angusto, circ. 50  $\mu$  alto. Paraphyses septatae, validae, 2—2.5  $\mu$  crassae, laxe cohaerentes, apice haud incrassatae. Asci angusti, crassitudine vulgo 10  $\mu$  non superantes, anguste pyriformes, sporae (male evolutae) oblongae: (10—) 12—14 (—17)  $\times$  4 (—5)  $\mu$ , epispodium tenue, laevigatum, haud rugulosum. — Gonodia Nostocacea.

Unfortunately the apothecia were so badly developed that it was

impossible to give quite reliable data on the colours. They were also damaged by a parasitic fungus. The upper part of the hymenium was often necrotized into an amorphous substance. I only saw a few spores, but they looked mature and well developed. Their form should be sufficient to distinguish the plants from *P. lepidiota* and *P. arctophila*, in the latter two species rather large and broad,  $15-22 \times 7-10$  or even  $12 \mu$ , in the present species oblong, narrow and short, the species name suggests these narrow spores.

The thalli of *Parmeliella lepidiota* and its  $\beta$  *tristis* were admirably described by TH. FRIES in Lich. Arct., p. 74: the former "thallo membranaceo, adscendenti-squamuloso, arcte imbricato, inciso-crenato crenis verrucoso-incrassatis, cervino, margine saepe cinerascenti-pulverulento", the latter "thallo crassiore et magis crustaceo . . . squamulis nigris, toruloso-implexis". In the present species the thallus is still more crustaceous, in exposed places covering the mosses much as in an *Ochrolechia*, in depressions between the mosses it is better developed, granular or coralloid, here it would not be adequate to use the terminus "squamulosus". No trace was seen of the membranaceous marginal squamules which are so characteristic of *P. lepidiota*.

## PELTIGERACEAE.

### *Solorina* ACH.

#### 1. *Solorina crocea* ACH.

Godthaab: Nùk (TH. FR.). — Egedesminde: Sargardleq (GRØNTVED). — Disko: Godhavn and Sinigfik (GRØNTVED).

There were but a few plants in the present collections, but it is evident from my above mentioned paper on the PELTIG. in the Copenh. Arctic Herb. 1928, p. 3 that it is common enough in West Greenland, as was to be expected.

#### 2. *Solorina saccata* (L.) ACH.

Disko: Nordfjorden and Kuánerssuit.

There were but a few plants. It is a very interesting find, for it is the first good record from Greenland. All the former records are based on other species, cfr. LYNGE, l. c. p. 4. The plants in the present collection were tested microscopically, the asci contained 4 spores.

#### 3. *Solorina spongiosa* (SM.) ANZI.

Disko: Nordfjorden, very scarce, only one plant.

The genus *Solorina* was not well represented in the present collection. We should have expected to find also *S. bispora* and *S. octospora*. The former species has been collected at Upernavik and at Ũmának by VAHL,

the latter has so far not been collected on the west coast of Greenland. Either species is very common in North East Greenland, see LYNGE and SCHOLANDER Lich. N.E. Greenland, 1932, p. 24 and 26. I have repeatedly made the remark that TH. FRIES was not much interested in the large lichens, his collections are much richer with respect to crustaceous lichens.

Paraphenyldiamin does not stain the species of *Solorina* (in *S. bispora* only a faintly yellow reaction of the medulla).

### Nephroma ACH.

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

Godthaab: Nuk (TH. FR.). — Egedesminde: Sarqardleq island in Langesund (GRØNTVED). — Disko: Blæsedalen and Sinigfik (GRØNTVED).

There are a lot of finds of this species from West Greenland, it is supposed to be quite common there, cfr. LYNGE, l. c. p. 5. DEICHMANN BRANTH and ROSTRUP write that it is found here and there throughout the whole country, but not in abundance ("Hist og her i hele Landet, men i ringe Mængde"), Grønlands Lichen-Flora, p. 467.

#### 2. *Nephroma expallidum* NYL.

Disko: Blæsedalen (GRØNTVED), Godhavn, Kuánerssuit and Blaa-fjeld or Uivfaq (TH. FR.).

These finds are interesting. Formerly there was but one find from Greenland, viz. "Tørveøen ved Egedesminde", acc. to DEICHMANN BRANTH and GRØNLUND, p. 753, this plant is lacking in the Copenh. herb.

Three other species of *Nephroma* have been collected in Greenland, viz. *N. laevigatum*, *N. parile* and *N. resupinatum*, but they were not found in the present collections, cfr. LYNGE, l. c. p. 6—7.

### Peltigera PERS.

#### 1. *Peltigera aphthosa* (L.) HOFFM., s. ang.

Disko: Sarpiussat and Kuánit (GRØNTVED).

If this species is restricted to plants with confluent, not elevated nerves and a continuously brownish-black underside, it is certainly rare in the Arctic, and I was glad to identify it in these collections.

#### 2. *Peltigera leucophlebia* (NYL.) Gyelnik.

Syn. *P. aphthosa* f. *variolosa* Mass., vide G. NILSSON (DEGELIUS) Zur Flechtenflora von Ångermanland, 1931, p. 37.

Disko: Blæsedalen (GRØNTVED) and Nordfjorden (TH. FR.).

The commonest "*Pelt. aphthosa*" in the Arctic.

#### 3. *Peltigera venosa* (L.) HOFFM.

Disko: Uivfaq or Blaa-fjeld, only one plant, with a parasitic fungus.

It is more common in West Greenland than this single find would suggest.

4. *Peltigera canina* (L.) WILLD.

Egedesminde: Sarpiussat (GRØNTVED). — Disko: Kuánerssuit (TH. FR.) and several other localities (GRØNTVED).

5. *Peltigera rufescens* (WEISS) HUMB.

Disko: Lyngmarken (TH. FR.), collected at several localities near Blæsedalen (GRØNTVED).

6. *Peltigera scabrosa* TH. FR.

Godthaab: Nuk (TH. FR.). — Egedesminde: Sarpiussat and Sarqardleq (GRØNTVED). — Disko: Godhavn (LAGERKRANTZ), Blæsedalen (GRØNTVED), and Sinigfik (GRØNTVED).

Few species, if any, were so well represented in the collections as *P. scabrosa*, the number of localities was considerable, and there were fine plants. It is supposed to be a common species in West Greenland. — There are quite a number of plants in the Copenhagen herb. from the whole west coast as far north as Upernavik.

7. *Peltigera erumpens* (TAYL.) VAIN.

Egedesminde: Sarpiussat (GRØNTVED). — Disko: Godhavn, Blæsedalen and Lyngmarken, at the latter locality with an *Illosporium* (GRØNTVED), Blaafjeld or Uivfaq, here also its var. *leptoderma* (TH. FR.).

The number of plants in GRØNTVED's collection suggests it to be a common species in West Greenland, as was to be expected. There were but a few plants in the Copenhagen herb., but it is one of the small *Peltigerae*, at least in the arctic.

8. *Peltigera malacea* (ACH.) FR.

Egedesminde: Sarpiussat Peninsula (GRØNTVED). — Disko: Blæsedalen, Sinigfik and Angnertussoq (GRØNTVED).

9. *Peltigera polydactyla* (NECK.) HOFFM.

Egedesminde: Sarpiussat Peninsula (GRØNTVED). — Disko: Godhavn and Blæsedalen (GRØNTVED).

The plants were small and not well developed.

## LECIDEACEAE.

### *Lecidea* (ACH.) ZAHLBR.

I have been much interested in the genus *Lecidea*, and I have tried to extend my study also to the other species of *Lecidea*, collected in Greenland by Scandinavian botanists, or determined by Scandinavian botanists. Much thank is due to the director of the Botanical Museum of Copen-

hagen, Professor KNUD JESSEN, and to the staff of the said museum, for all the Greenland lichens of its collections which they have allowed me to examine. It is often so difficult to get to sight plants, preserved in Extra-Scandinavian herbaria that I have found it necessary to limit my studies to the above mentioned collections.

A review of the lichenological research work in Greenland up to 1888 is found in DEICHMANN BRANTH og GRØNLUND Grønlands Lichen-Flora, Medd. om Grønl., vol. III, p. 449—453. Since then little of importance has been published on Greenland lichens by botanists outside of Scandinavia.

The following Clavis also inlucts the "species excludendae" and a few species, detected in Grant Land, separated from Greenland only by the Robeson Channel.

*Clavis specierum.*

*Species saxicolae.* (Sp. lignicolae v. ossicolae p. 40, sp. terricolae v. muscicolae p. 37).

1. Medulla J caerulescens.
2. Thallus KOH mox rubescens vel e flavo rubescens, P intense flavescens. . . . . 48. *L. pantherina* (ACH.) TH. FR., p. 65
- 2\*. Thallus KOH —.
3. Thallus hydrate ferrico tinctus, P—.
4. Areolae crassae, bullato-verrucosae (saepe subnitidae)
  47. *L. silacea* ACH., p. 65
- 4\*. Areolae planae vel raro subconvexae.
  46. *L. lapicida* ACH. f. *ochracea* (NYL.) VAIN. p. 65
- 3\*. Thallus hydrate ferrico non tinctus, P—.
4. Thallus fuscus.
  5. Thallus crassus, verrucoso-areolatus, hypothecium incoloratum vel dilute fuscescens.
    52. *L. atrobrunnea* (RAM.) SCHAER., p. 68
  - 5\*. Thallus tenuis, areolae planae vel subplanae, hypothecium obscure fuscum. 51. *L. paupercula* TH. FR., p. 68
- 4\*. Thallus albidus vel albido-cinereascens.
  5. Sporae globosae, diam. circ. 5  $\mu$ , thallus P—.
    43. *L. occidentalis* LYNGE, p. 63
  - 5\*. Sporae ellipsoideae.
6. Hypothecium nigricans, hymenium altum, circ. 100—125  $\mu$ . Thallus albidus (-glaucescens).
7. Apothecia saepe thallo subimmersa, plana, margine (interdum etiam disco) p. m. pruinosa, sporae ellipsoideae, 10—13  $\times$  5—7  $\mu$ .
  50. *L. speirea* ACH., p. 67

- 7\*. Thallus caeruleo-cinereus, apothecia adpressa, magis convexa, nuda, sporae late ellipsoideae,  $7-9 \times 5-7 \mu$  . . . . . [75. *L. confluens* FR., p. 80]
- 6\*. Hypothecium incoloratum vel p. m. dilute fuscum.
7. Apothecia maxima, diam. usque ad 6—7 mm, hymenium superne olivaceum, sporae  $8-10 \times 5-6 \mu$ , thallus P—. 49. *L. magna* LYNGE, p. 66
- 7\*. Apothecia minora, diam. 1—2 mm, sporae  $8-10 \times (4-5) 5-6 \mu$ .
8. Excipulum KOH sanguineum (crystalla praecipituntur), apothecia supra thallum leviter, sed distincte elevata, hymenium superne intense cyanescens, thallus P intense flavescens. 44. *L. cyanescens* LYNGE, p. 63
- 8\*. Excipulum KOH non sanguineum, thallus P—.
9. Apothecia innata, thallum aequantia, saepe primum pruinosa, hymenium superne nigricans aut olivaceo-nigricans  
42. *L. tessellata* FLK., p. 62
- 9\*. Apothecia adnata, raro innata, margine prominenti non pruinosa, hymenium superne subaeruginoso-nigricans.  
46. *L. lapicida* ACH., p. 65
- 7\*\*. Apothecia minuta, diam. 0.15—0.3 mm., thallo immersa, sporae  $13-14 \times 7.5-10 \mu$ .  
45. *L. subrhagadiella* LYNGE, p. 64
- 1\*. Medulla J non caerulescens.
2. Thallus KOH rubescens (crystalla fasciculata praecipituntur), medulla P flavescens.
3. Thallus rufescens vel flavido-stramineus, apothecia majora, 0.8—4.0 mm, thallo immersa, immarginata, cortex KOH rubescens. . . . . 55. *L. armeniaca* (D. C.) FR., p. 69
- 3\*. Thallus albidus vel cinerascens, apothecia parva, 0.5—1.2 mm, thallo adnata, margine tenui nitido circumdata, etiam medulla KOH rubescens.  
65. *L. Lulensis* (HELLB.) TH. FR., p. 76
- 2\*. Thallus KOH non rubescens.
3. Thallus cephalodiis rufescentibus instructus, sporae magnae,  $20-30 \times 10-16 \mu$ , thallus P—.
4. Thallus  $\text{CaCl}_2\text{O}_2$  haud rubescens (in plantis groenlandicis cephalodiis destitutus), albidus vel persicino-albidus, apothecia immersa . . . . 36. *L. consentiens* NYL., p. 60

- 4\*. Thallus carneo-cinereascens,  $\text{CaCl}_2\text{O}_2$  rubescens.  
 5. Apothecia areolis immersa, et eam ob causam aspicilioidea videntur 37. *L. pelobotrya* (WBG.) LEIGHT., p. 61  
 5\*. Apothecia inter areolis sita, thallum subaequantia.  
 35. *L. panaeola* ACH., p. 60
- 3\*. Thallus cephalodiis destitutus, sed soreidiis instructus, cinereascens vel ochraceus, P—.  
 40. *L. soredizodes* (NYL.) VAIN., p. 62
- 3\*\*. Thallus cephalodiis soreidiisque destitutus.
4. Thallus ferrugineo-rufus, P—.  
 5. Thallus parvus, tenuis, semper fertilis, apothecia minuta, 0.4—0.7 mm lata, thallo innata, concava.  
 41. *L. Dicksonii* ACH., p. 62
- 5\*. Thallus maximus, crassus, apothecia rara, majora, 1—2 mm lata, adnata, planiuscula, subpruinosa.  
 39. *L. flavocaerulescens* (HORNEB.) ACH., p. 62
- 4\*. Thallus non ferrugineo-rufus.  
 5. Hypothecium obscurum.  
 6. Thallus obscurus, fuscescens, bene areolatus.  
 [77. *L. fuscoatra* (L.) ACH., p. 80]
- 6\*. Thallus albidus vel cinereus.  
 7. Apothecia minuta, diam. 0.2—0.3, interdum usque ad 0.5 mm.  
 8. Hymenium superne caerulescens vel smaragdulum.  
 9. Asci clavati, sporae 11—13 × 4—5  $\mu$ .  
 28. *L. vorticosa* (FLK.) KBR., p. 56<sup>1)</sup>
- 9\*. Asci subcylindrici, sporae 6—8 × 5—6  $\mu$ , vel subglobosae, diam. 6—7  $\mu$ .  
 29. *L. ultima* TH. FR., p. 57<sup>2)</sup>
- 8\*. Hymenium superne fuscum.  
 70. *L. impavida* TH. FR., p. 78
- 7\*. Apothecia majora, 0.5—3.0 mm, thallus P—.  
 8. Hymenium angustum, 40—60  $\mu$ , sporae parvae, excipulum violaceum (KOH).  
 9. Sporae (raro evolutae) subcylindricae vel elongato-oblongae, 6—11 × 2.5—3.5  $\mu$ .  
 31. *L. auriculata* TH. FR., p. 58

<sup>1)</sup> In Koerber Lich. sel. germ. No. 598 I found a yellowish-orange colour with paraphenylendiamin, in the Arctic plants no such colour was seen, but their thallus is, perhaps, too thin for an unobjectionable observation.

<sup>2)</sup> Non vidimus.

- 9\*. Sporae subglobosae, diam. 4—5  $\mu$ , vel breviter ellipsoideae, 6—7  $\times$  4—5  $\mu$ .  
33. *L. brachyspora* TH. FR., p. 60
- 8\*. Hymenium altum, circ. 100  $\mu$ , sporae magnaе, (15—) 25—35  $\times$  8—22  $\mu$ , excipulum nigricans.  
9. Thallus persicino-albidus, apothecia innata, sporae maximae, 26—38  $\times$  15—22  $\mu$ . . . . . 36. *L. consentiens* NYL., p. 60
- 9\*. Thallus albidus vel albido-cinereus, apothecia non immersa, sporae majusculae, 15—30  $\times$  8—11  $\mu$ .  
38. *L. macrocarpa* (D. C.) TH. FR., p. 61
- 5\*. Hypothecium incoloratum vel pallidum.  
6. Apothecia parva, 0.4—0.5 mm, thallus P—.  
7. Thallus fere acrustaceus.  
27. *L. conferenda* NYL., p. 55
- 7\*. Thallus bene evolutus, areolatus.  
8. Thallus albidus, sporae ellipsoideae, parvulae, 8—10  $\times$  4—5 (—5.5)  $\mu$ .  
57. *L. asukensis* LYNGE, p. 69
- 8\*. Thallus alutaceus, sporae late ovaes vel subglobosae, majores, 12—14  $\times$  8—10  $\mu$ .  
62. *L. convallium* LYNGE, p. 74
- 6\*. Apothecia majora.  
7. Paraphyses (in aqua) facillime liberae, thallus P—.  
8. Thallus evanescens.  
21. *L. pungens* (KBR.) NYL., p. 51
- 8\*. Thallus melius evolutus, granulatus.  
22. *L. goniophila* FLK., p. 52
- 7\*. Paraphyses (in aqua) non facillime liberae.  
8. Sporae plus minusve fabaceae, thallus P intense rubescens. 63. *L. cyathoides* ACH., p. 75
- 8\*. Sporae ellipsoideae, mediocres, 7—8 ad 13—15  $\mu$  longae.  
9. Hymenium superne fuscum.  
10. Thallus cinereus vel albidus, tenuis, rimosus P—, areolis parvis, 0.2—0.4 mm, apothecia mediocria, 0.7—1.3 mm sicca atra, madefacta atrofusa.  
30. *L. lithophila* (ACH.) TH. FR., p. 57

10\*. Thallus cervinus v. fuscus, crassiusculus, verrucoso-areolatus, areolae 0.5—1.0 mm latae, apothecia fuscoatra, majuscula, 1—2 mm, medulla P rubescens.

69. *L. aenea* DUF., p. 78

10\*\*. Thallus obscure cinereus, (in arcticis) tenuis, areolae granulatae, subeffiguratae, parvae, 0.2—0.3 mm, apothecia majora, ad 1 mm, sicca atra, humida obscure atropurpurea, thallus P—.

64. *L. leucophaea* (FLK.) NYL. var. *obscurescens* VAIN., p. 76

9\*. Hymenium superne aeruginosum vel olivaceo-nigricans.

10. Sporae anguste oblongae, 7—10 × 2.5—4  $\mu$ , thallus P—.

11. Thallus evanescens, paraphyses apice non incrassatae.

32. *L. subauriculata* LYNGE, p. 59

11\*. Thallus bene evolutus, ochroleucus, paraphyses apice incrassatae, in KOH usque ad 4—5  $\mu$ .

60. *L. Theodori* LYNGE, p. 72

10\*. Sporae ellipsoideae vel late ellipsoideae usque ad subglobosae.

11. Paraphyses apice valde incrassatae (in KOH 4  $\mu$  superantes), thallus areolatus.

12. Thallus cretaceo-albidus, hypothallo atro anguste limitatus, sporae 12—14 (—17) × 5—6  $\mu$ , pycnoconidia 8—10  $\mu$ , medulla P flavo-aurantiaca. 54. *L. perlata* MAGN., p. 69

12\*. Thallus obscure cinereus, areolae granulatae, saepe effiguratae supra hypothallum conspicuum atrum approximatae vel dispersae, pycnoconidia elongata, arcuata, 16—20  $\mu$ , thallus P—.

13. Excipulum pallidum vel in parte exteriori infuscatum.  
64. *L. leucophaea* (FLK.) NYL. var. *obscurescens* VAIN., p. 76
- 13\*. Excipulum atro-purpureum.  
66. *L. obnubila* TH. FR. et HELLB., p. 76
- 12\*\*. Thallus ochroleucus v. flavescenti-ochroleucus, P pulchre flavescens, saltum medulla.  
13. Areolae concavae vel subplanae, hypothallo atro distincto impositae, sporae  $10-11 \times 6-7 \mu$  (sec. VAIN. Lich. Fenn. IV, 284:  $7-12 \times 4-6 \mu$ ).  
56. *L. arctogena* TH. FR., p. 69
- 13\*. Areolae convexae, hypothallus (vulgo) minus distinctus, sporae late ellipsoideae, (8—)  $10-14 \times 5-8 \mu$ .  
53. *L. aglaea* SOMRFT., p. 69
- 11\*. Paraphysum apices leviter solum incrassatae (KOH  $1.7 \mu$ ), thallus areolatus.  
12. Sporae subglobosae,  $6.5-8 \times 5-6 \mu$ , thallus argillaceus.  
59. *L. scrobiculatus* TH. FR., p. 72
- 12\*. Sporae ellipsoideae,  $8-12 \times 5-5.5 \mu$ , thallus pallide sulphureus.  
61. *L. atromarginata* MAGN., p. 73
- 12\*\*. Sporae ellipsoideae,  $9-12 \times 5-6 \mu$ , thallus albidus.  
34. *L. despecta* TH. FR., p. 60<sup>1)</sup>
- 11\*\*. Paraphyses apice haud incrassatae, thallus albidus vel albidosulphureus, rimosus, sed haud

<sup>1)</sup> Not seen.

areolatus, P plus minusve intense flavescens.

58. *L. elata* SCHAER., p. 70<sup>1)</sup>

*Supra terram, muscos vel plantas emortuas.*

1. Thallus squamosus vel squamuloso-crustaceus, species Groenlandiae P—. . . . . (Subgen. *Psora* (HALL.) MASS.
2. Squamae majores, (in arcticis) 1—4 (—5) mm latae.
  3. Squamae albidae vel glaucescentes (in herbariis interdum in aetate leviter in fusco-rubescens vergentes, sed semper albido-marginatae). . . . . 72. *L. rubiformis* WBG., p. 79
  - 3\*. Squamae (normaliter) rubescentes.
    74. *L. decipiens* (EHRH.) ACH., p. 80
  - 3\*\*. Squamae fuscescentes vel castaneae.
    4. Squamae contiguae, arcte adnatae.
      71. *L. demissa* (RUTSTR.) ACH., p. 78
    - 4\*. Squamae imbricatae, marginibus plus minusve liberae vel etiam adscendentes.
      5. Squamae castaneae, nitidae, apothecia globosa.
        73. *L. globifera* ACH., p. 79
      - 5\*. Squamae fuscescentes, opacae, apothecia planiuscula. . . . . [79. *L. lurida* (Sw.) ACH., p. 81]
  - 2\*. Squamulae minores, subgranulatae.
    3. *L. rufofusca* (ANZI) NYL., p. 42
- 1\*. Thallus crustaceus, uniformis.
  2. Sporae 10—12:nae, anguste ellipsoideae, thallus P—.
    6. *L. epiphaea* NYL., p. 44
  - 2\*. Sporae 8:nae.
    3. Paraphyses facillime discretiae, thallus P—.
      4. Sporae ellipsoideae.
        5. Paraphyses valde incrassatae, fuscocapitatae.
          4. *L. fuscocapitata* LYNGE, p. 43
        - 5\*. Paraphyses apice leviter vel haud incrassatae.
          24. *L. Wulfenii* (HEPP) ARN., p. 52
      - 4\*. Sporae globosae. . . . . 25. *L. Magnussonii* LYNGE, p. 53
    - 3\*. Paraphyses plus minusve concretae.
      4. Species parasitica (in *Diapensia lapponica*).
        15. *L. Diapensiae* TH. FR., p. 49
      - 4\*. Species autonomae.
        5. Hymenium granulis caeruleis instructum vel striis

<sup>1)</sup> A plant from Switzerland, leg. Frey: intensely yellow; Arctic plants, determinations submitted to Magnusson: hardly any reactions, suggesting a subdivision of this polymorphous species.

- irregularibus caeruleis variegatum, apothecia diu plana, hymenium angustum, 40—70  $\mu$ , thallus P—.
6. Thallus tenuis, albido-cinereus, hypothecium obscurum, hymenium granulis caeruleis instructum. . . . . [76. *L. fusca* (SCHAER.) TH. FR., p. 80]
- 6\*. Thallus albidus et passim subcaesio-variegatus, hypothecium (ab hymenio indistincte limitatum!) pallidum vel dilute fuscescenti-rubricosum, hymenium striis irregularibus caeruleis variegatum.
7. Thallus crassus, verrucosus, e verrucis toruloso-ramulosis contextus. 19. *L. ramulosa* TH. FR., p. 50
- 7\*. Thallus tenuis, minutissime granulatus vel arachnoideus. . . . . 18. *L. ementiens* NYL., p. 49
- 5\*. Hymenium granulis vel striis caeruleis destitutum.
6. Episporium crassum, sporae magnae, 16—24  $\times$  10—16  $\mu$ , thallus P—. 8. *L. Tornoënsis* NYL., p. 45
- 6\*. Episporium tenue.
7. Hypothecium obscurum, thallus P—.
8. Thallus albidus vel pallidus, crassus, apothecia adnata.
9. Granulae thalli parvae, apothecia (hymenium  $\pm$  in atrofuscescentem vergentia) satis dispersa, demum convexa, epithecium fuscum, paraphysum apices capitatae (KOH addito).
14. *L. Berengeriana* (MASS.) TH. FR., p. 48
- 9\*. Granulae thalli majores, circ. 0.5 mm, subeffiguratae, apothecia conglomerata, mox convexa, atra, nitida, epithecium aeruginoso-fuligineum, paraphysum apices haud incrassatae.
20. *L. assimilata* NYL., p. 50
- 8\*. Thallus olivaceo-fuscescens vel fuscescens, modice incrassatus, granulatus vel verruculosus, apothecia adpressa, hypothecium KOH —, sporae 8—17  $\times$  4—8  $\mu$ .
- [84. *L. uliginosa* (SCHRAD.) ACH., p. 82]
- 8\*\*. Thallus tenuissimus, verniceus, apothecia p. p. stipitata, hypothecium KOH violascens, sporae 12—18  $\times$  4—5  $\mu$ .
17. *L. crassipes* (Th. Fr.) NYL., p. 49
- 7\*. Hypothecium incoloratum vel pallidum.

8. Apothecia pallida, testacea vel rufescentia vel cinnamomea.
9. Thallus crassus, e verruculis subcontiguus contextus, P rubescens.  
2. *L. cuprea* SOMRFT., p. 42
- 9\*. Thallus tenuis, minute granulosus vel subeffusus, P—.  
1. *L. vernalis* (L.) ACH., p. 42
- 8\*. Apothecia obscura, atra vel atrofusca.
9. Epithecium aeruginosum vel smaragdulum.
10. Sporae anguste oblongae, 15—25 × 3—4  $\mu$ , thallus crassus, albidus vel cinerascens, apothecia mox convexa, thallus P rubescens.  
9. *L. alpestris* SOMRFT., p. 45
- 10\*. Sporae latiores, (4—) 6—9  $\mu$  crassae, thallus P—.
11. Thallus tenuis-tenuissimus vel arachnoideus.
12. Sporae parvulae, 8—15 (—18) × 4—5 (—6)  $\mu$ , apothecia subglobosa, paraphyses apice haud incrassatae.  
10. *L. limosa* ACH., p. 46
- 12\*. Sporae majores, (18—) 21—28 × 6—8  $\mu$ , apothecia diu plana, deinde depresso convexa, paraphyses bene incrassatae, apice 5—6  $\mu$ .  
11. *L. membranacea* LYNGE, p. 47
- 11\*. Thallus crassus, granulis globosis vel papillatis formatus.
12. Granulae albido-cinerascentes, minutae, 0.1—0.2 mm latae, sporae 13—18 × 6—7  $\mu$ .  
13. *L. caesioatra* SCHAER., p. 48
- 12\*. Granulae albido-flavescentes, majores, 0.25 mm latae, sporae 16—22 × 6—9  $\mu$ .  
12. *L. pallida* TH. FR., p. 47
- 9\*. Epithecium fuscum vel rubricosum-fusce-

scens (paraphyses fusco-capitatae) vel olivaceum, thallus P—.

10. Thallus  $\text{CaCl}_2\text{O}_2$  rubescens, apothecia diu plana, olivacea.

16. *L. granulosa* (EHRH.) SCHAEER., p. 49

10\*. Thallus  $\text{CaCl}_2\text{O}_2$  non rubescens.

11. Sporae parvulae,  $9-10 \times 4-5 \mu$ .

7. *L. tecta* LYNGE, p. 45

11\*. Sporae majores,  $13-21 \times 6-$

$9 \mu$ . 3. *L. rufofusca* (ANZI) NYL., p. 42

*Species ad ligna vel ad ossa.*

1. Paraphyses facillime liberae, saltem plantae ossicolae P flavescentes. . . . . 23. *L. glomerulosa* (DC.) STEUD., p. 52

1\*. Paraphyses haud facillime liberae.

2. Sporae magnae,  $16-24 \times 10-16 \mu$ , episporium incrassatum.

8. *L. Tornoënsis* NYL., p. 45

2\*. Sporae minores.

3. Sporae pachydermaticae, subglobosae, diam  $10-12 \mu$ .

26. *L. pachydermatica* LYNGE, p. 54

3\*. Sporae leptodermaticae.

4. Sporae late ellipsoideae usque ad subglobosae vel globosae.

5. Thallus granuloso-leprosus, P—, paraphyses arcte cohaerentes, capitatae (KOH), sporae globosae, diam.

$4-6 \mu$ . . . . . 67. *L. Nylanderi* (ANZI) TH. FR., p. 77

5\*. Thallus verrucosus, non leprosus, P rubescens, paraphyses laxius cohaerentes, clavatae, sporae late ellipsoideae usque ad subglobosae,  $6-10 \times 4-7 \mu$ .

68. *L. fuscescens* SOMRFT., p. 78

4\*. Sporae majores, anguste ellipsoideae,  $15-17 \times 4-5 \mu$ , thallus P—. . . . . 5. *L. erythrophaea* FLK., p. 44

*Lecidea (Biatora) castanea* HEPP is here referred to the genus *Lecanora* which see.

*Lecidea cinnabarina* SOMRFT. Fine specimens were collected by J. VAHL on *Betula* at Tunugdliarfik in the Julianehaab district. I would refer this species to the genus *Protoblastenia*. It was not found in the present collections.

*Lecidea vitellinaria* NYL. was collected at "Wajgattet" in West Greenland by J. VAHL. It is a fungus, *Nesolechia vitellinaria* (NYL.) REHM, parasitic on *Candelariella vitellina*, cfr. KEISLER Flechtenparasiten, in RABENHORST Kryptogamenflora, 1930, p. 132.

The reaction with paraphenyldiamin has been tested for all the Greenland species of *Lecidea* that were accessible to me, and for a few other Arctic *Lecideae*. The greater part of them, by far, were "P—", but the result was more promising than for some other great genera of Crustaceous lichens.

*Lecidea* ("—" indicat immutata)

<i>aenea</i> , medulla rubescens	flavescens, plantae arcticae im-
<i>aglaea</i> , medulla flavescens	mutatae videntur)
<i>albocaerulescens</i> , e flavo aurantiaco-	<i>ementiens</i> , —
rubescens	<i>epiphaea</i> , —
<i>albosuffusa</i> , —	<i>erythrophaea</i> , —
<i>alpestris</i> , rubescens	<i>flavocaerulescens</i> , —
<i>arctogena</i> , pulchre flavescens.	<i>fusca</i> , — (plantae mu-
<i>armeniaca</i> , cortex subimmutatus,	scicolae)
medulla flavescens.	<i>fuscescens</i> , rubescens
<i>assimilata</i> , —	<i>fuscoatra</i> , —
<i>asukensis</i> , —	<i>fuscocapitata</i> , dilutissime flavescens,
<i>atrobrunnea</i> , —	vel potius immutata
<i>atromarginata</i> , levissime vel haud	<i>globifera</i> , —
lutescens	<i>glomerulosa</i> , plantae ossicolae rube-
<i>auriculata</i> , —	scentes
<i>Berengeriana</i> , —	<i>goniophila</i> , —
<i>brachyspora</i> , — (MALME Lich.	<i>granulosa</i> , —
Suec. 598)	<i>impavida</i> , —
<i>caesioatra</i> , — vel dilutis-	<i>lapicida</i> , —
sime flav.	<i>leucophaea</i> , et var. <i>obscurescens</i> , —
<i>conferenda</i> , — (thallus too	<i>Lidii</i> , —
thin for observation)	<i>limosa</i> , —
<i>confluens</i> —	<i>lithophila</i> , —
<i>consentiens</i> , —	<i>lulensis</i> , —
<i>convallium</i> , —	<i>lurida</i> , —
<i>crassipes</i> , —	<i>macrocarpa</i> , —
<i>crustulata</i> , —	<i>magna</i> , —
<i>cuprea</i> , rubescens	<i>Magnussonii</i> , —
<i>cyanescens</i> , flavescens	<i>melancheima</i> , —
<i>cyathoides</i> , rubescens.	<i>membranacea</i> , —
<i>decipiens</i> , —	<i>mollis</i> , —
<i>demissa</i> , —	<i>Nylanderii</i> , —
<i>Diapensiae</i> , no proper thallus	<i>obnubila</i> — (medulla
<i>Dicksonii</i> , —	dilut. flav.?)
<i>elata</i> , plus minusve intense flave-	<i>occidentalis</i> , —
scens (planta helvetica intense	<i>pachydermatica</i> , ?

<i>pallida</i> ,	—	<i>sorediza</i> ,	—
<i>panaeola</i> ,	—	<i>soredizodes</i> ,	—
<i>pantherina</i> ,	flavescens	<i>speirea</i> ,	—
<i>paupercula</i> ,	—	<i>subauriculata</i> ,	—
<i>pelobotrya</i> ,	—	<i>subrhagadiella</i> ,	—
<i>perlata</i> ,	cortex —, medulla flavoaurantiaca vel aurant.-rubescentes.	<i>tecta</i> ,	—
<i>plana</i> ,	—	<i>tesselata</i> ,	—
<i>pungens</i> ,	athallina	<i>Theodori</i> ,	—
<i>ramulosa</i> ,	—	<i>Tornoënsis</i> ,	—
<i>rubiformis</i> ,	— (vel dilutissime flavescens?)	<i>uliginosa</i> ,	—
<i>rufofusca</i> ,	—	<i>vernalis</i> ,	—
<i>silacea</i> ,	—	<i>vorticosa</i> ,	flavorbescens (Kbr.Lich. sel. Germ. 168, plantae arcticae subathallinae).
<i>sorediata</i> ,	—	<i>Wulfenii</i> ,	—

#### Sect. *Lecideae Vernales*.

##### 1. *Lecidea vernalis* (L.) ACH.

Disko: Godhavn and Blæsedalen (TH. FR.), Skarvefjæld (GRØNTVED), Mellemfjorden, Kuánerssuit and Uivfaq (Blaafjeld) (TH. FR.).

Evidently quite as common in Disko as in other Arctic regions. There is also a considerable number of plants in the Copenhagen herb., as far north as Upernavik (RYDER), there is every reason to suppose that it should be common all over West Greenland.

##### 2. *Lecidea cuprea* SOMRFT.

Godthaab: Kook Islands or Kitsigsut. — Disko: Lyngmarken and Blæsedalen.

There was a lot of plants from Blæsedalen, otherwise it was scarce in the collection. — Old apothecia are almost black.

*Lecidea cuprea* is not supposed to be of the common species in Greenland. Some plants, referred to this species in the herb., are *L. vernalis* rather than *L. cuprea*. In the Copenh. herb. I found the following plants of *L. cuprea*: Godthaab: Ameralik (VAHL, Aug. 1830), Julianehaab: Tasermiut (VAHL, Aug. 1829), East Greenland: Aluk near Prins Christian Sound, a little north of 60° n. (VAHL, July 1829) and — not located — Nûk (EBERLIN).

Stained red with paraphenylendiamin. No such staining could be obtained with *L. vernalis*.

#### Sect. *Lecideae Erythrophaeae*.

##### 3. *Lecidea rufofusca* (ANZI) NYL.

VAIN. Lich. Fenn., IV, p. 57, ubi syn. — A good plant is found in

MALME Lich. Suec. No. 361, cfr. MALME in Svensk Bot. Tidskr., VII, 1913, p. 376.

Disko: Godhavn, extremely scarce, only two small plants, growing on decayed *Saxifraga oppositifolia* and between *Polytrichum* sp.

Thallus satis crassus, verruculosus.

Apothecia numerosa, diam. usque ad 1—1.2 mm, discus ab initio planus, obscure fuscescens, persistenter epruinosis, margine pallidiori circumdatus, deinde magis convexus, margine plus minusve evanescenti. Hypothecium incoloratum, hymenium superne fuscescens, strato incolorato tectum, paraphyses cohaerentes, superne leviter (capitato-)incrassatae, 2—3  $\mu$  crassae, sporae simplices, majusculae, 15—21  $\times$  9  $\mu$ .

Hymenium J e caeruleo vinosum.

The apothecia quite resemble those of *Rinodina mniaraea*, on account of the dark brown, convex disk and the distinct margin in the young apothecia, the verrucose thallus is not unlike *Lecidea caesioatra* SCHAER., syn. *L. arctica* SOMRFT.

*Lecidea rufofusca* is an addition to the lichen flora of Greenland, but TH. FRIES was not the first to find it. In the Copenh. herb. I detected a plant from Ameralik in the Godthaab district, collected by the eminent observer J. VAHL in Aug. 1830, and determined as *Lecidea cuprea* var. *Berengeriana* by DEICHMANN BRANTH.

In Denmark Island (Danmarks ø), Scoresby Sound, HARTZ collected a very remarkable *Lecidea*, named *L. limosa* by DEICHMANN BRANTH. Its numerous apothecia are quite plane, epruinose, its hypothecium uncoloured, its epithecium is dark brownish, its paraphyses not quite coherent and very incrassated towards the tips (they resemble some species of *Catillaria*), its spores were but poorly developed, ellipsoidal, small, 10  $\times$  5  $\mu$ . The hymenium does not stain blue with J, but impurely reddish, the hypothecium more bluish. After this *Lecidea limosa* is quite out of the question, I regard it a "*Biatora*" near to *L. rufofusca*. It differs from that species in its thallus which has rather large, radially cracked squamules, rather than small granules. In the type plant of *Lecidea rufofusca* (ANZI Lich. Lang. No. 178) I measured spores 14—15  $\times$  6—8  $\mu$ . — HARTZ's plant differs from *Lecidea fuscocapitata* LYNGE in its epruinose apothecia which almost cover the thallus. One gets the impression that we have here representatives of a critical section, comprising several Greenland (American?) species.

#### 4. *Lecidea fuscocapitata* LYNGE n. sp.

Nûgssuaq Peninsula: Atanikerdluk, on clayey soil.

Thallus crassus, mollis, irregulariter areolato-verrucosus, areolis 0.3—0.6 mm latis, thallus superne valde inaequalis, pallide albidoflavescens.

Apothecia supra thallum bene elevata, dispersa vel hinc inde magis approximata, rotundata, diam. circ. 0.4 mm, planiuscula, discus etiam cum margine integri persistenti albido-pruinosis. Excipulum incoloratum, plectenchymaticum, hypothecium incoloratum. Hymenium 60—65  $\mu$  altum, superne violaceo-fuscum, paraphyses facillime discretæ, indivisæ, validæ, circ. 2  $\mu$ , superne valde incrassatæ, 6—7.5  $\mu$ , sensim clavatæ vel sæpe capitatæ, apicibus fusco-violascentibus. Asci angusti, subcylindrici, 10  $\mu$  crassi, membrana superne valde incrassata. Sporae male evolutæ, paucas vidimus, ellipsoideæ vel oblongæ, 10—13  $\times$  4.5—5  $\mu$ .

Hymenium J e caeruleo mox vinosum, KOH partes coloratæ hymenii magis violascentes.

*Lecidea fuscocapitata* is a very distinct species, characterised especially by its very remarkable paraphyses, from which its name has been derived. If studied under a binocular lens of high power ( $\times 32$ ), deep cracks are seen between the irregular, soft areolæ which are elevated above the substratum, the more so if the underlying clay has been removed in the course of time.

It is difficult to find its affinity. It might be compared with *L. rufofusca*, from which it is sufficiently distinct by its plane pruinose apothecia, and its thick, discrete paraphyses. The species might, perhaps, quite as well have been referred to a proper, new section. It is recommended to the attention of American lichenologists.

##### 5. *Lecidea erythrophaea* FLK.

At Nanortalik in the Julianehaab district EBERLIN collected a *Lecidea*, which was referred to this species. It was detected on an old twig. It has a brown epithecium, and narrow, rather large spores, 15—17.5  $\times$  4—5  $\mu$ , as in *Lecidea erythrophaea*. But it differs in its more convex, pale brown, slightly pruinose apothecia, moistened almost transparent, an intensely granulose epithecium, and its narrow paraphyses, hardly incrassated at their tips.

Its spores are too large for *Lecidea turgidula*, *L. Cadubriæ*, and *L. atroviridis*, and too narrow for *L. porphyrosпода*. It is nearer related to *Lecidea erythrophaea* than to any other Scandinavian *Lecidea*, but it is, perhaps, a nearly related American species, differing in the characters above mentioned.

It is an interesting plant, the only find of this species in Greenland. On the same twig was found *Lecidea Tornoënsis* which is fairly common in West Greenland.

##### 6. *Lecidea epiphaea* NYL.

This species was not found in the present collections, but there is a correctly determined plant in the Copenh. herb., collected by HARTZ

in Danmark Island, Scoresby Sound: Apothecia subglobosa, fusca, sporae 12—14: nae, 10—12  $\mu$  longae.

7. *Lecidea tecta* LYNGE n. sp. (Plate III, fig. 1).

Disko: Lyngmarken, on the soil.

Thallus tenuis, verrucosus, verrucae minute granulosae, diam. 0.2—0.35 mm, interdum subfarinosae, pallide cinerascens.

Apothecia numerosissima, thallum subtegentia. Apothecia haud composita, adpressa vel in aetate basi constricta usque substipitata, ob substratum abductum, magnitudine mediocri, 0.5—0.8 (—1.0) mm, diu plana, deinde depresso globosa, discus atrofuscus, epruinosis, minute scabriusculus, margine persistenti, integri, leviter dilutius colorato cinctus. Excipulum omnino incoloratum, etiam cum hypothecio. Hymenium angustum, 50—55  $\mu$ , superne obscure fuscum. Paraphyses conglutinatae, fusco-capitatae, satis validae, apice (in KOH) 5  $\mu$ . Asci anguste clavati, membrane superne mediocriter incrassata. Sporae octonae, suboblongae, 9—10  $\times$  4—4.5 (—5)  $\mu$ .

Hymenium J intense atro-caerulescens, praecipue asci, excipulum KOH intense sanguineum, crystallae fasciculatae praecipituntur. Medulla J haud caerulea, cortex thallinus KOH sanguineus.

Evidently a very good new species, sufficiently distinct by its grey, verrucose thallus, numerous apothecia, covering the thallus (whence its name), and especially by its reaction with KOH.

I have referred it to the *Erythrophaea* section. *Lecidea epiphaea* has 12—16 spores in each ascus, other species of the section, such as *L. humida* and *L. rufofusca* have considerably larger spores. *Lecidea septentrionalis* and *L. turficola* have a distinctly brown thallus. TH. FRIES expressly states that the apothecia are not stained by KOH in these species (Lich. Scand.)

Sect. **Lecideae Tornoënsis.**

8. *Lecidea Tornoënsis* NYL.

Godthaab or Nuk (Th. FR.). — Disko: Skarvefjæld (GRØNTVED) and Nordfjorden (Th. FR.).

In the present collections the species was very scarce. In the Copenh. herb. there is a considerable number of plants, in all 14 localities. Unfortunately I have not revised this material. DEICHMANN BRANTH evidently did not examine all of them microscopically, but even if some localities must be dropped, the material suggests a fairly common and well distributed species.

Sect. **Lecideae Alpestris.**

9. *Lecidea alpestris* SOMMERF.

Disko: Godhavn and Blæsedalen.

In Blæsedalen TH. FRIES collected a great number of plants, the material calls to mind his remark in Lich. Scand. p. 537: "latas plagas saepe tegens".

The habitus agrees well with our Scandinavian plants. The hypothecium is uncoloured, the hymenium more or less intensely bluish, dark blue at its upper part, the paraphyses very coherent. The spores were but sparingly developed, as is often the case with this species, I only detected a few ones — or none — in each section. They were shorter than we generally find them in Scandinavian plants,  $14-19 \times 2.5-3 \mu$ , in MALME Lich. Suec. I measured  $18.5-24 \times 3-3.5 \mu$ .

The difference between *Lecidea alpestris* and *L. stenotera* seems to be of very little importance. According to VAINIO Lich. Fenn. IV, p. 376—8 the hypothecium of the latter species is "partim dilute intenseve subrubricosum subfuscensve partim subalbidum pallidumve", in *L. alpestris* it is simply "decoloratum". I found no reddish hypothecium in the Greenland plants, and not in MALME Lich. Suec. No. 491, referred to *L. stenotera* by VAIN., l. c.

*Lecidea alpestris* was lacking in my Novaya Zemlya collection. It is evidently rare in Greenland. I have revised the Copenh. material and found it at the following localities: "Groenlandia" (herb. Liebm., also herb. Bock), Julianehaab: Nassaq (label: Narksuk), and in Nanûseq or "Nenese" South Greenland, leg. VAHL Sept. and May 1829; East Greenland: Scoresby Sound: Hekla Harbour and Danmark Island (HARTZ). — Several plants which DEICHMANN BRANTH had named *Lecidea alpestris*, were found to belong to other species, such as *L. assimilata* and *L. pallida*.

10. *Lecidea*, cfr. *limosa* ACH.

Disko: Nipisat, very scarce.

A single, poorly developed plant, too poor to allow of an unobjectionable determination. No thallus was visible, the apothecia were found between blue-green Algae (*Gloeocapsa*).

Apothecia convex, subnitidous. Hyphae of excipulum radiating at the exterior part and aeruginose, inner part of excipulum, hypothecium and lower part of hymenium almost concolorous, pale brownish, upper part of hymenium aeruginose. Many radiating dark stripes in the hymenium. Spores poorly developed,  $8-10 \mu$ .

The inner parts of the apothecia call to mind *Lecidea ementiens*, but the apothecia were convex from the beginning.

It was unexpected to find so little of this species in the present collections, for in the Copenh. herb. I detected the following plants, many of them typical ones, scattered under several names (det. DEICHMANN BRANTH): Upernavik (KOLD. ROSENV. 1886, Ryder Exped. 1887), Disko: Mudderbugten (PORSILD 1898), East Greenland: Qeqertatsiaq,

just north of 60° n. (EBERLIN 4.6.85), Cape Dalton and Cape Stewart (HARTZ).

11. *Lecidea membranacea* LYNGE n. sp. (Plate II, fig. 4).

Disko: Uivfaq, on dead mosses, very scarce.

Thallus tenuis vel tenuissimus, subgranulosus, granulis 0.13—0.15mm latis, vel subverniceus, cinereo-albidus vel cinerascens, interdum subamorphus, muscos arcte tegens et eam ob causam sine forma propria distincta.

Apothecia optime evoluta, numerosa, hinc inde confluentia et etiam concrenentia, basi plus minusve constricta, mediocria, diam. 0.3—0.5 mm, apothecia dispersa majora, usque ad 1.0 mm. Discus ater, epruinosis, subnitidus, scabrosus, diu planus, deinde depresso convexus, margine haud elevato, tenui, subnitido, indistincto et saepe evanescenti circumdatus. Excipulum in parte exteriori epithecio subconcolor, hyphis radiantibus formatum, praeterea incoloratum, etiam cum hypothecio. Hymenium 70—75 (—80)  $\mu$  altum, superne aeruginosum vel subsmaragdulum. Asci lati saccati, usque ad 35  $\mu$  crassi, octospori. Paraphyses cohaerentes, superne leviter incrassatae, 2.5—3  $\mu$  crassae. Sporae majusculae, 21—25 (—28)  $\times$  6—8  $\mu$ .

Asci J intense caerulescentes, gelatina minus afficitur.

Its large spores, uncoloured hypothecium and aeruginose hymenium clearly refer this species to the *L. Alpestris* section. The majority of the species in that section have a very characteristic thick, granular to verrucose thallus (*L. pallida*, *caesioatra*, *alpestris*), very different from the thallus of the present species. Its thin, almost verniceous thallus is much more like that of *L. limosa*. But I have always found the spores of that species considerably smaller, in good agreement with TH. FRIES Lich. Scand. p. 538: 9—18  $\times$  4—6  $\mu$ , and VAINIO Lich. Fenn. IV, p. 380: 8—15  $\times$  4—5  $\mu$ , *Lecidea limosa* has very convex, almost semiglobose apothecia, and thin paraphyses, not incrassated at their tips. *Lecidea crassipes* has much the same thallus, a thin film, densely covering the mossy substratum, almost without a proper form. But *L. crassipes* has a very dark hypothecium, a blackish epithecium and smaller spores: 8—14  $\times$  4—5  $\mu$ .

12. *Lecidea pallida* TH. FR.

Disko: Kuánerssuit and "the Eskimo camp". It was scarce, found on a friable stone. The habitus agrees well.

Hypothecium incoloratum, hymenium pallide aeruginosum, paraphyses cohaerentes, apice (KOH) incrassatae. Asci J caerulescentes, gelatina sordide rubescens. Sporae parve visae, simplices, 18—20  $\times$  7—7.5  $\mu$ . — Pycnoconidia arcuata, elongata, usque ad 22  $\mu$  longa.

TH. FRIES writes "Spermogonia frustra quaesita" (Lich. Scand. p. 539), neither does VAINIO make any mention of them in Lic. Fenn. IV.

It seems to me that it is impossible to distinguish specifically between *Lecidea pallida* TH. FR. and *L. Dovrensis* NYL. The latter name is the older one, but according to TH. FRIES Lich. Scand. p. 539 the type plant of *L. Dovrensis* should belong to *L. alpestris*. TH. FRIES's statement is difficult to understand, for NYLANDER measured large spores:  $20-25 \times 8-9$ , and VAINIO measured  $16-23 \times 7-10 \mu$ . I have not seen it.

In the Copenh. herb. DEICHMANN BRANTH had referred several plants to *Lecidea pallida*. After a revision the following ones remained: Jakobshavn: Pákitsoq (VAHL aug. 1833), Disko (VAHL, det. NYL.: *Lecidea Dovrensis*), East Greenland: Kangerdluaraq, just north of  $60^{\circ}30'$  (EBERLIN).

13. *Lecidea caesioatra* SCHAER.

VAINIO Lich. Fenn. IV, p. 384, ubi syn. — *Lecidea arctica* SOMRFT. Suppl. Flor. Lapon., 1826, p. 156.

Godthaab: Kook Islands or Kitsigsut. — Disko: Godhavn, Lyngmarken, Malingiaq and Uivfaq or Blaafield.

There were but a few plants. I found: Hypothecium uncoloured, hymenium smaragdine at its upper part, paraphyses coherent, spores  $13-18 \times (5-6-8 \mu)$ , TH. FRIES records exactly the same spore size (Lich. Scand. p. 540). The apothecia are but slightly pruinose, otherwise the habitus agrees well with Norwegian plants. — The red reaction with  $\text{CaCl}_2\text{O}_2$  was very faint, but it is not more intense in MALME Lich. Suec. No. 189.

VAINIO called attention to the identity between SCHAERER's *Lecidea caesioatra* and the well known Scandinavian *L. arctica* SOMRFT. I have not seen SCHAERER's type plant and not his first description in Naturw. Anzeig., II, 1818, p. 10, but to judge from his description in Lich. Helv. Spicil., p. 151, it looks very probable. SOMMERFELT's name dating from 1826, SCHAERER's must take preference.

It is difficult to state its distribution in Greenland, several of the plants, referred to this species in the Copenh. herb. belong to other species.

Sect. **Lecideae Fuscae.**

14. *Lecidea Berengeriana* (MASS.) TH. FR.

Godthaab: Kook Islands or Kitsigsut. — Disko: Lyngmarken, Blæsedalen, Kuánerssuit and Blaafield.

Very scarce from all the localities.

In the Copenh. herb. I have identified it from the following localities: Holsteinsborg: Malingiaq-Kingua in the Ikertôq Fjord (J. A. D. JENSEN),

and two finds from the Julianehaab district: Julianehaab and Tunugdliarfik (VAHL), some other determinations belong to other species.

15. *Lecidea Diapensiae* TH. FR.

Godthaab: Kook Islands or Kitsigsut, very scarce.

Supposed to be a rare species. In the Copenh. herb. there is no plant from West Greenland, it is an addition to the flora of West Greenland. But there are two plants from Scoresby Sound in East Greenland (HARTZ), one of them correctly determined, the other is a fungus which is much more common on *Diapensia lapponica* than the lichen parasite is.

Sect. **Lecideae Granulosae.**

16. *Lecidea granulosa* (EHRH.) SCHAER.

Collected by EBERLIN at Qeqertatsiaq in East Greenland (S.E.Gr.) 12.6.1885, just north of 60° n. It is, to my knowledge, the only find of this species in Greenland, and in the whole Arctic if we can call South East Greenland Arctic. — It was not found in the present collections.

Sect. **Lecideae Crassipedis.**

17. *Lecidea crassipes* (TH. FR.) NYL.

Egedesminde: Sarqardlit in Langesund (GRØNTVED). — Disko: Blaafjeld or Uivfaq (TH. FR.).

*Lecidea crassipes* is an addition to the lichen flora of Greenland.

18. *Lecidea ementiens* NYL.

NYLANDER *Lichenes novi e Freto Behringii*, Flora, 1884, p. 222, Enum. Lich. Fret. Behr., 1888, p. 22 (sep.). MAGNUSSON *New or Interesting Swedish Lich.*, Bot. Not., 1934, p. 465. *Lecidea ramulosa* var. *depressa* TH. FRIES *Lich. Scand.* 1874, p. 521, LYNGE *Lich. Bear Island*, 1926, p. 28, *Lich. Novaya Zemlya*, 1928, p. 86. — *Lecidea subdepressa* VAIN. *Lich. Pitlek.*, 1909, p. 129.

Godthaab: Kook Islands or Kitsigsut. — Disko: Mellemfjorden and — not located — Eqalluit.

The species, included under the name *Lecidea ramulosa*, sensu latiore, have repeatedly been examined. TH. FRIES found a "hypothecium rubricosofuscens", NYLANDER wrote that the apothecia of *Lecidea ementiens* are "intus albida", in *Lecidea subdepressa* VAINIO found a "hypothecium superne sordide pallidum, ceterum albidum", I found a colourless hypothecium.

In these species the hypothecium verum is so little distinct from the hymenium that it is easily included into the hymenium, I have myself made this mistake in my Bear Island paper. The hymenium begins at the base of the asci. If the elements of the hymenium are very conglutin-

ated it is recommended to relax them, e. g. by the application of HCl + alc.

The colours of hymenium and hypothecium are evidently rather variable. MAGNUSSON could not find different characters of specific importance in the internal structure of the apothecia, nor could I. But VAINIO is of opinion that *Lecidea ementiens* should be different from his *Lecidea subdepressa* on account of the uncoloured epithecium of the former species (VAIN., 1909, p. 129, Lich. Fenn., IV, 1934, p. 371). — Very characteristic are the irregular stripes or grains of a bluish or bluish-violet colour in the hymenium.

MAGNUSSON attributed specific importance to the development of the thallus, in *Lecidea ementiens* a "very thin, often arachnoid thallus following the unevenness of the substratum", we can add with TH. FRIES that we often find "granulae minutae" scattered over this thin bluish film. *Lecidea ramulosa*, sensu angustiore has the well known thick verrucose thallus, after TH. FRIES "e verrucis toruloso-ramulosis contextus". — MAGNUSSON is possibly right in attributing specific importance to this difference in the thalline development.

*Lecidea ramulosa* itself, as well as *Lecidea ementiens*, are of the most widespread and common lichens in Novaya Zemlya and in the whole Svalbard region, I also found them to be most abundant in North East Greenland. It is, therefore, astonishing that they should have escaped the attention of botanical collectors in West Greenland almost entirely. DEICHMANN BRANTH and GRÖNLUND do not mention such species in their Grønlands Lichen-Flora. Seidenfaden collected *Lecidea ementiens* at Dark Head south of Upernavik. In the Copenh. herb. I detected plants of *Lecidea ramulosa*, s. lat., collected by VAHL in Disko Island in 1834 and at Lyngmarken near Godhavn, collected by KOLDERUP ROSENVINGE, but unfortunately I made no notice of the thalline development.

19. *Lecidea ramulosa* TH. FR., sensu ang.

Disko: Nordfjorden.

We cannot conclude from this single find that it should be rare in West Greenland.

20. *Lecidea assimilata* NYL.

f. *irrubata* TH. FR.

Godthaab: Kook Islands or Kitsigsut. — Disko: Malingiaq.

f. *infusata* TH. FR.

Disko: Mellemfjorden and — aberrant plants — from Malingiaq.

A lot of plants was found in the Copenh. herb., under several names. West Greenland: Upernavik (VAHL, Aug. 1834), Marraq north of Disko Island (KOLDERUP ROSENVINGE, May 1888), Christianshaab: Sydostbugten (VAHL, Sept., 1835), Frederikshaab: Smallesund (KOLDERUP

ROSENVINGE 1888), Julianehaab: Narssaq at Qaqarssuaq (KOLDERUP ROSENVINGE 1888). East Greenland: Ikerasagssuaq — written Ikarisarsoak — east of Cape Farvel (VAHL, July 1829), Kangerdluluk about 61° n. l., Cape Dalton south of Scoresby Sund (HARTZ), and Danmark Island in Scoresby Sund (HARTZ).

I have referred all these plants to var. *irrubata*. Farthest north, at Cape Benet WULFF collected var. *infuscata*.

#### Sect. *Lecideae Elaeochromae*.

This section is a very natural one, distinguished by its easily separated paraphyses, not incrassated at their tips, and by its broadly elliptical spores. Its pycnoconidia are long, acicular, arcuated, but unfortunately they are but rarely found. TH. FRIES included a lot of units into one, very wide species, *Lecidea elaeochroma* (ACH.) TH. FR. Lich. Scand. p. 542. This is possibly quite as good as a too excessive subdivision into different elementary species. On the other side we cannot overlook that the wide species comprises units with a different chemical reaction, *Lecidea olivacea* (HOFFM.) MASS. with a positive reddish reaction with  $\text{CaCl}_2\text{O}_2$ , the other units with no  $\text{CaCl}_2\text{O}_2$  reaction. Generally lichens are very sensitive to differences of substratum, it is a rare thing to find the same species on rocks, wood and mosses, as we do with the units of *Lecidea elaeochroma*, s. l., and chiefly on that reason I have ventured a subdivision, in agreement with the opinion of scientists who know more of lichens than other botanists do, such as VAINIO and MAGNUSSON. But I am obliged to confess that it is difficult, if possible, to find perspicuous morphological or structural characters which justify a specific distinction. — A revision of the large material in the Copenhagen herb. did not tempt me.

#### 21. *Lecidea pungens* (KOERB.) NYL.

Syn. *Lecidea goniophila* FLK., according to VAINIO Lich. Fenn. IV, p. 258. — In herb. Acharius in Helsingfors VAINIO found a plant from FLOERKE himself (a cotypus) of *Lecidea goniophila* which he identified with *Biatora pungens* KOERB. FLOERKE had a very wide limitation of his species, and undoubtedly he united the athalline *pungens* with other plants which had a better developed, granular thallus. We cannot conclude from this that the single plant in herb. Acharius is the type of his *Lecidea goniophila*. I have at present no access to FLOERKE's herbarium, and not even to his description in Berl. Mag., 1809, p. 311. I am, therefore, inclined to regard *Lecidea goniophila* FLK. s. l. as a species, from which *Lecidea pungens* (KOERB.) NYL. has been detached. I have referred to the latter species plants which had no thallus at all, or nearly so, and with small, plane, margined apothecia.

Disko Island: Ujaragssugssuk and Asuk. — Nûgssuaq Peninsula: Atanikerdluk.

There were but a few plants of *Lecidea pungens* in TH. FRIES'S collection, of course we cannot conclude from this that it should be rare.

22. *Lecidea goniophila* FLK., sensu ang.

Syn. *Lecidea stigmatea* ACH. Lich. Univ., 1810, p. 161 "p. maj. p.", according to VAIN. Lich. Fenn. IV, p. 252. If we prefer to distinguish specifically between the present species and the former one, it might have been quite as well to reserve FLOERKE'S name *goniophila* for the wider species, and reserve the names *pungens* and *stigmatea* for the two narrower species. — I have given preference to FLOERKE'S name on the reason that it is one year older than Acharii name, 1809 against 1810.

Disko Island: Asuk (f. *granulosa*), Kuánerssuit (? , male evoluta). — Narssaq (or Ritenbenk ?, label only a datum, f. *granulosa*). Collected at Sinigfik by GRÖNLUND. — Nûgssuaq Peninsula: Atanikerdluk (with a luxuriant, white, granular thallus, another plant from a calcareous quartzite agreed well with a "*Lecidea stigmatea* var. *diasemoides*" from Vicki in Finland, leg. et det. VAIN. — At Atâta qâqâ GRÖNTVED collected a plant 2000 m above sea-level, a minute thallus with a few white granules, apothecia convex, hypothecium uncoloured, hymenium intensely smaragdine in its upper part (epithecium).

At Holsteinsborg VAHL collected a plant which NYLANDER referred to *Lecidea incongrua*.

23. *Lecidea glomerulosa* (D. C.) STEUD.

Disko: Sinigfik and Qigdlüssat (GRÖNTVED).

The plants which were found on whale bones are exceptionally luxuriant with thick, verrucose greyish-white thallus, spores larger than usually, up to  $22 \times 10 \mu$ , hymenium faintly violet.

24. *Lecidea Wulfenii* (HEPP) ARN.

Syn. *Lecidea elaeochroma* var. *muscorum* TH. FRIES Lich. Scand., 1874, p. 545. — *Lecidea glomerulosa* var. *muscorum* VAIN. Adjum. Lich. Lapp., II, 1883, p. 94. — *Lecidea olivacea* f. *Wulfenii* VAIN. Lich. Fenn., IV, 1934, p. 275.

Disko Island: Godhavn, Blæsedalen (TH. FR.), Sinigfik (GRÖNTVED), Ritenbenk (TH. FR.), Mellemfjorden and Blaa fjeld or Uivfaq (TH. FR.).

A considerable number of plants suggests it to be quite as common in the Disko region as it is elsewhere in the Arctic.

The paraphyses are easily discrete, the hypothecium uncoloured or pale yellowish-brown, the hymenium bluish-black at its upper part, the spores broadly ellipsoidal.

It has much the same right to the rank of a proper species as the

other species of the section. If so it seems to me that the above combination is the correct one. In his Cat. Lich. Zahlbruckner has called it a variety of *Lecidea glomerulosa*, an opinion which is quite as justified as that here accepted. But Zahlbruckner is hardly right in naming it var. *muscorum*, for in his paper Zur Erinnerung an F. X. Freiherrn v. WULFEN 1882, p. 161, ARNOLD made it probable that WULFEN's *Lichen muscorum* should be "*Biatora sanguineoatra* NYL.", and not the present species. The question could be decided if somebody would examine WULFEN's type plant, does it exist?

VAINIO made the following observation: "KOH dilute lutescens, addito  $\text{CaCl}_2\text{O}_2$  fulvescens aut subaurantiacus,  $\text{CaCl}_2\text{O}_2$  solo non reagens" Lich. Fenn. IV, p. 275. But that observation hardly justifies the combination *Lecidea olivacea* f. *Wulfenii*.

Sect. **Lecideae Occidentalium** LYNGE, sect. nov.

Paraphyses facile discretæ, sporæ globosæ. Medulla J —. Species terricolæ, muscicolæ vel corticolæ.

25. *Lecidea Magnussonii* LYNGE n. sp.

Disko: Mellemfjorden, ad terram muscosam.

Thallus crassus, bullato-verrucosus, verrucae 0.5—1.0 mm latae, cinereo-fuscescentes, madefactæ fuscescentes, firmæ, sorediis destitutæ.

Apothecia adpressa, sed thallum superantia, numerosa, saepe congesta, mediocria vel majuscula, diam. 0.5—1.0, interdum usque ad 2.0 mm, discus diu planus, margine integro, crasso circumdatus, deinde leviter convexus, margine subexcluso. Discus ater vel madefactus obscure fuscescens, epruinosis, sub lente scabridus. Excipulum in parte exteriori violaceo-nigrescens vel subcarbonaceum, superne dilutius coloratum, pallide violascens, in hypothecium incoloratum transiens. Hymenium 100—110  $\mu$  altum, inferne dilute caerulescens vel subincoloratum, superne smaragdulo-nigrescens. Paraphyses facile discretæ, indivisæ vel apicem versus interdum furcatae, satis validæ, 2  $\mu$  crassæ, apice haud incrassatæ, distincte septatæ. Asci angusti, cylindrici, 10—12  $\mu$  crassi, membrana apice haud incrassata. Sporæ octonæ, uniseriatæ, leptodermaticæ, globosæ, diam. (6—) 8—10  $\mu$ .

Pycnoconidia recta, cylindrica, 10—15  $\mu$  longa.

Paraphyses et membrana ascorum J pulchre caerulescentes, gelatina deinde sordide decoloratur, hymenium KOH superne pulchre smaragdulum,  $\text{HNO}_3$  magis violascens. Medulla J —, KOH —,  $\text{CaCl}_2\text{O}_2$  —.

I have but rarely found a lichen with so distinct and so characteristic characters. The globose spores, narrow asci and easily discrete paraphyses represent a very rare combination. Its paraphyses might suggest the

*Elaeochroma* section, but the spores and especially the very narrow asci are against it. — Its habitus suggests some species of the *Leucophaea* section, its thick, verrucose thallus really resembles such species as *Lecidea obnubila* or *L. griseoatra*. We have one species in that section with globose spores, viz. *Lecidea Nylanderii*. But all the species of that section have more or less inflated asci and coherent paraphyses. The narrow asci and the discrete paraphyses call to mind the *Lecidea Tenebrosa* section, but all the known species of that section are saxicolous, and they have not globose spores.

This species is, perhaps, a member of an American section of *Lecideae*, hitherto unknown.

*Lecidea insperapilis* NYL. Enumer. Lich. Fret. Behringii, 1888, p. 261 has globose spores, "paraphyses non confertae", asci not described, spores globose. But its thallus is "albidus, tenuissimus, continuus . . . apothecia convexa . . . epithecium rufofuscum".

*Lecidea denotata* NYL. Enum. Lich. Fret. Behringii, 1888, p. 261 has globose spores, smaller than in the present species, diam. 4—5  $\mu$ . But it has a "thallus vix ullus . . . epithecium fuscescens". NYLANDER supposed it to be related to *Lecidea fuscescens*.

*Lecidea delicatula* VAIN. Lich. Pitlek., 1909, p. 125 has apothecia with a remarkably similar structure, apart from its brownish epithecium. But its thallus is "farinoso-granulatus", VAINIO compares it with *Lecidea humosa*, of the *Lecidea Uliginosa* section.

One is easily inclined to believe that *Lecidea Magnussonii* has an exceptionally high hymenium. From the dark part of the excipulum to the upper part of the epithecium I have measured nearly 200  $\mu$ . But a well cleared section shows that the base of the asci lie about 100—110  $\mu$  below the surface. In an uncleared section there is no visible line of distinction between the hymenium and the hypothecium, and none between the latter and the excipulum.

The material was not quite scarce. In some plants I found the above mentioned staining of the epithecium with KOH and HNO<sub>3</sub>, in another just the inverse, "KOH leviter rosaceo-violascens, HNO<sub>3</sub> caerulescens". Otherwise these colours are very constant in this genus. But habitually the plants agreed so well that I could not doubt of their identity.

I have named the species in honour of the eminent Swedish lichenologist Dr. A. H. MAGNUSSON who has worked up the genus *Acarospora* in the present collection, and who has repeatedly placed his vast knowledge at my disposal for the preparation also of this paper, with his wonted generosity.

26. *Lecidea pachydermatica* LYNGE n. sp.

Christianshaab: Sydostbugten, on decaying twigs of *Betula*, leg. N. HARTZ 1890.

Thallus tenuis vel tenuissimus, granulatus, granulis diam. 0.1—0.13 mm, (sub lente,  $\times 32$ ) subcoralloideus, albedo-cinereus.

Apothecia numerosa, minuta, diam. 0.3 mm raro superantia (usque ad 0.4 mm), substipitata, discus ater (etiam madefactus), scabrosus diu planus, margine concolori crasso integro circumdatus, deinde depresso convexus, margine subevanescenti. Hypothecium sat obscure fuscum, excipulum hypothecio subconcolor vel eo obscurius coloratum. Hymenium altissimum, usque ad 100—110  $\mu$ , superne aeruginosum vel aeruginoso-olivaceum. Paraphyses facile liberae, hinc inde ramosae, validiusculae, circiter 2  $\mu$  crassae, apice haud incrassatae. Asci numerosissimi, subcylindrici, usque ad 100  $\mu$  longi, 10—12  $\mu$  crassi, membrana ascorum etiam in apice tenuis. Sporae octonae, uniseriatae, pachydermaticae, subglobosae, diam. 10—12  $\mu$ , vel latissime ovoideae, circ. 10—14  $\times$  9—10  $\mu$ , vel irregulariter subquadrangulae.

Pycnoconidia non visa.

Membrana ascorum J plus minusve intense, persistenter caerulescens, gelatina J subincolorata, hymenium KOH —, nisi epithecium pulchre caerulescens.

The thin arachnoid thallus might, perhaps, suggest a fungus or be due to the disintegration of the substratum. But some granules were examined microscopically and found to consist of a fully normal lichen structure, filled with gonidia.

Its black apothecia would exclude the "*Biatorae*". — Its paraphyses, asci and spores refer *Lecidea pachydermatica* to the present section. It is distinct from *Lecidea Magnussonii* in its thin thallus and thick-walled spores.

It has the same thick-walled spores as *Lecidea Tornoënsis*, but that species is a *Biatora*, its apothecia are "sanguineo-rufa, atro-sanguinea vel nigricantia", its spores are much larger, 16—24  $\times$  10—16  $\mu$ , its paraphyses "concretatae, hyalinae vel sordide fuscidulae, apicem versus intensius coloratae, addito KOH fusco-capitatae sese praebent" (TH. FR. Lich. Scand. p. 464—5). — *Lecidea Nylanderii* has considerably smaller, leptodermatous spores, 4—6  $\mu$  in diam., and coherent, brownish-capitulated paraphyses.

#### Sect. *Lecideae Sylvicolae*.

27. *Lecidea conferenda* NYL.

var. *paraphana* (NYL.) TH. FR.

Godthaab, very scarce, on a granitic rock.

Planta fere crustacea, granulis minutis cinereis circum apothecia solum visis. — Apothecia minuta vel parva, diam. 0.5 mm haud superantia, approximata, discus ater, epruinatus, subopacus, planus,

margine distincto circumdatus, deinde leviter depresso convexus. Excipulum dilute violascens, hymenium circ. 45—50  $\mu$  altum, superne aeruginosum, hypothecium incoloratum, paraphyses cohaerentes, sporae oblongae vel cylindrico-oblongae, rectae vel subrectae, 11—15  $\times$  3—3.5  $\mu$ .

Hymenium J e caeruleo obscure vinosum, KOH immutatum vel leviter decolorascens, excipulum KOH pallidius coloratum.

VAINIO referred NORRL. et NYL. Herb. Lich. Fenn. No. 145 (s. n. *Lecidea sylvicola*) to this species (Lich. Fenn. IV, p. 305). But that cannot be correct, for the said plant has a brown disk, a high hymenium (about 100  $\mu$ ), and large spores (e. g. 20  $\times$  8  $\mu$ ).

f. *submoriformis* LYNGE n. f.

Thallus albidus, granulis vel verruculis parvis, 0.3—0.5 mm latis, crenulatis, plus minusve discretis formatus. — Apothecia moriformiter composita, hymenium angustum, superne obscure smaragdulum, inferne in excipulum fusco-violascentem transiens. Sporae parce visae, 7—10  $\mu$  longae.

TH. FRIES described a f. *moriformis* (Lich. Scand. p. 560). It agrees with the present plant in its moriform apothecia, but it differs in its "crusta tenuissima, dispersa vel fere obsoleta".

At Godthaab TH. FRIES collected a *Lecidea* which habitually resembles *Lecidea vorticosa*, but the structure of its apothecia agrees better with *Lecidea conferenda*. In the Arctic we find that *Lecidea conferenda* is not a little variable, botanists who like to make new species, will here find an excellent material.

28. *Lecidea vorticosa* (FLK.) KBR.

Disko: Mellemfjorden. — Nûgssuaq Peninsula: Atanikerdluk, on a rock, consisting of quartzitic conglutinated grains.

The plant from Atanikerdluk may be thus described: Thallus sub-acrustaceus. — Apothecia numerosa vel numerosissima, parva, diam. 0.5—0.7 mm, nitida, plana et bene marginata, deinde depresso convexiuscula. Excipulum hypothecio concolor, fusco-nigricans, in parte interiori leviter dilutius coloratur. Hymenium superne intense smaragdulo-nigricans, in parte inferiori dilutius coloratum, sed bene aeruginosum. Paraphyses cohaerentes, hinc inde ramosae, apice haud incrassatae. Sporae oblongae vel ellipsoideae, 8—12.5  $\times$  3.5—4 (—5)  $\mu$ .

Hymenium J persistenter caeruleo-nigricans, HNO<sub>3</sub> subimmutatum.

VAINIO described his *Lecidea Ivalensis* (Adjum. Lich. Lapp., II, 1883, p. 65—66, Lich. Fenn. IV, 1934, p. 296), separated from *Lecidea vorticosa* by a colour difference: "hymenium totum smaragdulo-caeruleascens, hypothecium violaceonigricans, excipulum nigricans" in the former species, in the latter species the lower part of the hymenium is uncoloured,

and the excipulum is of the same colour as the hypothecium, "fusconigrum" after TH. FRIES Lich. Scand. p. 515. I am not convinced that these differences justify a specific distinction. In KOERB. Lich. sel. Germ. No. 168 I found a hymenium that was well coloured all over, even if it was darker towards the epithecium.

TH. FRIES referred this species to the *Lecideae Macrocarpae*. It might, perhaps, quite as naturally be placed with the *Micro-Lecideae*, the *Sylvicola* section of TH. FRIES, Lich. Scand. p. 555. — If a *Lecidea vorticosa* with rather small apothecia, perhaps a young plant, is compared with *Lecidea erratica* f. *deplanatula* VAIN., there is a habitual difference in the very nitidous apothecia of the former species. But the structure of the apothecia is almost identical. *Lecidea vorticosa* has slightly larger spores,  $11-13 \times 4-5 \mu$ , against  $6-9 \times 3 \mu$ , but this difference is not great. In one of the Greenland plants I found spores, hardly exceeding  $10 \mu$ . The excipulum is dark all through in *Lecidea vorticosa*, pale at the inner part in *Lecidea erratica*.

At Laksebugten in Disko Island TH. FRIES collected a plant which I have referred to this species, although with much doubt. The internal structure of the apothecia agrees well, but there is a distinct, though thin thallus, minutely rimose, grey, with a slight reddish tinge (due to age?). In the Arctic this species is generally crustaceous. The apothecia are sessile, but not innate. In the related *Lecidea leptocerania* ANZI Lich. Lang. No. 340 the apothecia are more innate in the thin thallus, the disk almost equalling the surface of the thallus.

29. *Lecidea ultima* TH. FR.

Collected by the English Polar Expedition of 1875—76 at Floeberg Beach in Grant Land on the coast of Robeson Channel, and described by TH. FRIES in his paper on the lichens of this expedition, 1879, p. 363.

I found no species in the present collection that could be identified with *Lecidea ultima*.

Sect. **Lecideae Lithophilae.**

30. *Lecidea* cfr. *lithophila* (ACH.) TH. FR.

Disko: Malingiaq, on hard rocks, very scarce.

Thallus tenuis vel tenuissimus, areolis dispersis minutis, rotundatis, 0.2—0.4 mm latis, convexis, cinereis formatus.

Apothecia numerosa, parva, diam. 0.5—0.7 mm, sessilia, sed basi plus minusve constricta, discus ater, etiam madefactus, epruinosis. Excipulum in parte exteriori anguste ( $5-7 \mu$ ) aeruginosum, praeterea pallide flavo-fuscescens. Hypothecium incoloratum, hymenium angustum, circ.  $50 \mu$  altum, inferne incoloratum, superne ( $15-20 \mu$ ) sensim

olivaceo-fuscescens. Paraphyses concretæ, KOH si addito  $1.7\ \mu$  crassæ, apice clavatæ,  $4\text{--}4.5\ \mu$ . Sporæ rarissime evolutæ, oblongæ vel ellipsoideæ,  $8.5\text{--}11 \times 5\ \mu$ .

Medulla J —, KOH — vel dilute flavescens, hymenium et partes interiores apothecii ( $130\ \mu$ ) J caerulescentes. Discus  $\text{CaCl}_2\text{O}_2$  —.

After the above description the plant must be related to *Lecidea lithophila* or to *L. plana*. It differs from the latter in an important colour character: *Lecidea plana* has an almost black epithecium, blue if KOH is applied. It differs from *Lecidea lithophila* in less important characters: the disk is black, even moistened, and not pruinose. That the apothecia are constricted at their base is, perhaps, due to the meagre development of the thallus. Not having found the difference from *Lecidea lithophila* sufficient for a specific distinction, I have referred the plant to that species, although with considerable doubt.

My doubt was not diminished by the fact that if this determination should be tenable it is the first *Lecidea lithophila* which has ever been found in Greenland. — DEICHMANN BRANTH writes that it is "Meget almindelig i alle Landets Egne" (very common all over the country, Grønlands Lichen-Flora, 1888, p. 499). In the Copenhagen herb. there was a great material, determined by the Rev. DEICHMANN BRANTH as *Lecidea lithophila*. He had evidently taken this name quite literally, for it covered a great number of saxicolous species, with the exception of *Lecidea lithophila*, such as *Lecidea lapicida*, *L. tessellata*, *L. goniophila*, *L. obnubila*, & c. *Lecidea lithophila* itself was not found in the collection.

31. *Lecidea auriculata* TH. FR.

var. *diducens* (NYL.) TH. FR.

Disko: Godthaab and Laksebugten. — Nûgssuaq Peninsula: Atanikerdluk.

var. *evoluta* TH. FR.

Holsteinsborg.

The last mentioned plant has a well developed thallus, areolato-verrucose, white to pale greyish-white. Its apothecia are well developed, large,  $1\text{--}1.5$  ( $\text{--}2$ ) mm in diam., convex. The excipulum is dark brownish, with a faint tinge of violet if KOH is added, the hypothecium is brown, hymenium low, little more than  $50\ \mu$  in height, above bluish-green, paraphyses distinctly clavated (KOH), spores  $7\text{--}10 \times 2.5\ \mu$  (only a few ones seen). — Medulla J —, KOH —, but excipulum bluish by J.

The var. *evoluta* was collected at Holsteinsborg already by VAHL in May 1833.

The plants from Atanikerdluk had been collected on quartz grains, conglutinated by some other substance, a very rich substratum for

crustaceous lichens. In one of these plants I detected fertile pycnides, the pycnoconidia were straight,  $10-12 \mu$ .

In the Copenh. herb. there is a considerable material from East Greenland, not much from West Greenland. But the above data suggest it to be rather common also in West Greenland, as was to be expected. In addition to the before mentioned plant from Holsteinsborg I found the following plants in the Copenh. herb.: Julianehaab: Nanortalik, determination not unobjectionable, the hypothecium was rather pale (EBERLIN). East Greenland: Ũmánaq, about  $63^\circ$  N. (EBERLIN), Scoresby Sound: Danmark Island and Hekla Harbour (HARTZ). North Greenland: J. P. Koch Fjord, a very poor plant, hardly to be determined with certainty (WULFF).

Quite athalline plants of *Lecidea auriculata* are not always easily distinguished from plants of *Lecidea lapicida* with an analogous development. In either species the medulla of the excipulum is stained bluish by J, more intensely so in *L. lapicida*; in either species the excipulum is more or less violet, more intensely so in *L. auriculata*. The latter species has a considerably lower hymenium ( $45-50 \mu$  against  $60-65 \mu$ ), and a darker hypothecium than *L. lapicida* has, but if the section is very thin, a "Quetschpräparat", the hypothecium is not very dark, even in *L. auriculata*. The best distinctive character is, perhaps, the spores: in *L. lapicida* "ellipsoideae",  $9-13 \times 4-6 \mu$ , in *L. auriculata* "suboblongae, angustae",  $6-11 \times 2.5-3.5 \mu$ . But unfortunately spores are often lacking, especially in *L. auriculata*. HCl will clear up the section and bring spores to light, without swelling them. — If well developed, the apothecia of *L. auriculata* are larger than in *L. lapicida*,  $1-2.5$  mm against  $0.7-1.2$ , or only exceptionally as large as 2 mm, such characters are valuable, but relative.

32. *Lecidea subauriculata* LYNGE n. sp. (Plate III, fig. 4).

Disko: Laksebugten and Storøen.

Thallus evanescens, cinerascens videtur.

Apothecia numerosa, crebria, satis parva, diam.  $0.4-1$  mm, supra saxum elevata, basi constricta, discus nitidus, sub lente scabriusculus, ater, epruinosis, diu planus et margine distincto circumdatus, in apoth. juven. prominenti, discus deinde convexiusculus, et margo magis evanescens. Excipulum in parte exteriori distincte violaceum, in parte interiori subincoloratum vel dilute flavescens, in hypothecium incoloratum sensim transiens. Hypothecium ab hymenio haud bene limitatum, circiter  $50 \mu$  altum, granulis incoloratis inspersum, superne pulchre caeruleo-nigricans, praeterea incoloratum. Paraphyses arcte cohaerentes, in KOH et in HCl magis discretas, tenues, apice non incrassatae, indivisae vel hinc inde ramosae, etiam ramoso-connexas vidimus. Asci clavati, sporae octonae, ellipsoideae vel oblongae,  $7-8 \times 3-4 \mu$ .

Medulla excipuli J immutata, hymenium J caerulescens, asci persistenter, gelatina saepe deinde sordide vinosum, excipulum KOH intense roseo-violascens. Totum hymenium HCl pulchre smaragdulum.

In the specimen from Storöen the apothecia were smaller than 0,5 mm the other plant had larger apothecia, up to 1.0 mm.

This species is not distinguished by so marked characters as are several other new species in the collection. Habitually the plants agree well with *Lecidea auriculata* var. *diducens*, the reaction of the excipulum with KOH is also much the same, only more intense. But *Lecidea auriculata* has a much darker, almost black, excipulum and hypothecium, usually well limited from the uncoloured lower part of the hymenium. KOH + HCl only stain the upper part of the hymenium smaragdine, these reagents combined isolate the paraphyses which are then distinctly clavated and considerably thicker than in *Lecidea subauriculata*.

The present species is sufficiently distinct from *Lecidea Pilati* (HEPP) KBR. with its "excipulum granulis chrysophanicis refertum".

The material was scanty, but I found it impossible to identify the plants with any other *Lecidea*, known to me, so I ventured to describe them as a new species.

33. *Lecidea brachyspora* TH. FR.

Recorded by TH. FRIES from Floeberg Beach, Grant Land (Lichens coll. by the Engl. Polar Exped., 1879, p. 362), but not found in the present collections. It has never been found in Greenland proper, but it should be looked after there.

34. *Lecidea despecta* TH. FR.

Described by TH. FRIES from Floeberg Beach in Grant Land. I cannot get a clear conception of the species from TH. FRIES's rather short description, and I have not seen the plant. It should be compared with my *Lecidea subauriculata*, they may be identical.

Sect. **Lecideae Panaeolae.**

35. *Lecidea panaeola* ACH.

Disko: Skarvefjæld and Sinigfik (GRØNTVED), Sâtoq, Mellemfjorden and Nipisat (TH. FR.).

There were but a few plants. GRØNTVED's (sterile) plant can be referred to var. *elegans* TH. FR.

DEICHMANN BRANTH records it from several localities (Grønlands Lichen-Flora 1888, p. 498). I have a notice in my papers that the plants from South Greenland: Tunugdliarfik and Ikerasagssuaq are good and typical plants.

36. *Lecidea consentiens* NYL.

Disko: Mellemfjorden.

The plants are rather small, habitually they agree well with MAG-

NUSSON Lich. sel. Scand. No. 218. The apothecia were often destroyed, only a black, carbonized hymenium being left. The few spores seen were rather small:  $20-27 \times 12-15 \mu$ . There were no cephalodia, the chemical reaction  $\text{CaCl}_2\text{O}_2$  —.

There is no mention of the species in Grønlands Lichen-Flora, and I found no plant in the Greenland herb. in Copenhagen. It is evidently an addition to the lichen flora of Greenland.

37. *Lecidea pelobotrya* (WBG.) LEIGHT.

Disko: Mellemfjorden and Malingiaq.

Only a few, but typical plants: apothecia immersed into the centre of convex areolae, cephalodia of the usual habitus, and a distinctly red colour with  $\text{CaCl}_2\text{O}_2$ . — It is doubtful whether this species should be referred to this genus, or to *Lecanora (Aspicilia)*. I have found it related to *Lecidæ panaeola* and *L. consentiens*, accordingly I have enumerated it in connexion with these species.

It is an addition to the lichen flora of Greenland, but TH. FRIES was not the first to find it, for in the Copenhagen herb. I detected a plant, collected by VAHL at Ikerasagssuaq which I would refer to *L. pelobotrya*, NYLANDER had determined it *Lecanora rhaetica* var. *hyperborea*.

38. *Lecidea macrocarpa* (DC.) STEUD.

Disko: Blæsedalen, Malingiaq, Storøen and Nipisat.

In the *macrocarpa* material there were but two plants with a fairly thick, verrucose thallus, almost white in colour. The apothecia are plane, and they remain so for a long time, at last they are “depresso-convexae”, but not so convex that the plants can be referred to *Lecidea convexa*. Their size was very moderate, hardly exceeding 1.0 mm. Ripe spores could not be found.

In Lich. Fenn. IV VAINIO described 3 formae, agreeing well with the present plants, viz. f. f. *contigua*, *phialaea* and *superba*. These formae must be nearly related, at least I have been unable to grasp the difference between them. — Anyhow, these plants can with safety be referred to  $\beta$ . *superba* (KBR.) TH. FR. as limited in Lich. Scand. p. 505.

In the other plants the thallus was very thin, in some of them almost evanescent. The apothecia were small to moderate in size, measured 0.6—0.8 mm, hardly ever attaining 1.0 mm. Ripe spores were generally not found, in one plant I measured 17—18  $\mu$  in length, the hymenium about 100—110  $\mu$  in height.

Two plants from Blæsedalen agree well with VAINIO's description of var. *meiosporella* (Lich. Fenn. IV, p. 165), and with a plant in our herb., determined by VAINIO. The other plants are also comparable with this type, their apothecia are too small for var. *platycarpa* or the other formae with large apothecia.

VAINIO gives preference to the name *Lecidea steriza* (ACH.) VAIN. But Acharius used this name as a subspecies in Meth. Lich., 1803, p. 40, not as a species. The oldest specific name is *Lecidea macrocarpa* (*Patellaria macrocarpa* D. C. in Lam. et Candolle Flore française, ed. III, vol. II, 1805, p. 347. — It might be an advantage to reserve the name *macrocarpa* for the whole complex of related species. If so it has to be considered whether the name *Lecidea platycarpa* ACH. should not be a better name for this species in a more restricted limitation than *Lecidea steriza* is. *Lecidea platycarpa* was used as a specific name by Acharius in Lich. Univ., 1810, p. 173, as a specific name *Lecidea steriza* dates from VAINIO Lich. Pitlek., 1909, p. 144.

39. *Lecidea flavocaerulescens* (HORNEM.) ACH.

Godthaab, intensely coloured plants (TH. FR.). — Disko: Sinigfik (GRØNTVED), Malingiaq, pale plants (TH. FR.).

At Malingiaq TH. FRIES collected several well fertile plants. The hymenium is often dehiscent, leaving a depression, surrounded by the margin of the apothecium. There is no trace of soredia, we have, accordingly, this species, and not *Lecidea Lidii* LYNGE.

40. *Lecidea soredizodes* (NYL.) VAIN.

var. *ochracea* LYNGE.

Collected by TYGE BÖCHER north of Cape Ravn on the Blosseville coast south of Scoresby Sound (LYNGE The Lichens of the Scoresby Sound Committee's 2nd East Greenland Exp., 1933, p. 10). It was not found in the present collections.

41. *Lecidea Dicksonii* ACH.

Syn. *Lecidea atroferrata* DEICHM. BRANTH et GRØNL. Grønlands Lichen-Flora, 1888, p. 503.

Disko: Sinigfik (GRØNTVED), Nordfjorden and Mellemfjorden (TH. FR.).

This species is almost ubiquitous in the Arctic, and there is every reason to suppose that it should be equally common in Greenland also, even if it was rather scarce in the present collections. In the Copenh. herb. I found the following plants, determined as *Lecidea atroferrata* var. *Dicksonii*. West Greenland: Julianehaab: (VAHL June 1838) and Nanortalik (EBERLIN), Holsteinsborg (VAHL); East Greenland: Qeqertatsiaq at 60°9' n. (EBERLIN), Sergitnûat just south of 61° n., and Karrat akûnguât, 61°42' n. Scoresby Sound (HARTZ): Hekla Harbour (HARTZ); North Greenland: J. P. Koch Fjord (WULFF).

Sect. **Lecideae Silaceae.**

42. *Lecidea tessellata* FLK.

Disko: Laksebugten in Mellemfjorden, and Storøen. Ritenbenk coal mine, very fine plants, var. *polaris* TH. FR.

In the Copenh. herb. there were several plants of this species which is so common and so widespread in the Arctic. Disko: Mudderbugten (PORSILD), Ritenbenk: Sarqaq (VAHL Aug. 1835), Holsteinsborg (VAHL), Julianehaab, var. *polaris* (VAHL), and Qaqortoq "ad templi muros" (VAHL). East Greenland: Scoresby Sound, Danmark Island and Gaase-landet (HARTZ).

43. *Lecidea occidentalis* LYNGE n. sp. (Plate IV, fig. 3).

Disko: Kuánerssuit, ad saxa non calcarea.

Thallus crassus, fissuris profundis rimoso-areolatus, areolis angulatis, 0.5—1.0 mm latis, laevigatis, convexis usque verrucosis. Thallus sorediis isidiisque destitutus, satis mollis, albidus vel albido-cinereascens.

Apothecia numerosa vel numerosissima usque ad confluentia et tum mutua pressione angulosa, mediocria, diam. 1.0—1.5 mm, thallo innata. Discus depresso convexus, ater, etiam madefactus, opacus, epruinosis, margine indistincto thallum aequanti vel eo leviter superanti circumdatus. Excipulum in parte exteriori anguste cinereo-fuscum, praeterea incoloratum vel dilute solum fusco-cinereascens, sine limite distincto in hypothecium incoloratum transiens. Hymenium angustum, circ. 40  $\mu$  altum, inferne incoloratum, superne plus minusve obscure olivaceo- vel fusco-fuligineum. Paraphyses cohaerentes, in KOH facilius discretae, distincte septatae, circ. 2  $\mu$  crassae, superne incrassatae, 4—5  $\mu$ . Asci anguste pyriformes, 25—35  $\times$  10  $\mu$ , membrana superne mediocriter incrassatae. Sporae octonae, globosae, diam. circ. 5  $\mu$ , episporium tenue.

Pycnides non visae.

Medulla, excipulum, hypothecium et hymenium J obscure caerulescentia, KOH et HNO<sub>3</sub> incolorata.

The new species evidently belongs to the *Lecidea Silacea* section of TH. FRIES Lich. Scand. p. 487. Habitually it resembles *Lecidea tessellata*  $\beta$  *polaris*, but it is perfectly distinct from that, and from all other species of its section, by its small, globose spores.

The lower part of the hymenium, and sometimes also the uncoloured underlying parts of the apothecia, had a slight tinge of violet, perhaps due to the age of the plants (collected in 1871). The plants were found on small fragments of the stone, their size cannot be stated, but it is evidently no small *Lecidea*.

44. *Lecidea cyanescens* LYNGE n. sp. (Plate I, fig. 3).

Disko: Laksebugten ad saxa non calcarea.

Thallus crassitudine mediocri, rimoso-areolatus, areolis 0.5—1.0 mm latis, angulosis, minute rimosis, planis. Thallus albidus,

leviter in cinerascetem vergens, epruinosis, sorediis isidiisque destitutus, mollis, cretaceus.

Apothecia numerosa vel numerosissima, hinc inde seriata, mediocria, diam. 1—1.5 mm, supra thallum leviter, sed distincte elevata, aterrima. Discus e plano depresso convexus, laevigatus, margine distincto, persistenti circumdatus. Excipulum in margine et in parte exteriori atro-cinerascens, praeterea incoloratum. Hypothecium omnino incoloratum. Hymenium superne pulchre smaragdulum, praeterea incoloratum et ab hypothecio non bene limitatum, hymenium circ.  $90\ \mu$  altum. Paraphyses satis validae, haud concretae, apice leviter incrassatae,  $2.5\text{--}3.5\ \mu$ . Sporae (vulgo male evolutae) ellipsoideae,  $7.5\text{--}8.5 \times 4\text{--}5\ \mu$ .

Medulla J caerulea, KOH non mutata, sed excipulum KOH sanguineum, crystallae praecipituntur.

This species is nearly related to *Lecidea tessellata*, called *L. cyanea* in TH. FRIES Lich. Scand. The apothecia are a little more elevated than in the latter species, and epruinose, but the only distinction of importance is the blood-red staining of the excipulum by KOH, due to the precipitation of blood-red, fasciculated crystals. I was unable to obtain any red colour in the medulla itself by KOH, and that will distinguish the species from *Lecidea pantherina*.

45. *Lecidea subrhagadiella* LYNGE n. sp. (Plate III, fig. 3).

Disko: Nordfjorden, ad saxa granitica (non calcarea).

Thallus albidus, tenuis vel tenuissimus, profunde rimoso-areolatus vel hinc inde areolis subdiscretis vel dispersis formatus. Areolae angulosae, minutae, 0.15—0.25 mm latae, superne planae vel depresso convexae, nitidiusculae, vulgo laevigatae, sorediis isidiisque destitutae.

Apothecia numerosa vel numerosissima, hinc inde congesta, parva, diam. 0.15—0.3 mm, rotundata, primo thallo immersa, deinde magis elevata, aterrima, subnitida, discus planus margine crasso concolori persistenti circumdatus. Excipulum valde obscuratum, hypothecium rufufuscens, hymenium superne caeruleo-fuligineum. Paraphyses cohaerentes, articulatae, ramosae, apice haud incrassatae. Asci valde inflati, membrana superne valde incrassata. Sporae (parce visae)  $13\text{--}14 \times 7.5\text{--}9$  ( $\text{--}10$ )  $\mu$ .

Medulla J intense caerulescens, KOH non colorata, hymenium J intense caeruleo-nigricans, superne KOH dilute violascens.

If compared with the Scandinavian species it looks related to *Lecidea rhagadiella* (NYL.) TH. FR. Lich. Scand. p. 488, and VAIN. Lich. Fenn. IV, 1934, p. 116. I have not seen that species, but to judge from the above mentioned descriptions it must differ from the present species in a considerably thicker thallus (0.5—1.5 mm thick), larger apothecia (0.5—1.5 mm in diam.), and a pale to uncoloured hypothecium. The

thick margin of the apothecia in *Lecidea subrhagadiella*, surrounding a very small disk, gives also the present species an aspicilioid habitus.

46. *Lecidea lapicida* ACH.

Godthaab, lots of plants. — Disko: Laksebugten, Nipisat, and Narssaq.

The Godthaab plants are rather variable, some of them with a fine, areolated thallus, f. *declinans*, in others the thallus is almost evanescent, f. *ecrustacea*.

f. *ochracea* (NYL.) VAIN.

VAIN. Lich. Fenn. IV, 1934, p. 132.

Disko: Mellemfjorden at Laksebugten.

The thallus is entirely ochraceous, the medulla J blue, and KOH —, the hypothecium quite uncoloured.

In the Copenh. Greenland herb. I found a very great number of plants, under many names. The number of localities is, in reality, so great that we are justified in saying that *Lecidea lapicida* is one of the commonest and the most widespread lichens in Greenland. The localities are: North Greenland. Marraq (in the Vaigat Sound?, KOLDERUP ROSENVINGE), Disko: Godhavn (Kruuse), Egedesminde (f. *declinans*, SØRENSEN), Holsteinsborg (f. *verrucifera*, VAHL June 1833), Julianehaab (var. *ochracea* with a thick thallus, approaching *Lecidea silacea*, VAHL): Nanortalik (f. *declinans*, VAHL, and var. *ochracea*, EBERLIN). East Greenland. Inger Qajarfik (EBERLIN), Scoresby Sound (f. *verrucifera*, HARTZ): Cape Stewart (f. *declinans*, HARTZ), Hekla Harbour (f. *ecrustacea*, HARTZ), and Danmark Island (f. *acrustacea*, f. *declinans* and var. *ochracea*, HARTZ). Not located: Igtúngualâq (var. *ochracea*, SØRENSEN), Analuarsuk (VAHL Oct. 1828), Kobbefjord (f. *ecrustacea*, WARMING), and Neriaes qíngua (f. *ecrustacea*, HARTZ).

47. *Lecidea silacea* ACH.

Not found in the present collections. But in the Copenh. herb. there is a plant, collected at Holsteinsborg by VAHL in June 1833.

48. *Lecidea pantherina* (ACH.) TH. FR.

TH. FRIES Lich. Scand., II, 1874, p. 491.

Godthaab. — Disko Island: Sinigfik (GRØNTVED), Blæsedalen (TH. FR., GRØNTVED), Laksebugten and Nipisat (TH. FR.). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

To judge from the present material, and from the Copenh. material this species must be as common as any other *Lecidea* in Greenland. In the Copenh. herb. I found the following plants, under different names. West Greenland. Holsteinsborg (slightly ochraceous, VAHL), Julianehaab, several plants (one plant with a well developed thallus, resembling

*Lecidea tessellata*, another plant, resembling NORRL. et NYL. Herb. Lich. Fenn. No. 339, f. "*polycarpa*", and a third plant, f. *oxydata*, all of them collected by VAHL. East Greenland. Danmark Island in Scoresby Sound (fine white thallus, HARTZ). North Greenland. Centrum Island (WULFF, det. LYNGE: *Lecidea peralbida*, this species is hardly to be distinguished from *Lecidea pantherina*). There were also a few finds which I was unable to locate.

VAINIO has found that Acharii *Lecidea lapicida*  $\beta$  *L. cyanea* in herb. ACH. is the present species, after his own rules of nomenclature he therefore named it *Lecidea cyanea* (ACH.) VAIN. This cannot be valid after the generally accepted rules of nomenclature, for Acharius used the name for a subspecies.

In my very large Spitsbergen material I have repeatedly found that the chemical reaction with KOH is more intense in the excipulum than it is in the medulla, it is therefore with much hesitation that I have ventured to propose the related species *Lecidea cyanescens*. — In the Arctic *Lecidea pantherina* is quite a proteous species. In some plants the thallus is perfectly developed, white, areolated, much approaching *Lecidea tessellata*, from which it only differs in the chemical reaction. In others the thallus is more poorly developed, down to almost acrustaceous plants. In the Arctic we often find plants, the thallus of which radiates like a fan along the circumference. Any number of formae can be described, but I have not been able to find specific differences. A chemical investigation of the species would be of great interest, as it is the species is chiefly a chemical one, limited by the positive reactions with J and with KOH.

49. *Lecidea magna* LYNGE n. sp. (Plate II, fig. 3).

Disko: Kuánerssuit, ad saxa non calcarea.

Thallus late expansus, crassus, rimoso-areolatus, areolis irregulariter angulatis, 0.5—1.0 mm latis, convexis usque verrucosis, superne minute rugulosis. Thallus dilute cinereus, epruinosis. Hypothallus non distincte visus.

Apothecia numerosa, usque confluentia, primo subplana et distincte marginata, fissuris irregulariter divisa, deinde maxima, diam. usque ad 6—7 mm sese supra areolis expandentia, et fissuris crebris, reticulatis areolato-divisa. Discus ater, epruinosis, subopacus. Excipulum peripheriam versus obscuratum, obscure olivaceum, praeterea incoloratum vel dilute — dilutissime fuscidulum. Hyphae excipuli arcte conglutinatae, minute plectenchymaticae, crystallis adpersae (CaOx?), marginem versus bene radiantes. Hypothecium pallidum, inferne (100—150  $\mu$ ) subincoloratum, superne (60—70  $\mu$ ) dilutissime fuscidulum, sine limite distincto in hymenium concolorem transiens. Hymenium 50—60  $\mu$  altum, superne (10  $\mu$ ) olivaceum. Paraphyses conglutinatae, distincte

septatae, 1.5—2  $\mu$  crassae, superne subclavatae et 4  $\mu$  crassae. Asci rari, irregulariter sat anguste saccati, octospori. Sporae male evolutae (ob omnino maturas vidimus ?), ellipsoideae videntur, 8—10  $\times$  5—6  $\mu$ .

Pycnides non visae.

Medulla J violaceo-caerulescens, KOH non colorata. Hymenium J persistenter caerulescens, etiam cum hypothecio, excipulum J subimmutatatum, hymenium KOH immutatatum vel leviter in flavo-fuscescentem vergens.

The specimens were found on numerous small slices of the underlying rock, the maximum size of the species cannot be stated. No marginal part of the thallus was found. The profound cracks between the areolae are black, which may be due to a dark hypothallus, or perhaps simply to the profoundness of the cracks in the thick thallus.

The species is characterized by its thick thallus, of a rather pale, purely ash-grey colour, and especially by its enormous apothecia. Are there larger apothecia in this genus? They are very much larger than the areolae. One gets the impression that they expand over the neighbouring areolae by a marginal growth which is quite exceptional in the genus *Lecidea*. The radiating marginal hyphae of the excipulum is supposed to facilitate this manner of growth. A good section of the apothecia reveals the remains of the underlying (dead?) areolae.

This manner of growth calls to mind *Actinogyra* (*Gyrophora*) *polyrrhiza*, studied by SCHOLANDER (On the Apothecia in the Lichen Family Umbilicariaceae, *Nyt Magazin for Naturvidenskaberne*, LXXV, 1934, p. 28, and figures). Also in that species the apothecia expand over the surface of the surrounding thallus by a marginal growth.

The species can be referred to the section *Silaceae* of TH. FRIES *Lich. Scand.* p. 487. *Lecidea tessellata* is, perhaps, the nearest related Scandinavian species. But its real affinity is evidently western, MAGNUSSON has described an American species, *Lecidea columbiana*, differing in its smaller apothecia and a more modest size on the whole.

It is natural to give the new species a name, suggesting its enormous size, as well as THEODOR MAGNUS FRIES who detected it.

#### Stirps *Lecideae Confluentis*.

##### 50. *Lecidea speirea* ACH.

Disko: Blæsedalen and Kuánerssuit.

The former plant has a thick, cracked, rimose, entirely white (cretaceous) thallus, spores 10  $\times$  6.5  $\mu$ , in the latter plant the thallus is considerably thinner.

In the Copenh. herb. there is no *Lecidea speirea* from West Greenland. There are two plants from Scoresby Sound in East Greenland. I

have not checked the determinations microscopically, macroscopically they are not convincing.

Stirps **Lecideae atrobrunneae.**

51. *Lecidea paupercula* TH. FR.

Godthaab. — Disko: Mellemfjorden.

In the former plant there is a dark hypothecium, hymenium 80—85 $\mu$ , a smaragdine epithecium, spores 12—13  $\times$  5—6.5 $\mu$ , evidently a "good" determination. The other plant is not unobjectionable. Its plane areolae suggest *Lecidea paupercula* and not *L. atrobrunnea*, its hypothecium is brown, more or less dark, but not "fuscofuligineum". Though several apothecia were carefully examined no spores could be detected, accordingly I cannot exclude the large-spored species of the section, *Lecidea atrocarpa* ACH. and *L. atrocarpoides* VAIN.

In the Arctic we sometimes find plants, intermediate between *Lecidea paupercula* and *L. atrobrunnea*: areolae thin, plane, resting on a distinct, black hypothallus, as in the former species, but with a very pale to uncoloured hypothecium, as in *Lecidea atrobrunnea*. A plant of that kind was found in the Copenh. herb., collected by VAHL at Tunugdliarfik in the Julianehaab district (det. DEICHMANN BRANTH: *Lecidea confluens*). — A *Lecidea paupercula* from Scoresby Sound (herb. Copenh.) is certainly a meagre *L. atrobrunnea*. I have no notes on the two plants, mentioned in Grønlands Lichen-Flora, p. 502, from West Greenland: Arsuk and Qaersok.

52. *Lecidea atrobrunnea* (RAM.) SCHAEER.

Disko: Narssaq, Ritenbenk coal mine, Mellemfjorden, Malingiaq, Blaafjeld or Uivfaq, and Laksebugten, Nipisat — Nügssuaq Peninsula: Atanikerdluk and Atâta qâtâ, in the latter locality small, sterile areolae, collected 2000 m above sea-level by GRØNTVED (all the other localities by TH. FR.)

There was a considerable number of plants, collected together with other nitrophilous species, such as *Lecanora melanophthalma*, a. o. The plants are generally well developed, with thick, confluent areolae.

In Grønlands Lichen-Flora it is stated to be fairly common all over the country ("Temmelig almindelig i hele Landet"), which is most probably quite correct. In the Copenh. herb. I found the following plants. West Greenland. Disko (VAHL?): Asuk (PORSILD), Ritenbenk (VAHL), Holsteinsborg (VAHL 1833, KØRNERUP): Søndre Strømfjord at Qegetârarsuaq (J. A. D. JENSEN), Sukkertoppen (WARMING 1884), Julianehaab (VAHL 1830). East Greenland: Ūmânaq (EBERLIN), Scoresby Sound: Danmark Island and Red Island (HARTZ). North Greenland: Centrum Island (WULFF). — Not located: Sagdliarviarsuk (VAHL).

Sect. **Lecideae Armeniacaе.**53. *Lecidea aglaea* SOMMERF.

Disko: Kuanerssuit, very scarce.

This species is supposed to be rare in Greenland. In the Copenh. herb. I found a good plant from Ameralik in the Godthaab district (VAHL July 1831), and another plant from Kobberpynten in Scoresby Sound (HARTZ). A plant from Nanortalik (EBERLIN) belongs to *Lecidea atromarginata*. Most probably a plant from Holsteinsborg (VAHL May 1833) is really *Lecidea aglaea* (det. DEICHMANN BRANTH: *Lecidea confluens*). DEICHMANN BRANTH writes: Here and there in South and West Greenland ("S. og V. Gr.: Hist og her"). This may be true, but there are no plants to prove it.

54. *Lecidea perlata* MAGN.

*Lecidea perlata* H. MAGN. Studien über einige Arten der Lecidea armeniaca- und elata-Gruppe, Medd. Göteb. Bot. Trädg., VI, 1930, p. 94 and 106.

Godthaab. — Disko: Nipisat, very scarce, det. MAGNUSSON.

Apothecia at first immersed, then extending over the thallus, without margin. The concrete paraphyses are very thick, at least 5, often 7—10  $\mu$  at their apices, the spores are 11—15.5  $\times$  5—7  $\mu$ . Excipulum dark brown, hymenium bluish (especially if KOH is added) at its upper part. — It is an addition to the lichen flora of Greenland.

55. *Lecidea armeniaca* (DC.) FR.

Disko: Narssaq and Blaafjeld or Uivfaq.

There are several plants, all of them with the deep reddish-brown colour which is so characteristic of old herbarium specimens. — In the Copenh. herb. I found the following plants: Ritenbenk: Sarqaq (VAHL Aug. 1830), Julianehaab: Nanortalik (EBERLIN), and one plant from East Greenland: Danmark Island in Scoresby Sound (HARTZ). — But the plant from Igaliko, mentioned in Grönl. Lichen-Flora p. 501, is in reality *Rhizocarpon chionophilum*, f. pallida.

56. *Lecidea arctogena* TH. FR.

Disko: Sâtoq, very scarce.

Supposed to be rare in Greenland, for in the Copenh. herb. I only detected one plant, collected at Nanortalik in the Julianehaab district by EBERLIN.

57. *Lecidea asukensis* LYNGE n. sp. (Plate VI, fig. 3).

Disko: Asuk, on a sandstone, containing much calcareous substance.

Thallus orbicularis, diam. circ. 2—3 cm, thallis compluribus concrescentibus interdum plagae majores obtectae sunt. Thallus tenuis, sed distinctus, bene limitatus, rimis irregularibus in areolis non radianti-

bus, angulatis, 0.3—0.5 mm latis divisus. Areolae soreidiis isidiisque destitutae, laevigatae, planae, albidae, sub lente subcretaceae, hinc inde levissime in flavescens vergentes, hypothallo caesio-glaucoscenti circumdatae, praecipue secundum marginem thalli.

Apothecia numerosa, sed non numerosissima, dispersa vel interdum magis congesta, sed fere semper discreta, rotundata, parvula, diam. 0.4—0.5 mm, supra areolas bene elevata. Discus ater, epruinosis, margine concolori crasso persistenti integro circumdatus et eam ob causam concavus videtur (*Aspiciliae* in memoriam revocantur). Excipulum secundum marginem obscurum, hyphis obscure caeruleo-nigricantibus, articulatis formatum, praeterea incoloratum. Hypothecium omnino incoloratum (vel levissime in caerulescentem vergens). Hymenium 70—80  $\mu$  altum, superne caeruleo-fuligineum, praeterea incoloratum vel dilutissime in violascentem vergens. Paraphyses haud arcte cohaerentes, sed non facile discretae, superne incrassatae, 4—5  $\mu$ , caeruleo-nigricantes. Sporae (parce evolutae) ellipsoideae, parvulae, 8—10  $\times$  4—5 (—5.5)  $\mu$ .

Pycnides non visae.

Medulla J —, cortex et medulla KOH —, hymenium J caeruleo-fuligineum, HNO<sub>3</sub> superne leviter violaceo-fuligineum.

The small apothecia, concave on account of the thick, persistent margin, quite suggest an *Aspicilia*. But there was no trace of gonidia in the excipulum. The colours of the lower part of the hymenium and the hypothecium are so faint as to be hardly perceptible.

*Lecidea asukensis* is a species of the *Lecidea Elata* section. From *Lecidea elata* itself which it habitually resembles, and its nearest relatives (*L. atromarginata*, *L. scrobiculata* and *L. interrupta* it is sufficiently distinct by its thick paraphyses. — Its habitus is quite different from the well-known species *Lecidea armeniaca*, *L. arctogena* and *L. aglaea*. — *Lecidea perlata* has a thicker thallus with convex areolae, and much larger spores. — *Lecidea aglaeida* and *L. aglaeiza* also have a very thick thallus.

The cortex of the present species is so adspersed with angular grains that it is absolutely impellucidous, the hyphae are hardly to be distinguished even after a clearing, neither alcohol + HCl, nor chlorale hydrate will work well in this case. It is difficult, if possible, to distinguish a lower limit of the cortex. If stained with chlor-zink-iodide the gonidia were easily seen, 70—80  $\mu$  below the surface of the thallus.

In *Lecidea asukensis* the thallus is thinner towards the centre, or even lacking (destroyed?) there. If the thallus itself is very thin, or the areolae very small, the darker hypothallus is very distinctly seen.

#### 58. *Lecidea elata* SCHAER.

Disko, very scarce (TH. FR.), determination confirmed by MAGNUSON). — Nûgssuaq Peninsula: Atâta qâqâ (GRONTVED), a very poor

plant, identified on account of its yellowish-white, effuse thallus, resting on a distinct, glaucous hypothallus.

var. *violascens* LYNGE, nov. var.

Disko: Narssaq, on soft calcareous rocks.

Thallus tenuissimus vel subevanescent, albidus, mollis, sub lente farinosus, pulveraceus, hinc inde ruptus, effusus.

Apothecia numerosa, sed satis dispersa, supra thallum bene elevata usque stipitata, majuscula, diam. 1.0—1.5 (—1.8) mm. Discus ater, epruinosis, primo planus et grosse marginatus, deinde plus minusve convexus, varie rugosus et immarginatus. Excipulum rufo-violaceum, hyphis radiantibus formatum, sensim in hypothecium pallidius transiens. Hymenium superne olivaceo-smaragdulum, interne sine limite distincto in hypothecium transiens. Paraphyses arcte cohaerentes, superne valde indistinctae (ob epithecium inspersum), in KOH haud vel levissime incrassatae. Asci male evoluti, angusti. Sporae parvissime visae, 10—13 × 6—7 (—7.5)  $\mu$ , satis late ellipsoideae.

Pycnides non visae.

Hymenium et hypothecium J intense et persistenter caerulescentes, etiam cum cortice excipuli, KOH —.

The evanescent thallus and the stipitated apothecia gave these plants a very remarkable habitus. But the more the structure of the apothecia was studied, the more the resemblance with *Lecidea elata* became evident. Stipitated apothecia are not rare in this species, if growing on soft calcareous rocks, such as in the present case. The only difference of importance which I detected, was the reddish-violet excipulum, dark at the exterior part, paler towards the inner parts. In typical *Lecidea elata* plants, which I examined, I found no colour of that kind in the excipulum, it was either uncoloured or bluish-green.

In MAGNUSSON'S study of the *Lecideae* of the *Elata* section (p. 126) a considerable number of Greenland localities have been enumerated. After TH. FRIES, 1879, p. 361: Winter quarters of the "Alert", Polaris Bay (81°30') and Cape Sabine (78°40)". In North East Greenland it was collected in Geologfjorden in the large Franz Josef Fjord by SEIDENFADEN, and in Dusénfjorden and at Cape Humboldt in the same Franz Josef Fjord by myself. — But the plant from Carl Ritter Bay (80°, leg. KRARUP SMITH) is an *Aspicilia*, it was recorded by DEICHMANN BRANTH in Grønland. Lichen-Flora, p. 501, and after him by MAGNUSSON, l. c. In the Copenh. herb. I did not find the plants from Ūmánaq, Upernavik and Irving Island, recorded by DEICHMANN BRANTH, l. c. The information as yet available suggests *Lecidea elata* to be a rather rare species, known — so far — only from the Northern half of Greenland.

59. *Lecidea scrobiculata* TH. FR.

VIDE MAGNUSSEN Studien über einige Arten der *Lecidea armeniaca*- und *elata*-Gruppe, 1931, p. 134, ubi syn.

Recorded by TH. FRIES, 1879, p. 362, from several localities in the vicinity of Floeberg Beach in Grant Land, and also from Lincoln Bay (Greenland? or Grant Land?). It was not found in the present collections.

60. *Lecidea Theodori* LYNGE, n. sp. (Plate IV, fig. 4).

Nûgssuaq Peninsula: Atanikerdluk, on quartzitic grains, conglomerated by a non-calcareous substance.

Thallus modice incrassatus, usque ad 1 mm crassus, late expansus, rimis profundis areolatus, areolis angulatis, crenatis, circiter 1 mm latis, planis vel subconvexis, minute rimosus. Thallus ochroleucus, laevigatus vel leviter rugosus, ceraceus vel osseo-nitidus, sorediis isidiisque destitutus, madefactus mollis. Hypothallus ater hinc inde inter areolas visus.

Apothecia numerosissima, dense congesta usque conglomerata, supra thallum elevata, madefacta mollia, majuscula, diam. usque ad 2 mm. Discus epruinosis, ater, subnitidus, (sub lente) scabriusculus, primo planus et margine prominenti circumdatus, deinde depresso convexus et margine minus distincto circumdatus vel etiam immarginatus. Excipulum incoloratum, vel inferne linea angusta (5—8  $\mu$ ) obscurata limitatum, praeterea dilute solum cinerascens, hyphae excipuli intense adpersae, hypothecium incoloratum, hymenium angustum, circiter 45—50  $\mu$  altum, superne (6—7  $\mu$ ) olivaceo-caerulescens (KOH addito postremo subdecoloratum). Paraphyses distincte septatae, arcte cohaerentes, superne indistinctae, incrassatae, in aqua 2.5—3  $\mu$  crassae, in KOH 4—5  $\mu$ . Asci (parce visi) angusti, sporae octonae, anguste oblongae, subrectae vel leviter fabaceae, (7—) 8—10  $\times$  2.5—3  $\mu$ .

Pycnides frustra quaesitae.

Medulla J —, KOH — (etiam cortex KOH immutatus), hypothecium et hymenium J intense caerulescentia (100—130  $\mu$ ), hymenium HCl vel HNO<sub>3</sub> superne pulchre caerulescens.

The substratum was so weathered that it almost resembled a coarse sand, solidified at the surface, most probably it was a quartzitic rock that was so weathered under the surface that such thin flakes could be peeled off it.

A section through the areolae showed glomerated gonidia, large, up to 25  $\mu$  in diam., often containing endospores. Hyphae from the medulla expanded in a fan-like manner between these glomeruli and formed a kind of cortex. But the cortical hyphae were soon fused into an amorphous necral stratum, resulting in a soft surface of the thallus. The medullary hyphae were hardly to be discerned, even after a clearing with chlorale

hydrate, on account of a cover of minute, hardly discernible grains. — The hyphae of the excipulum were very indistinct, in part due to much air, but also on account of angular grains, contained in considerable abundance.

*Lecidea Theodori* evidently belongs to the *Armeniaca* section of TH. FRIES (Lich. Scand. p. 532). Its areolae have a waxy lustre, they are more contiguous (thallus areolato-rimosus) than they are in *Lecidea arctogena*, its hypothallus is, accordingly, little visible. *Lecidea Theodori* is also sufficiently distinguished from *Lecidea arctogena* by the very peculiar spores of the former species. It has the same uncoloured excipulum as *Lecidea scrobiculata*, but its narrowly oblong, slightly fabaceous spores sufficiently distinguish it from that species also, as well as from all the other species of the section, the spores quite resemble what we call a "wienerwurst".

The spores were scarce, but I found some of them in every section, they look fully ripe, not like shrunken spores, e. g. of *Lecidea scrobiculata*.

The species has been named in honour of THEODOR MAGNUS FRIES, Professor of Upsala, who detected it.

61. *Lecidea atromarginata* MAGN.

MAGNUSSON Studien über einige Arten der *Lecidea armeniaca*- und *elata*-Gruppe, 1931, p. 95 and 135.

var. *groenlandica* MAGN. nov. var. (Plate I, fig. 1; II, fig. 1).

Disko Island: Ujaragssugssuk, Narssaq, Mellemfjorden, Storøen and Igdlutsiait (TH. FR.), Sinigfik (GRØNTVED).

Thallus flavescens, areolis crassis contiguus vel tenuioribus dispersisque, hypothallus indistinctus. Apothecia crebra, prominentia, sessilia, primum marginata, sed mox convexa immarginata.

Thallus up to  $5 \times 2$  cm large and more than 1 mm thick, rimoso-areolated, or (from the same locality) with more or less dispersed or grouped areolae, in other specimens quite scattered and to a great extent concealed under the dense apothecia. Surface of the areolae uneven to rough.

Apothecia 0.7—1.5 mm large, 0.2—0.3 mm thick. Exciple distinct, 60—100  $\mu$  thick both at the upper margin and far in below the apothecia, pale, more or less bluish green, with perpendicularly radiating hyphae. Otherwise the structure agrees with the type. There are the same thick medullary hyphae covered with granules, producing needles in  $H_2SO_4$  and only slowly dissolving in HCl. Conidia 15—18 (—20)  $\mu$  long, arcuated.

The specimens seen differ in many respects, especially in appearance, from the type and might perhaps better be looked upon as a separate species. But on account of its variability it is hardly possible to draw

distinct limits to the very nearly related *Lecidea atromarginata*. (A. H. MAGNUSSON in litt.)

The first record of *Lecidea atromarginata* from Greenland was given by MAGNUSSON, l. c. p. 136: Moskusoksefjorden in North East Greenland (LYNGE 1929). But it was collected at Nanortalik in the Julianehaab district by EBERLIN in 1885 (herb. Copenh., det. DEICHMANN BRANTH: *Lecidea aglaea*). Though few these records suggest a widely distributed, perhaps common species in Greenland.

62. *Lecidea convallium* LYNGE, n. sp. (Plate II, fig. 2).

Disko Island: Blæsedalen, on a non-calcareous rock (diabase?), very scarce.

Thallus crassus, mollis, rimis angustis undulatis areolatus, areolis 0.2—0.5 mm latis, subplanis, superne granulatis, colore alutaceis vel argillaceis.

Apothecia numerosa, sed vulgo dispersa, interdum approximata, areolis immersa, thallum aequantia vel eum leviter solum superantia, rotundata, parva, 0.35—0.45 mm lata. Discus ater, epruinosis, planus, margine integro, nitidulo, depresso prominenti circumdatus. Excipulum ad latera apotheciorum fuliginium, infra hypothecium incoloratum, haud distincte a medulla et a hypothecio limitatum. Hypothecium omnino incoloratum, hymenium satis intense smaragdulum, superne smaragdulo-fuliginium, hymenium 85—90  $\mu$  altum, strato amorpho granulato tectum. Paraphyses cohaerentes, indivisae vel rarius divergente ramosae, apice non incrassatae. Sporae (vulgo immaturae) late ovales usque ad subglobosae, 12—14  $\times$  8—10  $\mu$ .

Medulla J —, KOH —, hymenium J sordide vinosum.

The excipulum is seen as a low black annulus around the hymenium and in about the same height as the latter. Under the hypothecium it is hardly developed as a distinct stratum, the apothecia are quite "open" downwards.

It is difficult, if possible, to find a natural section for this species, most probably it belongs to a western section, unknown at least to us European botanists. — Its small apothecia might refer it to the *Sylvicolae*, but its thick thallus and immersed apothecia are against it. Ad interim it can, perhaps, be placed in the *Armeniaca* section. There is no species in MAGNUSSON's paper on that section that can be identical with it.

If it is hunted after in the clavis specierum of VAINIO Lich. Fenn. IV, we have to compare it with *Lecidea melaphanoides* NYL., differing in a verrucose thallus and in much less immersed, distinctly convex apothecia.

If we only study the structure of its apothecia *Lecidea subcongrua* VAIN. Lich. Fenn. IV, p. 263 show some resemblance. But the well identified plants of that species which I have seen, have a rather thin thallus

with adnate apothecia. If the thallus is thicker, as it sometimes is, it is verrucose, rather than rimoso-areolatus, and the apothecia but slightly semi-immersa.

It is doubtful whether we ought to describe such small fragments of a plant as a new species. The possibility for an "execution" of it when more material will be to hand is not to be overlooked. But on the other side the plants make the impression of being perfectly developed, everything necessary to the determination is present, with the exception of the thalline margin, so often lacking in the plants of this material.

It is really difficult to find an appropriate name for a new species in this enormous genus. I had at first named it *Lecidea ventosa* ("Blæsedalen"), but VAINIO has mentioned a species of that name in a note of his Lich. Fenn., IV, p. 39. The name *convallium* suggests the same valley.

#### Sect. *Lecideae Rivulosae*.

##### 63. *Lecidea cyathoides* ACH.

VAIN. Lich. Fenn., IV, p. 312. — *Lecidea rivulosa* ACH. Vide MAGNUSSON Studies in the rivulosa group of the genus *Lecidea*, Göteborg. Vet. och Vitterh. samh. handl. ser. IV, vol. XXIX, No. 4, 1925, p. 22, ubi syn.

Disko Island: Ritenbenk coal mine.

Habitually the few plants much resemble *Lecidea mollis*, but they differed in some slight characters, e. g. the more uneven surface of the areolae. And never trust to habitus if crustaceous lichens are to be determined! The apothecia were examined in all the plants, with the following result: hypothecium incoloratum, hymenium superne fuscum, paraphyses validae, apice incrassatae, sporae fabaceae,  $10-12 \times 5-6 \mu$ .

The bean-like spores immediately exclude *Lecidea mollis*, they only leave us two possibilities, viz. *Lecidea cyathoides* and *Lecidea arcuatula*. The latter possibility would have been the probable one, for it is an American species. It has very narrow spores,  $8-12 \times 3.5-4.5 \mu$ , against  $5-7 \mu$  in *Lecidea cyathoides*. I have examined the spores in HAVAS Lich. Norv. No. 364 (*Biatora rivulosa*), and found the spores but little variable with respect to thickness, they were about  $5 \mu$  thick, at times a little broader. The agreed entirely with the Greenland plants.

In Norway *Lecidea cyathoides* is decidedly a southern plant, not detected north of Vågan and Engeløy in Nordland, just south of Lofoten. *Lecidea mollis* is quite as decidedly a northern plant, common along the northern coasts of Norway and in the mountains, found also in Novaya Zemlya. So far it has not appeared in the large Spitsbergen collections under determination, it is, perhaps, an eastern species.

I would not have been astonished to find *Lecidea mollis* in Greenland, but *Lecidea cyathoides* is a most surprising find. To judge from

descriptions Disko must be quite an Arctic island, on the other hand we should not forget that its latitude is only a little south of 70° n. l., the (known) northern limit of *Lecidea cyathoides* in Norway is 68° n. l., but that region is not Arctic.

*Lecidea cyathoides* is an addition to the lichen flora of Greenland, and to the Arctic flora in general.

To judge from VAIN. Lich. Fenn. IV, p. 313 Acharii *Lichen cyathoides* from Lich. Suec. Prodr., 1798 is identical with Acharii *Lecidea rivulosa* from METH. Lich., 1803. Preference must, accordingly, be given to the former name. Acharius himself wrote, 1803, p. 39: (of his *Lecidea rivulosa*) "In *Lecideam cyathoidem* per aetatem mutari suspicor, sed adhuc desunt mihi certae observationes hanc opinionem probantes vel refellentes".

#### Sectio *Lecideae Leucophaeae*.

##### 64. *Lecidea leucophaea* (FLK.) TH. FR.

TH. FRIES recorded its var. *griseoatra* from Cape Union, Floeberg Beach and Polaris Bay in his paper on the lichens of the British Polar Expedition, 1879, p. 360. There is also a record in Grønlands Lichen-Flora, 1888, p. 496, from Arsuk in West Greenland, det. TH. FR. — This species was not found in the present collections.

According to VAINIO the Scandinavian plants are not identical with *Lecidea panaeola* var. *griseoatra* FLOT." which has a "Hypothecium ubricosum-rufescens", against the "hypothecium pallidum aut partim albidum" of *Lecidea leucophaea*, s. l. (FLK.) NYL. VAINIO therefore introduces the name *Lecidea leucophaea* var. *obscurescens* for the plant which TH. FRIES names *griseoatra* (FW.) TH. FR. Lich. Scand. p. 460. I have examined a Finnish plant and found a rather pale brown epithecium, more olive-coloured if KOH was applied, and thick, incrassated paraphyses, about 4 (—5)  $\mu$  thick at their apices (in KOH). VAINIO writes "epithecium aeruginoso-fuligineum aut aeruginoso-fuscescens" (l. c. p. 196).

##### 65. *Lecidea lulensis* (HELLB.) TH. FR.

Disko: Ujaragssugsuk. — Ritenbenk (? , label only a datum which was almost illegible, either Ritenbenk or Godthaab).

It is an addition to the lichen flora of Greenland, if not the above mentioned *Lecidea leucophaea* plants should belong here, I have not seen them. — In Novaya Zemlya *Lecidea lulensis* is quite common, and to judge from the (unpublished) collections from Spitsbergen and the North East Land it is still more common there, so this Greenland find was only to be expected.

##### 66. *Lecidea obnubila* TH. FR. et HELLB.

Godthaab. — Disko: Mellemfjorden and Malingiaq. TH. FRIES had

evidently been interested in this species, for there was a considerable number of plants.

The plants agree to the point with TH. FRIES'S description in Lich. Scand. p. 459: the tumidous, leaden-coloured areolae, the black disk of the apothecia with a persistent margin, the purplish-black excipulum, more violet if KOH is applied, the uncoloured hypothecium (easily confused with the uncoloured upper part of the excipulum, upon which it is resting), the more or less dark, aeruginose upper part of the hymenium, paraphyses not much incrassated, in KOH about  $2.5\ \mu$  at their apices, spores (very rare)  $10\text{--}13 \times 5\ \mu$ , pycnoconidia arcuated,  $16\text{--}20\ \mu$ . The identity with *Lecidea obnubila* TH. FR. et HELLB. is, in my opinion, unquestionable.

VAINIO has identified this species with *Lecidea subplumbea* ANZI (Lich. Lang. No. 573). But as already stated in my paper on the Novaya Zemlya lichens, 1928, p. 111, the type plant of ANZI has an uncoloured excipulum, and no violet colour by KOH. I attribute a specific importance to this difference, as did also TH. FRIES himself.

VAINIO also quotes *Lecidea tumidior* NYL. as a synonym (Lich. Fenn. IV, p. 188), and he gives preference to this name, according to his own rules of nomenclature which differ from the generally accepted rules. NYLANDER wrote *Lecanora tenebrosa* \* *tumidior*. The specific name *tumidior* dates from VAINIO Adjum. Lich. Lapp., 1883, p. 88, *Lecidea subplumbea* from ANZI Anal. Soc. Ital. Not. XI, 1868, p. 16 (169). VAINIO refers to *Lecidea inserena* NYL. as a synonym, even this specific name is older than *tumidior*, dating from Flora, 1869, p. 84. VAINIO gave preference to the oldest name, no matter whether it was a specific name, or a name of inferior quality.

"*Lecidea tumidior*", as described by VAINIO, also has a pale excipulum: "intus pallidum vel dilute fuscenscens, extus fuscenscens, KOH leviter rubricosum" (Lich. Fenn. IV, p. 189). I have examined a large part of the Greenland plants, and always found the dark excipulum, described by TH. FRIES.

*Lecidea obnubila* is an addition to the lichen flora of Greenland, but the present plants are not the only finds. In the Copenh. herb. I found plants, collected by PORSILD in Disko Island at Egalúnguit itivnerat, and referred to *Lecidea lithophila* by DEICHMANN BRANTH, other plants from the same locality had been determined as *Lecidea impavida*.

67. *Lecidea Nylanderii* (ANZI) TH. FR.

Disko: Nordfjorden, on decayed wood, very scarce.

Thallus tenuis, subevanescent. Apothecia parva, diam. 0.3—0.4 mm, plana, bene marginata. discus obscurus, fere ater. Hypothecium incol-

ratum, hymenium superne olivaceum, paraphyses cohaerentes, KOH addito cinereo-capitatae. Asci inflati, sporae globosae, diam. 5—6  $\mu$ .

*Lecidea Nylanderi* is an addition to the lichen flora of Greenland.

68. *Lecidea fuscescens* SOMMERST.

Not detected in the present collections, but recorded from Tunugdliarfik in the Julianehaab district on *Betula* (VAHL), further from "Tasermiut Groenl. Orient". (HARTZ 1889, and in Danmark Island in Scoresby Sound. The best plants were, perhaps, the Tasermiut plants, collected on *Juniperus*: apothecia parva, persistenter plana, sporae subglobosae, paraphyses obscure fusco-capitatae, laxius cohaerentes, hypothecium incoloratum. — Whether these determinations are correct, or not, is difficult to say; at least I was unable to obtain the red reaction with paraphenyldiamin.

Sectio **Lecideae Aeneae.**

69. *Lecidea aenea* DUF.

In the Copenh. herb. there is a plant from Nanortalik in the Julianehaab district, collected by EBERLIN. Its areolae and its apothecia are rather small for the species, and its epithecium is "olivaceo-fuliginum". TH. FRIES writes that the epithecium of *Lecidea aenea* is "fuligineo-fuscum vel fuscescens fuliginumve" (Lich. Scand. p. 457), but he describes a plant from Dovre in Norway which "recedit paraphysum apicibus olivaceo-fuligineis fuligineisve", this plant is possibly identical with the Greenland plant. On the whole, I do not venture to contest the determination. — In Grønlands Lichen-Flora another plant is mentioned, from JENSENS Nunatak, but this interesting plant is not found in the Copenh. herb., at least not under the head of *Lecidea aenea*. Should it be a *Lecidea atrobrunnea*?

Sectio **Lecideae Fuscoatrae.**

70. *Lecidea impavida* TH. FR.

var. *Friesiana* MAGN.

MAGNUSSON New and Interesting Swedish Lichens, VII, Bot. Not., 1932, p. 424, and Lich. Sel. Scand. No. 147. — Cfr. also TH. FR. Lich. Scand. II, 1874, p. 529.

Godthaab, rather scarce.

This is the first find of *Lecidea impavida* in Greenland if we exclude the plant which PORSILD found in Disko Island, cfr. *Lecidea obnubila*.

Subgenus **Psora.**

71. *Lecidea demissa* (RUTSTR.) ACH.

Godthaab: Kook Islands or Kitsigsut. — Disko: Mellemfjorden and Lyngmarken. To judge from the very large material in the Copenh. herb.

*Lecidea demissa* must be a common and widely distributed species in Greenland, even if there are no finds from North Greenland where so much lichenological work is still to be done. The known localities, from the Copenh. and the Oslo herb., are: West Greenland. Jakobshavn: Pâkitsoq (VAHL), Christianshaab: Sydostbugten (VAHL 1835), Holsteinsborg (VAHL, Aug. 1832): Amitsuarsuk in Nordre Strømfjord (VAHL), Fredrikshaab: Smallesund (KOLDERUP ROSENINGE), Godthaab (KOLDERUP ROSENINGE): Baals Revier: Nûgársugssuk (VAHL, Aug. 1834), Julianehaab: Tunugdliarfik (VAHL, Sept. 1828), Narssaq (VAHL, Sept. 1829), Karisarsoak (VAHL, July 1829), Ujarasutsuik (VAHL, July 1829). East Greenland: Nanûseq (= Nenese) and Aluk east of Cape Farewell (VAHL, May and July 1829), Nûk (EBERLIN), Akorninarmiut: Eidsdalen (BJØRLYKKE), Scoresby Sound: Denmark Island and Hekla Harbour (HARTZ), Davy Sound: Cape Simpson (LYNGE, in the great fjord system between 72° and 74° n. l. I only found it here), Denmark Harbour (76°46', LUNDAGER).

72. *Lecidea rubiformis* WBG.

Disko Island: Skarvefjæld (GRØNTVED), Godhavn, Blæsedalen, Lyngmarken and Ujaragssugsuk (TH. FR.).

In the Copenh. herb. there are so many plants from the west coast as far north as Upernavik that it is thought unnecessary to give the special localities. It must be one of the commonest of all lichens. As was to be expected the number of finds from the east coast is more limited, but HARTZ collected it extensively in Scoresby Sound, and the present author found it to be extremely plentiful in the fjords between 72° and 74° N., there is no reason to believe that it should be less common in East Greenland. — We have so far no finds from North Greenland.

In old herb. plants the colour often changes into a more reddish. Such plants can be confused with *Lecidea globifera*, they are distinguished from that species by the pale, whitish margin of the squamules. In the Copenh. Greenland herb. the greater part of the "*Lecidea globifera*" material belonged to *Lecidea rubiformis*.

73. *Lecidea globifera* ACH.

It was not found in the present collections. But in the Copenh. herb. there is a plant, collected by VAHL at Ukivik in the Sermilik Fjord, north of Julianehaab, in April, 1830, which I cannot distinguish from *Lecidea globifera*. Another plant, collected by VAHL at Ritenbenk in Aug. 1835, should be compared with *Lecidea globifera*, but I would regard *Lecidea rubiformis* to be the more probable determination. — All the other *Lecidea globifera* plants distinctly belonged to *Lecidea rubiformis*.

74. *Lecidea decipiens* (EHRH.) ACH.

Disko Island: Blæsedalen near Godhavn, several plants were collected.

In the Copenh. herb. I only found two plants from the Godthaab district: Ameralik and Kapisilik, to which DEICHMANN BRANTH adds Igdlorssuit, evidently also in the Godthaab district. — In East Greenland it is certainly much more common. HARTZ collected it extensively in Scoresby Sound: Taagefjord, Røde Ø, Hekla Havn and Danmark Havn. I found it everywhere on calcareous rocks in the great fjord district between 72° and 74° N.

**Species dubiae vel excludendae.**

I have studied the material of the genus *Lecidea* from Greenland in the Copenhagen herbarium, with the exception of the "*Lecidea contigua*" and the species of the *Elaeochroma* section. Some of my observations will be found on the preceding pages, some observations on other species will be here described:

1. *Lecidea confluens* ACH. According to DEICHMANN BRANTH and GRÖNLUND Grønlands Lichen-Flora p. 498 this species is found at 4 localities in West and S.W. Greenland. In the herb. there is now quite a considerable material, referred to this species, also from East Greenland. I have examined all of them, without finding a single plant that could be referred to *Lecidea confluens*.

The greater part of the material is, in my opinion, *Lecidea lapicida* f. *acrustacea* or f. *declinans*. In a few of them the hypothecium is so dark that it quite suggested *Lecidea confluens*, and not *L. lapicida*. But few characters, if any, are more characteristic of *L. confluens* than its "thallus caeruleo- vel fimosocinereus" (TH. FR. Lich. Scand., p. 484), and no such thallus was seen in the Greenland plants.

The rest of the material was referred to *Lecidea pantherina*, *L. aglaea* and *L. paupercula* (or *L. atrobrunnea*?).

2. *Lecidea fusca* (SCHAER.) TH. FR. It was impossible to find any plant that could be referred to that species. A plant from Sermiliarssuk (HARTZ) did not contain anything that could be determined, one from Scoresby Sound (HARTZ) was *Buellia disciformis* var. *muscorum*, two other plants from the Upernavik district were *Lecidea vernalis* with very convex, dark red apothecia (RYDER's expedition).

3. *Lecidea fuscoatra* (L.) TH. FR. One plant is *Lecidea pantherina*, the whole rest *Lecidea atrobrunnea*. — I have myself given a record of *Lecidea fuscoatra* from Greenland: Cape Dalton, leg. TYGE BÖCHER. But that was a mistake which I am glad to correct. A new examination of the plant on a really good section (how necessary are such sections with Crustaceous lichens!) revealed the true nature of the thallus: a very thin healthy crusta, covered with a twice as thick stratum of

necrotized, quite amorphous hyphae. The latter stratum gave no reaction with J, but the lower stratum gave the positive reaction, characteristic of *Lecidea atrobrunnea*. The hypothecium and the excipulum were darker than we are wont to find them in perfectly developed plants, but this plant is evidently not healthy.

4. *Lecidea hilarescens* NYL. There is one plant from Nanûseq (leg. VAHL who wrote Nennese). It is a miserable specimen which I would never have dreamt of determining.

5. *Lecidea lurida* (Sw.) ACH. Recorded from the famous JENSENS Nunatak east of Frederikshaabs Isblink. Unfortunately the plant is not now found in the Copenhagen herb. The determination is highly improbable. *Lecidea lurida* is found "ad terram regionum calcarearum" (TH. FRIES Lich. Scand., p. 413). I have been unable to ascertain the geological nature of the nunatak, but the available information suggests "archaeon rocks", cfr. e. g. the map, p. 232, in the work Greenland, vol. I, Copenhagen 1928. — Another plant from Scoresby Sound (leg. HARTZ) is *Lecidea decipiens*. — There are no other records of it from Greenland.

6. *Lecidea obscurella* (SOMRFT.) NYL. In the Copenh. herb. there is a plant which EBERLIN collected at Tasermit, det. DEICHMANN BRANTH: "*Biatora obscurella* SOMRFT., *Lec. Cadubriæ*". These two species are not synonyms, the former has a "crusta tenuissima, saepissime obsoleta", the latter a "crusta granulosa". In my opinion the present plant is a Microfungus, there is no visible thallus, no gonidia, anyhow it differs from *Lecidea obscurella* in its coherent paraphyses, the said species has "paraphyses sat laxe cohaerentes, fusciscenti-capitatae" (TH. FR. Lich. Scand. II, p. 467).

7. *Lecidea parasemella* NYL. Upernavik (VAHL Aug. 1834): Hymenium superne smaragdulum, hypothecium incoloratum, paraphyses facillime liberae, validiusculae, apice levissime solum clavatae. Asci late saccati, 17—18  $\mu$  crassi, sporae ellipsoideae, 12—18  $\times$  7—8  $\mu$ . The plant is undoubtedly *Lecidea Wulfenii* (HEPP) ARN., cfr. *Lecidea parasemella* NYL. in VAIN. Lich. Fenn. IV, p. 276.

8. *Lecidea rhaetica* HEPP var. *hyperborea* NYL. a. Ikersagssuaq, not located, (leg. VAHL, undated, det. NYLANDER Ad Lichenogr. Groenl. quaedam addenda, Flora 1862, p. 82): Thallus albidus, crassus, irregulariter verrucoso-areolatus, cephalodiis pallide rosaceis crebre instructus Apothecia immersa, discus ater, epruinosis, hypothecium fuliginium, hymenium superne dilute olivaceo-fusciscens, sporae majusculae, 25—30  $\times$  12—15  $\mu$ , episporium satis crassum. — Medulla J —, hymenium J caerulescens, thallus KOH non tingitur, nisi dilutissime flavescens, cortex CaCl<sub>2</sub>O<sub>2</sub> rubescens. Paraphenylendiamino non tingitur. These data must refer the plant to *Lecidea pelobotrya*.

b. Igaliko, two plants (VAHL, Aug. 1829). Habitually they resemble

*Lecanora frustulosa*, with large white, osseo-albidous verrucae. But the plants are KOH —. They differ so much from *Lecidea rhaetica*, the thallus of which habitually resembles that of *Lecidea tessellata* that the original determination looks very improbable. — It is doubtful whether such plants can be determined.

9. *Lecidea turgidula* FR. Isortoq Fjord "ad ligna vetusta" (VAHL 1832, August). Thallus tenuis, granulatus,  $\text{CaCl}_2\text{O}_2$  —. Hymenium circ.  $70\ \mu$  altum. Epithecium cyanescens, hypothecium dilute flavescens, paraphyses haud concretæ, p. p. facile discretæ, sporæ late ellipsoideæ,  $10-12 \times 6-7.5\ \mu$ .

The rather large, broad spores, and the free paraphyses exclude *Lecidea turgidula* and refer the plant to *Lecidea glomerulosa* (DC.) STEUD.

10. *Lecidea uliginosa* (SCHRAD.) ACH. There were several plants in the Copenhagen herb., referred to this species, but I was unable to see *Lecidea uliginosa* in any of them. — One of them has been described as a n. sp. in the present paper: *Lecidea pachydermatica* LYNGE (Disko Bay: Sydostbugten, leg. HARTZ).

#### Mycoblastus NORM.

1. *Mycoblastus sanguinarius* (L.) NORM.

var. *alpinus* (FR.) STEIN.

Godthaab (Nûk) and Kitsigsut (Kook Islands).

The hymenium is intensely smaragdine, the spores very pachydermatous,  $50-62 \times 28-30\ \mu$  in size. — *Mycoblastus sanguinarius* is P— (MALME Lich. Suec. No. 111).

This is an interesting find, for there was formerly only one find from Greenland, Nanortalik in the Julianehaab district (leg. VAHL), all the finds on mosses.

#### Catillaria (ACH.) TH. FR.

*Clavis specierum.*

1. Hypothecium incoloratum, etiam cum excipulo, paraphyses facile discretæ, superne valde incrassatæ, obscuratæ, ad rupes calcareas.

2. *C. groenlandica* LYNGE n. sp., p. 83

1\*. Hypothecium obscurum, fuscum, etiam cum excipulo.

2. Ad rupes non calcareas, thallus evanescens, paraphyses indistinctæ. . . . . 1. *C. chalybeia* (BORR.) MASS., p. 82

2\*. Ad rupes calcareas, thallus crassiusculus, paraphyses haud concretæ, superne atro-clavatæ. . . 3. *C. arctica* LYNGE n. sp., p. 84

1. *Catillaria chalybeia* (BORR.) MASS.

Disko: Nordfjorden and Storøen (not located, evidently near Malingiaq, perhaps Qeqertaq Island), ad rupes non calcareas.

Thallus evanescens. — Apothecia parva, diam. 0.2—0.3 mm, nume-

rosa, sed satis dispersa, atra, etiam madefacta, epruinosa, primum planiuscula, deinde mox convexiuscula, margine evanescenti. Excipulum fuscum, etiam cum hypothecio, pars superior hymenii eodem colore. Paraphyses valde indistinctae, superne ( $\text{HNO}_3$ ) clavatae, asci late saccati usque ad subglobosi, octospori. Sporae incoloratae, medio leviter constrictae,  $12-14 \times 4-5 \mu$ . — Gonidia viridia.

Hymenium J vinosum, KOH et  $\text{HNO}_3$  subimmutatum.

Referred to this species, and not to *C. subnitida* or to *C. athallina*, on account of the colour of the hymenium which is brown and not smaragdine (cfr. VAIN. Lich. Fenn., IV, p. 420). There is no trace of smaragdine in the hymenium of the present species. I have, however, examined Swedish plants of *C. chalybeia*, collected and determined by very reliable lichenologists, such as MALME and others, and always found a smaragdine colour, at least in the lower part of the hymenium. HEPP Flecht. Eur. No. 13, quoted by VAINIO under the head of *C. chalybeia*, has a very faint smaragdine tinge.

The section is evidently critical. Having no access to types, I am obliged to content myself with the above remarks.

2. *Catillaria groenlandica* LYNGE n. sp. (Plate IV, fig. 1).

Nûgssuaq Peninsula: Atanikerdluk, ad rupes calcareas.

Thallus vulgo bene evolutus, areolatus, rarius tenuissimus, cum calce molli subconfusus, areolae subsquamaeformes, crenatae,  $0.5-0.8 \text{ mm}$  latae, discretae vel approximatae, pallide cinereo-flavescentes, subnitidae.

Apothecia numerosa, sed dispersa, mediocria, diam.  $0.5-0.6 \text{ mm}$ , primum adpressa, plana, tenuiter marginata, deinde mox magis elevata, convexa, emarginata, discus epruinosis, omnino ater, etiam madefactus. Excipulum gonidiis destitutum, omnino incoloratum, etiam cum hypothecio. Hymenium  $55-65 \mu$  altum, superne inaequaliter et plus minusve intense olivaceo-obscuratum (subfuligineum), inferne incoloratum. Paraphyses facile discretae, validae,  $2-2.5 \mu$  crassae, superne valde incrassatae,  $5-6$ , usque ad  $7 \mu$ , obscure clavatae vel saepius capitatae, indivisae vel plus minusve ramosae. Asci saccati,  $12-13 \mu$  crassi, octospori. Sporae incoloratae, uniseptatae,  $(8-10-12(-15) \times 4-5(-7) \mu$ , medio (KOH) constrictae.

Hymenium J persistenter caerulescens, KOH immutatum,  $\text{HNO}_3$  pulchre violascens. Thallus P—.

Gonidia viridia, rotundata, diam.  $12-15 (17) \mu$ , saepe endosporas continentia.

*Catillaria lenticularis* (ACH.) TH. FR. was divided into two separate species by VAINIO (Lich. Fenn., IV, p. 420 (427) and 421 (435), viz. *C. chalybeia* (BORR.) MASS., from hard rocks, distinguished i. a. by a dark hypothecium, and *C. lenticularis* (ACH.) LIND., from calcareous

rocks, distinguished from the former species i. a. by an entirely uncoloured hypothecium. It is evident from the description that *C. chalybeia* in that limitation is out of the question for the present species.

*Catillaria lenticularis*, s. a., has very small, appressed apothecia, about 0.2 mm in size, with a brownish or reddish disk, at least when moistened. And it is an athalline, almost endolithic plant, cfr. ARNOLD Lich. Exsic. No. 1393.

3. *Catillaria arctica* LYNGE n. sp. (Plate IV, fig. 2).

Disko: Ujaragssugssuk, ad rupes calcareas.

Crusta crassiuscula, rimoso-areolata, areolis angulatis, 0.5—1.0 mm latis, subcrenatis vel, si thallus minus bene evolutus est, tenuioribus et minus distincte limitatis. Thallus impure dilute flavidus, osseo-nitidus, sorediis isidiisque destitutus.

Apothecia numerosa, sed satis dispersa, arcte adpressa, diam. 0.5—0.8 (—1.0) mm, diu vel persistenter planiuscula, discus ater, etiam madefactus, epruinosis, margine parce prominenti, crassiusculo, deinde subevanescenti circumdatus. Excipulum obscuratum, subfuliginium, in parte interiori violascenti-fuliginium, etiam cum hypothecio, gonidiis destitutum. Hymenium angustum, 45—50  $\mu$  altum, paraphyses haud concretæ, ramosæ et superne atro-capitatae vel atro-clavatae. Asci inflato-pyriformes, saepe steriles, membrana ascorum superne valde incrassata. Sporae dyblastae, incoloratae, medio plus minusve constrictae, apice late rotundatae, 9—11  $\times$  5  $\mu$ .

Pycnides non visae.

Medulla J non caerulescens, P—, hymenium J e caeruleo mox vinosum, hymenium KOH subimmutatum, excipulum KOH leviter fusco-violascentis, etiam cum hypothecio, HNO<sub>3</sub> partes coloratae pulchre roseo-violascentes.

Its rather friable substratum consists of sand or quartz crystals, conglutinated by a calcareous substance. The cracks between the areolae are quite uncoloured.

Habitually it much resembles *C. groenlandica*, from which it chiefly differs in its dark excipulum and hypothecium. Its hymenium is very low, it quite suggests a *Bacidia*, it is about 10—15  $\mu$  lower than in the former species.

The genus *Catillaria* is not well represented in the Arctic. My Novaya Zemlya collection only contained one species. The number of plants in the very large Svalbard collections, at present under determination, is more considerable, but the species have not yet been determined.

Formerly no species of *Catillaria* was known from Greenland, all these 3 species are additions to the lichen flora of that continent. ДЕЙЧ-

MANN BRANTH and GRÖNLUND recorded *Catillaria proximella* (Grönl. Lich. Flora, p. 497), but this species is now referred to the genus *Melaspillea* (vide Zahlbr. Cat. Lich. II, p. 281).

**Bacidia** (DE NOTRS.) ZAHLBR.

*Clavis specierum.* (Species omnes muscicolae).

1. Thallus citrinus, ambitu abrupte limitatus, hymenium J non reagens (Subgen. *Arthrorhapis*) 6. *B. alpina* (SCHAER.) VAIN., p. 87
- 1\*. Thallus non citrinus, vulgo plus minusve obscure cinerascens, hymenium saltum primum J caerulescens.
  2. Apothecia pallide testacea, sporae (normaliter) triseptatae, 13—20 × 4—6  $\mu$ . . . . . 3. *B. sphaeroides* (DICKS.) ZAHLBR., p. 86
  - 2\*. Apothecia obscurata.
    3. Sporae elongatae vel fusiformes, triseptatae, apothecia mox convexa.
      4. Sporae 16—28 × 5—6  $\mu$ , apothecia diam. 0.5—0.8 mm.
        4. *B. microcarpa* (TH. FR.) LETTAU, p. 86
      - 4\*. Sporae 15—20 × 2.5—3  $\mu$ , apothecia 0.2—0.5 mm.
        5. *B. subfuscula* TH. FR., p. 86
    - 3\*. Sporae aciculares vel bacilliformes, apothecia plana.
      4. Apothecia pruinosa, hymenium 60—65  $\mu$  altum, sporae vulgo tri-septatae. . . . 2. *B. illudens* (NYL.) LYNGE, p. 85
      - 4\*. Apothecia epruinosa, hymenium 45—50  $\mu$  altum, sporae multi-septatae. . . . 1. *B. muscorum* (SW.) MUDD., p. 85

1. *Bacidia muscorum* (SW.) MUDD.

Disko: Uivfaq (Blaafjeld), incrustating dead mosses, scarce.

2. *Bacidia illudens* (NYL.) LYNGE, comb. nov.

*Lecidea illudens* NYL. Addenda nova, Flora, 1870, p. 34.

*Bacidia atrogrisea*  $\beta$  *irrorata* TH. FR. Lich. Arct., 1860, p. 180.

*Bacidia atosanguinea*  $\delta$  *irrorata* TH. FR. Lich. Scand., 1874, p. 355.

Disko: Nordfjorden, several plants, incrustating dead mosses.

Apothecia diam. 0.5—0.7 mm, deinde usque ad 2 mm lata, adpressa, primum urceolata vel concaviuscula, deinde persistenter plana, margo primum crasso, deinde tenuius, sed persistens, intense caesio-pruinosis. Excipulum fuscorubescens vel leviter in violascentem vergens, etiam cum hypothecio. Cortex excipuli hyphis superficiei perpendicularibus formatus. Hymenium 65—70  $\mu$  altum, superne aeruginosum. Paraphyses haud concreatæ, septatae, tenues, apicem versus distincte clavatae (circ. 4  $\mu$ ). Asci saccati, octospori, sporae bacillares, rectae vel subrectae, apicibus rotundatae, incoloratae, normaliter tri-septatae, sed longiores interdum multi-septatae, (23—) 25—35 (—44) × 2.5—3  $\mu$ .

Hymenium J e caeruleo obscure vinosum, KOH subimmutatum, HNO<sub>3</sub> articuli exteriores paraphysum roseo-violascentes colorantur.

It seems to me that this plant deserves a specific rank. Its pruina is very characteristic, as is also the very thick margin of the young apothecia, giving them a concave appearance. A section shows us a considerably higher hymenium than in *B. muscorum*, 60—65  $\mu$  against 45—50  $\mu$ , the difference is however apparently bridged over by intermediate stages (it is necessary to section full-grown apothecia). In the numerous Arctic plants examined I nearly always found tri-septated spores against the normally multi-septated spores of *B. muscorum*, and its spores are cylindrical or nearly so with rounded apices, against the apiculated spores of *B. muscorum*. Only quite short spores of *B. illudens* are perceptibly thicker at their middle parts. Apart from the spores which have got the axial position in the asci the spores are slightly curved in the asci, converging at either end of the ascus, free spores are, accordingly, not always quite straight.

TH. FRIES'S "*Bacidia atosanguinea* (SCHAER.) TH. FR." is a very comprehensive species. In VAIN. Lich. Fenn., II, 154—162 (sequ.) we find it divided into two species, viz. *B. affinis* (ZWACKH) VAIN. and *B. muscorum* (Sw.) ARN., distinguished by their spores which are "bacillares v. cylindricae" in the former species and "aciculares v. alterum apicem versus attenuatae" in the latter species. VAINIO'S *B. muscorum* also includes "var. *irrorata* (TH. FR.) VAIN.", the spores of which approach *B. affinis* more than *B. muscorum*, at least in Arctic plants.

3. *Bacidia sphaeroides* (DICKS.) ZAHLBR.

Disko: Godhavn, several plants, spreading over dead mosses.

4. *Bacidia microcarpa* (TH. FR.) LETTAU.

Godthaab: Kitsigsut (Kook Islands), uncertain determination on account of insufficiently developed spores. — Disko: Blaafjeld (Uivfaq), several plants.

5. *Bacidia subfuscata* TH. FR.

Disko: Nordfjorden, very scarce, only a few apothecia. — Ritenbenk.

The apothecia are very small, not exceeding 0.5 mm in diam., too small for *B. microcarpa*. The excipulum is brownish-violet, and more distinctly so if KOH is applied, the hypothecium is of much the same colour, although paler. The hymenium is about 50  $\mu$  high, dark here and there at the upper part, the paraphyses are not concrete, the uncoloured spores are straight, cylindrical, tri-septated, 15—20  $\times$  2.5—3  $\mu$ , too narrow (and rather short) for *B. microcarpa*. — The plant from Ritenbenk had a pale hypothecium, it was better developed, and the determination is, perhaps, more unobjectionable.

The colour of the excipulum and the hypothecium is against the determination, but the plant was poorly developed, which made an unobjectionable determination difficult, if possible.

6. *Bacidia alpina* (SCHAER.) VAIN.

Langesund: Sarqardlit (GRØNTVED). — Disko: Lyngmarken, Blæsedalen (TH. FR.), Skarvefjæld (GRØNTVED), Blaa fjeld (Uivfaq), (TH. FR.).

Only one fertile plant was detected, at Sarqardlek: Hymenium superne aeruginosum, sporae aciculares, elongatae, e. g. 40  $\mu$ , multi-septatae. — The others being sterile I cannot exclude the possibility of *B. Anziana*, with three-septated spores. — It seems to me that the habitus of the plants must exclude *B. flavovirescens*, sometimes recorded from Greenland.

This species is supposed to be common, at least in many parts of Greenland. Dr. GELTING made some sociological studies in East Greenland and brought back an astonishing number of plants of this species.

*Bacidia alpina* stains slightly orange by paraphenyldiamin.

Several species of *Bacidia* have been recorded from Greenland. It is impossible to quote them without a careful microscopical examination.

*Bacidia sphaeroides*. NYL. determined a plant of this species (var. *subduplex*, collected on soil at Sarqaq in West Greenland, DEICHMANN BRANTH and GRØNLUND, Grønl. Lich. Flora, p. 494). This is the single former record, I found no plant in the herb. Copenhagen. Possibly it is not so rare, at least some plants, referred to *Lecidea vernalis*, should have their spores examined.

*Bacidia flavovirescens*. I might suggest that the records of this species stand for *B. alpina*.

**Toninia** (MASS.) TH. FR.

*Clavis specierum*. (Species omnes muscicolae vel terricolae).

1. Sporae dyblastae (Sect. *Thalloidima* (MASS.) TH. FR.).
2. Squamulae arcte adpressae, tenues vel crassitudine mediocri, ambitu lacinulato-effiguratae vel crenatae.
  3. Apothecia plana, minuta (0.2—0.4 mm), in acervulos suborbiculares densissime conglomerata.
    3. *T. cumulata* (SOMRETT.) TH. FR., p. 89
  - 3\*. Apothecia convexa, majores, diam. usque ad 0.7—0.8 mm, numerosa, sed magis dispersa.
    6. *T. lobulata* var. *Theobaldi* (KBR.) LYNGE, p. 91
- 2\*. Squamae non effiguratae, thallus ambitu et medio uniformis.
  3. Squamae majores, bullatae, pruinosae, hypothecium saltem superne rubricosum.
    4. *T. caeruleonigricans* (LIGHTF.) TH. FR., p. 90

- 3\*. Squamulae minores, epruinosa, hypothecium (sub)incolatum.
4. Thallus albidus vel cinerascens, bullato-verrucosus, verrucis parvis . . . . . 1. *T. squalescens* (NYL.) TH. FR., p. 88
- 4\*. Thallus lurido-fuscescens, squamulae planae, arcte adpressae . . . . . 2. *T. groenlandica* LYNGE, p. 88
- 1\*. Sporae tetra- vel pleioblastae (Sect. *Eutoninia* TH. FR.)
2. Thallus satis crassus, squamulis crenatis v. crenato-lobatis, apothecia mox convexa, sporae subfusiformes: 12—25 × 3—6 $\mu$ .
6. *T. lobulata* (SOMRFT.) LYNGE, p. 90
- 2\*. Thallus tenuis, minute squamulosus, apothecia primum plana, sporae subaciculari-fusiformes: 17—25 × 3—4 $\mu$ .
5. *T. fusispora* (HEPP) TH. FR., p. 90

1. *Toninia squalescens* (NYL.) TH. FR.

TH. FR. Lich. Scand., 1874, p. 340, ubi syn.

Disko: Mellemfjorden, on *Grimmia*, sp.

Thallus albidus vel cinerascens, granulato-verruculosus vel subsquamulosus.

Apothecia primum adpressa, deinde leviter elevata (ob thallum erosum ?), diam. 0.5—0.8 mm, mox convexa, atra, etiam madefacta, epruinosa. Excipulum subincolatum vel hinc inde olivascens, hyphis radiantibus formatum, hypothecium incolatum, hymenium 70—75 $\mu$  altum, dilute flavo-fuscescens, interdum leviter in violascentem vergens, superne anguste subfuligineum. Paraphyses indistinctae, cohaerentes, KOH si addito facilius discretae, tenues, superne (KOH) leviter solum clavatae. Asci pyriformes, membrana superne valde incrassata. Sporae (male evolutae) octonae, incolatae, dyblastae, septo plus minusve constrictae, apice rotundatae, 9—12 × 4.5—5 $\mu$ .

Hymenium J e caeruleo mox decoloratur, saltem gelatina, asci magis persistenter colorantes, hymenium KOH subdecoloratur. Thallus P—.

I have compared the Greenland plants with Swedish plants, determined by MALME and MAGNUSSON (e. g. MALME Lich. Suec. No. 314), I think that they agree perfectly. In MALME 314 I found slightly longer, up to 15 $\mu$ , narrower, oblong spores, not constricted at the septum, TH. FRIES states 7—10 × 4—6 $\mu$ .

2. *Toninia groenlandica* LYNGE, n. sp.

Disko: Blæsedalen, in considerable abundance, on the soil.

Thallus squamulosus, squamae lurido-fuscescens, planae vel deinde convexae, arcte adpressae, saepe plus minusve dispersae,

diam. 1—2 mm, nitidiusculae, secundum marginem rotundatae vel levissime crenatae.

Apothecia numerosa, dispersa vel approximata, primum plana et marginata, deinde convexa, immarginata, atra, nuda, diam. usque ad 1 mm. Excipulum fuscofuligineum, hypothecium pallidius coloratum. Hymenium strato amorpho incolorato tectum, in parte superiori flavo-fuscescens vel sordide olivaceo-fuligineum, hymenium angustum: 50—55  $\mu$ . Paraphyses arcte cohaerentes, superne clavato-incrassatae (3—4  $\mu$ ). Sporae (saepe carentes) octonae, incoloratae, dyblastae, septo constrictae, cellulis inaequalibus, 10—13  $\times$  4—5  $\mu$ .

Hymenium J rubescens. Thallus P—.

Firstly I had to consider whether this species should be a *Toninia* or a *Catillaria* of the *Biatorina* section. The difference between these two genera is not greater than between *Psora* and *Eulecidea*, the generic distinction between *Toninia* and *Catillaria* is more due to usus than to logic.

The spores of the present species with their very unequal cellulae suggest a *Catillaria* rather than a *Toninia*, but the distinctly squamulose thallus is in favour of the latter genus. Habitually it resembles *T. squarrosa*, but it has larger squamules and quite different, one-septated spores, *T. squarrosa* has three-septated, acicular spores, 26—46  $\times$  2—4  $\mu$  (TH. FRIES Lich. Scand. p. 332). In its own section it is, perhaps, nearest related to *T. tristis* TH. FR., but that species has an intensely ferrugineous colour and longer and narrower spores, hardly constricted at the septum ("cylindrico- vel fusiformi-oblongae", TH. FRIES Lich. Scand. p. 341). — *Toninia squalescens* has a grey thallus with smaller and more bullate squamules, otherwise the structure of the apothecia agrees quite well with *T. groenlandica*.

We would not expect to find an Italian species, such as *T. tabacina*, in Greenland, and my species must be different from it. *Toninia tabacina* (Anzi Lich. Ital. sup. No. 243) has bullate squamules, almost as in *T. caeruleonigricans*, and the structure of its apothecia is quite different, upper part of the hymenium violet, paraphyses easily discrete, spores not constricted at the septum, and narrower, fusiform, I have measured 16—19  $\times$  4  $\mu$ .

### 3. *Toninia cumulata* (SOMRFT.) TH. FR.

Disko: Lyngmarken and Godhavn, at the latter locality many plants.

The apothecia are much infested by a parasitic fungus, as they often are. I did my best to find spores, but it was all in vain. — Thallus P—.

4. *Toninia caeruleonigricans* (LIGHTF.) TH. FR.

Disko: Blæsedalen and Ritenbenk coal mine.

There were several plants in the collection, this species is generally plentiful when found. — Neither this species, nor *T. candida*, stains perceptibly with paraphenyldiamin.

5. *Toninia fusispora* (HEPP) TH. FR.

TH. FRIES Lich. Scand. II, 1874, p. 334.

Disko: Nordfjorden, on mossy soil.

Apothecia aterrима, majuscula, diam. usque ad 2 mm, diu plana, margo primum crenatus, deinde in apotheciis convexis evanescens. Excipulum fusco-rubescens, etiam cum hypothecio. Hymenium  $65\ \mu$  altum, superne obscure smaragdulum. Sporae cylindrico-oblongae vel vulgo cylindricae, triseptatae, rarissime quinque-septatae et rarissime altero apice caudatae,  $17-25 \times 3-4\ \mu$ .

Hymenium J e caeruleo vinosum, KOH superne smaragdulum,  $\text{HNO}_3$  pulchre caeruleo- vel roseo-violascens.

Habitually the apothecia call to mind *Bacidia muscorum*, they long remain plane, appressed, up to 1 mm (or slightly more) in diam. But the *Bacidia* has multi-septated spores and a lower hymenium. — I have also compared these plants with *Bacidia microcarpa* (TH. FR.) and with *B. obscurata* (SOMRFT.). The former species has very convex to globose apothecia, rather small (0.5—0.8 mm in diam.) and an uncoloured excipulum, the latter species also has an uncoloured (or very pale) excipulum and hypothecium.

The thallus of the Greenland plants has suffered considerably, but it suggests a squamulose *Toninia*, rather than a crustaceous *Bacidia*. The three-septated, narrow spores and the dark hypothecium indicate *T. fusispora* or *T. aromatica*. — If the thallus had been better developed the determination would not have been difficult. The thin thallus and the cylindrical spores are in favour of *T. fusispora*, but the thallus is not "albus vel luteolo-albus", as in that species, it is more greyish. We must, however, bear in mind that the plant was collected in 1871. — I have not seen *T. aromatica*  $\beta$  *cervina*. It has narrower spores than the type of the species. But the present plants cannot be called "cervinus".

VAINIO is of opinion that *Toninia fusispora* "in *T. aromaticam* transire videtur" (Lich. Fenn. II, 1922, p. 135), and it is quite probable that he is right.

6. *Toninia lobulata* (SOMRFT.) LYNGE.

LYNGE Lich. Bear Island, 1926, p. 34, Lich. Novaya Zemlya, 1928, p. 127, pl. II, fig. 7—9, ubi syn.

Disko: Nordfjorden and Malingiaq, at the former locality in considerable abundance.

Its spores are more variable than in most other species of this genus. We often find one-septated spores, such plants have been named *Catillaria Theobaldi* by KÖRBER. But no other distinguishing characters being known to me, I only regard this a forma, hardly worth mentioning. It is common in the Arctic. — *Toninia lobulata* is P —.

Several species of *Toninia* have been recorded from Greenland, in herb. Copenh. there are 6 different species. But without a careful microscopical study of the plants I do not venture a reference to them.

### Lopadium KÖRB.

#### 1. *Lopadium pezizoideum* (ACH.) KÖRB.

var. *coralloidea* (NYL.) TH. FR.

Godthaab: Kookøerne (Kitsigsut). — Disko: Godhavn (TH. FR.), Skarvefjæld (GRØNTVED), Mellemfjorden and Blaafjeld (Uivfaq) (TH. FR.).

Very common, at least in some places it must be very plentiful, at Blaafjeld TH. FRIES collected more than 30 specimens. In some of these old plants the thallus has faded rather roughly, or it is almost crustaceous. But all plants with a well preserved thallus belong to *coralloidea*, which I am inclined to regard a proper species. — It is P —.

#### 2. *Lopadium fecundum* TH. FR.

Disko: Blaafjeld (Uivfaq).

Having detected one plant with octosporous asci I had to reexamine microscopically a great part of my *Lopadium* material. It only gave me three plants of this species, suggesting a rare and scarce plant. I cannot distinguish the two species habitually. — *Lopadium fecundum* is P —.

The former species is well represented from Greenland in the Copenh. herb., as was to be expected. The latter is an addition to the lichen flora of Greenland.

*Lopadium fuscoluteum* was not found in the present collections. There are two plants in the Copenh. herb., one of them simply labelled Greenland, the other Ujaragssugsuit (VAHL). — It is P —.

### Rhizocarpon (RAM.) TH. FR.

In 1932 I published a paper on the *Rhizocarpons* of Greenland (A Revision of the Genus *Rhizocarpon* (Ram.) TH. FR. in Greenland, Skrifter om Svalbard og Ishavet, No. 47, 1932, 1—30). It was based on the entire material of the Bot. Mus. of Copenhagen, on the (present) collection of TH. FRIES, and on my own collection from North East Greenland in 1929.

TH. FRIES'S collection was not then definitively determined. Since

1932 I have also received lichens, collected by Dr. JOHANNES GRØNTVED in West Greenland 1932, and some other minor collections. The present paper therefore contains considerable additions to my paper of 1932.

*Clavis specierum.*

1. Sporae persistenter dyblastae. . . . . Sect. *Catocarpus* TH. FR.
2. Thallus lutescens, raro partim dealbatus.
  3. Medulla KOH e flavo rubescens, crystallae fasciculatae praecipituntur. . . . . 1. *Rhiz. chionophilum* TH. FR., p. 93
  - 3\*. Medulla KOH haud rubescens.
    2. *Rhiz. occidentale* LYNGE, p. 93
- 2\*. Thallus cinereus vel fuscescens.
  3. Sporae maturae obscuratae.
    4. Thallus KOH sanguineo-rubescens.
      3. *Rhiz. Copelandii* (KBR.) TH. FR., p. 94
  - 4\*. Thallus KOH haud sanguineo-rubescens.
    5. Hymenium superne KOH roseo-violascens.
      6. Thallus areolatus vel verrucosus, sporae majores: 30—35 × 13—16  $\mu$ .
        4. *Rhiz. badioatrum* (FLK.) TH. FR., p. 94
      - 6\*. Thallus peltato-squamosus, sporae minores: 22—28 × 12—14  $\mu$ .
        5. *Rhiz. rittokense* (HELLB.) TH. FR., p. 94
    - 5\*. Hymenium superne KOH smaragdulum vel fuliginum. . . . . 6. *Rhiz. jemtlandicum* MALME, p. 95
  - 3\*. Sporae etiam maturae incoloratae.
    4. Medulla KOH e flavo rubescens, sporae 15—20 × 7.5—8  $\mu$  . . . . . 7. *Rhiz. discoense* LYNGE, p. 95
    - 4\*. Thallus KOH haud rubescens.
      5. Hyphae medullares J caerulescentes, hymenium superne violaceo-nigricans.
        8. *Rhiz. polycarpum* (HEPP) TH. FR., p. 95
      - 5\*. Hyphae medullares J haud caerulescentes, hymenium superne smaragdulo-nigricans.
        6. Thallus cinerascens vel rufescens, apothecia plana, margine elevato cincta.
          9. *Rhiz. Hochstetteri* (KBR.) VAIN., p. 95
        - 6\*. Thallus albidus vel plumbeus, apothecia deinde convexa immarginataque.
          10. *Rhiz. expallescens* TH. FR., p. 96
  - 1\*. Sporae demum murales vel tetrablastae (submurales). Sect. *Eurhizocarpon* STIZ.
    2. Thallus lutescens, rarius partim subalbidus.
      11. *Rhiz. geographicum* (L.) DC., p. 96
    - 2\*. Thallus cinereus vel fuscescens.

3. Sporae maturae obscuratae.  
 4. Sporae octonae, rarius quaternae, medulla J caerule-scens. . . . . 12. *Rhiz. grande* (FLK.) ARN., p. 97  
 4\*. Sporae binae vel singulae, medulla J ÷.  
     13. *Rhiz. disporum* (NAEG.) MÜLL. ARG., p. 97  
 3\*. Sporae etiam maturae incoloratae.  
 4. Hymenium superne KOH roseo-violascens, hyphae medullares J caerulescentes.  
     14. *Rhiz. distinctum* TH. FR., p. 97  
 4\*. Hymenium superne KOH non roseo-violascens, vulgo plus minusve intense smaragdulum; hyphae medullares J ÷.  
 5. Thallus fuscescens vel cinereo-fuscescens, haud farinosus vel cretaceus, sporae murales, sed interdum diu tetrablastae.  
 6. Sporae 25—30 × 13—14 μ.  
     15. *Rhiz. obscuratum* (ACH.) MASS., p. 97  
 6\*. Sporae 13—16 × 8—9 μ.  
     16. *Rhiz. microsporum* LYNGE, p. 97  
 5. Thallus albidus, farinosus, sporae typice murales.  
 6. Apothecia adpressa, sporae (25—) 30—34 × 12—16 μ. . . . . 17. *Rhiz. petraeum* (WULF.) MASS., p. 98  
 6. Apothecia elevata, sporae 20—22 (—24) × 10—13 μ. 18. *Rhiz. pseudospireum* (TH. FR.) LYNGE, p. 99

As is well known the medullary reaction with J and with KOH is of considerable specific importance in the genus *Rhizocarpon*. We might, perhaps, have expected that also the reaction with paraphenyldiamin should be equally important. All the Greenland species, known to me, were examined, but the result was little satisfactory.

All the yellow species stained more intensely yellow to orange, they evidently contain some chemical substance in common. — In *Rhiz. Copelandii* and *Rhiz. eupetraeum* I found an intensely yellow reaction, changing into orange after some time. — In all the other species the reaction of the cortex was negative, in the medulla a faintly yellow colour was observed in some species, e. g. in *Rhiz. disporum*.

1. *Rhizocarpon chionophilum* TH. FR.

Godthaab and Nipisat near Godthaab. — Disko: Godhavn (LAGERKRANTZ), Malingiaq.

West Greenland: Julianehaab: Igaliko (VAHL, herb. Copenh. s. n. *Lecidea armeniaca*).

2. *Rhizocarpon occidentale* LYNGE. (Plate X, fig. 4).

LYNGE, A Revision of the Genus *Rhizocarpon* in Greenland, 1932, p. 10, 20.

Disko: near Godhavn (LAGERKRANTZ).

The discrete areolae rest on a very conspicuous black hypothallus. This is the case with all the plants which I have seen. In the East Greenland plants, collected by me, the areolae are rugose, on account of minute reticulated cracks in the cortex with slightly convex "micro-areolae" between the cracks, as is so often the case with *Rhiz. chionophilum*. But the West Greenland plants had quite smooth areolae.

It is a very good species, characterized by a reddish hypothecium (more intensely reddish if KOH is applied), a very dark blackish-violet epithecium, more smaragdine by KOH, conglutinated paraphyses, 2.5—3  $\mu$  thick at their apices, a yellowish medullary reaction by KOH, and especially by its small spores: in the Disko plants I measured 14—16  $\times$  7.5—8  $\mu$ , in my East Greenland plants 13—18  $\times$  7—9  $\mu$ .

It is an addition to the lichen flora of West Greenland. In East Greenland it is not rare in the fjord district between Cape Simpson in Davy Sound in the south (about 72° N.) and Cape Wynn in the north (a little north of 74° N.). To these localities can be added Danmarks Havn in East Greenland farther north (76°46' N.), collected by LUNDAGER during the Danmark Expedition 1906—08. Unfortunately GALLØE referred this *Catocarpus* to *Rhiz. geographicum* (Lichens from the Danmark Expedition, 1910, p. 191).

3. *Rhizocarpon Copelandii* (KBR.) TH. FR.

Godthaab and Nipisat Harbour near Godthaab.

Widely distributed in Greenland, but evidently more common in some other Arctic regions. I have determined it from more than 20 localities in Spitsbergen (unpublished).

4. *Rhizocarpon badioatrum* (FLK.) TH. FR.

Godthaab, very scarce. — Disko: Malingiaq, very scarce.

A rare species in Greenland, as in other Arctic regions, and evidently very scarce. — The few plants from Malingiaq had a miserably developed thallus, not to be recognized, but the structure of the apothecia agreed fairly well with the present species. The plants suggest a life near the climatic limit of the species.

5. *Rhizocarpon rittokense* (HELLB.) TH. FR.

Godthaab. — Disko: Godhavn (TH. FR. and LAGERKRANTZ), and Sinigfik, fine and typical plants (GRØNTVED), and Nångissat (TH. FR.).

Found here and there in West Greenland, but evidently not common. So far it has not been found in East Greenland and not in the Svalbard (Spitsbergen) region. In spite of a single find in my Novaya Zemlya collection we must regard it a western plant in the Scandinavian mountain flora.

It is often sterile, if so it might be confused with *Lecidea atrobrunnea*, from which it is easily distinguished by the positive J reaction of the medulla in the latter species.

6. *Rhizocarpon jemtlandicum* MALME.

Godthaab and Nipisat near Godthaab. — Nûgssuaq Peninsula: Atâ (GRØNTVED).

Scattered all over the coasts of Greenland, but not supposed to be common. Habitually the plants agree well with Scandinavian plants, as does also the structure of the apothecia: Sporae dyblastae, obscuratae, parvulae, 20—25  $\mu$  longae, hymenium superne aeruginosum, medulla KOH flavescens, sed non deinde rubescens, CaClO<sub>2</sub> ÷.

7. *Rhizocarpon discoense* LYNGE n. sp.

Disko: Sinigfik, on a stone cairn, built of hard, dense rock, giving no CO<sub>2</sub> with HCl, evidently a basaltic rock (GRØNTVED).

Thallus verrucoso-areolatus, areolae rotundatae, diam. 0.3—0.4 mm., discretae, subdiscretae vel hinc inde magis contiguae, hypothallo atro impositae. Thallus cinereus (haud fuscescens), pruina destitutus.

Apothecia numerosa, dispersa, rotundata, diam. 0.5—0.8 mm, atra, epruinosa, sub lente scabrosa, thallum bene superantia, primo depresso convexa margine distincto, sed haud prominenti, circumdata, deinde alte convexa immarginata. Excipulum fuliginium, hypothecium fusco-rubescens, hymenium in parte inferiori dilute roseo-violascens, superiori fuliginium. Paraphyses conglutinatae, KOH distincte incrassatae, clavatae vel capitatae, 4—5  $\mu$  crassae. Sporae dyblastae, incoloratae, parvulae, 15—20  $\times$  7.5—8  $\mu$ .

Pycnides non visae.

Medulla J et CaClO<sub>2</sub> ÷, KOH e flavo rubescens, crystallae sanguinea, acicularia, saepe fasciculata praecipituntur. Hymenium J intense caeruleo-nigricans, KOH superne aeruginoso- vel smaragdulo-nigricans, inferne (et praecipue hypothecium) intensius violascens, solutione roseo-violascenti effundente, crystallae tamen haud praecipituntur.

Evidently a good new species. Its uncoloured spores and the texture of its apothecia agree fairly well with *Rhiz. Hochstetteri*, but it differs abundantly by its reddish hypothecium, the habitus of its areolae, and the chemical reaction with KOH. — Habitually it resembles *Rhiz. Cope-landii* much more, but the latter species has dark, somewhat larger spores: (18—) 20—25 (—27)  $\times$  10—12  $\mu$ .

8. *Rhizocarpon polycarpum* (HEPP) TH. FR.

Godthaab: Nipisat. — Disko: Mellemfjorden.

Not supposed to be common in Greenland.

9. *Rhizocarpon Hochstetteri* (KBR.) VAIN.

Godthaab. — Disko: Godhavn (male evolutum), Lyngmarken, Mellemfjorden and Kuánerssuit, and (not located) Nipisat (TH. FR.). — Disko: Mudderbugten (PORSILD).

At Storøen TH. FRIES collected a poorly developed plant: sporae dyblastae, incoloratae, 16—20 (—25)  $\times$  7.5—9  $\mu$ , epithecium pulchre caeruleo-nigricans, paraphyses leviter incrassatae, medulla J  $\div$ , KOH  $\div$ . The thallus is so miserable that it does not tell us anything, as is so often the case with Arctic *Rhizocarpons*. It is difficult to distinguish it specifically from *Rhiz. Hochstetteri*. The plant was submitted to Dr. SCHADE who called attention to the following differences from that species: "Die eigentümlich helle, fast ins Gelbliche spielende Tönung des Hypotheciumbrauns, das sehr schöne schwarzblaugrüne Epithecium und die Grösse und Form der farblosen Sporen", all of which characters agree better with *Rhiz. cinereovirens*. To my knowledge that species has never been found in the Arctic, and it differs considerably in the red reaction of the medulla with KOH.

The plant from Godhavn differs considerably in its intensely yellow reaction with paraphenyldiamin, otherwise this species is P  $\div$ . It may be a miserable specimen of an unknown American species.

10. *Rhizocarpon expallescens* TH. FR.

Disko: Mellemfjorden, very scarce.

The adnate apothecia are surrounded by an areolated, pale greyish (plumbeous) thallus which is poorly developed, only a few areolae around each apothecium. The hymenium is smaragdine-black in its upper part, hypothecium and excipulum reddish, and more intensely so if KOH is added. The paraphyses are distinctly incrassated at their apices, the spores — miserably developed — uncoloured, 17—18  $\mu$  long. Medulla J  $\div$ , KOH  $\div$ .

The above data suggest *Rhiz. expallescens*. It is an addition to the lichen flora of Greenland, for the *Rhiz. expallescens* of other collectors in the Copenhagen herb. is, in my opinion, *Rhiz. Hochstetteri*. This is an interesting extension of its known range. It was described from our Scandinavian Peninsula (Jemtland in Sweden and Tromsø in Norway), in the Arctic it has been collected in Spitsbergen, Novaya Zemlya and the Bering Strait region. In my paper on the Greenland *Rhizocarpons* it was referred to the Eastern Arctic species. Its eventual presence in Arctic Canada (apart from the Bering Strait region) is so far unknown. But if we could find it there, which is not improbable, we should have to call it circumpolar. However that may turn out, it is very rare in Greenland.

11. *Rhizocarpon geographicum* (L.) DC.

Godthaab. — Disko: Godhavn (GRØNTVED), Skarvefjæld (GRØNTVED), Sinigfik (GRØNTVED), Nordfjorden, Mellemfjorden, Malingiaq, Blaafjæld (Uivfaq), Laksebugten, and (not located) Nipisat. — Nügssuaq Peninsula: Atanikerdluk (TH. FR.) and Atâ (GRØNTVED), at the last mentioned locality with a parasitic fungus which Dr. KEISSLER, Wien, was kind enough to determine: *Discothecium stigma* Zopf.

Certainly quite as common in West Greenland as it is everywhere in the Arctic.

12. *Rhizocarpon grande* (FLK.) ARN.

Godthaab. — Disko: Sinigfik (GRØNTVED) and Malingiaq.

13. *Rhizocarpon disporum* (NAEG.) MÜLL. ARG.

Disko: Mellemfjorden. Nûgssuaq Peninsula: Atanikerdluk (TH. FR.) and Atâ (GRØNTVED), at the latter locality also its var. *Montagnei*.

In his paper "Die sächs. Arten der Flechtengattung *Rhizocarpon*" 1935, p. 94 SCHADE has given preference to the name *geminatum*. But it is evident from ZAHLBR. Cat. Lich., IV, p. 353 that the species name *disporum* is older, dating from HEPP FLECHT. Europ., 1853, the species name *geminatum* dates from KOERBER Syst. Lich. Germ., 1855. He is also of opinion that the *Montagnei* deserves a specific rank. I cannot agree with him on that point, I have often found one and two spores in each ascus in the same section.

14. *Rhizocarpon distinctum* TH. FR.

Disko: Malingiaq.

In this very careful paper "Die sächs. Arten der Flechtengattung *Rhizocarpon*" Beih. Bot. Centralbl. LIV, 1935, B, p. 96 SCHADE has accepted the name *Rhiz. ambiguum* (NAEG.) ZAHLBR. for the present species. But this combination cannot be valid after the present rules of nomenclature, for according to ZAHLBR. Cat. Lich. IV, p. 344, it was proposed as a variety name, not as a species name, in SCHAEERER Lich. Helv. Spicil., 1828, p. 137 (*Lecidea petraea* var. *ambigua*). ZAHLBRUCKNER quotes *Rhiz. atroalbum* ARN. Flora LIV, 1871, p. 148 as a synonym. But if there is a nomen confusum in this genus, it certainly must be "*atroalba*" and if this name is rejected the oldest species name is *Rhizocarpon distinctum* TH. FR. Lich. Scand. II, 1874, p. 625. *Rhiz. ambiguum* was introduced as a species name by ZAHLBRUCKNER in his Cat. Lich. IV, p. 344, we do not understand on which arguments.

15. *Rhizocarpon obscuratum* (ACH.) MASS.

Storøen. — Disko: Blæsedalen.

It is a rare species in the Greenland flora. — The thallus is paler than in MALME Lich. Suec. No. 16, but the structure of the apothecia agrees very well: Sporae incoloratae, diu tetrablastae, deinde murales, 25—30 × 13—14  $\mu$ , hymenium KOH aeruginosum, hypothecium KOH roseo-violascens, thallus KOH ÷.

16. *Rhizocarpon microsporum* LYNGE n. sp.

Disko: Nipisat, ad saxa non calcarea.

Thallus areolatus, areolae angulatae, 0.3—0.5 mm. latae, tenuitate mediocri, contiguæ vel plus minusve discretæ, subplanæ vel deinde leviter convexæ, pallide cinereæ, ut videtur strato necrali tectæ.

Apothecia numerosa, supra areolas sita et supra thallum plus

minusve elevata, diam. 0.4—0.7 mm, primo plana et margine crassiusculo integro tecta, deinde mox convexa, margine magis evanescenti. Discus ater, epruinosis, scabrosus. Hypothecium fusco-rubescens, hymenium 100—110  $\mu$  altum, inferne dilute smaragdulum, superne caeruleo-nigricans. Paraphyses (KOH) distincte clavatae. Asci saccati, 6—8-sporei, sporae parvae: 13—16  $\times$  8—9  $\mu$ , incoloratae, diu tetrablastae, deinde nonnihil submurales, halone circumdatae (saepe male evolutae vel immaturae).

Medulla J  $\div$ , KOH  $\div$ , hymenium J intense caerulescens, hypothecium KOH pulchre roseo-violascens, solutionem violaceam effundens.

If we will try to identify this species after the best papers on the genus, such as the well known papers by TH. FRIES, MALME and VAINIO we find that:

*Rhiz. obscuratum* has much larger spores: (20—) 24—30 (—33)  $\mu$  long. The same is the case with *Rhiz. reductum*: 22—36  $\times$  10—16  $\mu$ .

*Rhiz. postumum* (NYL.) TH. FR. has the small spores of the present species: 14—17  $\times$  6—9  $\mu$ , but it has a red epithecium.

*Rhiz. submodestum* VAIN. has a "thallus verruculis minutissimis obscuratis indicatus", its spores are rather small: 14—22  $\times$  7—9  $\mu$ .

*Rhiz. subreductum* VAIN. has a thallus "cervinus vel cinereo-subfuscescens". Its apothecia are "inter areolis sita et thallum subaequantia aut demum leviter vel parum prominentia" and its spores "persistenter triseptatae" (VAIN. Lich. Fenn. II, p. 315). It seems to me that this is the nearest species to the present one. The pale grey colour of *Rhiz. microsporium* may be due to a destroyed cortex, but no trace of a brownish colour is visible. The colour of the thallus, the elevated apothecia and the somewhat muriform spores of *Rhiz. microsporium* should be sufficient to distinguish it from VAINIO's species.

Possibly a plant from Disko: Mellemfjorden belongs to the same species. The greyish-white thallus is very thin, the spores apparently agree, but the whole plant is too miserably developed to allow of an unobjectionable determination.

17. *Rhizocarpon petraeum* (WULF.) MASS.

Disko: Nordfjorden, very scarce.

A thin circular, very soft thallus, pale greyish in colour. At the centre the thallus is rimoso-areolated, towards the margin the areolae are more discrete and somewhat effuse.

The apothecia are more or less distinctly arranged in circular lines. They are black, plane, appressed to the thin thallus, with a thick, persistent margin. The hymenium is very high, 130—135  $\mu$ , interspersed by angular grains, olive to black at its upper part. The spores are muriform, uncoloured, rather variable in size, I have measured (25—) 30—34  $\times$  12—16  $\mu$ .

The species is here limited after MALME Västra Jämtlands Rhizocarpon-arter, Svensk Bot. Tidskr., 1914, p. 280. Habitually the specimen agrees fairly well with MALME Lich. Suec. No. 350.

18. *Rhizocarpon pseudospeireum* (TH. FR.) LYNGE.

var. *groenlandicum* LYNGE n. var.

Disko: Nordfjorden, very scarce, on a diabasic rock.

Differt a typo thallo albido, molli, minus contiguo, in areolis subdiscretis, bene limitatis, depresso verrucosis dissoluto, centrum versus magis areolatus.

Margo apotheciorum tenuis, parum distinctus. Hypothecium fusco-fuliginium, hymenium  $125\ \mu$  altum, superne fuliginium, granulis angulatis inspersum. Paraphysum apices  $3\text{--}4\ \mu$  crassae. Sporae incoloratae, murales,  $20\text{--}22.5\text{--}(24) \times 10\text{--}13\ \mu$ , septa transversalia  $3\text{--}5$ , longitudinalia  $1\text{--}(3)$ . — Hyphae medullares corpusculis angulatis inspersae.

Hymenium KOH superne olivaceo-aeruginosum, hypothecium KOH rubescens, medulla J et KOH  $\div$ .

The structure of the apothecia agrees well with *Rhiz. pseudospeireum*. The plant has been submitted to Dr. MALME who is of opinion that it cannot be separated from that species as a proper species.

When I wrote my paper on the Greenland Rhizocarpons, in 1932, only 17 species of that genus were known to me from Greenland. The present paper adds 5 species to the number, raising the total to 22 different species. Two of the five species have been proposed as new (*Rhiz. discoense* and *microsporium*), the other three are *Rhiz. expallescens*, *petraeum* and *pseudospeireum*. It is possible that the last mentioned species is a circumpolar one, in 1932 I referred it to the Eastern Arctic species.

Though the increase in number is considerable, it only confirms the general results obtained in my paper of 1932, viz. 1. The discontinuity in the Arctic distribution of the *Rhizocarpons*, and 2. The poverty of the Greenland *Rhizocarpon* flora as compared with that of the eastern Arctic. From the Bering Strait region one expedition, the Vega expedition, brought home 29 different species of the genus, and from Novaya Zemlya one expedition, the Norwegian expedition of 1921, 27 different species. A very great paper on the Svalbard lichen flora is in preparation, so far I have identified 17 species of *Rhizocarpons* in the Svalbard flora, but the determination of this genus is not quite finished.

## CLADONIACEAE.

### *Baeomyces* PERS.

#### 1. *Baeomyces roseus* PERS.

FREY, ED.: Cladoniaceae, in RABENH. Kryptogamenflora, 1933, p. 29, ubi syn.

Disko: Ujaragssugssuk, very sparingly.

I can find no mention of it in Greenland literature, and there is no plant in the Copenhagen Herb. It is evidently an addition to the lichen flora of Greenland.

*Baeomyces roseus* stains intensely yellowish-orange with paraphenylendiamin. The same is the case with *B. placophyllus* (the marginal lobes especially along their margins), and with *B. rufus*.

### Cladonia (HILL.) VAIN.

The determination of Arctic *Cladoniae* is often very difficult, in some cases hardly possible, on morphological characters only. The reason is the frequent destruction or deformation of the podetia which is so often seen in the Arctic. Lichens cannot retire underground during the winter, and there is hardly a *Cladonia* which can resist the Arctic winter undamaged if not protected by a snow cover. Fortunately the reagent of Asahina, paraphenylendiamin, gives us an excellent help, it sometimes distinguishes between related species with a certainty which a morphological examination could not yield. Though several botanists have used it, and collected much valuable information, we do not yet find much information in literature on its properties.

It was, therefore, thought desirable to give a survey of its action on as many *Cladoniae* as possible, for the present purpose especially on Arctic *Cladoniae*. My young student friend, Mr. EILIF DAHL, made the tests. He made it on 4 different plants of each species, all of them determined by SANDSTED. His results are (+: stained, —: unstained):

Subgen. <i>Cladina</i> :		<i>Cladonia digitata</i> . . . . .	+
<i>Cladonia alpestris</i> . . . . .	P +	— <i>flabelliformis</i> . . . . .	+
— <i>impexa</i> . . . . .	—	— <i>Floerkeana</i> . . . . .	—
— <i>mitis</i> . . . . .	—	— <i>macilenta</i> . . . . .	+
— <i>rangiferina</i> . . . . .	+	Subg. <i>Cenomyce</i> , ser. <i>Ochrophaeae</i> :	
— <i>sylvatica</i> . . . . .	+	<i>Cladonia acuminata</i> . . . . .	P +
— <i>tenuis</i> . . . . .	+	— <i>alcicornis</i> . . . . .	+
Subgen. <i>Pycnothelia</i> :		(medulla yellow).	
<i>Cladonia papillaria</i> . . . . .	P —	— <i>alpicola</i> . . . . .	+
Subgen. <i>Cenomyce</i> , ser. <i>Cocciferae</i> :		— <i>amaurocraea</i> . . . . .	—
<i>Cladonia bacillaris</i> . . . . .	P —	— <i>bacilliformis</i> . . . . .	—
— <i>bellidiflora</i> . . . . .	—	— <i>botrytes</i> . . . . .	—
— <i>coccifera</i> . . . . .	—	— <i>caespiticia</i> . . . . .	+
— <i>deformis</i> . . . . .	—	— <i>cariosa</i> . . . . .	+
(or sometimes a		(medulla yellow).	
yellowish discolouring).		— <i>carneola</i> . . . . .	—
		(but often discoloured).	

<i>Cladonia cenotea</i> .....	—	<i>Cladonia glauca</i> .....	—
(or yellowish dis-		<i>gracilis</i> .....	+
coloured).		(medulla red).	
— <i>cervicornis</i> .....	+	— <i>Grayii</i> .....	—
— <i>coniocraea</i> .....	+	— <i>lepidota</i> .....	+
— <i>convoluta</i> .....	+	— <i>macrophyllodes</i> ..	+
(medulla).		— <i>magyarica</i> .....	+
— <i>cornuta</i> .....	+	— <i>Norrlinii</i> .....	+
(medulla and so-		— <i>ochrochlora</i> .....	+
redia).		— <i>pityrea</i> .....	+
— <i>cornutoradiata</i> ...	+	— <i>pyxidata</i> .....	+
— <i>crispata</i> .....	—	(incl. of <i>chloro-</i>	
— <i>cyanipes</i> .....	—	<i>phaea</i> , <i>Pocillum</i>	
(but often dis-		and <i>pachyphyllina</i> ).	
coloured).		— <i>rangiformis</i> .....	—
— <i>decorticata</i> .....	—	— <i>scabriuscula</i> .....	+
(but after some		— <i>sqamosa</i> .....	—
time faintly red).		— <i>strepsilis</i> .....	+
— <i>degenerans</i> .....	+	(yellow medulla).	
— <i>Delessertii</i> .....	—	— <i>subcariosa</i> .....	+
— <i>delicata</i> .....	+	— <i>subcervicornis</i> ...	+
— <i>dstricta</i> .....	—	— <i>subrangiformis</i> ..	+
— <i>ecmocyta</i> .....	+	(medulla).	
(medulla red).		— <i>subsquamosa</i> .....	+
— <i>elongata</i> .....	+	— <i>symphyrcarpia</i> ...	+
(medulla red).		(often faintly).	
— <i>fimbriata</i> var. <i>ma-</i>		— <i>turgida</i> .....	+
<i>major</i> et <i>minor</i> ....	+	— <i>uncialis</i> .....	—
— <i>furcata</i> .....	+	— <i>verticillata</i> .....	+
(medulla red).			

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

Disko: Blæsedalen (GRØNTVED).

2. *Cladonia mitis* SANDST.

Frederikshaab: Neria near Narssalik, 61°33' (Eugenius). — Godt-  
haab: Kookøene or Kitsigsut. — Langesund: Sarqardlit (GRØNTVED). —  
Disko: Blæsedalen, Sinigfik and Angnertussoq (GRØNTVED).

In TH. FRIES's collection there were only the plants from the Kook  
Islands. We cannot conclude from this that it should be rare in West  
Greenland, for it was plentiful in the other collections, it is certainly one  
of the commonest West Greenland *Cladoniae*.

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

Frederikshaab: Neria near Narssalik, 61°33' (Eugenius), splendid  
specimens.

4. *Cladonia Floerkeana* (FR.) SOMRFT.

Godthaab: Kookøene or Kitsigsut.

Extremely scarce, only two plants. They are quite typical, well fertile, with columnar podetia without scyphi, squamules or soredia. They agree perfectly with NORRL. and NYL. Herb. Lich. Fenn. No. 445 which VAINIO referred to var. *chloroides* (FLK.) VAIN.

It has been recorded from Greenland but once: Nunarssuaq near Kap Farvel, leg. Mrs. LUNDHOLM, see DEICHMANN BRANTH Tillæg til Grønlands Lichen-Flora, 1892, p. 754. I have not seen this plant.

5. *Cladonia coccifera* (L.) WILLD.

var. *stematina* ACH.

Frederikshaab: Neria near Narssalik, 61°33' (Eugenius). — Godthaab: Kookøene or Kitsigsut. — Disko: Blæsedalen (GRØNTVED) and Blaa-fjeld or Uivfaq (TH. FR.).

One of the plants has red apothecia, a rare occurrence in the Arctic. TH. FRIES was more interested in rare species and in small crustaceous lichens than in common species. We know from other collections that *Cladonia coccifera* is common enough in West Greenland. — Its var. *pleurota* was not found in these collections.

6. *Cladonia deformis* HOFFM.

Frederikshaab: Neria near Narssalik, 61°33' (Eugenius). — Godthaab: Nûk (TH. FR.). — Langesund: Sarqardlit (GRØNTVED). — Disko: Godhavn (PORSILD), Lyngmarken (TH. FR.), Blæsedalen and Sinigfik (GRØNTVED).

Evidently quite common in West Greenland. The podetia are large and well developed, but sterile, as is usual in Greenland.

At Sarqardleq in Langesund GRØNTVED collected a *Cladonia* which habitually much resembled *Clad. digitata*. The podetia were somewhat deformed, short, sorediated, with large basal phyllocladia, and stained slightly yellow with KOH. But the reaction with paraphenylen gave us the correct determination, *Clad. deformis*. It was one of the many Arctic *Cladoniae* where the upper part of the podetia had been damaged and deformed, exposed to the severe Arctic conditions of life.

7. *Cladonia bellidiflora* (ACH.) SCHAER.

Frederikshaab: Neria near Narssalik, 61°33' (Eugenius). — Godthaab: Kookøene or Kitsigsut (TH. FR.). — Disko: Sinigfik (GRØNTVED).

TH. FRIES only collected it once. His plants are quite magnificent, well fertile, large, squamulose, suggesting the type of the species: f. *coccocephala* (ACH.) VAIN. — In some other plants the upper part of the podetia is destroyed, at least the phyllocladia, resulting in a very microphylline, almost sorediated cover. Such formae of the needle-*Cladoniae* are common in the Arctic. In my opinion they are caused by frost or by exsiccation of exposed apices, e. g. such parts, as are unprotected by the snow during the winter.

8. *Cladonia amaurocraea* (FLK.) SCHAER.

Langesund: Sarqardlit, very scarce (GRØNTVED).

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

Julianehaab: Tunugdliarfik, south of Kiagtût (A. E. and M. PORS-  
ILLD, 1925). — Langesund: Sarqardlit (GRØNTVED).

In the Copenhagen herb. there is a lot of plants from West Green-  
land. It is certainly common enough there.

10. *Cladonia scabriuscula* (DEL.) SANDST.

Disko: Sinigfik (GRØNTVED, det. SANDSTEDE).

It was found amongst the willows, evidently not quite scarce. The  
plants were very fine. Perhaps the most interesting *Cladonia* in the  
collections, and an addition to the lichen flora of Greenland.

In the lichens of the Danish fifth Thule Expedition through Arctic  
Canada there was a most perplexing (not well developed) *Cladonia*. It  
was submitted to our best authority on *Cladonia*, and he suggested  
*Cladonia cenotea* var. *exaltata*. But the test with paraphenyldiamin  
gave a better determination: *Cladonia scabriuscula* f. *farinacea*, and this  
later determination was approved of by SANDSTEDE. The plant was  
found in Northern Baffin Land: Eclipse Sound at Mitimatalik (LYNGE  
Lich. of the 5th Thule Exp., 1935, p. 16).

In BRUCE FINK Lich. Flora of the U. S., 1935, p. 255 "*Cladonia  
furcata* var. *scabriuscula*" is recorded from "New Hampshire, Massachu-  
setts, Minnesota, and Iowa". It is at present impossible to state its  
accurate distribution in Europe. SANDSTEDE writes "Vorkommen wie  
bei der *Cl. furcata*, gerne auf den Vordünen der Nordseeinseln, auf den  
Nehrungen, in dichten Nadelwäldern, unter Heide an Erdwällen" (*Cladonia*,  
in RABENH. Kryptogamenflora, 1931, p. 215). The species is  
mentioned in MAGNUSSON Flora över Skand. busk- och bladlavar, 1929,  
p. 52 (as *Clad. furcata*\* *C. surrecta*), but special localities are not given.  
MALME distributed it from Öland in Sweden (Lich. Suec. No. 527).

The finds in Baffin Land, and in Greenland, are an interesting con-  
nection between the finds in the United States and in Europe. After this  
we should have to look after it also in Western and Northern Norway.

11. *Cladonia crispata* (ACH.) FLOT.

var. *virgata* (ACH.) VAIN.

Disko: Sinigfik (GRØNTVED).

The plants are slender, more so than for instance NORRL. and NYL.  
Herb. Lich. Fenn. No. 674, but otherwise they agree well. *Cladonia  
crispata* is such a common plant on the moors and along brooklets in  
Northern Norway, but in the Arctic it is one of the rarest *Cladoniae*. I  
did not find it in Novaya Zemlya, there is a single find from Spitsbergen:  
Prins Karls Forland (TH. FRIES, unpublished). There was no Greenland  
plant in the Copenhagen herb., and the present plant is supposed to be  
the first record from Greenland.

12. *Cladonia Delessertii* (NYL.) VAIN.

Langesund: Sarqardlit (GRØNTVED).

Only fragments of the upper part of some apothecia were detected in the collection. The podetia are distinctly maculated, without phyllocladia or scyphi, and with distinctly pervious axilli. The determination is not unobjectionable, for it is often difficult to distinguish between this species and *Clad. crispata*. But as they are the fragments agree well with NORRL. et NYL. Herb. Lich. Fenn. No. 438 ("*Clad. crispata* var. *subfurcata*", duly referred to *Clad. Delessertii* by MAGNUSSON in his Busk- och bladlavar, p. 54), in my opinion better than with MALME Lich. Suec. No. 451 (*Cladonia crispata* var. *ceptrariaeformis*), on account of the very maculated podetia.

13. *Cladonia squamosa* (SCOP.) HOFFM.f. *turfacea* (ARN.) VAIN.

Langesund: Sarqardlit (GRØNTVED).

In the best of the few plants the brown podetia have distinct, though small scyphi. Corticated parts alternate with ecorticated, small "areoles" of cortex often loosen from the podetia at their lower end, they will then look like small folioli, affixed at their upper part to the podetia. Such plants agree with NORRL. et NYL. Herb. Lich. Fenn. No. 665.

14. *Cladonia cenotea* (ACH.) SCHAEER.

Disko: Lyngmarken (TH. FR.).

The plants are fine and quite typical, but unfortunately TH. FRIES only collected a few plants, and there were no plants in the other collections. This species is one of the rarest lichens in Greenland. Formerly there were but 3 finds, one from West Greenland: Godthaab at Ameralik (VAHL), and two finds from North East Greenland (LYNGE and SCHOLANDER).

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

Disko: Sinigfik (GRØNTVED), very scarce.

One of the rarest Greenland *Cladoniae*, formerly only collected once there, at Godhavn in Disko by L. SMITH.

16. *Cladonia acuminata* (ACH.) ARN.var. *Norrliinii* (VAIN.).

Disko: Eqalúnguit (TH. FR.).

The chemical reaction with KOH is very distinct, but the colour did not visibly change into red.

It was very scarce, and found only once. It has formerly been found in North East Greenland by the Norwegian expeditions in 1929—30, but as far as I can see it is an addition to the lichen flora of West Greenland.

17. *Cladonia gracilis* (L.) WILLD.

Disko: Sinigfik (GRØNTVED).

Scarce, evidently quite rare. The plants must be referred to var. *hordalis*.

18. *Cladonia elongata* (JACQ.) HOFFM.

Frederikshaab: Neria near Narssalik, 61°33' (EUGENIUS 1924). — Godthaab: Kookøene or Kitsigsut (TH. FR.). — Langesund: Sarqardlit (GRØNTVED). — Disko: Godhavn, Lyngmarken, Qigdlüssat and Fortune Bay (GRØNTVED), Mellemfjorden (TH. FR.).

TH. FRIES was not much interested in this species which is almost ubiquitous in the Arctic, but his plants from Kookøene are the most magnificent ones which I have ever seen. The number of plants in the other collections suggests the species to be quite as common in West Greenland as elsewhere in the Arctic.

19. *Cladonia cornuta* (L.) SCHAER.

Disko: Blæsedalen (GRØNTVED).

Certainly a very rare species in Greenland. It was collected in North East Greenland by the Norwegian expeditions in 1929 and 1930, an unexpected find so far north. DEICHMANN BRANTH and GRØNLUND record a find from Egedesminde in West Greenland (Grønlands Lichen-Flora, p. 486).

20. *Cladonia lepidota* NYL.

Disko: Godhavn and Fortune Bay (GRØNTVED).

It was unexpected to find so few plants of this common Arctic species in the collections. Some of the plants from Godhavn have a distinct scyphus (var. *gracilescens* (FLK.) DR.), which is but rarely seen in the Arctic, the greater part of the plants belongs to the ascyphous var. *stricta* (NYL.) DR., called *Cladonia cerasphora* by VAINIO.

21. *Cladonia subcervicornis* (VAIN.) DR.

Disko: Sinigfik (GRØNTVED).

There are many fine podetia with the characteristic broad and flat scyphi, and central proliferation. Habitually I could not have distinguished it from *Cladonia cervicornis*, but the chemical reaction is KOH +.

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

Godthaab: Kookøene or Kitsigsut (TH. FR.). — Disko: Blæsedalen (TH. FR., GRØNTVED), Sinigfik (GRØNTVED), Nordfjorden and Mellemfjorden (TH. FR.).

TH. FRIES's plants from Blæsedalen and Nordfjorden are typically var. *Pocillum* (ACH.), with thick, appressed, confluent, almost crustiform squamules and hardly any podetia. — I have referred GRØNTVED's Sinigfik plants to var. *chlorophaea* (FLK.) and the other plants to var. *neglecta*.

23. *Cladonia bacilliformis* (NYL.) VAIN.

Disko: Mellemfjorden (TH. FR.).

Found on wood, evidently drift-wood. It is an interesting addition to the lichen flora of Greenland, but it was not quite unexpected, for it is common on decayed trunks in Northern Scandinavia.

24. *Cladonia cyanipes* (SOMRFT.) VAIN.

Godthaab: Kookøene or Kitsigsut. — Disko: Godhavn (TH. FR.), Blæsedalen and Skarvefjæld (GRØNTVED), Nordfjorden (f. *connectens*) and (not located) Nipisat (TH. FR.).

Formerly there were but one West Greenland find, from Egedesminde (Fylla expedition), and 6 finds from East Greenland, all by the Norwegian expeditions in 1929—30. We have always regarded it a rare species in Greenland, but the number of finds in the present collections suggests it to have been overlooked.

As long as only the collection of TH. FRIES was at my disposal I could not understand the poverty of the *Cladoniae*. It only brought me 11 species. But the other collections brought me no less than 13 species, in addition to the 11, raising the number to 24. A trained lichenologist who paid special attention to the *Cladoniae*, would certainly add still more to our knowledge.

My Novaya Zemlya collection from 1921 contained 20 *Cladoniae*. It is probable that Greenland has a very rich flora of this genus.

**Stereocaulon** SCHREB.

I have tested all the present species of *Stereocaulon* with paraphenylendiamin, without detecting any staining that could be used for specific distinction.

1. *Stereocaulon alpinum* LAUR.

Julianehaab: Tunugdliarfik south of Kiagtût (A. E. PORSILD and M. P. PORSILD 1925). — Egedesminde: Sarqardlit in Langesund, fine plants of var. *erectum* (GRØNTVED). — Disko: Lyngmarken, also fertile plants (TH. FR.), Godhavn, Blæsedalen, Sinigfik (GRØNTVED).

2. *Stereocaulon rivulorum* MAGNUSSON.

Disko: Blæsedalen and Skarvefjæld (GRØNTVED), Mellemfjorden (TH. FR.).

3. *Stereocaulon fastigiatum* ANZI.

Disko: Godhavn (GRØNTVED), Nordfjorden and "the Eskimo camp" (TH. FR.).

Rare or overlooked in West Greenland, formerly there was but one find, from Upernavik: Nutârmiut (Exped. RYDER, herb. Copenh.). In the Copenh. herb. I have identified two plants from Kutak (EBERLIN) and from Scoresby Sound: Danmark Island (HARTZ), north of Scoresby Sound it was quite plentiful (the Norwegian expeditions in 1929 and 1930, LYNGE and SCHOLANDER Lich. North East Greenl. 1932, p. 49).

4. *Stereocaulon denudatum* FLK.

Disko: Lyngmarken, f. *genuinum* and f. *pulvinatum* (TH. FR.), and Godhavn (GRØNTVED).

*Stereocaulon denudatum* is quite plentiful in the Copenhagen Greenland herb., it must be common in West Greenland.

5. *Stereocaulon paschale* (L.) ACH.

Disko: Sinigfik and Fortune Bay (GRØNTVED).

The former plants were quite magnificent. I was glad to find these plants in the collection, for *Ster. paschale* is supposed to be a rare species so far north. Many of the literary records from the Arctic stand for other species, *Ster. alpinum* or other related species. But the cephalodia and the coralloid phyllocladia distinguish *Ster. paschale* from *Ster. alpinum* (see MAGNUSSON'S excellent paper on the Boreal Stereocaulons).

### UMBILICARIACEAE.

The family *Umbilicariaceae* has recently been treated in an excellent monograph by EDUARD FREY: *Umbilicariaceae*, in RABENHORST'S Kryptogamenflora, 1932. FREY found that the usual subdivision into the two old genera *Umbilicaria* and *Gyrophora* was untenable, and he united them into one genus, *Umbilicaria* HOFFM., emend. FREY. His subdivision of this genus is based on the spores and on the development of the thallus (l. c. p. 206—8).

P. F. SCHOLANDER studied the apothecia in this genus, and in a well illustrated and very suggestive paper: On the Apothecia in the Lichen Family Umbilicariaceae, *Nyt Magazin for Naturvidenskaberne*, vol. LXXV, 1934, p. 1—31, he published his results. SCHOLANDER found four types of apothecia, viz.

1. *Umbilicaria* (HOFFM.) emend. SCHOL.: apothecia without gyri, surface of hymenium smooth, whole hymenium ascogenous.

2. *Omphalodiscus* SCHOL.: the young apothecia with a central sterile column, prominent over the hymenium, and an ascogenous hymenium between the column and the margin. Later irregular fissures develop from this column, and similar irregular shorter fissures are also formed between the central fissure and the margin, ascogenous tissue then between the fissures and the margin.

3. *Gyrophora* (ACH.) emend. SCHOL.: ascogenous tissue included in more or less concentric gyri of the well known type, apothecia more or less stipitated, with a margin surrounding the disk.

4. *Actinogyra* SCHOL.: apothecia not stipitated, ascogenous gyri radiating from the centre, with their growth the apothecia expand over the thallus along the circumference, disk not surrounded by a margin.

It seems to me that this subdivision of the genus is based on important, fundamental characters, and that it gives a better subdivision of the family than any other formerly advanced. Especially is the last

genus, *Actinogyra*, so essentially different from the rest that it must be impossible simply to unite its species with the others into the same genus.

The next, and less important, question is whether SCHOLANDER'S units should be acknowledged as proper genera, or whether they should be regarded as subgenera. The aim of taxonomy is not only to build up a system, based on hard logical considerations. The system must be practicable also. — It is not to be denied that the old genus *Umbilicaria* (or *Gyrophora*) had a uniform habitus. At first glance a lichen could be referred to that genus, an important thing.

If we will consider lichen genera in general we are obliged to confess that a great part of them are artificial and highly unsatisfactory. — There is no satisfactory distinction between *Bacidia* and *Bilimbia*, now generally united into one genus *Bacidia*. The distinction between *Toninia* and *Catillaria* (or *Biatorina*) is almost equally unsatisfactory, and it is not always acknowledged (cfr. A. L. SMITH Brit. Lich., II, 1911, p. 110). It may be difficult enough to distinguish between a *Buellia* and a small-spored *Rhizocarpon*. Even the genera *Lecidea* and *Lecanora*, the most important representatives of two different families, are confluent, several species have been referred to either genus.

The cause of these difficulties evidently is the dual nature of the lichens. A logical system must be based on a uniform set of characters. But the whole development of a lichen thallus is profoundly influenced by its gonidia, as was to be expected. Accordingly, if we base our system on the fungus only, the component which is the most easily accessible to our examination, we must be prepared to find our systems disturbed by the other component which is, perhaps, equally important to the "consortium".

We must, therefore, be glad to welcome a research work, the result of which is a logical subdivision of a difficult unit. — The objection to the said research is that it is necessary to know the type of the apothecium in order to name a certain *Umbilicaria*, an undesired complication, and in some species apothecia are extremely rare, or even unknown.

But what of other cryptogamous plants? It is in many cases necessary laboriously to cultivate a bacterium or a microfungus in order to determine it. And as to higher plants? Is it an objection against the validity of a species of *Poa*, or of *Draba*, that some of them cannot be determined if they are not in flower?

The genus *Actinogyra* is not found in the present material, it is a question whether it is found in the Arctic. But the other three genera were represented.

I have tested all the Greenland *Gyrophoraceae*, known to me, with paraphenyldiamin (the species *arctica*, *cylindrica*, *decussata*, *deusta*, *fuliginosa*, *hyperborea*, *Lyngei*, *pennsylvanica*, *polaris*, *polyphylla*, *pro-*

*boscidea*, *rigida*, *torrefacta*, *vellea* and *virginis*). The result was very meagre. *Gyrophora proboscidea* gave an intensely yellow colour of the medulla, and in the *Lyngei* I obtained a faintly yellow colour of the old thalline rugi, which was not seen in the *decussata*. That was all, no staining was obtained in any of the other species, neither in the cortex, nor in the medulla.

### **Umbilicaria** (HOFFM.) emend. SCHOL.

#### 1. *Umbilicaria rigida* (DU RIETZ) FREY.

Disko: Ujaragssugssuk, very scarce (TH. FR.).

#### 2. *Umbilicaria Lyngei* SCHOL.

SCHOL. On the Lichen Family Umbilicariaceae, Nyt Magazin for Naturvidenskaberne 1934, p. 19, pl. I, fig. 1, IV, fig. 1.

Disko: Godhavn (TH. FR., GRØNTVED), Skarvefjæld (GRØNTVED), Ujaragssugssuk and Blaafjeld or Uivfaq (TH. FR.). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

Undoubtedly a common and widespread species.

It has for some time been clear that the old species *Gyrophora* (or *Umbilicaria*) *decussata*, or *G. discolor*, was not uniform in the Arctic, but SCHOLANDER was the first to distinguish between these two species which he referred to two genera. The most important distinguishing character lies, accordingly, in the apothecia. Apart from that *Umbilicaria Lyngei* has a thin thallus, and it has an entirely different biology, it is found on cliffs and boulders, preferably in screes at high altitudes and it is not nitro- or ornithocophilous, such as *Omphalodiscus decussatus*.

We did our best to get to sight a type plant of *Lichen decussatus* from Dauphiné, but the plant was missing in the herb. Villars. It is difficult to say with certainty whether VILLAR's plant is identical with the present species, or with *Omphalodiscus decussatus* SCHOL. But a study of material from Central Europe gave SCHOLANDER the conception that the present species was different from VILLAR's plant.

### **Omphalodiscus** SCHOL.

#### 1. *Omphalodiscus decussatus* (VILL.) SCHOL.

SCHOL. On the Lichen Family Umbilicariaceae, Nyt Magazin for Naturvidenskaberne, 1934, p. 23, text fig. 3, pl. I, fig. 4, IV, fig. 6.

Disko: Mellemfjorden and Malingiaq (TH. FR.). — Nûgssuaq: Atanikerdluk (TH. FR.) and Atâ (GRØNTVED).

The last mentioned plant is very typical.

According to SCHOLANDER, l. c., its habitat is "cliffs and boulders, in the Arctic distinctly nitrophilous, on bird-stones and in bird-cliffs, frequently associated with other nitrophilous or relatively nitrophilous lichens, such as *Gyrophora arctica*, *Omphalodiscus Kraschennikovii*,

*Xanthoria candelaria*, *Physcia dubia* (syn. *Physcia tribacia* in Scand. Arctic literature), *Parmelia infumata*, a. o.”

2. *Omphalodiscus virginis* (SCHAER.) SCHOL.

SCHOLANDER, l. c., p. 25, pl. I, fig. 6.

Disko: Blaa fjeld or Uivfaq, very scarce (TH. FR.).

3. *Omphalodiscus Krascheninnikovii* (SAV.) SCHOL.

SCHOLANDER, l. c., p. 24, textfig. 2 and 4, pl. IV, fig. 7. — *Gyrophora polaris* SCHOL. in LYNGE and SCHOLANDER Lich. N.E. Greenland, p. 57, pl. IV, fig. 1—4.

Disko: Blaa fjeld or Uivfaq, quite scarce (TH. FR.).

It is a widely distributed species, perhaps especially in the western Arctic, but evidently circumpolar.

### **Gyrophora** (ACH.) emend. SCHOL.

SCHOLANDER, l. c. p. 26.

1. *Gyrophora proboscidea* (L.) ACH.

Disko pluribi: Godhavn, Lyngmarken, Ujaragssugssuk, Mellemfjorden and Kuánerssuit. — Nûgssuaq Peninsula: Atanikerdluk. All plants collected by TH. FR.

In the Copenhagen herb. there is not much of the true *Gyrophora proboscidea*, but never the less it is supposed to be one of the commonest lichens all over Greenland. The considerable number of finds in the present collection is in favour of that opinion, even if the number of plants is not great.

2. *Gyrophora hyperborea* (HOFFM.) ACH.

Godthaab: Nûk (TH. FR.). — Disko: Godhavn, Mellemfjorden and Blaa fjeld or Uivfaq, and Nipisat (TH. FR.), Sinigfik (GRONTVED). — Nûgssuaq Peninsula: Atâ (GRONTVED).

Evidently equally common here as in other parts of Greenland.

3. *Gyrophora arctica* ACH.

Godthaab: Nûk and Kookørerne (TH. FR.). — Disko: Lyngmarken (TH. FR.). Several plants, and some of them quite magnificent.

4. *Gyrophora torrefacta* (LIGHTF.) CROMB.

Godthaab: Nûk (TH. FR.). — Disko: Godhavn (TH. FR., GRONTVED). var. *erosa* (WEB.) LYNGE, comb. nov.

Disko: Godhavn, Lyngmarken, Mellemfjorden, Blaa fjeld or Uivfaq and Nipisat (TH. FR.).

Many localities, but not many plants, the latter variety is supposed to be the commoner here as elsewhere in the Arctic.

Our well known "*Gyrophora erosa* (WEB.) ACH." sensu latiore was described by WEBER in Spicil. Florae Goetting., 1778, p. 259, as *Lichen erosus*: "umbilicatus, diaphanus, inferne albescens, fibrosus. . . . Facile distinguitur inferiori superficie alba aut glauca, fibris crebris obsita".

*Umbilicaria torrefacta* was described by SCHRADER in Spicil. Flor. Germ., 1794, p. 104: "umbilicata, pulla, supra rugosa, subtus reticulato-fibrosa, verrucis nigris crispis" and further "folium crassum, coriaceum . . . non nisi versus marginem eleganter reticulato-cribrosum . . . inferior facies papillis s. granulis totam superficiem lente adnota obducentibus, exceptis frequenter emittit fibras reticulatas".

But this is not the first description of *torrefacta*, for SCHRADER quoted *Lichen torrefactus* Lightf. Flor. Scot. II, 1777, p. 862 as a synonym. LIGHTFELLOW's description is rather diffuse: "the under side is fibrous, and of a paler colour, especially towards the centre, where the fibres are most numerous, and are thin, compressed, and reticulated. The space between the fibres is finely granulated, which gives it a slight asperity, like chagrin."

If the species is limited sensu latiore, we cannot overlook the fact that LIGHTFELLOW's name is a fully valid specific name, and that it must have a better priority than the specific name *erosa*, being one year older.

Morphologically the present species varies with respect to the development of the thallus. Some plants are rather small and thin, densely perforated, under side almost erhizinose and smooth or with small papillae: *Gyrophora erosa* s. ang. Others are rather coarse, rigid, less perforated, more rhizinose on the under side and trabeculate between the perforations: *Gyrophora torrefacta*, s. ang. In addition to this it has been stated that *Gyrophora erosa*, s. ang. does not stain with  $\text{CaCl}_2\text{O}_2$ , whereas the medulla of *Gyrophora torrefacta* s. ang. stains red with  $\text{CaCl}_2\text{O}_2$ .

The importance attributed to all these characters has been differently judged of. In Lich. Univ., 1810, p. 224—5 ACHARIUS wrote of  $\beta$  *G. torrida*, a syn. *G. torrefacta*: "non nisi varietatem prioris (i. e. *G. erosa*) est". — NYL. Lich. Univ. II, p. 16: *torrida* "omnino cum *U. erosa* confluit". — In his excellent and most careful monograph on the *Umbilicariaceae* in RABENHORST Kryptogamenflora, 1932, p. 372, FREY gave the rank of a variety to *torrefacta*, but he did evidently not attribute any great importance to it.

On the other side CROMBIE (Brit. Lich., 1894, p. 329), HARMAND (Lich. de France, 1909, p. 702), and A. L. SMITH (Brit. Lich., I, 1918, p. 398) gave specific rank to *torrefacta*, evidently much influenced by NYLANDER's observation of the different reaction with  $\text{CaCl}_2\text{O}_2$ . — I have also been inclined to regard *torrefacta* a proper species (Lich. Nov. Zemlya, 1928, p. 172, Lich. N.E. Greenland, 1932, p. 62), especially on account of the different chemical reaction with  $\text{CaCl}_2\text{O}_2$ . But I now find it difficult to maintain that view, for we do not always find that the chemical reaction with  $\text{CaCl}_2\text{O}_2$  coincides with the very variable morphological characters.

In the present material I have only found the positive reaction in plants from Godthaab (Nük) and from Godhavn. The staining was never

doubtful. The "positive" plants were coarse, rhizinose and very scabrous beneath. The "negative" plants were equally rhizinose and equally scabrous beneath, but they were, perhaps, on an average coarser. I am not much inclined to base specific distinctions on chemical differences alone if not followed by morphological differences also — as they generally are.

I have applied the test of ASAHINA (paraphenylendiamin) to some of the plants, and found a negative reaction in all of them.

5. *Gyrophora deusta* (L.) ACH.

Disko: Lyngmarken, only a few plants (TH. FR.).

*Gyrophora deusta* is a rare species in Greenland. It was not mentioned by DEICHMANN BRANTH and GRÖNLUND in Grønlands Lichen-Flora, but VAHL collected it at Sukkertoppen (64°40'). We have no other finds from West Greenland. In East Greenland it has been collected by SCHOLANDER at Röhssfjorden in N.E. Greenland, (LYNGE and SCHOL. Lich. N. E. Greenland, 1932, p. 63), and also at several localities in South East Greenland (unpublished).

6. *Gyrophora vellea* (L.) ACH.

Disko: Godhavn, Lyngmarken and the "eskimo camp" (TH. FR.).

The number of localities is not so great, but there are many plants. There are lots of plants in the Copenh. herb., it is evidently one of the commonest lichens on the coasts of West Greenland.

7. *Gyrophora cylindrica* (L.) ACH.

Godthaab: Nûk and Kookøerne or Kitsigsut (TH. FR.). — Disko: Godhavn, Lyngmarken, Nordfjorden, Mellemfjorden, Eqalúnguit, Kuánerssuis, Blaa fjeld or Uivfaq, and Nipisat (TH. FR.). — Nûgssuaq Peninsula: Atanikerdluk (TH. FR.) and Atâta qâqâ, 2000 m above sea-level, destroyed plants (GRÖNTVED).

Numerous plants from many localities suggest *Gyrophora cylindrica* to be common and plentiful, as was to be expected. If we also consider the very numerous plants in the Copenhagen herb. we find that it must be the commonest *Gyrophora* in West Greenland.

By far the greater part of the material must be referred to var. *Delisei*. But plants from several localities, e. g. the rich material from Uivfaq, show transitional stages to the *fimbriata*-type, even if these plants are also generally coarser than f. *fimbriata* is in Norway.

## ACAROSPORACEAE.

### *Sporastatia* MASS.

1. *Sporastatia cinerea* (SCHAER.) KOERB.

Godthaab, very few plants (TH. FR.).

It is evidently a very rare species in Greenland, to judge from literature. DEICHMANN BRANTH and GRÖNLUND record a "*Sporastatia ci-*

*nerea* var. *haplocarpa* TH. FR. Lich. Spitsb. p. 43" from Umanaq. This variety has "apothecia sat magna, demum elevata convexaque simplicia" (TH. FR., l. c.). TH. FRIES's plants in the present Greenland collection have plane apothecia, not larger than they usually are, and with a gyrose disk. But I have found this gyrosity less distinct in Arctic than in Scandinavian plants. — Not stained perceptibly with paraphenylendiamin.

2. *Sporastatia testudinea* (ACH.) MASS.

MAGNUSSON Acarosporaceae, in RABENHORSTS Kryptogamenflora, 1935, p. 9—15, ubi syn.

The first specific name is "*coracina*" SOMMERF. Supplem. Flora Lapp., 1826, p. 142. SOMMERFELT called it *Lecidea coracina*, but as pointed out by MAGNUSSON this combination was objectionable on the reason that ACHARIUS had already used it in Lich. Univ., 1810, p. 161 for another species. According to TH. FRIES Lich. Scand. p. 607 Acharii species is a mixtum of three different species, none of which is our *Sporastatia testudinea*. SOMMERFELT's *Lecidea coracina* is also a mixtum, and the same is the case with Acharii *testudinea*. The use of the last mentioned specific name is, accordingly, more based on use and wont than on a special type plant.

Disko: Lyngmarken, Ujaragssugssuk, Mellemfjorden and two localities which I have been unable to locate: Nipisat and Qivitut (TH. FR.). — Nûgssuaq Peninsula: Atanikerdluk (TH. FR.).

The number of plants is quite considerable, it is evidently quite as common in West Greenland as in other Arctic regions. — It is P —.

**Sarcogyne** FLOT.

1. *Sarcogyne simplex* (DAV.) NYL.

Disko: Malingiaq. — Nûgssuaq Peninsula: Atanikerdluk (TH. FR.).

At the latter station TH. FRIES collected more plants than I have ever seen of this species in an Arctic collection.

2. *Sarcogyne rugosa* LYNGE n. sp. (Plate I, fig. 2).

Disko: Lyngmarken, ad rupes siliceas (TH. FR.).

Thallus nullus visibilis.

Apothecia adeo congesta ut composita videntur, saepe pedicellata, majuscula, usque ad 3.5 mm lata, sed vulgo minora, circ. 2.0 mm. Discus (etiam madefactus) aterrimus, scabroso-rugosus, excipulum in parte haud lata et crassitudine irregulari exteriori carbonaceum, praeterea incoloratum, corpusculis angulatis numerosis instructum (cryst. calcii oxalici?). Hypothecium incoloratum. Hymenium crassitudine irregulari, 100—125  $\mu$  altum, superne intense carbonaceum (25—30  $\mu$ ), praeterea incoloratum, columnis sterilibus numerosis incoloratis in partes fertiles divisum, etiam rimis lateribus carbonaceis divisum.

Paraphyses arcte cohaerentes, praecipue in parte superiori, tenues, circ.  $1.5 \mu$  crassae, crebre ramosae. Asci (saepe steriles) saccati,  $12-15 \mu$  lati, sporae numerosissimae, minutae, sat anguste ellipsoideae,  $2.5-4 \mu$  longae.

Hymenium J caerulescens, columnae steriles minus intense colorantur, etiam hypothecium J (minus intense) caerulescens; KOH immutatum.

There is no thallus visible, and the whole material only consists of apothecia, evidently detached from the substratum with a knife. The material was submitted to the monographer of the genus, Dr. MAGNUSSON, who acknowledged it to be a new species.

It is distinguished by its apothecia which are congested into almost "moriform" clusters. They are much larger than in *Sarc. simplex* ( $0.3-1.0$  mm). The new species differs from *Sarc. clavus* by the congested apothecia (scattered in *Sarc. clavus*), uncoloured hypothecium and hymenium strands and especially by its carbonaceous epithecium. The hymenial strands are widened upwards, as they usually are. The crystals of the excipulum perhaps consist of CaOx, but they were only in part dissolved even if heated with  $\text{HNO}_3$  ( $10\%$ ).

The name *rugosa* suggests the very uneven surface of the apothecia.

3. *Sarcogyne pruinosa* (SM.) KOERB.

Disko: Asuk. — Nûgssuaq Peninsula: Atanikerdluk (Th. FR.) and Atâ (GRØNTVED).

Only a few plants, found on calcareous rocks, it cannot be common. — The apothecia are epruinose, as they usually are in Arctic plants, and adpressed, not foveolato-immersed into the rock.

It is interesting that apart from the new species we find the same species of *Biatorella*, sensu latiore, in Greenland, Spitsbergen and Novaya Zemlya.

#### Acarospora MASS.

Extracted from MAGNUSSON The Lichen-Genus *Acarospora* in Greenland and Spitsbergen, *Nyt Magazin for Naturvidenskaberne*, vol. LXXV, p. 221—241, Oslo 1935.

Dr. MAGNUSSON was also kind enough to prepare a *Clavis specierum* for the genus which he allowed me to use for the present paper:

1. Thallus yellow, radiating. Apothecia  $\pm$  plane, marginated.
  1. *A. oxytona* (ACH.) MASS. p. 115
- 1\*. Thallus brown or ochraceous or pale.
  2. Thallus squamulose-areolate.
  3. Spores  $3-5 \times 2(3) \mu$ .
  4. Thallus cortex  $\text{CaCl}_2\text{O}_2$  —.
  5. Hymenium mostly more than  $125 \mu$  in height.
  6. Disk smooth, sometimes punctiform.

7. Thallus very dark below.  
 4. *A. pyrenopsoides* H. MAGN., p. 116
- 7\*. Thallus pale below.  
 8. Thallus ochraceous.  
 3. *A. sinopica* (WNBG.) KBR., p. 115
- 8\*. Thallus  $\pm$  brown.  
 9. Apothecia without prominent proper margin.  
 2. *A. smaragdula* (WNBG.) TH. FR., p. 115
- 9\*. Apothecia with thick proper margin.  
 10. Cortex 50—100  $\mu$  thick.  
 6. *A. verruciformis* H. MAGN., p. 116
- 10\*. Cortex thinner than 50  $\mu$ .  
 5. *A. scyphulifera* VAIN., p. 116
- 6\*. Disk rough, often dilated.  
 7. *A. scabrida* (HEDL.) H. MAGN., p. 116
- 5\*. Hymenium less than 125  $\mu$  in height.  
 6. Cortical cells 3—5  $\mu$  large.  
 9. *A. veronensis* MASS., p. 116
- 6\*. Cortical cells smaller.  
 7. Areolae tuberculate, below black.  
 8. *A. tuberculata* H. MAGN., p. 116
- 7\*. Areolae  $\pm$  smooth to uneven.  
 8. Spores somewhat large, 4—6  $\times$  3  $\mu$ .  
 12. *A. Lyngei* H. MAGN., p. 116
- 8\*. Spores 3—4,5  $\times$  2  $\mu$ .  
 9. Cortex 35—40  $\mu$ . Squamules with free margins . . . . . 11. *A. Friesii* H. MAGN., p. 116
- 9\*. Cortex 15—20  $\mu$ . Squamules appressed.  
 10. *A. persimilis* H. MAGN., p. 116
- 4\*. Thallus cortex  $\text{CaCl}_2\text{O}_2$  +.  
 13. *A. cartilaginea* H. MAGN., p. 116
- 3\*. Spores 8—12  $\times$  4—5  $\mu$ .  
 14. *A. macrospora* (HEPP) BAGL., p. 116
- 2\*. Thallus radiating. . . . . 15. *A. molybdina* (WNBG.) TREV., p. 116

1. *Acarospora oxytona* (ACH.) MASS.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 222).

2. *Acarospora smaragdula* (WNBG.) TH. FR.

Disko: Nordfjorden (TH. FR., MAGNUSSON, l. c. p. 223).

3. *Acarospora sinopica* (WNBG.) KOERB.

Julianehaab: Nanortalik (VAHL?) and — not located — Ukivigserqait

(VAHL). — Holsteinsborg (VAHL 1833, TH. FR., MAGNUSSON, l. c. p. 223).

4. *Acarospora pyrenopsoides* H. MAGN.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 224).

5. *Acarospora scyphulifera* VAIN.

Godthaab (TH. FR., MAGNUSSON, l. c. p. 224).

6. *Acarospora verruciformis* H. MAGN.

Holsteinsborg (VAHL 1833, MAGNUSSON, l. c. p. 224).

7. *Acarospora scabrida* (HEDL.) H. MAGN.

Julianehaab (VAHL 1828, MAGNUSSON, l. c. p. 225).

8. *Acarospora tuberculata* H. MAGN.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 225).

9. *Acarospora veronensis* MASS.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 226).

10. *Acarospora persimilis* H. MAGN.

Disko: Mellemfjorden. — Nûgssuaq: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 227).

11. *Acarospora Friesii* H. MAGN.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 228).

12. *Acarospora Lyngei* H. MAGN.

Ritenbenk Island east of Disko (TH. FR., MAGNUSSON, l. c. p. 230).

13. *Acarospora cartilaginea* H. MAGN.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR., MAGNUSSON, l. c. p. 236).

14. *Acarospora macrospora* (HEPP) BAGL.

Julianehaab: Nanortalik (leg. ?, MAGNUSSON, l. c. p. 239).

15. *Acarospora molybdina* (WNBG.) TREV.

Godthaab (TH. FR.) — Holsteinsborg (TH. FR.) — Disko: Godhavn, Malingiaq, Blaafjeld or Uivfaq and — not located — Sâtoq and Igdlutsiait (TH. FR., MAGNUSSON l. c. p. 240).

Many localities and many plants, common where birds are abundant.

## PERTUSARIACEAE.

### *Pertusaria* DC.

1. *Pertusaria bryontha* (ACH.) NYL.

Disko: Nordfjorden, not many plants.

*Pertusaria bryontha* is supposed to be rare in Greenland, but widespread: Formerly we had a few finds: Thule district: Cary Island (SEIDENFADEN), Julianehaab district: Tunugdliarfik (VAHL), and East Greenland: Myggbukta, Moskusoksefjorden and Veganeset in the Traill Island (LYNGE, unpublished).

Not stained by paraphenyldiamin.

2. *Pertusaria oculata* (DICKS.) TH. FR.

Godthaab: Kookøerne or Kitsigsut (TH. FR.), in great abundance. Disko: Godhavn, Blæsedalen and Skarvefjæld (GRØNTVED).

The commonest *Pertusaria* in the Arctic. To judge from the material in Copenhagen it is supposed to be fairly common all over West Greenland. In East Greenland it has been collected at Akornarmiut by the Norwegian botanist BJØRLYKKE, but I have seen no plants farther north, none from Scoresby Sound and none from the Norwegian expeditions north of Scoresby Sound. — It stains intensely yellow, then red with paraphenylendiamin.

3. *Pertusaria panyrga* (ACH.) MASS.

Disko: Kuánerssuit, very scarce.

Formerly we only had the finds, recorded in DEICHMANN BRANTH and GRØNLUND Grøn. Lichen-Flora, p. 510: Christianshaab in Disko Bay (VAHL) and Tunugdliarfik in the Julianehaab district. It has never been collected on the east coast.

Not stained perceptibly by paraphenylendiamin.

4. *Pertusaria dactylina* (ACH.) NYL.

Godthaab: Nûk and Kookøerne or Kitsigsut (TH. FR.). — Disko: Sinigfik (GRØNTVED), Mellemfjorden and Kuánerssuit (TH. FR.).

There was a lot of plants in TH. FRIES's collection, all of them sterile. I was glad to find this beautiful *Pertusaria* so well represented in the collections. Formerly we only had 3 Greenland finds: Godthaab district: Íkátoq (VAHL, s. n. *Pert. oculata*), Frederikshaab (VAHL) and Julianehaab district: Tunugdliarfik (VAHL). No locality is known from East Greenland.

Stained yellow, then intensely red by paraphenylendiamin.

5. *Pertusaria coriacea* TH. FR.

ERICHSEN *Pertusariaceae*, in RABENH. *Kryptogamenflora*, 1935, p. 342 et 370, ubi syn.

Godthaab: Kookøerne or Kitsigsut. — Disko: Nordfjorden, Blaa-fjeld or Uivfaq and Malingiaq. — Nûgssuaq Peninsula: Atâ (GRØNTVED).

There were so many plants from so many localities that it must be common and plentiful. It is distinguished from *Pert. glomerata* by its shining surface and its great brittleness. It is also generally sterile, I have never seen its apothecia, *Pert. glomerata* is always fertile, and its prominent apothecia much resemble *Lecanora verrucosa*. ERICHSEN writes (l. c.) that he obtained a distinctly yellow colour with paraphenylendiamin in *Pert. glomerata*, but no colour in *Pert. coriacea*. I found the same reaction in the former species, but also in *Pert. coriacea* I found an orange colour, at least in the lower part of the cortex (best seen in a section).

*Pertusaria coriacea* is widely distributed in Greenland, the available records suggest it to be a northerly species. In West Greenland we formerly had two finds from the Thule district: Cary Island and Pandora Harbour (SEIDENFADEN), in East Greenland HARTZ collected it at several

localities in Scoresby Sound, and farther north I collected it in Holmsvika and Landgangsdalen in 1929 (unpublished).

*Pert. protuberans* has been collected in S.W. Greenland in the Julianehaab district: Tunugdliarfik (VAHL) and Julianehaab (P. H. SØRENSEN). Habitually there is no objection to the determinations, but I have not sectioned the plants.

*Pert. Sommerfeltii* has been recorded from Ikertôq (VAHL) and from some localities on the East coast (Herb. Copenhagen). The firstly mentioned plant was found on mossy soil, the microscopical examination decided for *Lecanora verrucosa*. But one plant from Hekla Havn in Scoresby Sund (leg. HARTZ) must be *Pert. Sommerfeltii*. It has linear asci, intensely blue by J, and very thick-walled spores, it was collected on the dead twigs of willows.

### **Lecanora** (ACH.) TH. FR.

#### *Clavis specierum.*

- I. Thallus uniformis, latere tantum superiore corticatus, apothecia elevata. . . . . Subgen. *Eulecanora* TH. FR., p. 122<sup>1)</sup>
  1. Thallus supra muscos crescens.
    2. Thallus albidus vel cinerascens (vel obsoletus), discus rufofuscus.
      3. Discus epruinosis, margine crasso persistenti, albido, vulgo integro circumdatus, sporae 12—22 × 7—12  $\mu$ .
        2. *L. epibryon* ACH., p. 122
      - 3\*. Discus saepe epruinosis, apothecia biatorina, margine evanescenti, sporae 16—25 × 5—7  $\mu$ .
        16. *L. castanea* (HEPP) TH. FR., p. 128
    - 2\*. Thallus flavidus vel flavo-virescens, discus olivaceo-nigricans.
      3. Thallus parvus, lobi minute granulato-squamulosi, KOH immutati, sporae ellipsoideae, 10—12 × 4.5—6  $\mu$ .
        14. *L. leptacina* SOMRFT., p. 128
      - 3\*. Thallus maximus, pulvinatus, lobi glebulosi-verrucosi, in centro subpapillati, sporae ellipsoideo-fusifformes, 15—17 × 7—7.5  $\mu$ .
        11. *L. maxima* LYNGE, p. 126
    - 1\*. Thallus rupicolus.
      2. Thallus evanescens.
        3. Discus helvolus vel flavescens.
          12. *L. polytropa* (EHRH.) RABH. var. *ecrustacea* SCHAER., p. 128
        - 3\*. Discus ater vel obscure atro-rufescens.
          4. Discus margine tumidulo, albido, pruinoso circumdatus,

<sup>1)</sup> All the species of *Eulecanora*, mentioned in the present paper, were tested with paraphenyldiamin. The two species of the *frustulosa* section, *L. frustulosa* itself and *L. maxima*, gave an intensely yellow colour, *L. epibryon*, *L. leptacina*, and *L. sordida* a faintly yellow colour. All the other species were "P—".

paraphyses 1.5—2  $\mu$ , apicem versus vix incrassatae; planta ad rupes calcareas crescens.

5. *L. dispersa* (PERS.) RÖHL., p. 124

4\*. Discus margine tenuissimo, obscuro, epruinoso vel livido-pruinoso circumdatus, paraphyses apice capitatae, usque ad 5  $\mu$  crassae; planta ad rupes basalticas crescens.

9. *L. discoënsis* LYNGE, p. 125

2\*. Thallus bene evolutus.

3. Thallus cinereo-fuscescens . . . 15. *L. badia* (PERS.) ACH., p. 128

3\*. Thallus flavidus, KOH intensius flavescens.

4. Lobi crassi, glebuloso-verrucosi.

10. *L. frustulosa* (DICKS.) ACH., p. 126

4\*. Lobi tenuiores (usque evanescentes), areolato-granulati.

5. Discus helvolus vel flavescens.

12. *L. polytropa* (EHRH.) RABH., p. 128

5\*. Discus olivaceo-nigricans (saltem in aetate).

13. *L. intricata* (SCHRAD.) ACH., p. 128

3\*\*. Thallus albidus vel albedo-cinerascens.

4. Hymenium violaceum. . . . 1. *L. atra* (HUDS.) ACH., p. 122

4\*. Hymenium non violaceum.

5. Hymenium superne aeruginosum vel smaragdulum, vulgo ad rupes calcareas crescentes.

6. Apothecia parva, 0.4—0.7 mm lata.

7. *L. torrida* VAIN., p. 124

6\*. Apothecia majora, 1.5—2 mm lata.

8. *L. groenlandica* LYNGE, p. 124

5\*. Hymenium superne fuscescens.

6. Thallus KOH flavescens, late expansus, crassus, rimosus, discus (etiam madefactus) lividus, caesio-pruinosis,  $\text{CaCl}_2\text{O}_2$  flavescens.

3. *L. sordida* (PERS.) TH. FR., p. 122

6\*. Thallus KOH —, multo minor, discus siccus ater, madefactus fuscus,  $\text{CaCl}_2\text{O}_2$  —.

7. Thallus crassus, cretaceus, verruculas vel strias, 2—4 mm latas circa apothecia formans.

6. *L. subtorrida* ZAHLBR., p. 124

7\*. Thallus tenuis, verruculas sparsas usque evanescentes formans. 4. *L. Behringii* NYL., p. 123

II. Thallus latere tantum superiore corticatus, apothecia concava vel urceolata, saltem ab initio thallo immersa, deinde in nonnullis speciebus ob marginem tumidulum emersa usque ad (supra thallum tenuem) elevata.

Subgen. *Aspicilia* (MASS.) TH. FR., p. 129

1. Thallus ad muscos vel ad terram nudam crescens.  
17. *L. verrucosa* ACH., p. 129
- 1\*. Thallus saxicolus.
2. Medulla J caerulescens.
3. Thallus KOH rubescens, areolae albidae vel albido-cinera-scentes, discus (madefactus) rufescens.  
18. *L. alpina* SOMRFT., p. 129
- 3\*. Thallus KOH non rubescens.
4. Thallus cinereus vel albido-cinereus, discus (made-factus) fusco-rubescens, sporae  $12-24 \times 7-10 \mu$ .  
19. *L. cinereorufescens* (ACH.) TH. FR., p. 129
- 4\*. Thallus flavido-ochraceus, discus etiam madefactus aterrimus, sporae parvae,  $7-8 \times 4.5-5.5 \mu$ .  
20. *L. molariformis* LYNGE, p. 129
- 2\*. Medulla J non caerulescens.
3. Thallus saltem ambitu radiatus.
4. Thallus albido-glaucescens vel cinereus, in centro granuloso-vel rimoso-areolatus, ambitu radiatus.  
33. *L. perradiata* NYL., p. 143
- 4\*. Thallus saepe obscure cinereus, pro maxima parte plicato-vel filamentoso-radiatus, radii magis discreti, divergenter ramosi, "circumserpentibus", interdum moniliformibus. . . . . 34. *L. proserpens* NYL., p. 144
- 3\*. Thallus uniformis, areolatus vel verrucosus vel membrani-formis.
4. Medulla (vel stratum corticale) KOH rubescens.
5. Thallus verrucoso-papillatus, obscure cinereus vel cinereus-olivaceus. . . . 22. *L. mastrucata* (WBG.) ACH., p. 130
- 5\*. Thallus rimoso-areolatus (in arcticis areolae saepe subdiscretae sunt). . . . 21. *L. cinerea* (L.) SOMRFT., p. 130
- 4\*. Medulla KOH plus minusve intense flavescens, sed non rubescens.
5. Thallus flavido-ochraceus. 31. *L. narssaqensis* LYNGE, p. 140
- 5\*. Thallus cinereus.
6. Thallus verrucoso-papillatus, obscure cinereo-nigrescens, apothecia verrucis profunde immersa.  
23. *L. mastoidea* LYNGE, p. 130

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<sup>1)</sup> All the species of *Aspicilia*, mentioned in the present paper, were tested with paraphenyldiamin. The result was meagre: *L. alpina*, yellow, *L. cinerea*, first yellow, then orange to red, *L. mastoidea* and *L. mastrucata*, cortex no reaction, medulla first yellow, then orange to red. In neither of the other species I was able to detect any reaction.

- 6\*. Thallus rimoso-areolatus, cinereus vel cinereo-albidus, apothecia magis aperta, thallum subaequantia ..... 24. *L. arctica* LYNGE, p. 132
- 4\*\*. Medulla KOH immutata.
5. Discus rufescens, depressus.  
27. *L. lacustris* (WITH) TH. FR., p. 138
- 5\*. Discus albedo-pruinosis, etiam cum margine tumidulo..... 32. *L. nikrapensis* (DARB.) ZAHLBR., p. 141
- 5\*\*. Discus ater, epruinosis.
6. Thallus ochraceo-flavescens vel ochraceo-cinereascens.
7. Hymenium superne pulchre smaragdulum, thallus tenuis vel tenuissimus, irregulariter rimosus, margine effusus.  
28. *L. flavida* HEPP, p. 138
- 7\*. Hymenium superne fuscum.
8. Thallus parvus, 5—6 mm latus, rimoso-areolatus, ambitu abrupte limitatus.  
29. *L. Friesii* LYNGE, p. 138
- 8\*. Thallus late expansus, usque ad 50 mm latus, centrum versus areolatus, ambitum versus magis (flabelliformiter) dissolutus, et ob hypothallum tenuissimum subeffusus.  
30. *L. basaltica* LYNGE, p. 139
- 6\*. Thallus albidus vel plus minusve obscure cinereus, tenuissimus.
7. Thallus laevigato-membranaceus, rimis irregularibus solum hinc inde ruptus.  
25. *L. annulata* LYNGE, p. 136
- 7\*. Thallus crebre rimoso-areolatus.  
26. *L. elevata* LYNGE, p. 136

### III. Thallus effiguratus, utrinque corticatus.

Subgen. *Placodium* (HILL) TH. FR., p. 144

1. Thallus centro cephalodiis rufescentibus, radiatim rimosus, et peripheriam versus sorediis depressis instructus, thallus P—.  
35. *L. gelida* (L.) ACH., p. 144
- 1\*. Thallus cephalodiis sorediisque destitutus.
2. Thallus substrato arcte adnatus.
3. Thallus cinereo-glaucescens, medulla P aurantiaco-rubescens ..... 36. *L. melanaspis* (ACH.) TH. FR., p. 144
- 3\*. Thallus stramineus, P—. 37. *L. straminea* (WNBG.) ACH. p. 144

- 2\*. Thallus pulvinatus, substrato haud arcte adnatus, thallus P —.
3. Discus ater, paraphyses apice obscure capitatae, 5 usque ad  $7\mu$  crassae, epithecium haud granulolum.
4. Thallus KOH flavescens, apotheciis omnino tectus, subtus albidus, species eximie ornithocoprophila  
38. *L. contractula* NYL., p. 144
- 4\*. Apothecia numerosissima, thallum tamen haud omnino tegentia, thallus KOH —, subtus ambitum versus plus minusve late nigricans, species minus intense ornithocoprophila  
39. *L. melanophthalma* RAM., p. 145
- 3\*. Discus dilutius coloratus, paraphyses apice haud vel leviter solum incrassatae, epithecium minute granulolum, thallus subtus ambitum versus plus minusve late olivaceo-nigricans.
4. Thallus KOH flavescens, discus carneo-rubescens vel luteocarneus. . . . . 41. *L. rubina* (VILL.) ACH., p. 146
- 4\*. Thallus KOH —, discus testaceus.  
40. *L. peltata* (DC.) STEUD., p. 145

Subgen. **Eulecanora** TH. FR.

1. *Lecanora atra* (HUDS.) ACH.

Disko Island: Blaafjeld or Uivfaq. — Nûgssuaq Peninsula: Atanikerdluk.

*Lecanora atra* was quite scarce in this collection. The few plants in the Copenh. herb. do not suggest a common species in Greenland.

2. *Lecanora epibryon* ACH.

Godthaab: Kook Islands or Kitsigsut. — Disko Island: Nordfjorden, Mellemfjorden and Blaafjeld or Uivfaq.

An ubiquitous plant all over the Arctic, and certainly quite as common in Greenland as elsewhere. In the Copenh. herb. there are several plants, found in places where lichens have been collected, from West, East and North Greenland.

3. *Lecanora sordida* (PERS.) TH. FR.

Syn. *Lecanora glaucoma* (HOFFM.) ACH. — An syn. *Lichen rupicola* L. MANTISSA, I, 1767, p. 132? — An syn. *Lichen rimosus* Retz. Flor. Scand. Prodr., 1779, p. 225?

Disko Island: Lyngmarken, very scarce.

The plants have a very thick white thallus, yellow by KOH, and not quite insensible to  $\text{CaCl}_2\text{O}_2$  (a very faint, yellow colour). The apothecia are almost immersed into the thallus, the disk very pruinose, distinctly yellow by  $\text{CaCl}_2\text{O}_2$ . Habitually it differs somewhat from Scandinavian plants, but I have not ventured to separate it.

In the Copenh. herb. I found two good plants, one from "Groenlandia" (herb. Liebm.) and one from Ameralik in the Godthaab district (leg. VAHL, det. NYL.: *Lecanora glaucoma* var. *Swartzii*). — I did not find the Upernavik plant, mentioned in Grøn. Lich.-Flora, p. 480. — *Lecanora sordida* is not supposed to be common in Greenland.

It is very hard to find an unobjectionable name for this species. ZAHLBRUCKNER introduces the old Linnean name (*Lichen*) *rupicola* L. MANTISSA, I, 1767, p. 132. But this species is not mentioned in VAINIO Revisio Lich. in herb. Linn. asserv., it is doubtful whether the plant really exists. In Smith Brit. Lich., I, 1918, p. 283 the name *rupicola* is quoted with a "?".

*Lichen rimosus* RETZ. Flor. Scand. Prodr., 1779, p. 225, is next in age. TH. FRIES simply quotes this name as a synonym, Lich. Scand. I, 1871, p. 246, he rejects it without giving any arguments. Should he not have examined it? At present I have no access to Retzii herbarium, accordingly I do not think it advisable to accept this little known name.

Next come the two well known names *Lecanora sordida* and *L. glaucoma*. The former dates from PERSSON in Usteri Neue Annalen d. Bot., 1794, p. 26, the latter from HOFFMANN Deutschlands Flora, 1795, p. 172 (ZAHLBRUCKNER writes 1796, Cat. Lich. V, p. 526). Curiously enough HOFFMANN quoted his own Plantae Lichenosae, tab. 52 and 53. But the printing of that work had evidently been delayed, for the printing date is 1801. After this I have given preference to the combination *Lecanora sordida* (PERS.) TH. FR.

#### 4. *Lecanora Behringii* NYL.

Nûgssuaq Peninsula: Atanikerdluk, on old bones.

In Lich. Pitlek., 1909, p. 47, VAINIO gave a full description of this species which evidently substitutes *Lecanora Hageni* in the Arctic. He calls attention to the "cortex excipuli ex hyphis verticalibus formatus". This agrees exactly with the plants which TH. FRIES collected at Atanikerdluk on old bones of birds and whales. I therefore regard this determination as good.

GRØNTVED collected a *Lecanora* at Qigdlüssat, also on bones. There is no difference in size between his plants and the above mentioned ones, but the white margin is, perhaps, a little thicker than in TH. FRIES's plants. I could not find the palissade structure of the cortex, it is more plectenchymatous with rounded articuli and very indistinct hyphae, on account of the very adspersed cell-walls. It may possibly belong to *Lecanora dispersa*.

The same cortical structure was found in some plants which TH. FRIES collected on a calcareous sandstone at Atanikerdluk. The cortex was not well set off from the inner part of the excipulum and the cortical hyphae were adspersed to an extent that defied all efforts to clear them

up, the grains were not removed by KOH, not by HNO<sub>3</sub> and not by chlorale hydrate. The young apothecia have a relatively thick, pruinose margin, but it is much thinner in full-grown apothecia, and much thinner than in typical *Lecanora dispersa*. Yet the plants may belong to the latter species.

5. *Lecanora dispersa* (PERS.) RÖHL.

Disko: Qigdlüssat (GRONTVED). — Nügssuaq Peninsula: Atanikerdluk (TH. FR.), on a calcareous sandstone.

Cfr. the notes under the head of *Lecanora Behringii*.

6. *Lecanora subtorrida* ZAHLBR.

ZAHLBRUCKNER Die Gattung Lecanora, 1928, p. 23, in Rep. Scient. Res. Norw. Exped. Nov. Zemlya, No. 44.

Disko Island: Narssaq, on a soft sandstone that contains some calcareous substance.

I have compared the plants with ZAHLBRUCKNER's type in our herb., and I can find no specific difference. In the Greenland plants the hymenium measured 62—65  $\mu$  in height, and the paraphyses were not coherent.

7. *Lecanora torrida* VAIN.

VAINIO Lich. Pitlek., 1909, p. 45. — LYNGE Lich. Bear Island, 1926, p. 56. — MALME Lich. Orae Sibir. borealis, Ark. f. Bot., 1932, p. 27.

Godthaab, a small plant, growing on a much weathered fine-grained granitic rock.

The plant agrees entirely with the description given by VAINIO, l. c., with one exception only: the hymenium of the present plant preserves its smaragdine colour if HNO<sub>3</sub> is applied, VAINIO wrote "HNO<sub>3</sub> violascens". I have seen the type plant in Stockholm. The type plant was found on a calcareous rock, as was also the Bear Island plant, collected by TH. FRIES in 1868. The substratum of the Greenland plant gave no CO<sub>2</sub> with mineral acids, neither did the "Vega" plant from Cape Tscheljuskin, determined by MALME, this plant was found on a slaty rock. It is possible that the felspar in the Greenland rock has supplied some Ca, sufficient for the plant, otherwise crustaceous lichens are very particular about their substratum with respect to Calcium. — There were a few pycnoconidia, but I was unable to obtain an unobjectionable preparate of the pycnoconidia. VAINIO found them to be 16—22  $\mu$  in length.

8. *Lecanora groenlandica* LYNGE n. sp. (Plate IX, fig. 1).

Nügssuaq Peninsula: Atanikerdluk, a fragment, collected on a calcareous rock.

Thallus crustaceus, uniformis, crassitudine mediocri, rimoso-areolatus, albidus, opacus, areolis 0.3—0.4 mm latis.

Apothecia numerosissima, thallum fere tegentia, majuscula, diam. usque ad 1.5—2 mm, rotundata, sessilia, sed supra thallum elevata.

Discus aterrimus, epruinosis, depresso convexus vel deinde magis convexus, margine pure albido, integro, persistenti circumdatus. Excipulum haud corticatum, gonidia continens. Hypothecium omnino incoloratum, hymenium a hypothecio haud bene limitatum, superne smaragdulo-fuligineum, inspersum. Paraphyses arcte cohaerentes, superne leviter solum clavatae,  $1.5-2.5\ \mu$  crassae. Asci angusti, circiter  $10\ \mu$  crassi, numerosi, sed fertiles rarissimi. Sporae parvae, ellipsoideae vel oblongae, angustae,  $7-8 \times 2.5-3\ \mu$ .

Medulla J —, hymenium J persistenter et intense caerulescens, hypothecium J minus intense caerulescens, medulla KOH immutata, epithecium KOH et  $\text{HNO}_3$  immutatum.

There was only a fragment of a plant, it is, perhaps, a larger one. No marginal areolae were present. The excipulum had not developed a cortex, towards the surface its hyphae were fused into an almost amorphous substance. — *Lecanora groenlandica* has a certain exterior resemblance to *Lecanora atra*, from which it is easily distinguished by the colour of its hymenium and its small spores. The structure of the apothecia agrees fairly well with *Lecanora torrida* VAIN. which has considerably smaller apothecia and slightly larger spores,  $8-11 \times 4-5\ \mu$ .

9. *Lecanora discoënsis* LYNGE n. sp.

Disko Island: At the "Eskimo camp", on an amygdaloid lava (21.6.1871).

Thallus subnullus, minute granulosus, albidus.

Apothecia satis numerosa, dispersa vel hinc inde magis approximata, parva vel mediocria, diam. usque ad 0.5 mm, rotundata, ab initio adpressa, deinde supra saxum bene elevata, substipitata. Discus epruinosis, ater, madefactus subolivaceus, margine concolori integro cinctus, interdum etiam thallo tenuissime annulata. Excipulum gonidiis majusculis, diam. usque ad  $25\ \mu$ , cystococcoideis, repletum, bene corticatum, cortex hyphis pachydermaticis, superficiei perpendicularibus, hyphae excipuli haud inspersae. Hypothecium omnino incoloratum, hymenium superne olivaceo-fuligineum, strato amorpho incolorato deinde rupto tectum,  $50-55\ \mu$  altum. Paraphyses (maturae) superne in  $\text{HNO}_3$  leviter capitatae, in KOH distincte capitatae,  $5\ \mu$  crassae, distincte septatae ( $\text{HNO}_3$ ), vulgo indivisae. Asci anguste saccati,  $10-12\ \mu$  crassi, membrana superne valde incrassata. Sporae octonae, ellipsoideae,  $10-12 \times 4-5.5\ \mu$ .

Hymenium J caeruleo-nigricans, praecipue asci, etiam hypothecium J caerulescens, cortex excipuli et medulla J haud caerulescentes, KOH —, hymenium  $\text{HNO}_3$  superne smaragdulum.

It is sufficiently distinct from *Lecanora groenlandica* by its smaller apothecia, corticated excipulum, more olive-coloured epithecium and larger spores. Its minutely granular thallus is only distinctly seen under

a lens of high power. — *Lecanora Nordenskiöldii* VAIN. and *L. permelan-  
cholica* ZAHLBR. have a brown epithecium. *Lecanorae* with this habitus  
and a smaragdine or olive-coloured epithecium are very rare.

After its habitus it is a *Lecidea* rather than a *Lecanora*, on account  
of its dark margin, but its excipulum is filled with gonidia.

An excellent clearing of the sections is obtained by  $\text{HNO}_3$ , if not  
cleared in this manner the paraphyses look more incrassated at their  
tips, evidently on account of a gelatinous covering.

10. *Lecanora frustulosa* (DICKS.) ACH.

var. *Ludwigii* (ACH.) TH. FR.

Disko Island: Blæsedalen, Kuánerssuit and Laksebugten.

There are several plants of *Lecanora frustulosa* in the Copenh. herb.  
It is not of the commonest lichens in Greenland, but it cannot be rare,  
at least in South Greenland. In herb. Copenh. I found the following plants.  
Disko Bay: Christianshaab (VAHL), Godthaab: Ameralik and Íkátog  
(VAHL), Julianehaab: Tasermit and Tunugdliarfik (VAHL) and — not  
located — Ukivigserqait (VAHL), and from East Greenland: Scoresby  
Sound at Danmark Harbour, Kopperpynten and Buksekap (HARTZ). I also  
found it in Ymerøen in the Franz Josef Fjord in 1929 (unpublished).

var. *occidentalis* LYNGE n. var. (Plate VI, fig. 2).

Disko Island: Mellemfjorden at Laksebugten.

Thallus apotheciis creberrime tectus. Discus ater, etiam madefactus  
leviter solum in fusciscentem vergens. Hymenium superne olivaceo-  
fuliginium, paraphyses minus arcte concretæ, sporæ 12—13 × 7  $\mu$ . —  
Medulla J —, KOH flavescens, hymenium J persistenter caerulescens,  
KOH dilutius olivaceum.

The thallus itself is, perhaps, not much different from that of *Leca-  
nora frustulosa* var. *argopholis*. But it is so entirely covered with apotheci-  
a that it is little visible. The disk is black on account of the colour of  
the epithecium which is distinctly dark olive, against an equally distinctly  
brown in *Lecanora frustulosa* var. *argopholis*. The brown colour of the  
latter species was described by authors such as TH. FRIES Lich. Scand.  
p. 256, and Harmand Lich. France, p. 1026, and I found it quite typically  
in Havås Lich. Norv. No. 365 which I examined. The said differences are,  
perhaps, sufficient to establish a proper species, but more material is  
to be desired before doing so.

11. *Lecanora maxima* LYNGE n. sp. (Plate IX, fig. 2).

Disko: Lyngmarken, rather plentiful in the collection, found on  
mosses over (irrigated?) rocks.

Thallus plagas latas tegere videtur, a substrato facile separa-  
tus, pulvinatus, pulvinuli usque ad 4—5 cm lati, thallus crassus,  
coriaceus, gleboso-verrucosus vel in centro subpapillatus,  
lobi (vulgo) 1—1.5 mm lati, in thallis juvenilibus adpressi, crenati,

deinde saepe plus minusve adscendentes et imbricati, superne flavidi vel albido-flavescentes, scabriusculi, inferne et ad latera mox obscurati usque nigricantes.

Hyphae medullares valde adpersae, etiam hyphae corticis superioris. Ad latera loborum hyphae fusco-nigricantes, densius contextae, papillae-formes, sed non corticatae, sensim vel mox necrotientes.

Apothecia numerosa, approximata, magna, diam. 2—3, interdum usque ad 4 mm, arcte adpressa, supra thallum haud elevata. Discus persistenter planus, lividus, interdum deinde fusco-nigricans, margine thallo concolori, elevato, valde crenato, persistenti circumdatus. Latera excipuli fusco-nigricantia, excipulum praeterea incoloratum, etiam cum hypothecio. Gonidia in margine excipuli inclusa. Hymenium circiter 100  $\mu$  altum, superne granulosum, fuscum, praeterea incoloratum. Paraphyses valde conglutinatae, satis validae, 2—2.5  $\mu$  (in HCl), apice vix vel leviter solum incrassatae. Asci male evoluti, sporae ellipsoideo-fusiformes, apice apiculatae (ut in *Lecanora badia*), 15—17  $\times$  7—7.5  $\mu$ .

Pycnides numerosissimae, perifulcrum circum ostiolum leviter obscuratum. Fulera exobasidialia, pycnoconidia subrecta, 12—17  $\mu$  longa.

Medulla J non caerulescens, cortex KOH flavescens, thallus CaCl<sub>2</sub>O<sub>2</sub>—Hymenium J primum caerulescens, gelatina deinde fere decoloratur, asci subsistentente colorantur.

Habitually the thallus quite resembles a *Thalloidima* which is, of course, out of the question. — The plant might be a *Placodium*, in that case related to *Lecanora rubina*. But that species has a very different anatomical structure: a firm, very distinct lower cortex, well set off from the medulla, and about 25—30  $\mu$  thick, its hyphae more or less perpendicular to the surface and very thick-walled, quite an armour. Nothing of that kind is seen in the present species. From the young, small, button-like, appressed and crenate thalli the lobes develop in a most extraordinary manner. In the full-grown thalli they form inflated, towards the centre almost columnar, densely imbricated lobes, alive only at and near their apices. On a good section we find that the sides are brownish-black, the coloured parts rapidly increase in thickness, they are gradually transformed into a softer, evidently dead structure, forming the centre of the lobes. The living parts of the lobes are very corneous, but on account of the necrotic inner parts the pulvinuli are very fragile, they easily break up. The hyphae of the coloured parts have a velvety appearance, built up of rather thick, almost papillose hyphae, many of which protrude from the average surface.

The wall of the hyphae was so adpersed that it resisted all efforts to clear them. One lobe was left in glycerine over night, and my best section was cleared with C<sub>2</sub>H<sub>5</sub>OH + HCl, as far as possible. The upper cortex was then very little distinct, not well limited from the lower

strata and more like densely contexted medullary hyphae than a proper cortex.

Between the lobes Cyanophyceous algae had found wonderful habitats, *Gloeocapsa* and *Oscillatoria* abounded. This suggests a moist locality, mossy rocks that are frequently irrigated. Such rocks are also the locality of *Lecanora frustulosa*, and it is easily seen from the description that this species must be nearly related. If very widely limited it might perhaps also include the present species as a pulvinated forma, on account of the mossy substratum. But on the whole its habitus is too different.

12. *Lecanora polytropa* (EHRH.) RABH.

*F. crustacea* SCHAEER. Disko Island: Malingiaq.

ZAHLBRÜCKNER identified this forma with var. *alpigena* (ACH.) DALLA TORRE et SARNTH. in his paper on the *Lecanorae* from Novaya Zemlya, 1928, p. 28. But ACHARIUS wrote on his *alpigena*: "Crusta tartarea subrimoso-areolata" & c. (Lich. Univ., 1810, p. 379).

Var. *leucococca* (SOMRFT.) TH. FR. Holsteinsborg. — Disko Island: Sinigfik (GRØNTVED), Sâtoq, Mellemfjorden, Kuánerssuit and Nipisat (TH. FR.).

The number of plants is quite considerable, there is every reason to suppose that it should be equally common in West Greenland as it is elsewhere in the Arctic. — The apothecia are largely infested with a parasite which colours the disk black. Such plants should not be confused with *Lecanora intricata*.

13. *Lecanora intricata* (SCHRAD.) ACH.

Godthaab. — Disko Island: Nordfjorden and Mellemfjorden.

It is not probable that this species should be common in Greenland, there are but a few plants in the Copenh. herb.

14. *Lecanora leptacina* SOMRFT.

Disko: Mellemfjorden, only a few plants, with *Pyrenopsis pulvinata*.

15. *Lecanora badia* (PERS.) ACH.

var. *cinerascens* Fw.

Godthaab. — Disko Island: Lyngmarken, Nordfjorden, Mellemfjorden, Malingiaq and Nipisat. — Nûgssuaq Peninsula: Atanikerdluk.

There are so many plants, and especially so many localities that it suggests a common plant. In the Copenh. herb. there are 8 localities, scattered from Disko Island in the west southwards and from the east coast northwards to Scoresby Sound. — In the Arctic the var. *cinerascens* is the commonest type by far.

16. *Lecanora castanea* (HEPP) TH. FR.

Disko Island: Sinigfik (GRØNTVED), Lyngmarken, Blæsedalen, Godhavn and Blaafjeld or Uivfaq (TH. FR.).

The spores were not well developed, what I found corresponded to

the common type, 16—20 (—25)  $\mu$  in length, they were too short for var. *curvescens*. In some apothecia the spores were simple, in others one-septated.

It has often been referred to the *Lecideae*, and its margin really suggests that genus (Subgen. *Biatora*). I sectioned several apothecia without finding gonidia, until at last I cut a rather young apothecium, stained with chlorzinkiodide, after a clearing with chlorale hydrate. This method revealed gonidia in abundance under the hypothecium, but do they die off in older apothecia? The excipulum has an exceptionally fine palissade cortex, thick-walled hyphae perpendicular to the surface.

Subgen. **Aspicilia** (MASS.) TH. FR.

17. *Lecanora verrucosa* ACH.

Disko Island: Godhavn, Blæsedalen, Nordfjorden, Mellemfjorden and Blaafjeld or Uivfaq (TH. FR.). — Nûgssuaq Peninsula: Atâ (GRONTVED).

An ubiquitous plant in the Arctic, supposed to be equally common in West Greenland as elsewhere.

18. *Lecanora alpina* SOMMERF.

Godthaab. — Disko: Laksebugten.

All the plants were chemically tested: Medulla J caerulescens, KOH sanguinea. But habitually they differ considerably, in some plants the areolae are plane, contiguous or only separated by broad cracks, in others the areolae are much more discrete, often quite verrucose. The colour varies from ash-grey to greyish-white.

19. *Lecanora cinereorufescens* (ACH.) TH. FR.

Godthaab, few plants, J +, KOH —.

20. *Lecanora molariformis* LYNGE n. sp. (Plate VIII, fig. 1).

Nûgssuaq Peninsula: Atanikerdluk near the coal mine, on a calcareous stone together with *Rinodina ochracea* LYNGE.

Thallus crassiusculus, (ut videtur) late expansus, fissuris profundis irregulariter areolatus, areolae non radiantes, angulatae, (0.2—) 0.5—0.7 (—0.8) mm latae, superne fissuris minoribus, haud profundis, numerosis, ramosis varie rugosae. Thallus flavido-ochraceus, sed areolae superne (ob corticem denudatum?) sub lente visae magis albidae, subnitidae, fere osseonitidae. Thallus soreidiis isidiisque destitutus, hypothallo glauco vel cinereonigrescenti bene limitatus, hypothallus etiam in rimis primariis satis latis distincte visus.

Apothecia numerosa vel numerosissima, centrum versus hinc inde confluentia et eam ob causam angulata, mediocria vel majuscula, diam. 1—1.5 (—2) mm, innata, thallum subaequantia vel deinde leviter supra thallum elevata. Discus planus, aterrimus (etiam madefactus), epruinosis, scabriusculus vel rugosus, margo (pro *Aspicilia*) tenuis,

parce elevatus, persistens, thallo subconcolor. Hypothecium omnino incoloratum, ab excipulo haud bene limitatum. Hymenium angustum, 50—55  $\mu$  altum, dilutissime aeruginosum, superne obscure caerulescenti-fuliginosum et inspersum. Paraphyses conglutinatae, indivisae, superne non incrassatae. Asci angusti, fere semper steriles, sporae rarissime evolutae, parvae, 7—8 (—9)  $\times$  4.5—5.5  $\mu$ .

Pycnides non visae.

Hymenium J intense et persistenter caeruleo-nigrescens, etiam cum hypothecio et excipulo, etiam medulla J caerulescens, thallus KOH non coloratus (nisi in parte superiori dilutissime flavescens), hymenium KOH et HNO<sub>3</sub> haud mutatur.

Its apothecia are innate, even in age very little higher than the areolae. But the disk is very "open", large, surrounded only by a thin, crenate margin. It is no typical *Aspicilia*, also its low hymenium and its small spores rather suggest a *Eulecanora*. But TH. FRIES writes that the apothecia are "elevata" in *Eulecanora*, and "in thallo immersa" in *Aspicilia* (Lich. Scand.).

The new species is characterized by its thalline colour, reaction with J, low hymenium, small spores, and lecanorine habitus of the apothecia. If studied under a lens of high power the areolae stand forth, surrounded by darker and rather broad cracks, not unlike a molar tooth, hence the species name.

21. *Lecanora cinerea* (L.) SOMRFT.

Disko Island: Nipisat Harbour, very scarce, supposed to be rare in Greenland, as it is in other Arctic countries.

22. *Lecanora mastrucata* (WBG.) ACH.

Godthaab. — Disko Island: Nordfjorden and Storøen.

The Godthaab plants: Hymenium 150  $\mu$  altum, superne fusco- vel olivaceo-fuliginosum, hypothecium incoloratum, circ. 50  $\mu$  altum, hyphis dense contextis formatum, paraphyses indistinctae, cohaerentes, asci male evoluti, vulgo steriles, sporae 20—25 (—27)  $\times$  13—15  $\mu$ . — Excipulum marginem versus plectenchymaticum. — Hymenium J e caeruleo mox vinosum, excipulum (et cortex) KOH plus minusve intense sanguineum, crystallae rubrae praecipituntur.

The reaction with KOH is not always equally intense, it should always be studied under the microscope. In the same plant I once found a very intense reaction in the excipulum and in the adjacent parts of the thallus, and hardly any reaction in some other verrucae. It may be due to a partial destruction of the cortex which is often seen in Arctic lichens.

23. *Lecanora mastoidea* LYNGE n. sp.

Godthaab, on siliceous rocks.

Thallus ut videtur late expansus, crassus, haud rimosus, sed verrucis interdum papilliformiter evolutis, subdiscretis vel

contiguus formatus, epruinosis, sorediis isidiisque destitutus. Thallus obscure cinereus vel fusciscenti-nigrescens, ambitu hypothallo atro angusto radianti circumdatus, hypothallus etiam inter papillos plus minusve distincte visus, saltem peripheriam thalli versus.

Apothecia numerosa, dispersa, haud parva, diam. usque ad 1 mm, ab initio verrucis immersa, singula, deinde magis elevata, margine verrucos superantia et tum basi constricta, substipitata. Margo integer, crassus, persistens, excipulum saepe quasi appendiculatum, discus epruinosis, ater, madefactus leviter in fusciscentem vergens, primo — ob marginem constrictum — parvus, deinde magis expansus, urceolatus vel concavus vel in apotheciis maximis subplanus. Hyphae excipulares crebre contextae, superne hypothecii subparalleles, superficiem versus radiantes, constrictae septatae, articulis rotundatis formatae, corticem fere formantes ("cortex" tamen ab hyphis medullaribus non distincte limitatus). Gonidia in margine numerosa, etiam sub hypothecium adsunt, sed sparsa et magis dispersa. Hypothecium incoloratum, 45—50  $\mu$  altum, ab excipulo satis bene limitatum, hyphis tenuioribus, crebre contextis, in parte superiori saltem plus minusve adscendentibus formatum. Hymenium altum, 125  $\mu$ , superne olivaceo-fuligineum et granulis valde inspersum. Paraphyses concretae, superne (etiam in KOH) haud vel levissime incrassatae, indivisae vel rarissime subramosae, constrictae septatae. Asci numerosi, pyriformes, sporae tamen frustra quaesitae, etiam pycnides frustra quaesitae.

Hymenium J praecedente caerulescentia levissime fugacissimeque sordide vinose rubescit, KOH superne dilutius olivascens. Medulla J non caerulescens, KOH distincte intenseque flavescens, sed non deinde rubescens.

It is evident from the description that this species approach *Lecanora gibbosa* (ACH.) NYL. I have not studied the type plant of ACHARIUS, I do not even know whether his material is really uniform. Most probably Acharii conception of the species, and perhaps also NYLANDER's, is a wider one than that of the present generation, it might be quite as well to reserve the name *gibbosa* for the whole section. After the different descriptions by ACHARIUS it is hardly possible to exclude the present plants from his species *gibbosa*. It is also evident from HUE's careful description (Lich. Morph. et Anat. No. 610) that the anatomical characters are almost identical, at least I can detect no difference of specific importance.

But in the *Aspicilliae* the habitus often gives us the best characters. And if compared with well determined plants, such as MALME Lich. Suec. No. 571, and HARMAND Lich. Gall. praecipue exsicc. No. 81 (HUE based his description, l. c., on that plant) we find important differences which, in my opinion, justify a specific distinction. The two exsiccati which agree very well have a distinctly "rimoso-areolated" thallus, with more or

less convex areolae, into these areolae the apothecia are more or less profoundly immersed, the disk remains a small opening for a long time, at last it is more expanded, urceolated, but always immersed into the areolae. — In the Greenland plant there is no “rimoso-areolated” thallus. The areolae, if we can use this terminus, are developed as verrucae or even papillae, and they are almost discrete. The apothecia develop at the top of these papillae, at first small, dark spots, later they are more elevated, narrowly affixed, almost pedicellated, easily detached from the thallus, as are also the verrucae themselves.

HUE expressly states “reagentibus immutatus” (l. c.), neither did MALME Lich. Suec. No. 571 stain perceptibly with KOH. In the Greenland plant the thallus stains intensely yellow with KOH, if studied under the microscope — as all reactions should — one would every moment expect the precipitation of red fasciculated crystals, but they do not appear. It seems to me that this reaction would distinguish the species from *Lecanora mastrucata* which habitually resembles it very much.

There is a distinctly radiating black hypothallus surrounding the thallus, just behind the circumference the initiating verrucae are, accordingly, also arranged in somewhat radiating lines, but this is only seen 2—4 mm from the margin.

24. *Lecanora arctica* LYNGE n. sp. ad interim (Plate VIII, fig. 2).  
An syn. *Lecanora subdepressa* NYL. ? — vide infra.

Disko Island: Storøen (typus), Nordfjorden (?), Mellemfjorden and Malingiaq (poor specimens). — Nûgssuaq Peninsula: Atâ. The last mentioned plant was collected by GRØNTVED, the others by TH. FRIES.

Thallus crassitudine mediocri, ut videtur late expansus, crebre rimoso-areolatus, areolae angulatae, steriles 0.2—0.3 (—0.5) mm latae, areolae fertiles majores, usque ad 1.4 mm. Areolae subplanae vel depresso convexae, interdum altius convexae. Thallus intactus pure cinereus, sed ob corticem saepe destructum interdum magis albidus visus est. Hypothallus haud evolutus.

Apothecia numerosa vel numerosissima, vulgo dispersa, rarius subconfluentia, et tum angulata, mediocria vel majuscula, diam. usque ad 1 vel 1.2 mm, in areolis vulgo singularia, rarius bina. Discus ater, epruinus, concavus usque crateriformis vel in apotheciis majoribus subplanus, margine proprio persistenti, satis crasso, obscuro circumdatus. Excipulum in parte exteriori obscuratum, hyphis flabelliformiter ramosis, septatis, articulis rotundatis, formatum, praeterea incoloratum. Hypothecium omnino incoloratum. Hymenium strato amorpho incolorato rupto tectum, superne impure fuscescens vel olivaceo-fuligineum, praeterea incoloratum, satis altum, 100—110 (—125)  $\mu$  altum. Paraphyses arcte cohaerentes, indivisae, distincte septatae, sed haud moniliformes, satis validae, superne haud incrassatae vel, si optime evolutae, in aqua

incrassatae videntur, in acidis tamen leviter solum clavatae. Asci vulgo steriles, sporae male evolutae, late ovales, usque subglobosae vel subangulatae, interdum guttulis oleosis repletae,  $15-20 \times 10-12$  ( $-14$ )  $\mu$ .

Pycnides haud frequentes, perifulcrum subincoloratum, circum ostiolum solum leviter obscuratum, pycnoconidia subrecta, filiformia, elongata,  $15-20$  ( $-23$ )  $\mu$ .

Medulla J non caerulescens, KOH distincte flavescens, sed non rubescens,  $\text{CaCl}_2\text{O}_2$  et KOH +  $\text{CaCl}_2\text{O}_2$  non rubescens. Hymenium J e caeruleo mox obscure vinosum, KOH decoloratum, HCl et  $\text{HNO}_3$  superne plus minusve usque pulchre smaragdulum. Cortex P immutatus, medulla dilute flavescens.

Var. *composita* LYNGE n. var.

Disko: Mellemfjorden, on a rock, containing no calcareous substance (a granite?).

Thallus cinerascens, areolatus, areolae parvae, vulgo circ. 0.3 mm latae, planiusculae. Apothecia primo subimmersa, deinde saltem margine magis emersa, parva, diam. 0.5—0.7 mm. Hymenium saepe columnis excipularibus in pluribus divisum. Sporae  $20-22 \times 10-12$   $\mu$ . — Pycnoconidia frustra quaesivimus.

On account of these darker excipular columnae through the hymenium the disk looks as if corroded. The columnae are not seen in all apothecia, specific importance has, therefore, not been attributed to them.

The cortex is very indistinct, hardly to be studied with certainty except on microtome sections. In my best hand sections I found that the gonidia were more or less glomerated in an irregular stratum, about  $50-80$   $\mu$  thick. The cortex is formed of rounded cells, and it is equally well developed on the sides of the verrucae (areoles) as on their upper central part. But the cortex is rapidly destroyed, at last it only forms a decomposed, almost amorphous stratum necrale. One might expect a development of soredia through this cortex, but they are never formed.

It is quite evident that these plants belong to the *Lecanora gibbosa* section. But they cannot be identified with *Lecanora gibbosa* itself, as seen in Scandinavian collections, such as MALME Lich. Suec. No. 571 and 919, and NORRL. et NYLANDER Herb. Lich. Fenn. No. 532. The Scandinavian plants have a considerably darker thallus, the fertile areolae have apothecia with a much smaller, less "open" disk, 0.2—0.4 mm in diam., the spores are considerably larger than in the Greenland plants, and the pycnoconidia considerably shorter, e. g. in MALME l. c. No. 919 I measured  $12-15$   $\mu$ , in NORRL. et NYL. No. 532  $8-10$   $\mu$ , and in Krypt. Exsic. Vindob. No. 164 (differing somewhat from the Scandinavian plants with respect to habitus)  $8-10$   $\mu$ . In the Scandinavian plants mentioned the cortex consists of the same rounded articuli as in the Greenland plants, but it is much better preserved, like the latter it is

equally well developed on the sides of the areolae as on their top. *Lecanora gibbosa* does not stain yellow with KOH.

In the *gibbosa* section there are two units, differently judged of, which are of special interest in this connection, *laevata* and *subdepressa*.

*Sagedia laevata* was described by ACHARIUS in his paper Förteckning på de i Sverige växande arter af Lafvarnes familj, Kgl. Vet. Akad. Nya Handl., 1809, p. 164: "Crusta contigua laevigata sordide glaucescenti-lurida", and in Lich. Univ., 1810, p. 327—8 we find: "Crusta . . . rimulis quibusdam sparsis notata et ubi verrucae apotheciorum erumpunt, parum elevata" etc. As usually the plant in his herbarium fully agrees with his diagnosis, the point could not have been expressed more accurately. See plate VII, fig. 3, in the present paper.

The thallus really is "laevigatus", almost a little verniceous, more or less cracked, but the fissures are irregular, even if they are rather numerous they do not form an areolated thallus. An areolated thallus is only formed by a regular network of cracks. The elevated apothecia rise from this laevigated thallus, cfr. ACH. Lich. Univ. pl. VI, fig. 5.

One gets the impression that the *laevata* has been correctly understood by most authors. — TH. FRIES writes: "Crusta tenuissima, laevigata, subcontigua, glauco-lurida v. virescens. ." (Lich. Scand. I, p. 276). — VAINIO: "Thallus laevigatus, saepe tenuior, marginem versus saepe nitidus, continuus vel centro rimosus, olivaceus . . . apothecia margine demum saepissime nigricante, elevato" (Adj. Lich. Lapp., I, 1881, p. 168). — HUE: "Olivaceus vel cinerascenti-olivaceus . . . peripheriam versus satis late continuus . . . in centro magis rimosus, passim areolatus areolis parvis . . . in superficie laevigatus crustamque fere aequatam, in ambitu determinatam . . ." (Lich. Morph. et Anat., No. 669, Suite I, 1910, p. 86).

The spore size and the length of the pycnoconidia in the Greenland plants agree with the measures given for *Lecanora laevata*. In a plant of that species, collected by ARNOLD at PANEVEGGIO in Tyrol in 1886 I measured the pycnoconidia and found their length to be 16—21  $\mu$ .

Considering the systematic importance of the thalline development in the *Aspicilliae* it is impossible to refer the Greenland plants with their rather thick and typically areolated thallus to *Lecanora laevata*.

It is much more difficult to clear up the true nature of *Lecanora subdepressa*. The first description, known to me, is found in NYLANDER Observata Lich. in Pyr. Orient., Bull. Soc. Linn. de Norm., 2e sér., VII, Caen 1872, p. 34: "Forsan varietas *L. gibbosae* (ACH.). Sporae longit. 0.018—24 mm, crassit. 0.010—14 mm. Spermatia recta, longit. 0.009—0.012 mm, crassit. 0.0005 mm parum excedentia. — Supra saxa micaceo-schistosa, passim". And in Lich. Fret. Behringii, p. 225, he wrote: "Thallus ambitu subradiatus. Spermatia longit. 0.011—15 mm, crassit.

0.0005 mm". These lapidary words give us no impression of the habitus of the plant, as is so often the case with NYLANDER's descriptions.

I am indebted to the Botanical Museum of Helsingfors for permission to study NYLANDER's type plant from Valbonne, Pyr. Orient., see plate VII, fig. 2, in the present paper. Profound, but irregular cracks divide that thallus into areoles which are, however, irregular in size and form. If studied under a binocular lens of high power ( $\times 32$ ) the areolae stand forth, almost like columns, with a plane or almost plane surface. The fertile areolae are very numerous, there are in reality few areolae that are not fertile. We find one or more, up to 5 or 6 apothecia in each areole, the disk is profoundly immersed, the margin is not much prominent, almost at level with the surface of the areolae. We cannot regard the areolae themselves as the proper margin of the apothecia.

I have got the impression that NYLANDER did not always distinguish between *Lecanora subdepressa* and *L. laevata*. He collected a plant at Fontainebleau (4.7.1881, herb. NYL. No. 25580) which he named *Lecanora subdepressa*, but if the type of thalline cracks, which is the same as the areolation, really separates that species from *Lecanora laevata*, I would call that plant *Lecanora laevata*. I cannot distinguish it from Acharii type plant.

VAINIO's description of *Lecanora gibbosa* var. *subdepressa* in Adj. Lich. Lapp., I, 1881, p. 168 is in good accord with NYLANDER's plant from VALBONNE: "Thallus areolatus, saepe opacus et pro parte albicans vel cinereoalbicans. Apothecia urceolata, margine albicante vel cinereo, thallo fere concolore".

It is really difficult to distinguish the Greenland plants from NYLANDER's VALBONNE plant, I would hardly have ventured to do it. But it is doubtful whether or no the VALBONNE plant is the true type of *subdepressa*. The type is, perhaps, rather ARNOLD's plant from Rettenstein in Tyrol (ARNOLD Lich. Ausfl., V, 1870, p. 529). Unfortunately I have not seen this plant, anyhow it has considerably larger spores than the Greenland plants,  $25-30 \times 12-16 \mu$ . I have also seen the *Aspicilia subdepressa* NYL. in ARNOLD Lich. Exsic. No. 1168, in our own herb. as well as in herb. VAINIO in Åbo. Its colour is more grey than in the Greenland plants, and still more important, it has the laevigate thallus with the irregular cracks which I found in the Acharian type plant of *Sagedia laevata*. Its apothecia are rather immersed, the margin is only slightly elevated above the thallus. It is very questionable whether we can identify the Greenland plants with these Tyrolian ones, and to escape an undesirable confusion I have preferred to give them the new name *Lecanora arctica*.

E. FRIES Lich. Suec. No. 367, s. n. *Parmelia cinerea* var. *laevata* is, in my opinion, a true *Lecanora laevata*. But in this plant the apothecia

are so abundant and so approximated that the "laevigateness" of the thallus is almost obliterated, covered as the thallus is with rather elevated apothecia.

MALME Lich. Suec. No. 819 s. n. *Lecanora laevata* is also the true Acharian species. The plant is, perhaps, more cracked than in the type plant, but the cracks are irregular, cut in a plane surface in such a manner that a truly areolated thallus is not formed.

25. *Lecanora annulata* LYNGE n. sp. (Plate V, fig. 3).

Disko Island: Asuk, on stones of hard rocks (perhaps from a strand-wall?).

Thallus non radians, ambitu flabelliformiter procrecens, effusus, tenuissimus, membraniformis, continuus, deinde concrecens, leviter solum crassior, hinc inde rimis irregularibus ruptus, laevigatus et planus. Thallus argillaceo-cinereus vel albido-cinereus, sorediis isidiisque destitutus, epruinosis, hypothallo tenuissimo glauco anguste circumdatus.

Apothecia numerosa usque numerosissima, rotundata, diam. 0.4—0.5 mm vel mutua pressione interdum subangulata, in centro congesta, ambitum versus magis in seriebus reticulatis disposita, supra thallum bene elevata et rimis a thallo separata. Discus concavus, ater, madefactus tamen fuscescens, margine crasso, persistenti, typice integro, elevato annulatus. Excipulum incoloratum, etiam cum hypothecio. Hymenium circiter 100  $\mu$  altum, superne haud intense fuscum, strato amorpho incolorato valde rupto tectum. Paraphyses crassitudine mediocri (1.5—2  $\mu$ ), apice haud incrassatae, distincte septatae, contentum moniliforme videtur. Asci saepe steriles, saccati vel pyriformes, haud lati, 12—15  $\mu$  crassi, membrana ascorum superne valde incrassata, subcylindriformis. Sporae octonae, late ellipsoideae, 12—15 (—17)  $\times$  8—10  $\mu$ .

Pycnides non visae.

Hymenium J plus minusve intense aeruginoso-caerulescens, ascorum contentum et sporae tamen fulvescunt, KOH fere decoloratur, medulla J et KOH non coloratur.

Its thin, clay-coloured, effuse thallus resembles that of *Lecanora flavida*, but towards the centre it is considerably thicker. *Lecanora annulata* is sufficiently distinct from *Lecanora flavida* in its very prominent and much larger apothecia with the brownish hymenium. — Named *Lecanora annulata* on account of the thick margin ("annulus") of its apothecia.

26. *Lecanora elevata* LYNGE n. sp. (Plate VI, fig. 1).

Disko Island: Laksebugten and Blaafield or Uivfaq.

Thallus tenuis, late expansus, haud bene limitatus, fissuris profundis in areolis angulatis vel subrotundatis divisus; areolae convexae, contiguae vel subdiscretae, non radiantes, parvae, circ.

0.15—0.25 (—0.35) mm latae, superne pallide cinerascetes vel madefactae magis cinereo-fuscescentes, saepe (ob corticem destructum) subalbidae. Thallus pruina, sorediis isidiisque destitutus, hypothallus non visus.

Apothecia numerosa, sed vulgo dispersa, rarius approximata, parva, diam. 0.3—0.5 mm, simplicia vel rarius quasi composita et tum majores, usque ad 1.2 mm lata. Apothecia (pro *Aspicilia*) supra thallum bene elevata, discus urceolatus, aterrimus, epruinus, margine crasso, elevato, integro, persistenti circumdatus. Hyphae excipulares peripheriam versus valde obscuratae, cinereo-fuligineae (epithecio concolores), flabelliformiter radiantes, constrictae septatae. Hypothecium incoloratum, hymenium 90—100  $\mu$  altum, paraphyses subconcretae, satis validae, 2—2.5  $\mu$  crassae, apice leviter solum incrassatae, (in hydrate chloralico) distincte moniliformiter articulatae, articulis superiores breviter subglobosae. Asci inflati vulgo steriles, sporae parcissime visae, late ovaes, (14—) 16—23  $\times$  10—12.5  $\mu$ .

Pycnides fertiles non visae.

Medulla J —, KOH —, KOH + CaCl<sub>2</sub>O<sub>2</sub> —, hymenium J e caeruleo mox vinosum, KOH decoloratur.

Referred to the *Aspiciliae* on account of the urceolated apothecia, the rather large and very broad spores also suggest that subgenus. I was unable to find a single gonidium in the excipulum of some plants, although I cleared good sections with hydras chloralici and stained with chlorzinkiodide, in other plants I immediately found gonidia abundantly in the margin. The first mentioned plants were at first placed with the *Lecideae*.

*Lecanora elevata* has a very thin thallus with small granules, more or less confluent into an areolated crusta if the thallus is better developed. The surface is not firm, in some plants it is quite corroded, under a strong binocular lens ( $\times$  32) almost arachnoid. But I have seen a cortex of that kind in many of these old Crustaceous lichens, and I am not quite convinced that it is natural. It may be due to the preservation during long years in the hot and dry room over the Upsala conservatory where the collection had been stored.

As stated in the diagnosis some apothecia looked as if they were composed, under a lens of small power they looked quite gyrophoroid. I sectioned one of them, but I did not find excipular columns in the hymenium, I got the impression that a number of new hymenia were developing over the remains of a destroyed old hymenium. This also explains to us why just these apothecia were so elevated over the thallus, some of them looked quite pedicellated.

The hyphae are not interspersed in *Lecanora elevata*.

The thallus is very much thinner in *Lecanora elevata* than it is in the Scandinavian *Lecanora gibbosa*, and its areolae are much smaller. In

the latter species the apothecia remain more or less immersed into the areolae. — The diagnosis suggests a resemblance to *Lecidea aspicilioidea*, but the apothecia are much larger in the latter species, 1—1.5 against 0.3—0.5 mm. In f. *varangrica* they are at last distinctly convex. In *Lecidea aspicilioidea* the paraphyses are easily discrete, they are more coherent in the present species, though not quite concrete. — It is doubtful whether *Lecidea aspicilioidea* really is a *Lecidea*, I sectioned a plant and found gonidia under the hypothecium (stain with chlorzinkiodide).

*Lecanora gyrodes* has a much thicker thallus with conical areolae, whence its name.

I have compared the present species, and all the other new species of the subgenus *Aspicilia*, with all available Arctic *Aspiciliae*, chiefly in the Vega collection and in my own Novaya Zemlya collection. A. H. MAGNUSSON who is at work on a large Yenisei collection has also seen them, and found them different from the numerous *Aspiciliae* which he is going to describe in his paper. Undoubtedly the Arctic *Aspiciliae* represent a genus with a lot of different species of a very restricted range of distribution.

27. *Lecanora lacustris* (WITH) TH. FR.

Disko: Storøen, very scarce.

The plants were of the usual Arctic type, with a poorly developed thallus. I have examined the gonidia, it was impossible to refer them to *Trentepohlia*. This will prevent a confusion with *Ionaspis epulotica*.

ZAHLBRUCKNER wrote *Lecanora lacustris* NYL. (Cat. Lich. V, p. 322), but in Lich. Scand., 1861, p. 155 NYLANDER wrote *Lecanora cinerea*\*\*\*\* *L. lacustris*, a subspecies cannot be the basis of a specific nomenclature.

28. *Lecanora flavida* HEPP.

Disko Island: Asuk and Narssaq (or Ujaragssugssuk?) and Storøen. — Nûgssuaq Peninsula: Atanikerdluk.

The plants have the typical thin grey thallus. The gonidia were examined, size about 10—12  $\mu$ , excluding *Trentepohlia* and *Ionaspis*. — The hymenium has a fine smaragdine colour, almost blackish at its upper part.

29. *Lecanora Friesii* LYNGE n. sp. (Plate VII, fig. 1).

Disko Island: near the Ritenbenk coal mine, on a hard dense rock, containing no calcareous substance (no CO<sub>2</sub> with HCl).

Thallus tenuis, crustaceus, uniformis, circulos parvos, diam. (in specimine) 5—6 mm, substrato arcte adhaerens, bene limitatus, hypothallo destitutus, rimis radiantibus et peripherialibus in areolis tessellatis, angulatis, 0.5—0.7 mm longis, 0.4—0.5 mm latis, planis, sublavigatis divisus. Thallus (etiam madefactus) pallide ochraceus vel ochraceo-cinereascens, sorediis isidiisque destitutus.

Areolae centrales ab apotheciis numerosis vel numerosissimis

occupatae. Apothecia in areolis immersa, singularia vel bina, rarissime terna, diam. adultiorum 0.35—0.4 mm, rotundata vel mutua pressione angulata, in aetate supra thallum magis elevata. Discus crateriformis, ater, madefactus distincte fuscus, epruinosis, margine crasso, integro, persistenti, prominulo, subinflexo, cinerascenti circumdatus. Excipulum distinctum haud evolutum, hypothecium incoloratum, hymenium 75—80  $\mu$  altum, superne fuscum vel cinereo-fuscescens et granulis angulatis plus minusve inspersum. Paraphyses filiformes, conglomeratae, septatae, vulgo indivisae, superne leviter incrassatae, 2—3  $\mu$ . Asci saccati, octospori, sporae late ellipsoideae vel ovae, membrana mediocriter incrassata cinctae, 11—15, rarius 17 vel usque ad 20  $\mu$  longae et 9—10  $\mu$  crassae.

Pycnides non visae.

Medulla J et KOH immutata, hymenium J e caeruleo impure vinosum, HNO<sub>3</sub> immutatum vel leviter dilutius solum coloratum. — Hyphae medullares granulis angulatis valde adpersae.

Its clayey thallus is a little more yellowish than in the much larger species *Lecanora cingulata* A. ZAHLBR. (Die Gattung *Lecanora*, Novaya Zemlya, 1928, p. 13, P. II, fig. 2), and there is no hypothallus, as in the latter species. *Lecanora Friesii* is evidently small in size, but there were only a few thalli in the collection. The thallus of *Lecanora flavida* is continuous, only with irregular cracks, "Wie eine dünn angeflogene Lage erdigen Schmutzes", as KOERBER very appropriately expressed it, and it has an intensely bluish epithecium.

The thallus of *Lecanora Friesii* is not composed of distinctly radiating lobes, such as in *Lecanora perradiata*. There is a circular thallus, divided by cracks into chessboard-like areolae. Radially the areolae are a little longer than they are broad.

*Lecanora annulata* of the present collection has a thinner, membranaceous thallus with only a few cracks, especially around and near the apothecia.

30. *Lecanora basaltica* LYNGE n. sp. (Plate V, fig. 1).

Disko: Narssaq, ad saxa basaltica, non calcarea.

Thallus tenuis, sed late expansus, in specim. usque ad 5 cm, lapidem tamen haud continue tegens. Thallus fissuris profundis irregulariter areolatus, peripheriam versus flabelliformiter dissolutus, centrum versus areolae aperte seriatas vel contiguae sunt. Cortex fissuris minutis numerosis, sed haud profundis varie rugosus. Thallus flavido-ochraceus, areolae superne saepe magis albidae (ob corticem destructum), subnitidae si cortex intactus est, sorediis isidiisque destitutus. Thallus hypothallo plus minusve distincto, concolori, tenui, membranaceo circumdatus.

Apothecia sparsa, inconspicua, pauca solum vidimus, discus ater, minutus, 0.15 mm latus, innatus et concavus, margine crasso,

integro, persistenti supra thallum leviter elevato cinctus. Hypothecium omnino incoloratum, ab excipulo haud bene limitatum. Hymenium 70—75  $\mu$  altum, superne infuscatum et inspersum. Paraphyses cohaerentes, in KOH facilius discretatae, distincte septatae ( $J_2 + ZnCl_2$ ), apice haud incrassatae. Asci satis anguste pyriformes, sporae parcissime evolutae, paucas solum vidimus, late ovaes vel late ellipsoideae, apice rotundatae, parvae (ob maturae?), 10—11  $\times$  7—7.5  $\mu$ .

Pycnides non visae.

Medulla J —, KOH — vel dilute flavescens. Hymenium J persistenter atrocaerulescens, etiam cum hypothecio et excipulo, KOH decoloratur. — Hyphae valde adpersae.

The single areolae resemble those of *Lecanora molariformis* of the present collection. But they are much thinner and they do not cover the substratum, they lie like a filigree work over the stone which is clearly visible between the areolae. *Lecanora Friesii* is also distinct in the scarce development of the (small) apothecia, evidently a valuable character in the *Aspicilliae*, and in the medullary reaction with J. The few apothecia are very inconspicuous.

31. *Lecanora narssagensis* LYNGE n. sp. (Plate III, fig. 2).

Disko Island: Narssaq, on basaltic rocks.

Thallus suborbicularis, diam. circiter 3 cm (in specimine), tenuitate mediocri, mollis, lapidem bene tegens, fissuris profundis areolatus, areolae subplanae vel depresso convexae, non radiantes, peripheriam versus sat regulariter tessellatae, centrum versus ob apothecia numerosa magis irregulares. Thallus flavido-ochraceus, sorediis isidiisque destitutus, abrupte limitatus, hypothallus non visus.

Apothecia numerosa vel numerosissima, in areolis saepe compluria enata et eam ob causam deinde quasi composita videntur. Apothecia mediocria, diam. 0.5—1.0 mm, rotundata vel saepe mutua pressione angulata, thallo immersa, deinde margine supra thallum plus minusve elevata, discus satis apertus, ater, epruinosis, subplanus, margine crasso, persistenti, integro cinctus. Hypothecium omnino incoloratum, ab excipulo haud bene limitatum. Hymenium circiter 100  $\mu$  altum, superne infuscatum et inspersum. Paraphyses cohaerentes, apice haud vel leviter solum incrassatae, distincte septatae (in KOH submoniliformes). Asci saccati vel pyriformes, saepe steriles, sporae late ovaes vel subglobosae, 15—17  $\times$  10—12  $\mu$ .

Pycnides non visae.

Medulla J non caerulescens, KOH flavescens. Hymenium J caerulescens, gelatina deinde sordide rubescens et asci impure caeruleo-fuliginei. — Hyphae valde adpersae.

This species has almost the same colour as *Lecanora basaltica* and *L. molariformis*. The latter species differs from *Lecanora narssagensis* in

its flat and expanded disk, and in the positive reaction of the medulla with J, and it was found on a calcareous rock. Crustaceous lichens are generally very particular about their substratum, they are either calciphilous or calciphobous. Like the present species *Lecanora basaltica* was found on a basaltic rock, as its name suggests. It is very sparingly fertile, a character of no small importance in Crustaceous lichens, and it has a thin, "filigree" thallus, not covering the substratum, with radiating marginal areolated lobes, surrounded by a thin, but distinctly visible hypothallus. I measured considerably smaller spores in that species,  $10-11 \times 7-7.5 \mu$ , and found its chemical reaction to be KOH —.

I am inclined to regard these two plants as specifically distinct. But the material was rather scarce, and a larger material alone can tell us whether the differences will be bridged over. If so, the present species would represent the better developed type, *Lecanora basaltica* a more meagre type.

32. *Lecanora nikrapensis* (DARB.) ZAHLBR.

*Aspicilia nikrapensis* DARB. Lich. coll. dur. 2nd. Norw. Polar Exped. in 1898—1902, Rep. of the Exp., No. 21, 1909, p. 12, tab. II, fig. 3. — *Lecanora mikrapensis* ZAHLBRUCKNER Cat. Lich. V, p. 322 (misprint for *nikrapensis*).

An syn. *Lecanora Lyngei* ZAHLBR. Die Gattung Lecanora, Rep. Norw. Exped. to Novaya Zemlya 1921, No. 44, 1928, p. 15, Pl. II, fig. 1.

Disko Island: Asuk, Ujaragssugssuk, and (?) Nordfjorden (TH. FR.). — Nûgssuaq: Atâ (GRONTVED) and Atanikerdluk (TH. FR.).

Thallus mollis, cretaceus, crustaceus, uniformis, late expansus, bene orbicularis, circiter 4 cm latus (in plantis ex Ellesmereland usque ad 8 cm latus), opacus. Thallus centrum versus crassitudine mediocri, irregulariter rimoso-areolatus, areolae ibi angulatae vel subrotundatae, 0.5—0.7 vel usque ad 1—1.2 mm latae, depresso convexae vel subplanae. Peripheriam versus thallus tenuis est, minus distincte rimosus et saepe in lobos vel areolas elongatas usque effiguratas, plus minusve distincte radiantes et saepe transversim ruptas dissolutus. Thallus albidus vel dilute cinereo-albescens, sorediis isidiisque destitutus, secundum marginem hypothallo tenuissimo albedo- vel cinereo-glaucescenti circumdatus.

Zona peripherialis plus minusve lata saepe apotheciis destituta, sed centrum versus thallus apotheciis numerosissimis, fere contiguis obtectus est. Apothecia singula, bina, rarius terna, in areolis convexis immersa sunt, deinde margine tumidulo, persistenti, thallo concolori, pruinoso supra thallum elevata. Discus concavus, interdum fissuris ruptus, ater, sed plus minusve intense albo-pruinosis. Apothecia mutua pressione angulata, diam. 0.5—1.0 mm, hinc inde subseriata

videntur. Hyphae excipulares et medullares granulis angulatis valde adspersae et eam ob causam valde indistinctae, in parte exteriori strato necrali tectae. Hypothecium omnino incoloratum, lentiforme, in centro crassius. Hymenium 90—100 (—110)  $\mu$  altum, superne fuscescens, strato granulato rupto tectum. Paraphyses cohaerentes, plus minusve ramosae usque ramoso-connexae, satis validae, apice haud incrassatae vel (maturae) levissime clavatae, septatae et plasmate interrupto moniliformes videntur. Asci inflato-saccati, 70—80  $\times$  25—37  $\mu$ , saepe steriles. Sporae maturae parce visae, late ellipsoideae vel ovoideae, interdum angulatae (in ascis, ob mutuam pressionem), 15—20  $\times$  12—15  $\mu$ .

Pycnides fertiles rarissima, perifulcrum circum ostiolum solum obscuratum, pycnoconidia arcuata, 12—16  $\mu$ .

Hyphae medullares J et KOH—, hypothecium J dilute caerulescens, hymenium J e caeruleo sordide vinosum, KOH superne dilute flavo-fuscescens, HNO<sub>3</sub> olivaceum.

If this species is not too narrowly limited it is a widely distributed species in the Arctic, and in places it is very common, perhaps plentiful. DARBISHIRE wrote, evidently with right, that it belonged to the *calcareo*-section, it is sufficiently distinct from *Lecanora calcarea* itself in its smaller spores (*calcareo*: 18—30  $\times$  14—22), 8 in each ascus (*calcareo*: sp. 2—6: nae). — In my Novaya Zemlya collection ZAHLBRUCKNER identified a species of *Aspicilia* which was, perhaps, more plentiful than any other *Aspicilia*, and which he named *Lecanora Lyngei*. I have been unable to find characters of sufficient importance to distinguish between these species, on the final revision of the present material I have found it necessary to unite them.

DARBISHIRE'S diagnosis is very brief, and it is not fully correct. He describes a black hypothallus or a thallus which is black when the plant "comes into contact with another lichen of the same species or another". I have seen nothing of that kind. DARBISHIRE describes the spores "16—20  $\times$  7—8  $\mu$ ", but those narrow spores must have been unripe. Even in DARBISHIRE'S own type plant I have found the broad spores which are so characteristic of the *Aspiciliae*.

In one of the present Greenland plants I detected fertile pycnides and measured a length of 12—16  $\mu$  in the pycnoconidia, this is considerably shorter than the length, measured by ZAHLBRUCKNER in the Novaya Zemlya plants: 21—25  $\mu$ . It is possible that this might suggest a specific difference, but the habitus which is so important in the *Aspiciliae* is so conformable in the Greenland, the Ellesmereland and the Novaya Zemlya plants that I have united all of them. It is hardly necessary to say that the species is also very common in Spitsbergen.

In the above mentioned paper DARBISHIRE described another *Aspicilia*, *A. lesleyana*. It has a considerably thicker, rimose thallus

which ends abruptly, and which is only in places distinctly radiating. It has the same soft, almost cretaceous appearance as *Lecanora nikrapensis*. If cleared up with HCl *Lecanora lesleyana* has very thick, clavated paraphyses, 7—8  $\mu$  at their upper end. I measured its spores in several apothecia, and always found them to be very broad, 9—11  $\times$  7—8  $\mu$ , DARBISHIRE's statement, 15  $\times$  7.5  $\mu$ , typically ellipsoidal spores, cannot be correct. — *Lecanora lesleyana* was found on hard rocks, giving no CO<sub>2</sub> with HCl, *L. nikrapensis* prefers slaty rocks, or calcareous sandstones.

The British Expedition to Svalbard recorded *Lecanora lesleyana* from that region. I have not seen their plant, but they were kind enough to send me an excellent photo of it. The photo does not suggest that species, but a very typical *Lecanora perradiata* which is equally common in Svalbard as it is elsewhere in the Arctic. — *Lecanora nikrapensis* is much coarser than *L. perradiata*, the marginal lobes of which are distinctly stellate and radiating. The colour of *L. perradiata* was described as "obscure cinereus" (NYL. Lich. Fret. Behr. 1888, p. 224), but the colour is variable, there are also almost white plants.

The plant from Nordfjorden in the present collection is a somewhat questionable determination. It was this plant which gave me the short pycnoconidia. The thallus is a little thicker than usual, the areolae not stellate at the circumference, there is no visible hypothallus, the apothecia are slightly larger and more open, with a larger and more perspicuous (though pruinose) disk. But such are just the characters which I would expect to find variable in a species which is so common as this one is.

### 33. *Lecanora perradiata* NYL.

ZAHLEBRUCKNER Die Gattung Lecanora, Norw. Nov. Zemlya Exped., 1921, No. 44, Oslo 1928, p. 9, Pl. III, fig. 3, ubi syn. — LYNGE Lich. Franz Josefs Land, Skr. om Svalb. og Ishavet, No. 38, Oslo 1931, p. 18, Lichens from the Scoresby Sound Comm. 2nd East Greenl. Exped. in 1932, Medd. om Grønland, vol. 104, København 1933, p. 8, Lich. coll. dur. the Danish 5th Thule Exped. through Arct. Canada, Rep. of the Exped., vol. II, No. 3, Copenh. 1935, p. 20.

Disko: Storøen (poorly developed, only some scattered apothecia with suggestions of greyish-white, radiating, furcate lobes), Asuk, and Nordfjorden (fine plants), leg. TH. FRIES. — Nûgssuaq Peninsula: Atâta qâqâ, 2000 m above sea-level (GRØNTVED).

The last mentioned plant was a fragment, hardly to be determined with certainty. Few lichens are more plastic than the present one. — I found "hymenium valde inspersum, paraphyses intricate divergentes ramosae, moniliformiter constrictae, sporae 12—13  $\times$  7—8  $\mu$ " in the fine plant from Nordfjorden. NYLANDER measured larger spores in his type plant from Konyam Bay: 16—18  $\times$  10—11. In one of my Novaya Zemlya plants, from Northern Kristovii Island I measured intermediate spores.

The plant from Asuk differs in its white thallus, only indistinctly radiating at its circumference, but it is a small, hardly full-grown plant. It might be referred to var. *albida* MALME Lich. Orae Sibir. Borealis, Arkiv f. Botanik, vol. XXV, A, 1932, No. 2, p. 26.

34. *Lecanora proserpens* NYL.

ZAHLBRUCKNER Die Gattung Lecanora, Norw. Nov. Zemlya Exped. 1921, No. 44, Oslo 1928, p. 11, pl. IV, fig. 4, ubi syn.

Godthaab, very scarce, isolated from a piece of stone, collected for a *Lecanora* of the *gibbosa* section.

#### Subgenus **Placodium** (HILL.) TH. FR.

35. *Lecanora gelida* (L.) ACH.

Disko Island: Blaafield or Uivfaq, very scarce in the present collections.

36. *Lecanora melanaspis* (ACH.) TH. FR.

Disko Island: Blæsedalen, a poor fragment only, Mellemfjorden, well developed plants, marginal radiating lobes not developed, found with *Lecidea atrobrunnea*, and perhaps influenced by the droppings of the birds.

37. *Lecanora straminea* (WNBG.) ACH.

Disko Island: Malingiaq, few plants.

In the Copenhagen herb. there is a considerable number of plants, from Disko Island and southwards on the west coast, also collected by EBERLIN in S.E. Greenland.

38. *Lecanora contractula* NYL.

Godthaab. — Disko Island: Godhavn, Sâtoq, Mellemfjorden, ossicola, and Blaafield or Uivfaq.

It is not quite scarce in the collection. — The colour of the disk changes from black to a reddish-brown when moistened. Usually the pulvinate thalli grow more or less isolated, but occasionally the individual plants are so confluent that they cover the whole stone, and the placodioid habitus is little visible.

This species is almost independent of its substratum, it is found on rocks, bones, etc. But it is extremely dependent on a rich supply of Nitrogen, preferably from the droppings of the birds, it grows associated with other ornithocoprophilous lichens, such as *Buellia coniops*, *Caloplaca murorum* var. *obliterata*, *Candelariella crenulata*, and the like.

In Lich. Scand. TH. FRIES named the species *Lecanora Thulensis* TH. FR., and he divided it into two subspecies, *a. feracissima* TH. FR. and *β. contractula* (NYL.) TH. FR. The former has a fairly large thallus, 1—2 cm in diam., entirely covered with apothecia, the latter is small, 1—3 mm, and the apothecia are less congested. Only the former subspecies, *a. feracissima*, is found in the present collection on stones, but at Mellemfjorden

TH. FRIES collected some plants on whales bones, the size of which rather suggested the *contractula*, sensu Nylanderii.

If we limit the species in the same manner as TH. FRIES l. c., *Lecanora contractula* NYL. Lich. Lapp. Orient., 1866, p. 126 must be the valid specific name. It is older than *Lecanora thulensis* TH. FR. Lich. Scand., I, 1871, p. 227. But if we prefer to divide the species into two the name *contractula* must follow the small plants: "pulvinulis 1—2 mm" (NYL., l. c.), and the other name, *thulensis*, must be reserved for the species with the larger plants.

39. *Lecanora melanophthalma* RAM.

Disko Island: Godhavn (TH. FR.), Sinigfik (GRØNTVED), Ujaragssugssuk, Mellemfjorden, Blaafjeld or Uivfaq, Nipisat and Laksebugten (TH. FR.). — Nûgssuaq Peninsula: Atanikerdluk (TH. FR., GRØNTVED), Atâ and Atâta qâqâ, at the latter locality 2000 m above sea-level (GRØNTVED).

The number of plants is so considerable that it must suggest a common and widespread species. A considerable number of plants is also found in the Copenh. herb., s. n. *Placodium chrysoleucum*. Several Norwegian expeditions have also found it in abundance in East Greenland, all over Svalbard, and in Franz Josef Land. But it was not found in my Novaya Zemlya collection and not in the Vega collection from Eastern Siberia. It is, perhaps, a species of rather western distribution in the Arctic.

In Lich. Scand. TH. FRIES united it with *Lecanora rubina* into one species which he named *Lecanora chrysoleuca*. But this arrangement is certainly not tenable. In addition to the macroscopical differences, the dark disk and the negative reaction of the cortex with KOH in the present species and the reddish disk and positive reaction in *Lecanora rubina* we may call attention to the paraphyses. They are dark olive-coloured to almost black in *Lecanora melanophthalma*, and its hymenium is covered with an amorphous substance which is more or less broken, in *Lecanora rubina* the hymenium is yellowish all over, the paraphyses rather stoutish, but not visibly incrassated at their tips, and the epithecium is intensely adpersed with small grains.

*Lecanora melanophthalma*, *L. rubina* and *L. peltata* have a low hymenium, 50—60  $\mu$  in height, in the firstly mentioned species the spores were broadly elliptical, I measured 9—11  $\times$  5—5.5  $\mu$ , the shorter spores being the commoner ones, in *L. rubina* I found very much the same spores, in *L. peltata* they were often a little narrower, but the difference was insignificant. Neither of the species stains with paraphenyldiamin.

40. *Lecanora peltata* (DC.) STEUD.

Disko Island: Blaafjeld or Uivfaq.

The thallus is so entirely covered with apothecia that no lobes are

visible. The disk is yellowish, the margin very crenate. I was unable to get any distinctly yellow staining with KOH on the margin and the cortex of the excipulum, but the cortex itself being yellowish, a fully unobjectionable observation is not easily obtained. — The plants agree entirely with my Novaya Zemlya plants, determined by ZAHLBRUCKNER. I have no other material for comparison.

41. *Lecanora rubina* (VILL.) ACH.

Nûgssuaq Peninsula: Atanikerdluk, very scarce.

*Lecanora rubina* and *L. melanophthalma* are species of an exceptionally interesting distribution. I have tried to trace it up, the results follow here.

My herbarium studies have been restricted to the Scandinavian herbaria which are supposed to give us the Arctic and the Scandinavian distribution in detail. A considerable part of the Arctic localities are based on my own unpublished manuscripts. I have not tried to collect all available information on their detailed distribution outside of the Arctic and of Scandinavia. But I have tried to obtain a general idea of their distribution, based in part on the Scandinavian herbaria, in part on a study of the floras and other important papers on the lichen flora of more local regions.

#### *Lecanora rubina* (VILL.) ACH.

Arctic: *Greenland*. Godthaab: Ameralik (VAHL, 1830). — Holsteinsborg: Ikertôq (VAHL 1832) and Nagssugtôq or North Strømfjord (Kornerup). Disko: Kuánerssuit (PORSILD). — Nûgssuaq: Atanikerdluk (TH. FR.).

*Norway*. Buskerud: Nerål (LYNGE). — Opland: Vestre Slidre: Opheim (SCHOL.); Nordre Fron: Sikkilsdalen (NORDHAGEN); Våge: Sell (KLYKKEN, HAVÅS), Laurgård (KINDT, NORMAN), Vågemo (HAVÅS, LYNGE), Vågefjellene (LYNGE), Visted (TH. FR., KINDT) and Tessevand (RESV.-DIESET); Lom (SOMRFT. 1832): Ulstad and Kjæstad (LYNGE), Røisheim (LYNGE), Fosheim (MAGNUSSON), Bæverdalen (LINDBERG), Lomseggen (INDEBETOU), Visdalen (J. E. ZETTERSTEDT), Lesja (VRANG), Dovre: Domås (KINDT) and Fokstua (SOMRFT. 1823). — Sørtrøndelag: "Dovre" (SOMRFT., M. N. BL., BOECK, FALK, TH. FR., LINDBERG, MOE, SCHIMPER), Opdal: Kongsvold (M. N. BL., LYNGE, VRANG, J. E. ZETTERSTEDT), Vårstigen (A. BL., M. N. BL., TH. FR., F. KLÆR), Drivstua (M. N. BL., TH. FR., KINDT, TORSSELL, WICKBOM, J. E. ZETTERSTEDT), Drivdalen (M. N. BL., BOECK, TH. FR., TORSSELL), Rise (SOMRFT. 1824). — Møre: Gruvedalen in Sundalen (HAVÅS).

*Sweden*. Lule Lappmark: Jokkmokk (HELLBOM 1864), Skarfi (HELLBOM 1864), Rittokk (HELLBOM) and Nammats (HELLBOM). Torne Lapp-

mark: Abisko pluribi (TH. C. E. FR., DU RIETZ, MAGNUSSON, SANTESSON, VRANG), Karanesvarre (HASSELROT).

*Finland.* Kilpisjärvi (J. P. NORRLIN 1867), just on the Swedish frontier.

*Faeroes.* Fanavatn in Suðeroi (HARTZ).

*The British Islands.* "Considered by CROMBIE as doubtfully British, it has not again been collected at BEN BRECHT" (SMITH Brit. Lich., I, 1918, p. 262).

*France (with the Pyrenees).* "Sur les roches granitiques ou schisteuses des hautes montagnes, rarement sur les vieux bois. Alpes de Savoie et du Dauphiné, où il n'est pas rare. — H<sup>tes</sup>-Pyrenées et Pyrenées Orientales". (HARMAND Lich. de France, V, 1913, p. 930—1). I have seen plants from the Pyrenees and from Dauphiné.

*Germany.* "In den Alpen Deutschlands hier und da häufig" (KOERBER Syst. Lich., 1855, p. 118), "Bayrische Alpen" (Sydow Flecht. Deutschl., 1887, p. 83) — neither of these authors distinguishes between the two species.

*Switzerland.* "Supra saxa quartzosa et mica aprica, rarius supra ligna ad meridionale latus per omne alpium jugum, interdum in zonam Fagi descendens" (STIZ. Lich. Helvet. I, 1882, p. 86). STIZENBERGER records many localities, I have also seen many Swiss plants in our Scandinavian herbaria. It is fully clear that the species is common in Switzerland, it is hardly necessary to give detailed localities.

*Italy.* "Ad rupes duriores siliceas in Alpibus et Apennino" (JATTA Flora Ital. Crypt., 1909—11, p. 280). I have seen several plants from Italy in the Scandinavian herbaria, cfr. also the Italian Lichenes Exsiccati.

*Austria.* A lot of localities are known from Tirolia, see DALLA TORRE and SARNTHEIM Die Flechten von Tirol, 1902, p. 226. I have also seen plants from Salzburg, Kärnthen and Nieder Oesterreich. It here descends to very low elevations, e. g. Krems an der Donau.

*Hungary.* Distributed from Hungary by LOJKA, Lich. Hung. 25. But I cannot find it mentioned in any of the publications by LOJKA which are accessible to me, and not in ZSCHACKE's papers on the lichens of Transsylvania. I am indebted to Dr. GYELNIK for some special Hungarian localities: Mehadia and Retyezat (LOJKA), and Mihald (HAZSLIN-SKYI).

*Russia.* OLIVIER quotes "Tauride" (Lich. Eur., II, 1909, p. 46, the statement is highly probable, but I have been unable to check it. Caucasus (LOJKA Lich. Univ. No. 72, ELENKIN Lich. Ross. No. 20, VAINIO Lich. Cauc., 1899, p. 284). Saratov, Ufa and Orenburg (ELENKIN Lich. flor. Ross. Med., II, 1907, p. 249) — Siberia: Krasnojarsk (BRENNER, unpublished).

*Turkestan* (TRINKLER). — *Himalaya*. Pangi (SKOLICZKA).

*China*. Recorded from Yunnan and Shensi by PAULSEN Lich. of Yunnan, 1928, p. 317 and by ZAHLBR. Lichenes (Chinenses), 1930, p. 172.

*The United States*. "On rocks, throughout the United States" (FINK Lich. Flora of the U. S., 1935, p. 308). I have myself seen plants from New England (TUCK.), Texas (leg.?), Colorado (hb. PLITT), California (WILLEY) and Montana (MERRILL Lich. Exsic. 209).

*Canada and Alaska*. Recorded by MACOUN from a lot of localities in Canada between Labrador and Vancouver Island (Cat. Canad. Plants, 1902, p. 105), and from Alaska by MACOUN, l. c. and by CUMMINGS (Alaska, 1910, p. 109). I have seen none of these plants.

*General*. *Lecanora rubina* is one of the rarest species in the Arctic, restricted to a few localities on the west coast of Greenland. This conspicuous species has never been found on the east coast of Greenland, and neither from the Svalbard islands (Spitsbergen), nor from Franz Josef Land or from Novaya Zemlya. It has never been recorded from the Siberian coast (Vega collections, Russian literature), and not from the Sayansk mountains (Russian literature). There is every reason to regard it a typically West-Arctic species.

It is distributed throughout all the European mountains from the Pyrenees in the west to Caucasus in the east, and further to China. It is evidently widely distributed in North America, perhaps in connection with the West Greenland localities.

For Scandinavia, see below.

It is of much interest that along its limits of distribution it varies, developing types, several of which must be regarded as proper species, distinct from *Lecanora rubina* itself. SAVICZ described his *Squamaria crustacea* from Camtchatka, "subsimilis et valde affinis *Squamariae rubinae* (VILL.) ELENK." (Новые Вуды и формы Лишайниковъ Камчатки. Известия Бот. Сада Петра Великаго, т. XIV, 1—2, 1914, p. 123). — I have seen a plant from Jakutsk: Verchojansk (Augustinovicz), differing so much from *Lecanora rubina* that I did not venture to include it in the above list, and other plants from Abyssinia and from the State of Washington, U. S. A., certainly representing related, but undescribed species.

### ***Lecanora melanophthalma* RAM.**

*Arctic. Western Islands*. Ellesmereland: Havnefjord (SIMMONS), Grant Land: Westward Ho Valley (FEILDEN).

*Arctic. West Greenland*. Godthaab: Ameralik, 64° N. (VAHL, 1830), Holsteinsborg 67° N. (KORNERUP): Ikertôq (VAHL), Jakobshavn and Sarqâq (VAHL), Disko: Mudderbugten (PORSILD) and Blaafjeld, Laksebugten and Ujaragssugssuk (TH. FR.), Ũmánaq (VAHL).

*Arctic. North Greenland.* Low Point, 83°2' N., J. P. Koch Fjord, 82°48' and Centrum Island, 82°48' (WULFF).

*Arctic. East Greenland.* Akorninarmiut: Dronning Marias Dal, 63°30' N. (BJØRLYKKE, SCHOL.); Kangerdlugssuaq: Amdrupnæsset and Brandal, 68° N. (SCHOL.). — D'Aunay Bay, Blossesville Coast, 1520 m above sea level (BÖCHER). — Scoresby Sound: Danmarks Ø and Gaaselandet (HARTZ). — Kong Oscar Fjord—Davy Sound: Antarctic Hamna (SCHOL.) and Holmsvika (LYNGE). — Vegasundet: Scott Keltie Islands, Geographical Society Island: Husbukta, Traill Island: Veganeset (LYNGE). — Sofiasundet: Kapp Humboldt (LYNGE). — Franz Josef Fjord: Myggbukta, Kap Bennet, Moskusoksefjorden, Blomsterbukta, Reinbukta and Kierulffjorden (LYNGE). — Clavering Sound district: Loch Fyne and Revet (SCHOL.), Eskimonæs (GELTING), Kap Herschel and Kap Wynn (LYNGE). — Germanialand: Danmarks Havn, Varderyggen and Lille Snenæs (LUNDAGER).

*Arctic. Svalbard.* Sørkaplandet: Olsokbreen (LID). — Bellsund: Recherchefjorden in Reinholmen and on the east side of the fjord (LYNGE), Van Keylenfjorden at Ahlstrandodden, Hesselmanodden, Ullaberget, Eholmen, Forsbladhamna and Mitterhuken (LYNGE), Van Mijenfjorden at Akseløya (LYNGE), Daviesdalen (LID), Blåhuken, Mortonstua, Litledalsfjeldet and Kolfjellet (LYNGE). — Adventfjorden (TH. FR.): Longyearbyen (DAHL). — Kapp Thorsen (DAHL). — North West Spitsbergen: Kongsfjorden (Kings Bay, TH. FR.), Mt. Rekstad (SVERDRUP), Magdalenefjorden (VAHL 1839, RESV.-Dieset): Trinityhamna (HØEG). — Kobbefjorden (TH. FR.), Amsterdamøya: Hollænderneset (DAHL). — Vogelsang and Nordre Norskøya (HØEG). — Red Bay (MALMGREN), Velkomstpynten (DAHL). — Wijdefjorden: Purpurdalen (DAHL). — North East Spitsbergen: Treurenburgfjorden (MALMGR., SCHOL.), Lomfjorden (MALMGREN): Klettreen and Faksedalen (SCHOL.). — Waigattøyene (MALMGR.). — North East Land: Kapp Torell (SCHOL.). Rundhaugen in Wahlenbergfjorden (SCHOL.), Kapp Forsius and Floraberget in Murchisonfjorden (SCHOL.), Brennevinsbukta (MALMGR., TH. FR.): Kapp Hansteen (SCHOL.) and Depotodden (DAHL). Sjuøyene: Phippsøya (DAHL). — Eastern Svalbard Islands: Edgeøya at Habenichtbukta and Kapp Lee (DAHL), Barentsøya near Steinbergfjellet (DAHL), Kong Karls Land at Mohnhøgda, Retziusfjellet and Hårfagrehaugen (DAHL).

*Arctic. Franz Josef Land.* Northbrook Island and Kap Flora (FISHER, PALIBIN), Kap Nansen, Kap Stephens, Kap Forbes and Kap Flora, ab. 80° N. (OLAF HANSEN).

*Norway.* Opland: Nordre Fron at Sikkilsdalen (Nordhagen), Våge at Laurgård (KINDT, NORM.) and Visted (TH. FR.), Lom at Ulstad (LYNGE) and Visdalen (J. E. ZETTERSTEDT), Dovre at Domås (KINDT). — Sør-

trøndelag: Kongsvold (J. E. ZETTERSTEDT), Knutshø (TH. FR.), Vårstigen (M. N. BL.) and Drivstua (TH. FR.), Lesja (VRANG). — Møre: Gruvedal in Sundalen and Slettafjeld in Romsdal (HAVÅS). — Hordaland: Between Hårteignuten and Hardangerjøkelen in many places, Ravnaberg in Hardangervidda and Nesheimshorgen in Granvin (HAVÅS). — Sogn and Fjordane: Neshögalden in Aurland (NORDHAGEN). — Finnmark: Skoganvarre in Porsanger (NORM.).

*Sweden.* Lycksele Lappmark: Stensele, Kyrkberget (MAGNUSSEN). — Lule Lappmark: Rittokk, Njunnats, Njammats, and Aktse Kallou (HELLBOM), Gellivarre at Ruotjajaure (DU RIETZ). — Torne Lappmark: Abisko pluribi (DU RIETZ, TH. C. E. FRIES, MAGNUSSEN, SANTESSON, VRANG), Pietsovarre (J. P. NORRLIN) and Paddavarats (DU RIETZ), Pelsavagge (HASSELROT).

*Finland.* Enontekis: Kilpisjärvi, near the Swedish frontier (J. P. NORRLIN).

*Iceland.* Hof (DAVIDSSON), Myvatn (GRÖNLUND 1876) and Viðvik in Skagafjord (ZOFONIASSON).

*France.* "Avec le précédent, avec lequel il a été vraisemblablement souvent confondu" (HARMAND Lich. France, V, 1913, p. 932), OLIVIER quotes localities from the Pyrenees and the French Alps (Lich. Eur., II, 1909, p. 46).

*Germany.* The German floras give us poor information on its distribution in Germany; HILLMANN thinks it doubtful whether both this species and *L. rubina* is really found within the German frontiers.

*Switzerland.* "Iisdem locis sicut *L. chrysoleuca*" (STIZENBERGER Lich. Helv. 1882, p. 87). I have also seen a considerable number of plants from Switzerland.

*Italy.* "Ad rupes graniticas et varie siliceas in Alpibus Pedemontis et Longobardiae, nec non in Apennino Etruriae et Italiae Meridionalis" (Jatta Flora Ital. Crypt., 1909—11, p. 280).

*Austria.* Mentioned from some localities in Tirol by DALLA TORRE et SARNTHEIM (Flechten von Tirol, 1902, p. 226).

*Spain.* Sierra Nevada (SCHIMPER).

*Hungary.* Comit. Esztergom (TIMKO et FORISS).

*Bulgaria.* (POPNIKOLOFF).

*Russia.* The Crimea: "in Tauri alpes Bulgar Dagh" (KOTSCHY). — Caucasus (LOJKA, sec. VAIN. Lich. Cauc., 1899, p. 285). — Saratov Gouv. (ELENKIN Lich. flor. Ross. Mediae, II, 1907, p. 250).

*Minor Asia.* Lycaonia, Uzedjik Dagh (planta recedit, SZATALA). —

*Kurdistania.* Media: Dagh distr. Bitlis, 2.800 m (HANDEL-MAZZETTI). —

*Turkestan* (recedit!, leg. TRINKLER). — *Persia* (KOTSCHY).

*Teneriffa* (VON FRITSCH, KOLKWITZ).

*Africa.* Kilimandscharo (J. Müller Rev. d. Steinschen Uebersicht, 1893, p. 516).

*The United States.* "On rocks, from South Dakota to Texas, and westward to California and Washington" (FINK Lich. Flora of the U. S., 1935, p. 305). I have seen plants from Texas (TUCK.), Colorado (BAKER), California (HASSE), and Oregon (WILLEY).

*Canada.* Saskatchewan (MACOUN Cat. Canad. Plants, 1902, p. 105). — Vancouver (MACOUN). — *The Bering Strait* (vide Cummings Lich. Alaska, 1910, p. 109).

*South America.* Patag. andina: Territ. Chubut pr. Pampa chica (SKOTTSBERG).

*Antarctic.* Geikie Land (BORCHGREVINK). — A var. *Daltonii* has been described in Hooker Flora Antarctica, II, 1847, p. 534.

*General.* In the Arctic *Lecanora melanophthalma* is distinctly western, but it has a much wider distribution than *Lecanora rubina*, extending eastward to Franz Josef Land. It is in that area equally common everywhere on bird-stones and prominent rocks, it is what we call an ornithocrophilous species. It has never been collected in Novaya Zemlya, and that quite suggests a spreading over the relatively short oversea distances so far north. It has not been collected on the Arctic Siberian coast before we come to the Bering Strait itself.

Apart from the Arctic and from Scandinavia it has much the same distribution in the old world as *Lecanora rubina*, lacking, however, (so far) from China. To judge from FINK, l. c., its distribution in North America is a little more restricted than that of *Lecanora rubina*. — I am not quite convinced that the two species have been kept apart in American literature.

The Andine and the Antarctic localities of *Lecanora melanophthalma* are very interesting. Habitually the plant from Geikie Land does not differ in any way from the Arctic plants. We have here an analogon to another lichen, *Neuropogon* (or *Usnea*) *sulphureus*, a western Arctic lichen which is also found in the Antarctic in a practically identical form.

It is hardly possible to understand the almost world-wide distribution of *Lecanora melanophthalma*, and the very wide distribution of *Lecanora rubina*, and their great variability, except on the supposition that they should be very old species. It is a reasonable idea that they should have attained their present range before the Glacial Epochs destroyed the relatively uniform climate of the Tertiary Age. Under the present climatic conditions they could hardly have attained a distribution of that kind!

The same arguments stand for the high age of *Neuropogon sulphureus*, and to a considerable degree also for that of *Dactylina madreporiformis*

and *D. ramulosa* (see LYNGE On Dufourea and Dactylina, Skr. om Svalbard og Ishavet, No. 59, Oslo 1933, with maps of distribution).

It is of great interest to study the distribution of the two species of *Lecanora* in Scandinavia. Either of them has a clear centre of distribution in the regio subalpina and alpina in Norway, from Northern Gudbrandsdalen over the Dovrefjell, so famous for its flora, down to Opdal and Sundalen on the northern slope of the mountains. In this region they are of the commonest of all lichens. I have seen them there almost everywhere in suitable positions. I have, unfortunately, largely neglected collecting them, but only on the reason that they were too common. *Lecanora rubina* is almost restricted to this area, with a single find as far south as Hol in Hallingdal. *Lecanora melanophthalma* extends more to the west, to the mountains in Sogn, Granvin and Hardangervidda. Eastward their distribution abruptly stops. Though I have rambled much about in the mountains east of Dovre, from Røros to and round about the great lake Fæmunden I have never seen these conspicuous lichens there. Nor has anyone else. It is very difficult positively to exclude a lichen from such a large area. Some day a blind hen might find a specimen! But at the present day all our available information suggests these two lichens to be lacking there.

Farther north in Scandinavia we find them again. They are evidently common around the Swedish lake Torne Träsk just east of the Norwegian frontier. They retire from the sea, at least we have no find from the Norwegian side of the frontier. I have never found them farther north in Norway, in the provinces Troms and Finnmark where I have collected extensively, but NORMAN once detected *Lecanora melanophthalma* at Skoganvarre in Finnmark. They extend southward from Torne Träsk through the Swedish "Lappmarks", we do not exactly know how far to the south. The lichenological exploration of these regions still leaves much to be desired, and the two species of *Lecanora* are recommended to the attention of botanists who work there, they are easily known.

Anyhow it is almost certain that *Lecanora rubina* and *L. melanophthalma* belong to the remarkable group of bicentric Scandinavian plants.

That this is the case was already suggested by the information, given by TH. M. FRIES on their distribution in Scandinavia in his Lich. Scand. But our knowledge was then (1871) too insufficient to allow of general conclusions, and the "bicentric" plants were not yet created.

It was created by TH. FRIES'S SON TH. C. E. FRIES in his classical Botanische Untersuchungen im nördl. Schweden, Upsala 1913, p. 318, compare also his whole chapter on "Gebirgspflanzen", l. c. p. 317—35. The bicentric species are not very numerous in Scandinavia, TH. C. E. FRIES enumerates 9 species (*Campanula uniflora*, *Carex bicolor* and

*C. misandra*, *Draba fladnizensis*, *Papaver radicum*, *Rhododendron lapponicum* (the type plant of the whole group), *Sagina nivalis*, *Sedum villosum* and *Wahlbergella apetala*). Three of them are West-Arctic, viz. *Campanula uniflora*, *Rhododendron lapponicum* and *Sagina nivalis*.

TH. C. E. FRIES advances the hypothesis "dass wir auf so starken pflanzengeographischen Grundlagen, wie solche überhaupt zu schaffen möglich sind, zur Annahme des Vorhandenseins einer norwegischen mecklenburgoglazialen Flora auf zwei von einander weit entfernten Plätzen der norwegischen Küste während der letzten Vereising selbst gezwungen sind", and he piles up heavy arguments in favour of his view on the next page. These bicentric species should have survived through the last glaciation and down to the present day, and spread from their ice-free refuges to their present area of distribution.

As formerly mentioned the two species of *Lecanora* are also West-Arctic species, and in my opinion their Scandinavian distribution is fully explained by the same arguments as that of the bicentric Scandinavian Vascular plants.

TH. C. E. FRIES writes, l. c., p. 329: "Die westarktischen Arten bizentrischen Typus' sind alle ausgeprägte Hochgebirgsarten, welche nur selten in der Regio subalpina anzutreffen sind". Our two *Lecanoras* descend down to about 300 metres above sea-level, at Vågevang in Norway (362 m above sea-level) they are very plentiful.

It would lead us far astray in this paper on West Greenland lichens if we should give an exhaustive summary on the very large Scandinavian literature on bicentric Vascular plants and their possible survival. We are obliged to content ourselves with reference to a few leading papers (others might have been equally important!).

In his Regionale Gliederung der Skandinavischen Vegetation, Svenska Växtsoc. Sällsk. Handl., VIII, Upsala 1925, p. 10, DU RIETZ explains the bicentric species in the same manner as TH. C. E. FRIES did. He further adds *Braya glabella*, *Carex parallela*, *Luzula nivalis*, *Sagina caespitosa*, *Saxifraga hieraciifolia* and *Stellaria longipes*. And he also records our *Lecanora rubina* as a bicentric lichen, the first and to my knowledge the only record of a bicentric Scandinavian lichen. If our knowledge on the distribution of the lichens had been equally great as that of our Vascular plants I think that there would have been many bicentric lichens in Scandinavia, and in general many lichens where a survival through the last glaciation could have been made probable. For the Arctic, and still more the Antarctic flora, clearly show us that lichens are much better adapted to a survival through Glacial Epochs than are Vascular plants.

NORDHAGEN is entirely of the same opinion as TH. C. E. FRIES. In his "Senkvartære klimavekslinger i Nordeuropa og deres betydning for

kulturforskningen" (Instituttet for Sammenlignende Kulturforskning, Ser. A, XII, Oslo 1933) he discusses the bicentric species which he can only explain in the following manner: "These plants represent the remains of an interglacial alpine flora which have survived the last Glacial Epoch in ice-free areas (nunataks, mountains, peninsulas etc.) along the Norwegian coast, in part in Søndmør, Romsdalen, Nordmør, in part in Northern Norway from the Salten Fjord to Vest-Finnmark" (translated from the Norwegian text). — NORDHAGEN also found an excellent support for the relic hypothesis in his studies on *Papaver radicum* (l. c. p. 45—75).

In his paper on *Arenaria humifusa* (Om *Arenaria humifusa* Wg. og dens betydning for utforskningen av Skandinaviens eldste floraelement, Bergens museums Aarb. 1935, Nr. 1) NORDHAGEN broadly discusses the Scandinavian "survivors". In this book he also adduces strong arguments in favour of the theory of the survival of plants in the Scandinavian Peninsula. *Arenaria humifusa* is shown to be West-Arctic (l. c. p. 28), but in Norway it is northern, not bicentric. — In this book NORDHAGEN gives us a very full bibliography on the problem.

The number of bicentric species in Scandinavia is not exhausted with the above enumerations. In his paper "Über *Nigritella nigra* (L.) RCHB., ihre Verbreitung und Geschichte in Skandinavien", Ber. Schweiz. Bot. Ges., XLVI, 1936, p. 207, 210 and 214 HOLMBOE mentions *Nigritella nigra*, *Euphrasia lapponica* and *Myricaria germanica* as bicentric plants. And the number may be still greater!

I may, perhaps, also be allowed to mention that I have advocated the theory of the survival of the lichens in Norway through the last Glacial Epoch, based on my studies on Arctic lichens and their distribution (e. g. in my General Results of Recent Norwegian Research Work on Arctic Lichens, Rhodora, 1934). — My results on *Lecanora rubina* and *L. melanophthalma* are fully in accord with this view.

One gets the impression that some of the relic species have lost much of their vitality with respect to spreading, cfr. FERNALD's Persistence of Plants and my own study on *Dufourea* and *Dactylina*. With other plants this is not the case, cfr. HOLMBOE on *Nigritella*. If my conception of the two *Lecanoras* is tenable, that they are survivors through the last glaciation, they must have extended their range quite considerably in Scandinavia. That is certainly also the case in the Alps.

Dr. GAMS, Innsbruck, has given me the following information: "*Lecanora rubina* and *L. melanophthalma* are very common in the Central Alps, especially they are almost constantly seen in the Ramalinetum strepsilis in regio subalpina and alpina. At Innsbruck *Lecanora rubina* is found associated with *Rinodina oreina* down to 1000 metres above sea-level, far below the limit of the glaciation (here above 2000 metres), it

hardly makes the impression of a true relic plant. I have also seen either of them (the two *Lecanoras*) with *Ramalina strepsilis*, in Caucasus near Kasbek, 2000 metres above sea-level, lower than the limit of glaciation. In the Alps *Ramalinetum strepsilis*, with *Lecanora rubina* and *L. melanophthalma*, is apparently more dependent on the droppings (from the birds) and the local climate than on historical causes, but it is most frequently met with in our nunatak regions."

### Ochrolechia MASS.

#### 1. *Ochrolechia frigida* (SW.) LYNGE.

LYNGE Lich. Nov. Zemlya, 1928, p. 182. — Räsänen Die Flechten Estlands, I, 1931, p. 93.

Godthaab: Kookøerne or Kitsigsut c. fr. (TH. FR.). — Disko: Godhavn c. fr. (PORSILD 1925), Sinigfik c. fr. (GRØNTVED), Blæsedalen, Mellemfjorden and Blaafjeld or Uivfaq (TH. FR.).

As was to be expected there was a number of plants of this species which is almost ubiquitous in all arctic regions. Var. *gonatodes* was present from Kookøerne. — I was a little astonished at not finding *Ochrolechia upsaliensis*, but it is difficult to distinguish between sterile plants of that species and *Ochrolechia frigida*.

Unstained, or very nearly so, by paraphenyldiamin. — *Crocynia neglecta* stains intensely yellow.

#### 2. *Ochrolechia inaequatula* (NYL.) ZAHLBR.

Godthaab: Kookøerne (TH. FR.). — Egedesminde: Sarqardlit in Langesund (GRØNTVED). — Disko: Lyngmarken (TH. FR.).

Its more or less erect papillae are here and there dissolved into coarse granular soredia. One poorly developed apothecium was found, there were a few ripe spores, very variable in size: 25—40  $\mu$ . Evidently 8 spores initiated, but rarely all of them reached maturity. No staining with paraphenyldiamin in *O. upsaliensis* and *O. Grimmeriae*; in *O. inaequatula* the soredia stain orange.

### Lecania (MASS.) TH. FR.

#### 1. *Lecania flavescens* LYNGE.

var. *occidentalis* LYNGE n. var.

*Lecania flavescens* LYNGE Lich. Nov. Zemlya, 1928, p. 188, pl. II, fig. 20—21.

Nûgssuaq Peninsula: Atanikerdluk, on a calcareous sandstone.

Differt a typo hypothallo deficienti et thallo eam ob causam distinctius limitatus. — Apothecia deinde supra thallum bene elevata. — Thallus P —.

In the type plant from Novaya Zemlya there is a very distinct hypothallus, developed around the thallus, especially in more protected places, such as small crevices in the purely calcareous substratum. The hypothallus gives a rather effuse habitus to the somewhat scattered "maculae" of the thallus.

The Greenland plant was collected on a calcareous sandstone at this exceptionally rich locality. No hypothallus is seen, and the thallus is not developed as isolated maculae, the habitus is accordingly not a little different in the two plants. But the structure of the apothecia agrees so well that I resolved to refer the two plants to the same species, at least until more material should prove them to be distinct. The spores are slightly broader in the type plant, and slightly more constricted at the septum, and there is a faintly violet tinge in the hymenium, not seen in the dark brown hymenium of the Greenland plant.

*Lecania disceptans* (NYL.) LYNGE (*Lecanora disceptans* NYL. Flora 1884, p. 212 et Lich. Freti Behringii, 1888, p. 223, *Lecania disceptans* LYNGE Lich. Nov. Zemlya, 1928, p. 188) has a thicker, more granulate thallus, a very thick, crenate margin around the apothecia, and larger spores:  $15-25 \times 7-8 \mu$ , in the present Greenland plant I measured  $10-12.5 \times 4-5.5 \mu$ .

### Haematomma MASS.

1. *Haematomma ventosum* (L.) MASS.

var. *lapponicum* (Räs.) LYNGE.

Disko: Blåsedalen, a few plants (Th. Fr.).

If stained with paraphenyldiamin the medulla of the common Scandinavian plants is coloured firstly orange, then cinnabar, the cortex is much less stained, if stained at all, but the intense colour of the medulla may show through. In the Arctic plants no such staining is seen. This difference is also seen in the KOH reaction: the common Scandinavian plants distinctly KOH yellow, the Arctic ones unstained, or nearly so. RÄSÄNEN called the latter plants *Haematomma lapponicum* (Die Flechten Estlands, 1931, p. 67). He also assigned shorter spores to the latter: "Th. KOH † gelb, Sporen bald länglich spindelförmig, 3—7-zellig, gebogen,  $40-55 \times 3-5 \mu$  *Haematomma ventosum* (L.) MASS. "Th. KOH =, Sporen lange gerade, länglich, undeutlich septiert,  $12-21 \times 3.5-5.5 \mu$  *Haematomma lapponicum* Räs."

I found it characteristic of *Haematomma ventosum* that the contents of the asci remain undifferentiated for a long time, after which they often contain unripe spores. When the spores are ripe there is hardly any difference between the two types. The ripe spores are not "spindelförmig", I always found them a little curvate, acicular, with one end caudately prolonged, there are 3—5 (—7) septa, the size is  $40-52 \times$

3—5  $\mu$  (TH. FRIES found 40—55  $\times$  3—5  $\mu$  in Lich. Scand., also RÄSÄNEN'S measures for *Haematomma ventosum*).

The paraphyses are rather coherent, blood-red or brownish-red in water, and very adspersed. KOH changes the colour into a bluish-violet, dissolves the grains, in either type the paraphyses are then easily discrete, stoutish (about 2.5  $\mu$  thick), and hardly incrassated at their tips.

RÄSÄNEN writes that *Haematomma lapponicum* has a "thallus virescens". The colour of *Haematomma ventosum* is known to vary considerably, TH. FRIES justly writes "sulphureus, virescenti-flavescens v. cinerascens". It seems to me that the colour of RÄSÄNEN'S own plants are entirely within that register, and that his statement "virescens" is not quite adequate.

It is RÄSÄNEN'S merit to have pointed out the chemical difference between the two types. I am, however, not much inclined to attribute specific rank to such units if there are not also morphological differences. *Haematomma ventosum* is recommended to the interest of chemists.

There is a considerable Arctic material in the Herb. Osloense. The whole of it was tested with Paraphenyldiamin, with the following result:

1. Baffin Land: Cumberland Sound (Polunin), P —.

2. West Greenland, only the present plant in our herb, it was P —. The large West Greenland material in herb. Copenh. has not been tested. East Greenland, all our plants from South East Greenland were P —, but a plant from Scoresby Sound (leg. HARTZ) was P + cinnabar. Not known north of Scoresby Sound.

3. In the Svalbard region it is one of many otherwise southern lichens that have only been found along the north coast (apart from a record, perhaps erroneous, that it should have been found in Bellsund by JENS VAHL). — There is one plant from Wijde Bay (leg. MALMGREEN) with a positive reaction, all the other plants are P —.

4. Novaya Zemlya, a considerable material, collected by me in 1921, also here a rather southern species. One plant, from Gribovii fjord, was P + cinnabar, all the other plants were P —.

It is a circumpolar species, but I have not seen the plants from the Bering Strait region, collected by ALMQUIST during the Vega Expedition.

*Haematomma coccineum* stains intensely yellow with P (RÄSÄNEN Lich. Fenn. No. 60).

*Haematomma elatinum* stains intensely yellow and then cinnabar with P (HAVÅS Lich. Norv. No. 565 and Krypt. Exsic. Vindob. No. 2864).

### Candelariella MÜLL. ARG.

#### *Clavis specierum.*

1. Thallus orbicularis, laciniato-radiusus.

1. *Cand. crenulata* (WNBG.) ZAHLBR.

- 1\*. Thallus haud laciniato-radiosus.
2. Asci multispori, thallus minute granulosus.
3. Vulgo ad saxa duriora, rarius ad saxa calcarea vel ad ossa crescens, thallus e granulis substrato adpressis, parvis, crenatis formatus, saepe obsoletus, vulgo bene fertilis.
2. *Cand. vitellina* (EHRH.) MÜLL. ARG.
- 3\*. In arcticis supra muscos vel alios lichenes crescens, minutissime erecte papillato-granulosus, subleprosus, flavo-virescens, granulis circ. 0.1 mm, (in arcticis) tantum sterilis visus . . . . . 3. *Cand. xanthostigma* (PERS.) LETTAU.
- 2\*. Asci octospori.
3. Thallus tenuis, minute granulosus, vulgo obsoletus, ad ossa vel saxa calcarea, rarius supra lichenes emortuos, apothecia frequentia, minuscula, diam. 0.5—1.0 mm, margine tenui . . . . . 4. *Cand. epixantha* (ACH.) SANDST.
- 3\*. Thallus optime evolutus, lobi crassi, placodiiformes, terra adpressi, apothecia haud frequentia, majuscula, diam. 1 mm, margine crasso . . . . . 5. *Cand. placodizans* (NYL.) MAGN.

The species of this genus do not stain with paraphenyldiamin.

1. *Candelariella crenulata* (WNBG.) ZAHLBR.

Holsteinsborg, very scarce (TH. FR.).

This extremely ornithocoprophilous species should be looked after in the bird-cliffs. We have not many stations from West Greenland, according to DEICHMANN BRANTH and GRÖNLUND Grønlands Lichen-Flora, 1888, p. 474, at Qaqortoq in the Julianehaab district and at Amitsuarssuk, branch of North Strømfjord in the Holsteinsborg district.

2. *Candelariella vitellina* (EHRH.) MÜLL. ARG.

Holsteinsborg, on bones (TH. FR.). — Disko: Mellemfjorden, Kuánerssuit, Malingiaq, also on bones, and Blaafjeld or Uivfaq (TH. FR.). — Nûgssuaq Peninsula: Atanikerdluk, on bones (TH. FR.), Atâ and Atâta qâqâ, at the latter station only two minute apothecia, collected 2000 m above sea-level.

All the plants were microscopically examined, they are well fertile. It is a common and widespread species, as was to be expected.

3. *Candelariella xanthostigma* (PERS.) LETTAU.

Disko: Godhavn, on mosses and dead lichens, very scarce.

At first I had identified this plant with *Cand. coralliza* (NYL.) MAGN. Lich. sel. Scand. No. 197, but on closer examination I found *Cand. xanthostigma* to be a better determination. Both species have erect, almost papillate granules, but in *Cand. xanthostigma* they are very small, rarely surpassing 0.1 mm, and often leprose, the other species has twice as large granules which are much coarser and not leprose. It is also a saxicolous species, but perhaps that does not signify so much

in this genus where the species are rather independent of the substratum.

The present plant agrees well with MAGN. Lich. sel. Scand. No. 141. This plant is sterile. I have examined MASS. Lich. Ital. No. 60 (*Candelaria vitellina* var. *xanthostigma*) and found the asci to be multi-sporous.

4. *Candelariella epixantha* (ACH.) SANDST.

Syn. *Cand. cerinella* (FLK.) ZAHLBR., vide LYNGE Lichens of the Danish fifth Thule Exped., 1935, p. 22.

Disko: Sinigfik, on a *Placynthium* and on whale bones, and Kigdlüssat, on whale bones (GRØNTVED). — Ritenbenk Island east of Disko, on bones (TH. FR.). — Nûgssuaq Peninsula: Atanikerdluk, on bones (TH. FR.) and Atâ, on a *Placynthium* (GRØNTVED).

Common and widespread on suitable substratum. All the plants were examined microscopically.

5. *Candelariella placodizans* (NYL.) MAGN.

LYNGE Lichens of the Danish fifth Thule Exped., 1935, p. 23.

Disko: Godhavn, Blæsedalen and Mellemfjorden (TH. FR.).

The species is easily recognized, also habitually. The present plants were not so well developed, as they usually are, but fortunately they were well fertile. The asci were examined and found to be octo-sporous.

This species which is so widely distributed in the Arctic, is equally common in West Greenland as in other Arctic regions, but it is found in the herbaria under other names. After the completion of the manuscript for my above quoted paper I have had an opportunity to study it in the Copenhagen herb. and found the following localities:

*West Greenland.* Julianehaab distr.: Ikerasak (KRUUSE) and Narssaq: Qaqugssuaq (KOLDERUP ROSENINGE). — Godthaab distr.: Amanlik (VAHL 1831) (Ameralik, not located), and Inanuk (Ivnaq nûa, not located, KORNERUP who travelled from Ameralik in the Godthaab distr. to south of the Frederikshaab Iceblink). — Christianshaab: Sydostbugten (VAHL 1835). — Jakobshavn Pâkitsoq (VAHL 1833). — Disko (VAHL 1834): Skansen and Asuk (PORSILD).

*North Greenland:* Low Point (WULFF).

*East Greenland:* Clavering Island: Revet (SEIDENFADEN), and Eskimoneset (GELTING), Kempe Fjord (SEIDENFADEN). Scoresby Sund: Danmarks Ø (HARTZ).

If we also consider the numerous stations, mentioned by LYNGE, l. c., we find *Cand. placodizans* to be distributed all over the coasts of Greenland.

## PARMELIACEAE.

### *Parmelia* (ACH.) DE NOTRS.

#### 1. *Parmelia austerodes* NYL.

Disko: Igdlutsiait (TH. FR.).

Only a few plants. The central part of the thallus forms distinct though very short isidioid diffuse soredia. Accordingly the plants must be referred to this species and not to *Parm. subobscura* VAIN. which is "sorediis omnino et constanter destituta" (VAIN. Lich. Pitlek., 1909, p. 33). *Parm. subobscura* is more common in the Arctic than *Parm. austerodes*. They are nearly related, often difficult of distinction in Arctic plants where excrescences, such as isidia and soredia, are often poorly developed. TH. FRIES's plants are very dark, darker even than NORRL. et NYL. Herb. Lich. Fenn. No. 209.

#### 2. *Parmelia subobscura* VAIN.

Nûgssuaq Peninsula: Atâ (GRØNTVED).

There is no trace of soredia, and if the species should be acknowledged, GRØNTVED's plant must be referred to this species.

It is possible that the staining with paraphenylendiamin might enable us a distinction between related *Hypogymniae*. It was thus found that the soredia of *Parmelia physodes* were stained intensely reddish, whereas they are not stained in *P. vittata*. I am indebted to my friend, Mr. EILIF DAHL, for this observation. He tested our whole Norwegian material and found that a considerable part of the "*Parmelia vittata*", mentioned in my Studies on the Lichen Flora of Norway, 1921, p. 135, in reality only belonged to the ubiquitous *P. physodes*. *Parmelia vittata* is a much more northerly type than formerly supposed. — In *Parmelia tubulosa* there is no staining with the "P", in *P. austerodes* (MAGNUSSEN Lich. Scand. No. 8) I obtained an intensely yellow (citrine) staining of the apical soredia, in *P. farinacea* (MALME Lich. Suec. No. 63) after some time a yellowish staining, but no red colour. — In the Arctic *P. subobscura* I obtained a faintly yellowish staining, or no staining of the stratum medullare, and hardly any staining of the cortex by P.

#### 3. *Parmelia intestiniiformis* (VILL.) ACH.?

Disko: Blæsedalen (GRØNTVED), Kuánerssuit and the "Eskimo camp" (TH. FR.).

TH. FRIES divided his *Parm. encausta* (SM.) NYL. into two subspecies: *multipuncta* (EHRH.) TH. FR. and *intestiniiformis* (VILL.) TH. FR. I am inclined to regard them as proper species. As was to be expected the Arctic representative is the latter one. It would be of much interest to see VILLAR's plant, I suspect it to be the *multipuncta*. The curator of the herb. VILLARS was very obliging, he did his best to find the plant, but in vain. It is evidently lacking.

The morphological difference is much strengthened by their chemical difference: *Parmelia encausta*, cortex, as well as medulla, intensely red by paraphenyldiamin, *Parmelia intestiniformis*, hardly any staining visible, or after some time a hardly perceptible yellow colour of the medulla.

As long as VILLAR's plant is not accessible it is hardly possible to ascertain unobjectionable names, anyhow it would spare confusion if we could name the Arctic (in Scandinavia alpine) plant *Parmelia intestiniformis* (VILL.) ACH., and the more southern plant, to my knowledge never collected in the Arctic, *Parmelia encausta* (SM.) NYL.

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

Disko: Kuánerssuit (TH. FR.).

Only collected once, but the plants are quite magnificent.

*Parmelia separata* TH. FR. and *Parm. groenlandica* LYNGE were not found in these collections, and they were not seen in the whole Copenhagen Greenland herbarium. On the west coast *Parm. centrifuga* must be very common, there were 25 localities represented in the Copenh. herb. But it is, perhaps, a rather southerly species, for we have no localities north of the Disko district. — From the east coast we have so far not a single find.

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

Disko: Godhavn and Kuánerssuit (TH. FR.).

These few finds confirm my former opinion that it should be a south-westerly species in Greenland, chiefly distributed in the Julianehaab district (LYNGE and SCHOLANDER Lichens from N.E. Greenland, 1932, p. 77). — *Parmelia incurva* does not stain perceptibly with paraphenyldiamin.

6. *Parmelia granulosa* LYNGE.

LYNGE and SCHOLANDER Lichens from N.E. Greenland, 1932, p. 74, ubi syn.

Disko: Sinigfik (GRØNTVED), Ujaragssugssuk and Kuánerssuit, Nipisat (not located) (TH. FR.). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

In TH. FRIES's collection there were but a few plants, and in the Copenhagen herb. only two plants, from the Holsteinsborg and the Julianehaab districts. It is a common species in the Arctic where it has been looked after, and it is a little difficult for me to believe that it should be so rare in West Greenland as these few finds suggest. In East Greenland it is common enough.

In the Arctic isidia, as well as soredia, are often poorly developed. This is also the case with the present species. In case of doubt it can be distinguished from *Parmelia stygia* by its negative reaction with paraphenyldiamin: the medulla of the latter species stains intensely yellow, then red, with "P".

The genuine *Parm. sorediata* (ACH.) TH. FR. was not found in the present collections. Like *P. granulosa* it is "P" —.

7. *Parmelia infumata* NYL.

Disko: Sinigfik (GRØNTVED), Blaa fjeld or Uivfaq and the "Eskimo camp" (TH. FR.). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

In the Arctic this species is one of the commonest on the bird-stones. There is no reason to suppose that it should be so rare in West Greenland, as the few known localities suggest. — No reaction with paraphenylen-diamin.

8. *Parmelia pubescens* (L.) VAIN.

Disko: Godhavn and Blæsedalen (GRØNTVED), Nordfjorden and Nipisat (TH. FR.).

9. *Parmelia minuscula* NYL.

Disko: Godhavn (TH. FR.), Røde elv and Skarvefjæld (GRØNTVED). — Nûgssuaq Peninsula: Atâ and Atâta qâqâ, 2000 m above sea-level (GRØNTVED).

The plants generally agree with f. *applanata* LYNGE, the commonest forma in the Arctic.

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

Egedesminde: Seqineqarajugtoq (GRØNTVED). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

All the Arctic species of the *saxatilis*-section (*P. saxatilis*, *P. sulcata*, *P. omphalodes* and *P. fraudans*) have the paraphenylen-diamin-reaction "medulla P. e flavo rubescens".

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

Egedesminde: Seqineqarajugtoq (GRØNTVED).

12. *Parmelia sulcata* TAYL.

Nûgssuaq Peninsula: Atâ (GRØNTVED).

The number of *Parmeliae* is not great in the Arctic, but it seems to me that the genus is underrepresented in these collections. I have repeatedly observed that TH. FRIES was not interested in the large lichens, he chiefly collected the crustaceous lichens. In this genus he did not collect a single species of the *saxatilis* section. The more occasional finds by GRØNTVED were welcome additions, but they could not always complete the results, obtained by TH. FRIES.

### Cetraria ACH.

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

Frederikshaab: Neria, 61°33', fine plants (EUGENIUS). — Egedesminde: Sarqardlit (GRØNTVED). — Disko: Blæsedalen and several other localities (GRØNTVED).

This species is evidently more common in West Greenland than in most other Arctic regions.

It is difficult enough to distinguish between *Cetraria islandica* and *C. crispa* after their habitus. In Lich. Univ., 1810, p. 513 ACHARIUS called attention to the "statura humiliora" and the "habitu pulvinato" of the latter as distinctive characters, in addition to its "laciniis... omnibus canaliculatis". He regarded the *crispa* a subspecies of *Cetraria islandica*.

TH. M. FRIES, on the f. *crispa*: "laciniis angustioribus crispatis, marginibus conniventibus, dense ciliatis" (Lich. Scand., 1871, p. 98).

The first to give specific rank to the *crispa* was NYLANDER: "*Cetraria crispa* et f. *subtubulosa* (FR.)", without description (Enum. Lich. Freti Behring., 1888, p. 202).

Since then opinions have differed on its systematic rank. We find it treated as a proper species by CROMBIE, Brit. Lich., 1894, p. 216, by MAGNUSSON, Skand. Busk- och Bladlavar, 1929, p. 92, and by several other authors. HARMAND, Lich. France, 1907, p. 427 called it *Cetraria islandica* var. *crispa*.

VAINIO called attention to a character, formerly not duly appreciated, *Cetraria islandica* var. *tenuifolia* (syn. *Cetraria crispa*): "Thallus... maculis decorticatis albidis fere solum sub margine recurvo lateris inferioris instructus" (Lich. Pitlek., 1909, p. 21).

If tested with paraphenylendiamin we obtain an intensely red staining of the medulla and the white maculae of *Cetraria islandica*, whereas no such staining is seen in *Cetraria crispa*. This is, perhaps, the best distinctive character. The red reaction is rather astonishing, for all the other *Cetrariae*, here mentioned (*Cetraria Delisei*, *C. nivalis*, *C. cucullata*, *C. hepatizon* — and also *C. fahlunensis* — and *C. nigricans*) gave no reaction with paraphenylendiamin.

*Cetraria crispa* is more rigid in texture than is *C. islandica*, but I did not succeed in finding noteworthy structural differences on hand sections.

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

Disko: Blæsedalen (GRØNTVED) and Nordfjorden (TH. FR.).

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

Frederikshaab: Neria, 61°33' (EUGENIUS 1925) and Narssalik, 61°38' (PORSILD 1925). — Disko: Godhavn and Blæsedalen (GRØNTVED) and Nordfjorden (TH. FR.).

Most probably it is quite as common in West Greenland as it is in East Greenland and in (all?) other Arctic regions. — It is P —.

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

Julianehaab: Tunugdliarfik s. of Kiagtût, 61°10' (A. E. and M. P. PORSILD 1925). — Frederikshaab: Neria, 61°33' (EUGENIUS 1925). — Disko: Godhavn (PORSILD 1924), Blæsedalen (GRØNTVED), Mellemfjorden (TH. FR.) — Nûgssuaq Peninsula: Kugssinerssuaq (GRØNTVED).

TH. FRIES evidently did not find it worth while to collect such

ubiquitous plants, but there are a few fertile plants in his collection. — It is P —.

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

Julianehaab: Tunugdliarfik, s. of Kiagtût (A. E. and M. P. PORSILD 1925). — Egedesminde: Sargardlit in Langesund (GRØNTVED). — Disko: Blæsedalen and Sinigfik (GRØNTVED), Nordfjorden (TH. FR.). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

There were lots of plants, TH. FRIES also collected a few fertile plants. — It is P —.

6. *Cetraria hepatizon* (ACH.) VAIN.

Disko: Godhavn, Skarvefjæld and Sinigfik (GRØNTVED), Mellemfjorden, Eqalûnguit and Kuânerssuisit (TH. FR.).

TH. FRIES's plants are remarkably fine, well fertile and with well developed pycnides. — *Cetr. fahlunensis* (L.) VAIN. with the pale under side and ellipsoidal pycnoconidia was not found in these collections, it is a more southerly plant in Greenland. — Either of the two species is P —.

7. *Cetraria nigricans* NYL.

Disko: Sinigfik, very fine plants (GRØNTVED).

TH. FRIES writes "Thallus intus J caerulescit" (Lich. Scand. p. 100). A microscopical examination confirmed this observation, but I also found a bluish-violet colour in the cortex.

It is a very interesting find, for to my knowledge there is no other locality known from West Greenland. It is a circumpolar species (LYNGE Lichens of the fifth Thule Exp. through Canada, 1935, p. 53). The present find was, accordingly, only to be expected, but it was very satisfactory to identify it from West Greenland. — In the Copenhagen herb. there is an unpublished find from Inugssulik, 1887, leg.?, about 74° n.l., in my opinion a correctly identified plant.

But two East Greenland plants are not correctly determined: EBERLIN's plant from Sergit nûat (DEICHMANN BRANTH og GRØNLUND Grønlands Lichen-Flora, p. 466) is *Cetr. crispa*, rather than *Cetr. nigricans*, and HARTZ's plant from Hold with Hope is typically *Cetr. Delisei*. — It is P —.

**Cornicularia** ACH.

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

Disko: Nordfjorden (TH. FR.).

It is P —.

2. *Cornicularia divergens* ACH.

Godthaab: Nûk (TH. FR.).

There was only one small plant in TH. FRIES's collection. DEICHMANN BRANTH and GRØNLUND write that it is common all over Greenland ("Almindelig i hele Landet", Grønlands Lichen-Flora, p. 465). But

this is hardly quite correct, at least we have no well identified plant on the east coast north of Scoresby Sound.

It is not perceptibly stained by paraphenylendiamin; *Cornicularia odontella* and *C. tristis* are P—.

## USNEACEAE.

### *Dactylina* (NYL.) TUCK.

LYNGE On *Dufourea* and *Dactylina*, Skr. om Svalb. og Ishavet, No. 59, p. 1—62, pl. I—II, figs. 1—6, Oslo 1933.

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

Disko: Nordfjorden and Mellemfjorden (TH. FR.), Sinigfik and Kuánit (GRØNTVED).

The collections contained a considerable number of fine plants. It is supposed to be common in West Greenland from the farthest north as far south as Godthaab, but we have no records from the southernmost districts. — We have no finds from East Greenland.

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

Syn. *Dufourea* or *Dactylina muricata*, vide LYNGE l. c. p. 40—43.

Disko: Blæsedalen (GRØNTVED) and Nordfjorden (TH. FR.).

TH. FRIES collected a considerable number of plants. — In Greenland it is a northern species, recorded from the northernmost parts down to Disko on the west coast and to Danmarks Havn on the east coast.

### *Alectoria* ACH.

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

Deutschl. Flora, vol. III, 2, 1813, p. 137.

Disko: Mellemfjorden and Kuánerssuit.

I do not think it possible to distinguish specifically between the pendulous, corticolous plant which TH. FRIES names *A. jubata a. proliza* (ACH.) TH. FR. Lich. Scand. I, p. 24, and his \* *chalybeiformis* (L.) TH. FR. l. c. p. 25. In this part of Greenland only the latter plant is found. It is distinguished from the former by its prostrate thallus, growing on stones, mosses and especially on the larger foliaceous lichens. Its branches are often more "serobiculato-foveolatus", most so at the base of the ramifications.

Preference must be given to the specific name *chalybeiformis* which dates from *Lichen chalybeiformis* L. Spec. Plant., 1753, p. 1155. As specific name *jubata* dates from *Parmelia jubata* ACH. Meth. Lich., 1803, p. 272.

2. *Alectoria nitidula* (TH. FR.) VAIN.

Adjum. Lich. Lapp., I, 1881, p. 116. — *Bryopogon jubatus*  $\beta$  *nitidulum* TH. FR. Lich. Arct., 1860, p. 25.

Disko: near the station (LAGERKRANTZ), Skarvefjæld (GRØNTVED), Mellemfjorden, Kuánerssuit, Malingiaq and Eqalúnguit (TH. FR.).

A considerable number of plants, collected by three botanists at so many localities, must suggest a common species. — It is found also in the Scandinavian mountains, but as far as I know not in the Svalbard region. There is one record from Franz Josef Land (ELENKIN et SAVICZ Lich. in region. arct. Ocean. Glacial., 1912, p. 84), none from Novaya Zemlya, and none from the Vega Expedition. — It is evidently a species of western origin in the Scandinavian flora.

Cortex crassus, 50—65 (—100)  $\mu$ , in parte exteriori anguste fuscus (5—6  $\mu$ ), praeterea incoloratus, in parte interiori abrupte limitatus. Cortex subcorneus, hyphis pachydermaticis luminibus angustissimis plus minusve longitudinalibus (sect. transv. et longitud.) formatus. — Medulla tenuissima arachnoidea, gonidia dispersa.

Cortex J  $\div$ , medulla J  $\div$ , thallus KOH et  $\text{CaCl}_2\text{O}_2$   $\div$ .

This is much the same structure as in *A. chalybeiformis*, in the latter species I found the thickness of the cortex much more irregular, on account of the undulated inner limitation.

*Alectoria nitidula* is distinguished from *A. chalybeiformis* by its erect habitus and by its lacking soredia, it should, however, be remembered that in the Arctic the soredia of the latter species are often very inconspicuous. *Alectoria nitidula* is intermediate between *Alectoria* and *Cornicularia*, it might also be referred to the latter genus. *Cornicularia divergens* has a more castaneous, more coarse thallus with its well known white stripes, and a distinctly red colour with  $\text{CaCl}_2\text{O}_2$ .

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

Godthaab: Kookøerne (Kitsigsut). — Disko: Godhavn (GRØNTVED) and Malingiaq (TH. FR.).

We cannot conclude from these few plants that it should be rare in West Greenland, for TH. FRIES was little interested in such "common and uninteresting" plants. It is well represented in the Copenh. herb. from West Greenland, as was to be expected.

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

Godthaab: Nùk. — Disko: Godhavn, Blæsedalen and Skarvefjæld (GRØNTVED).

It varies considerably. Some plants are coarse, or even very coarse, diam. of the stems up to 2—3 mm, apical branches often recurvated and bent downwards, and more or less dark, olive to almost black. In the mountains of Southern Norway (Dovre to Tron) apothecia are not rare in such plants. In my opinion they represent the type of the species. Such plants are quite common in Greenland, there are lots of them in the Copenh. herb. and in the present collections plants from Nùk, Godhavn and Blæsedalen belong here.

Other plants are much more slender, diam. of the stems not much exceeding 0.5—0.7 mm even near the base, they are branched from the

base, and the main stem is therefore not so distinct. The stem is intricately branched with more spreading apical branches which are paler than in the "type", sometimes quite concolorous with the lower part of the thallus. These plants cannot be referred to *A. cincinnata*, for they are more erect and not elongated as in the said species, and they show no tendency to fasciation.

GRØNTVED's plant from Skarvefjæld belongs here, it is also found in the Norwegian mountains, especially northwards. It may deserve a name: f. *septentrionalis* LYNGE, f. n. — It is not probable that it should be identical with *A. crinalis* ACH., found "ad arborum truncos" (ACH. Lich. Univ., p. 594).

It is often stated that *A. ochroleuca* is KOH —. If a drop of KOH is applied to the thallus little change of colour is seen, but if the drop is absorbed by a white filter-paper the paper is stained distinctly yellow.

5. *Alectoria cincinnata* (FR.) LYNGE.

Godthaab: Nûk and Kookørerne (Kitsigsut).

The plants from Nûk are large, fine plants with a distinct fasciation, the others are very intricately branched and the tendency to fasciation is less distinct.

In the Copenh. herb. there are several plants from South-west Greenland, collected from the Julianehaab district in the south to Holsteinsborg: Isortoq in the north.

The chemical reaction of the *Alectoriae* with paraphenylendiamin has received considerable attention, cfr. ASAHINA in The Journal of Japanese Botany, October 1936. My results were:

*Alectoria*.

*chalybeiformis*: cortex and medulla P —, but soredia red.

*cincinnata*: P —.

*Fremontii*: P —, also the soredia.

*implexa*: cortex distinctly yellow, then yellowish-orange, soredia red.

*nidulifera*: thallus distinctly red.

*nigricans*: yellow or yellowish-orange, especially the pseudo-cyphellae.

*nitidula*: cortex almost unchanged, but medulla firstly yellow, then red, but not always equally intensely, perhaps a polymorphous species, type plant not seen.

*ochroleuca*: in the robust plants, often fertile in Central Scandinavia no reaction was seen, such plants are also seen in the Arctic. But the f. *septentrionalis* stains firstly yellow, then red. It is found also in Novaya Zemlya.

*sarmentosa*: P —.

*simplicior*: P —.

*thrausta*: P —.

These results are interesting. They confirm the distinction between *A. nidulifera* and *A. simplicior*, and they suggest *A. ochroleuca* to be a polymorphous species, as do also the morphological characters.

#### **Neuropogon** NEES et FLOT.

It seems to me quite unnatural to unite these species with the other *Usneae* in the same genus, their well-known structure is really too different.

##### 1. *Neuropogon sulphureus* (KÖNIG) HELLBOM.

*Lichen sulphureus* KOENIG in OLAFSENS Rejse igjennem Island, Appendix, 1772, p. 16. — *Neuropogon sulphureus* HELLBOM Lichenaea Neo-Zeelandica, Bihang till K. Svenska Vet.-Akad. Handl., vol. XXI, Ser. III, No. 13, 1898, p. 21. (It is little probable that HELLBOM's record should stand for the present species.)

Disko: Godhavn, Lyngmarken, Ujaragssugssuk, Mellemfjorden and Blaafjeld or Uivfaq (often called "Meteor" on TH. FRIES's labels), leg. TH. FRIES. — Nûgssuaq Peninsula: Atâta qâqâ, 1700 m above sea-level, on a basaltic rock (GRØNTVED).

There was a lot of plants, it is certainly common in these regions. But it is not known much south of Disko Island, we have no finds south of Disko Bay, the southernmost being Christianshaab.

DR. CARL CHRISTENSEN, the historian of Danish botany, has been kind enough to give me the following information on J. G. KÖNIG, who is little known amongst us lichenologists: "He was physician at the Danish colony Trankebar in India, and he is best known as collector of plants in India. But before he went out to India he had been engaged by OEDER as collector of plants for "Flora Danica". As such he travelled in Iceland 1765—66. His list of finds came to the new editor of Flora Danica, O. F. MÜLLER, and he printed it in 1770 as "Enumeratio Stirpium in Islandia sponte crescentium (Nova Acta Nat. cur. vol. IV, p. 198), a naked list of names. Two years later J. ZOËGA printed it again as an Appendix to OLAFSEN's "Rejse", supplemented with a few additional species after the same (or another?) manuscript by KÖNIG. ZOËGA was a collaborator of OEDER's. Most probably the description of the new species is due to KÖNIG, but that cannot be proved. KÖNIG was a pupil of LINNÉ's, and no bad botanist".

*Neuropogon sulphureus* is P —.

In his Monograph of the genus *Usnea* (1936) which is based on a very extensive work during many years Motyka gives a survey of its distribution. Unfortunately this survey is little satisfactory for the Arctic. MOTYKA has overlooked its presence in Novaya Zemlya (LYNGE Lich. Nov. Zemlya, 1928, p. 213). — In East Greenland it is found much farther to the south than stated in the said paper (VAINIO Lich. Exped. AMDRUP,

1905, p. 126). — Kong Karls Land is situated in the eastern part of Svalbard, not in Greenland. — Many names of Arctic localities have been cruelly misspelt.

## CALOPLACACEAE

### *Protoblastenia* STEINER.

1. *Protoblastenia rupestris* (SCOP.) ACH.

Var. *calva* (DICKS.) STEIN.: Disko: Narssaq, very sparingly.

Var. *typica* TH. FR.: Disko, only one plant.

The former plant had no visible thallus, and prominent apothecia, the latter had a well developed thallus, and an entirely uncoloured hypothecium, excluding the *Siebenhaariana*.

2. *Protoblastenia terricola* (ANZI) TH. FR.

Disko Island: Ritenbenk coal mine, only a few plants.

Curiously enough these species are apparently rare in Greenland. I found no plant in the Copenhagen herb., and they are not mentioned in DEICHMANN BRANTH and GRÖNLUND'S Grønlands Lichen-Flora. In East Greenland I detected the former species in a few places on calcareous rocks, and I found the latter fairly common on the ground at several localities. The English Polar Expedition of 1875—76 collected *Protoblastenia rupestris* at Floeberg Beach in Grant Land and in Walrus Island (79°23' n.), I have been unable to locate the latter place, supposed to be situated on the coast of Grinnell Land. Should these lichens really be additions to the lichen flora of Greenland?

There are a lot of localities for either species from Spitsbergen in my unpublished papers, and also from Novaya Zemlya, cfr. my paper of 1928, p. 215—6.

*Protoblastenia rupestris* is P —.

*Protoblastenia cinnabarina* (SOMRFT.) was not found in the present collections, but VAHL detected fine plants at Tunugdliarfik in S.W. Greenland, on *Betula*.

### *Blastenia* MASS.

1. *Blastenia leucoraea* (ACH.) TH. FR.

Disko: Mellemfjorden, very scarce.

In Grønlands Lichen-Flora we find the following remarkable note: "Mixed with the varieties of the former species — i. e. *Caloplaca Jungermanniae* — out of which it is the darkest one" ("Blandet med den foregaaendes Afændringer, af hvilke den er den mørkeste"). I am unable to say much of its distribution in Greenland, but it is supposed to be rare, for the plants which I was able to check generally belonged to *Blastenia tetraspora*, a much more common species in Greenland as elsewhere in the Arctic.

I detected *Blastenia leucoraea* in two places in the great fjord district north of Scoresby Sound, and also in Jan Mayen. — There is some reason to believe that it is a rare species of western distribution in the Arctic. It has not been found in Svalbard, and not in Novaya Zemlya. — It is P —.

2. *Blastenia tetraspora* (NYL.) TH. FR.

Disko: Godhavn, Lyngmarken, Mellemfjorden and Blaafjeld or Uivfaq.

This species is most probably circumpolar, it is rarely lacking in Arctic collections of some importance (though sometimes named *Blastenia* or *Caloplaca leucoraea*). There are, however, not many plants in the present collections, and only 5 localities in my own collections from East Greenland in 1929. It is evidently less common in Greenland than in the Svalbard region, also in Novaya Zemlya I found it to be quite plentiful. — It is P —.

3. *Blastenia melanocarpa* (TH. FR.) STEINER.

*Blastenia melanocarpa* (TH. FR.) Steiner Flechten d. ital.-franz. Grenzgeb., Verh. k.k. zool.-bot. Ges., Wien, 1911, p. 60—61. — *Caloplaca ferruginea*  $\gamma$  *melanocarpa* TH. FR. Lich. Spitsb., 1867, p. 26. — *Caloplaca ferruginea*  $\eta$  *nigricans* (TUCK.) TH. FR. Lich. Scand. I, 1871, p. 184. — *Caloplaca melanocarpa* (TH. FR.) Steiner Adnot. lichen. IV, Oesterr. Bot. Zeitschr., 1918, p. 285. — *Caloplaca nigricans* (TUCK.) OLIV., cfr. LYNGE Lich. Bear Island, Res. Norske statsunderstøttede Spitsbergenekspedit., vol. I, 1926, p. 63, and Lich. Nov. Zemlya, 1928, p. 230.

As a specific name *nigricans* is older than *melanocarpa*, dating from OLIVIER Lich. Eur., II, 1909 — against 1911, but OLIVIER's *nigricans* is obviously a mixtum, and *nigricans* TUCK. a nomen nudum.

Disko: Mellemfjorden, on non-calcareous rocks, very scarce.

Thallus evanescens vel subevanescens.

Apothecia numerosa, sed satis dispersa, parva, diam. 0.3—0.5 mm. Discus planus, epruinosis, olivaceo-nigricans, tenuiter et persistenter atro-marginatus, discus madefactus distincte olivaceus, margo tamen persistenter nigricans. Excipulum gonidiis omnino destitutum, in parte exteriori caeruleo-nigricans, praeterea incoloratum vel dilute flavofuscens. Hypothecium incoloratum, hymenium 65—75  $\mu$  altum, superne irregulariter caeruleo-fuligineum, praeterea incoloratum, epithecium granulosis. Paraphyses satis cohaerentes, in parte tertia superiori ramosae, apice (indistincte) levissime solum clavato-incrassatae. Asci saccati vel pyriformes, circiter 12—13  $\mu$  crassi, octospori. Sporae polari-dyblastae, septum crassum, membrana in apice tenuissima, sporae typice ellipsoideae, apice subapiculatae, 12.5—15  $\times$  5—6  $\mu$ .

Hymenium J persistenter caerulescens (interdum etiam p. p. hy-

pothecium), KOH hymenium superne dilute olivaceo-smaragdulum, solutione roseo levissime solum effuso.

It seems to me that this plant is to the point identical with TH. FRIES's Spitsbergen plant, l. c., 1867, p. 26. On the authority of NYLANDER TH. FRIES later identified his plant with "*Lecanora ferruginea* var. *nigricans* TUCK.", l. c., 1871, p. 184. I am unable to check this, having no access to the type plant of TUCKERMAN. It is very uncertain whether TUCKERMAN ever described such a plant. NYLANDER gave no reference, and no arguments, as usually, and I have been unable to find a plant of that name mentioned in TUCKERMAN's publications. According to STEINER, l. c., 1911, p. 61, *nigricans* is only a herbarium name of TUCKERMAN's.

The difference between the present species and *Caloplaca Pollinii* JATTA, ZAHLBRUCKNER Cat. Lich., VI, p. 167, is unknown to me, and hard to understand. According to ZAHLBRUCKNER either of them is a corticolous species. In the Arctic *Blastenia melanocarpa* is found "supra saxa, muscos, plantarumque caespites" (TH. FR. 1867, p. 26).

I have carefully examined the excipulum on good sections, cleared up with chlorale hydrate, without being able to detect gonidia. I have, accordingly, referred it to the genus *Blastenia*.

Most probably it is an addition to the lichen flora of Greenland. — TH. FRIES recorded it from the winter quarter of the "Alert" on the east coast of Grant Land, (Lich. Engl. Polar Exped., 1879, p. 357).

In much the same place (Cape Union) the expedition also collected *Blastenia atrocyanescens* TH. FR. which VAINIO regards a *Lecanora* — after our nomenclature a *Caloplaca*. (TH. FR. l. c. p. 360, VAINIO Adjum. Lich. Lapp. I, p. 149). VAINIO found gonidia in its "hypothecio inferiore et parce etiam in excipulo", he also found that "summa pars hymenii (epithecium) intense est violacea." TH. FRIES also describes "paraphyses . . . graciles, immixtis aliis crassis distincteque articulatis", and a "crusta . . . granulosa v. rimulosa . . . fuscescenti-cinerascens". I have not seen a type plant of *Blastenia atrocyanescens*, but it seems to me that these characters should distinguish it from the present Greenland plants.

### **Caloplaca** TH. FR.

Few lichen genera are more in need of a monograph than *Caloplaca*. A monograph that paid full attention to the structure of the excipulum, to the paraphyses and the spores, e. g. the thickness of the spore wall, and after that to the study of the type plants. In the Arctic the thallus itself is of less interest in this genus. In the *Caloplaca ferruginea* section there is hardly a plant with anything like a well developed thallus.

After a penetrating monographical work we should be able to judge better of the species, and to build up a Clavis specierum, based on im-

portant characters. The following Clavis is only intended to be a suggestion, based on conspicuous, but perhaps not important characters, in order to facilitate the determination of the units which I have tried to identify in the collections, let them be species or not!

I have here not attempted a monographical treatment of *Caloplaca*. I should have been lost in the jungle, and never been able to finish the work if I should have done that wherever it was felt desirable. In a paper dealing with the whole material of a collection, such as the present one, it is inevitable to devote a rather preliminary treatment to some difficult genera.

*Clavis specierum.*

1. Thallus crustaceus (Sect. *Eucaloplaca* TH. FR.).
  2. Discus apotheciorum cerinus vel ochraceo-aurantiacus, (in arcticis) praecipue supra muscos, plantas emortuas, terram vel ad ossa vetusta crescentes.
  3. Discus margine subpulverulento thallo concolori circumdatus . . . . . 1. *C. stillicidiorum* (VAHL) LYNGE, p. 173
  - 3\*. Margo epruinosis, disco subconcolor.
    4. Apothecia majora, usque ad 2 mm lata, discus deinde crenulatus . . . . . 2. *C. Jungermanniae* (VAHL) TH. FR., p. 173
    - 4\*. Apothecia minora, 0.3—0.5 (—0.7) mm lata, margo integer . . . . . 3. *C. subolivacea* (TH. FR.) LYNGE, p. 173
  - 2\*. Discus apotheciorum plus minusve ferrugineus.
    3. Planta supra thallum aliorum lichenum (e. g. *Placynthium*) parasiticus . . . . . 5. *C. invadens* LYNGE, p. 174
    - 3\*. Thallus non parasiticus.
      4. Supra muscos, caespites herbarum vel supra Macroliche- nes, apothecia parva, 0.4—0.5 mm lata, margine thal- lode demum occultato.
        6. *C. cinnamomea* (TH. FR.) OLIV., p. 174
      - 4\*. Ad lignum vetustum.
        8. *C. ferruginea* (HUDS.) TH. FR. var. *ferrugineofusca* VAIN., p. 174
      - 4\*\*. Ad saxa.
        5. Discus margine distincto persistenti thallo concolori circumdatus . . . . . 7. *C. amniospila* (WBG.) OLIV., p. 174<sup>1)</sup>
        - 5\*. Margo thallinus exclusus vel valde indistinctus.
          6. Apothecia minuta, diam. 0.3—0.5 mm, sat dilute ferruginea . . . . . 9. *C. festiva* (FR.) ZW., p. 175

<sup>1)</sup> The present plants were found on rocks, with (partly on) *Lecanora melano-phthalma*, otherwise it is usually found on decayed wood, such as fences, and the like.

6\*. Apothecia majora, 0.5—1.0 mm, intense aurantiaco-vel fulvo-rufa.

4. *C. fraudans* (TH. FR.) DU RIETZ, p. 174

1\*. Thallus ambitu laciniato-effiguratus (Sect. *Gasparrinia* TH. FR.)

2. Thallus sorediis crateriformibus instructus.

11. *C. sorediata* (VAIN.) DU RIETZ, p. 176

2\*. Thallus sorediis destitutus.

3. Thallus optime evolutus 10. *C. elegans* (LINK) TH. FR., p. 175

3\*. Thallus e verruculis parcissimis constans, apotheciis pulverinatis obtectis. 12. *C. murorum* (HOFFM.) TH. FR. var.

*obliterata* (PERS.) VAIN., p. 176

All the present species of *Caloplaca* were tested with paraphenylen-diamin, but neither of them gave any change of colour.

1. *Caloplaca stillicidiorum* (VAHL) LYNGE.

LYNGE Lichens from Novaya Zemlya, 1928, p. 219, ubi syn.

Qigdlüssat, on whale bones (GRØNTVED). — Disko Island: Godhavn, on mosses (TH. FR.), Skarvefjæld, on mosses (GRØNTVED), Nordfjorden, Mellemfjorden, on dead Vascular plants, "Eik" (to judge from the diary near Kuánerssuit) and Blaafjeld or Uivfaq, very many plants, collected on mosses (TH. FR.). — Nûgssuaq Peninsula: Atanikerdluk, on bones (TH. FR.).

One of the commonest lichens here, as in other Arctic regions.

2. *Caloplaca Jungermanniae* (VAHL) TH. FR., s. ang.

Disko Island: Godhavn, Lyngmarken, Blæsedalen, Mellemfjorden and Blaafjeld or Uivfaq (TH. FR.).

*Caloplaca Jungermanniae* (excl. of *Caloplaca subolivacea*) is generally no common species in the Arctic. The number of finds in TH. FRIES'S collection is not inconsiderable, the number of plants more scarce.

It is not probable that *Caloplaca Jungermanniae* sensu ang. should be common in Greenland. In the Copenh. herb. I only found plants, collected by VAHL at Pâkitsoq near Jakobshavn, and at Tunugdliarfik near Julianehaab.

3. *Caloplaca subolivacea* (TH. FR.) LYNGE.

LYNGE Lichens from Novaya Zemlya, 1928, p. 224.

Disko Island: Skarvefjæld (GRØNTVED), Nordfjorden, Mellemfjorden and Blaafjeld or Uivfaq (TH. FR.).

This species is, perhaps, the commonest of all Arctic *Caloplacae*, found on decaying plants of nearly every kind, mosses as well as Vascular plants, such as *Saxifraga oppositifolia* and the like, further on old bones of every kind. — It is remarkable that it is so scarce, if found at all, on decaying *Cassiope tetragona*, this species must contain some substance, which prevents lichens from settling on it.

There are few plants from West Greenland in the Copenh. herb., but that can only be due to its inconsiderable size, measured with the eye of the "vascular botanist". In East Greenland it is most abundant, and in Spitsbergen one of the commonest of all lichens. It is found on the same substratum as the former species, and it forms a very characteristic association together with *Caloplaca stillicidiorum*, *Rinodina roscida*, *Lecanora verrucosa* and *L. epibryon* and other lichens.

4. *Caloplaca fraudans* (TH. FR.) OLIV.

Disko: Sinigfik, on a friable, weathered rock, composed of quartz and conglutinated by a calcareous substance (GRØNTVED). — Nûgssuaq Peninsula: Atâ (GRØNTVED).

5. *Caloplaca invadens* LYNGE.

LYNGE Lich. Novaya Zemlya, 1928, p. 228.

Disko Island: Blæsedalen, Mellemfjorden and Kuánerssuit (TH. FR.).

Habitually these plants agreed so well with my Novaya Zemlya plants that I found it unnecessary to study them microscopically. All the plants were parasitic on a lichen, perhaps a *Placynthium*, which had suffered severely from it. Apart from the parasitic manner it is very like *Caloplaca fraudans*.

6. *Caloplaca cinnamomea* (TH. FR.) OLIV.

Godthaab: Kook Islands or Kitsigsut, lots of plants. — Disko Island: Blaafjeld or Uivfaq.

In the present collection it was found on mosses, otherwise it is also found on old wood (e. g. in Jan Mayen on the old Austrian house). The species is characterized by darkly ferruginous apothecia, rather small, with a very indistinct, often missing whitish margin. In *Caloplaca amniospila*, as here limited, the apothecia are more rubescenti-ferruginous with a very distinct margin, the difference in size is hardly to be perceived. The difference in the spores is, perhaps, not so distinct as suggested by TH. FRIES in Lich. Scand. p. 183.

7. *Caloplaca amniospila* (WNBG.) OLIV.

Disko: Mellemfjorden, very scarce. — Nûgssuaq Peninsula: Atanikerdluk, very scarce.

I have compared the present plants with the type plant in Upsala, and found full agreement.

8. *Caloplaca ferruginea* (HUDS.) TH. FR.

var. *ferrugineofusca* VAIN.

Disko: Nordfjorden, scarce, on old wood.

There is no visible thallus. — The apothecia are very small, about 0.3 mm in diam. The disk is darker than in MALME Lich. Suec. Nos. 658 and 763, and somewhat convex, the proper margin is a little paler than the disk, there is no thalline margin visible.

It seems to me that the Greenland plant agrees well with VAINIO's type plant from Pitlekai which I have seen (Lich. Pitlek., 1909, p. 65), and with my own plants from Novaya Zemlya, with the exception that the margin is more distinct, and the disk more plane in the latter plant.

9. *Caloplaca festiva* (E. FR.) ZW.

*Biatora ferruginea*  $\gamma$  *festiva* E. FR. Sched. Crit. de Lich. Suec., Fasc. XIII, 1827, p. 8 (No. 373): "forma tertia apotheciis minutis aurantiaco-rubris, luteisve, quam ad *P. aurantiacam* facile referres". — E. FRIES Lich. Eur. Ref., 1831, p. 172, s. n. *Parmelia*. — An syn. *Lecidea caesiorufa* var. *festiva* Ach. Syn. Lich., 1814, p. 44 (Plantam Acharianam non vidimus).

Nûgssuaq: Atanikerdluk, ad saxa calcarea friabilia.

Thallus subnullus, albidus vel pallide cinerascens videtur. — Apothecia satis numerosa, dispersa, parva, diam. 0.4—0.6 mm, discus planus vel deinde leviter convexus, ochraceo-aurantiacus (quam in *Caloplaca Jungermanniae* leviter dilutius), margine concolori proprio crassitudine mediocri cinctus. Excipulum incoloratum, gonidiis plus minusve numerosis instructum. Hymenium 75—80  $\mu$  altum, superne (epithecium) granulose, flavo-fuscescens, praeterea incoloratum. Paraphyses superne solum cohaerentes, apice (par. matura) clavatae, usque ad 4  $\mu$  crassae, hinc inde ramosae. Asci apicem versus angustati, membrana ibi valde incrassata. Sporae male evolutae, maturae haud visae. — Hymenium J persistenter obscure caerulescens.

I have compared the plants with E. FRIES's type plant in Upsala, and I am unable to detect any habitual difference.

TH. FRIES is of opinion that Acharii *Lichen caesiorufus* "ad festivam potissimum referendus est" (Lich. Scand. I, p. 186), the difference should only be that the *caesiorufa* has a "crusta crassiuscula", *festiva* a "crusta tenuis". — E. FRIES himself simply refers to Acharii *caesiorufa* as a synonym of his own *festiva*.

During the times the name *caesiorufa* has become quite a nomen confusum. At present I have not access to Acharii herb., and I cannot compare the present plant with his *caesiorufa*. I have, therefore, thought it a prudent proceeding to refer them to *Caloplaca festiva* (FR.), the type of which I have seen.

Some lichenologists, e. g. DU RIETZ, are of opinion that *Caloplaca atroflava* (TURN.) should be the valid name of this species, it dates from TURNER, 1808, *caesiorufa* from 1798. There is also a *Lichen caesiorufus* from SCHRADER Spicilegium, 1794, p. 80. None of these types are accessible to me. — Neither do I know whether ZWACKH's *Caloplaca festiva* is the same as the present plant.

10. *Caloplaca elegans* (LINK) TH. FR.

Godthaab. — Disko Island: Skarvefjæld and Sinigfik (GRØNTVED),

Malingiaq and Ritenbenk coal mine (TH. FR.). — Nügssuaq Peninsula: Atanikerdluk (TH. FR.) and Atâ (GRØNTVED). Var. *tenuis* was collected at Atâ by GRØNTVED.

A very large material has been accumulated in the Greenland herb., showing it to be an almost ubiquitous plant in Greenland as in other Arctic regions.

11. *Caloplaca sorediata* (VAIN.) DU RIETZ.

Disko Island: Røde Elv (Red River), leg GRØNTVED.

*Caloplaca sorediata* is a rare species in Greenland, at least it has not been much collected. In the Copenh. herb. I found one plant, from TURNER Sound in East Greenland, det. VAINIO *Placodium granulatum*. I detected some plants in North East Greenland in the Franz Josef Fjord district (1929, unpublished), but I found it to be quite rare there.

12. *Caloplaca murorum* (HOFFM.) TH. FR.

var. *obliterata* (PERS.) sensu VAIN.

Disko Island: on the label »Sartok«, 19.6.1871, to judge from the diary it must be near to Blaafjeld, on the map I have found a name Sâtoq there.

Very scarce, some approximated apothecia, growing on a hard rock, together with coprophilous plants, such as *Lecanora contractula* var. *feracissima* and *Buellia coniops*. — In Grøn. Lichen-Flora, p. 473 we find several records of this species, there called *Xanthoria murorum*. I have no notes on them, I think that they should be distinguished with some care from *Caloplaca elegans*.

In the Copenh. herbarium we find a considerable material of *Caloplaca* and *Blastenia*, but it cannot be quoted without a thorough revision. Inter alia DEICHMANN BRANTH and GRØNLUND record *Caloplaca nivalis* from Nanûseq (= Nenese) in South Greenland. — I have not found it possible to check these determinations for the present paper.

### Fulgensia MASS.

1. *Fulgensia bracteata* (HOFFM.) RÄS.

Disko Island: Nordfjorden and Igdlutsiait (?).

We have but few records of its presence in Greenland. According to TH. FRIES the excellent collector JENS VAHL found it "in Waygattet" (the sound between Disko and Nügssuaq). In the Copenh. herb. I found one plant from East Greenland: Flade Pynt (in Scoresby Sound?), leg. HARTZ, May 1892. — I found it quite common in the fjord district north of Scoresby Sound where I also collected fertile plants (1929, unpublished).

In Natürl. Pflanzenfam., 1926, p. 250 ZAHLBRUCKNER states: "Ein Analogon zu *Blastenia* sect. *Protoblastenia*", on account of the simple spores of the last mentioned genus, as well as of *Fulgensia*. If we acknowl-

edge *Protoblastenia* as a proper genus, we are obliged to acknowledge also *Fulgensia*.

If treated with paraphenylendiamin it takes a more intensely yellow to orange colour, which disappears when the alcohol has evaporated.

## THELOSCHISTACEAE.

### *Xanthoria* TH. FR.

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

Disko Island: Malingiaq and Blaafjeld, only a few plants.

It is P —, as is also *Xanthoria parietina*.

## BUELLIACEAE.

### *Buellia* (DE NOTRS.) TH. FR.

*Clavis specierum.*

1. Sporae tetrablastae vel nonnihil murales.
  2. Ad rupes calcareas, sporae submurales. Sect. *Diplotomma* (FW.) KBR.
    12. *B. margaritacea* (SOMRFT.) LYNGE, p. 185
  - 2\*. Ad muscos destructos, sporae triseptatae
    5. *B. geophila* (SOMRFT.) LYNGE, p. 181
- 1\*. Sporae dyblastae.
  2. Apothecia sessilia, thallo non immersa. Sect. *Eubuellia* (KÖRB.) emend. VAIN. Lich. Pitlek., 1909, p. 76 et 82.
    3. Ad rupes (non calcareas), interdum usque ad arenam decompositam.
      4. Thallus nigricans vel nigro-cinerascens, medulla J ÷, sporae saepe simplices . . . . . 1. *B. atrata* (SM.) ANZI, p. 178
    - 4\*. Thallus fuscus, medulla J ÷, pycnides frequentes (in aliis spec. rariores), pycnoconidia elongata, arcuata.
      2. *B. coniops* (WBG.) TH. FR., p. 178
  - 4\*\*. Thallus albidus vel cinereus (vel evanescens).
    5. Hypothecium incoloratum, medulla J caerulescens.
      3. *B. vilis* TH. FR., p. 179
    - 5\*. Hypothecium obscurum.
      6. Medulla J caerulescens.
        4. *B. leptocline* (FLOT.) KÖRB., p. 179
  - 6\*. Medulla J haud caerulescens.
    7. Sporae majores: 15—25 × 7.5—10 μ, thallus albidus, bene evolutus.
      5. *B. disciformis* (FR.) MUDD  
var. *nodulosa* LYNGE, p. 180
  - 7\*. Sporae minores: 10—14 (—16) μ longae.

8. Apothecia majuscula, diam. 1—1.3 mm, convexa, thallus obscure cinereus, crassitudine mediocri 7. *B. occidentalis* LYNGE, p. 182
- 8\*. Apothecia minuscula, diam. 0.3—0.4—0.8 mm.
9. Thallus cinereus, crassitudine mediocri, ad arenosam.
9. *B. septentrionalis* VAIN., p. 183
- 9\*. Thallus evanescens, ad saxa arenaria.
8. *B. stigmatea* KÖRB., p. 183
- 3\*. Supra muscos vel lichenes destructos.
4. Sporae triseptatae. 6. *B. geophila* (SOMRFT.) LYNGE, p. 181
- 4\*. Sporae uniseptatae.
5. Apothecia epruinosa, atra. 5. *B. disciformis* (FR.) MUDD. var. *muscorum* (SCHAER.) VAIN., p. 180
- 5\*. Apothecia, saltem margine, pruina albida vel caesia tecta. 5. *B. disciformis* (FR.) MUDD var. *alboincta* (TH. FR.) LYNGE, p. 180
- 2\*. Apothecia immersa. Sect. *Melanaspicilia* (VAIN.)
3. Medulla J caerulescens, KOH rubescens.
10. *B. discoensis* LYNGE, p. 183
- 3\*. Medulla J non caerulescens.
4. Medulla KOH rubescens . . . 11. *B. immersa* LYNGE, p. 184
- 4\*. Medulla KOH haud rubescens.
12. *B. microplaca* (VAIN.) ERICHS., p. 184

All the species of *Buellia* in the present collection were tested with paraphenyldiamin, but neither of them was stained.

1. *Buellia atrata* (SM.) ANZI.

Godthaab. — Holsteinsborg. — Disko: Blæsedalen, Nordfjorden, Kuánerssuit, Malingiaq and (not located) Nipisat.

It is found on hard rocks. The number of plants as well as of localities, is so great that this lichen must be common and plentiful all over the area investigated. DEICHMANN BRANTH also states that it is common all over the country (Grønl. Lichen-Flora, p. 506, s. n. *B. coracina*), and there are lots of plants in the Copenh. herb.

It is evident from literature, and also from our Oslo herbarium, that it is a circumpolar species, but in the Svalbard region and in Novaya Zemlya it is much less common than in Greenland.

2. *Buellia coniops* (WBG.) TH. FR.

Godthaab. — Holsteinsborg. — Disko: Malingiaq and "Sartoq", supposed to be Sâtoq, a little island just west of Malingiaq.

There were not many plants in the collection. DEICHMANN BRANTH only records it from two Greenland localities, viz. Nanortalik in the Julianehaab district in South Greenland and Ritenbenk east of Disko Island. In the Copenhagen herb. there are plants from two other localities, viz. Egedesminde just south of Disko Island, and Taagefjorden in Scoresby Sound in East Greenland.

It is a very coprophilous species, inevitable in bird-cliffs and other places in the Arctic where birds abound. It is difficult to understand that it should be so rare in Greenland as these few localities suggest, but I have got the impression that the lichen flora of the Greenland bird-cliffs has been much neglected. I am convinced that such localities would give quite as interesting results in Greenland as elsewhere in the Arctic.

3. *Buellia vilis* TH. FR.

Disko: Mellemfjorden, on hard rocks.

There was but one plant in the collection, but it is perfectly typical. It is a rare species in Greenland, formerly not recorded from the West coast. There is one plant from East Greenland in the Copenhagen herb., collected in Danmark Island in Scoresby Sound by HARTZ. Habitually there is no objection to the determination, but I have not examined the plant microscopically.

4. *Buellia*, cfr. *leptocline* (FLOT.) KÖRB.

Disko: Nordfjorden, on a granitic rock.

The determination is suggested with some reserve. There is a thin thallus, purely white, rimoso-areolated, often with somewhat discrete, angular areoles, very small in size: 0.1—0.2 mm. The apothecia are very small, even the largest one does not surpass 0.4 mm in diam. They are black, without any trace of pruina, with a thick, persistent margin. The hypothecium is brown, as are also the swollen tips of the paraphyses. The spores are brown, rounded at the ends, constricted at the septum, 10—12 × 5  $\mu$ . — Medulla intensely blue by J, yellow by KOH.

The plant is evidently poorly developed, especially the apothecia. It is, perhaps, not possible to determine it with certainty. *B. leptocline* is an addition to the lichen flora of Greenland.

A plant in our herb., collected by FLOTOW in Silesia, has much larger apothecia, up to 1.5 mm in diam., a thin, indistinct thallus, irregularly rimose rather than areolated. But its quite young apothecia are very like those of the Greenland plant. — KÖRBER Lich. sel. Germ. No. 225 (*Buellia leptocline* (FLOT.) KÖRB.) agrees well with FLOTOW's plant, but its thallus is so thin that it is hardly perceptible.

5. *Buellia disciformis* (FR.) MUDD.

MUDD Manual Brit. Lichens, 1861, p. 216.

*Lecidea parasema* var. *disciformis* (E.) FRIES Nov. Sched. Crit., 1826, p. 9.

*Lecidea disciformis* NYL. Observ. aliquot ad Synopsin Lich. Holmiansium, Nya Bot. Not., 1852, p. 175.

The specific name *insignis* is one year younger, dating from HEPP FLECHT. Eur. fasc. I, 1853, No. 39. We have HEPP's own copy in Oslo, No. 39 contains two plants, Nos. a and b. I have examined several apothecia in either of them and only found one-septated spores.

In Lich. Arct., 1860, p. 226—7 TH. FRIES distinguished between *Buellia parasema* (ACH.) TH. FR. with a "crusta submembranacea, laevigata", and a *Buellia insignis* (NAEG.) TH. FR. with a "crusta tartarea, verrucoso-granulosa". There is, in reality, a great variability between plants with a very thin, membranaceous thallus, and plants with a better developed thallus, verrucoso-granulated or even papillate. I have myself once tried to regard the "*papillata* SOMMERF." a proper species (Lich. from the Gjøa Exped., 1921, p. 4). But it now seems to me that this is hardly possible, there is every transitional stage between all these forms of thalline development.

Either of the two species of TH. FRIES comprises plants with one-septated and with three-septated spores. We might rather attempt a specific distinction after this spore character.

var. *muscorum* (HEPP) VAIN.

Disko Island: Godhavn and Lyngmarken (TH. FR.), Skarvefjæld and Sinigfik (GRØNTVED), Nordfjorden, Mellemfjorden and Blaa fjeld (or Uivfaq (TH. FR.).

A widely distributed, certainly circumpolar lichen, equally plentiful in all the Arctic regions that have been investigated. The number of plants in the present collections is also so great that it suggests a common species, as was to be expected.

var. *albocincta* (TH. FR.) LYNGE.

Disko: Lyngmarken, Blæsedalen and Mellemfjorden.

The spores are variable in size to quite an extraordinary degree. In Norwegian plants from Alta in Finnmark I measured  $33-40 \times 12-13 \mu$ , in Greenland plants  $25-40 \times 12-14 \mu$  (Blæsedalen) and  $16-27 \times 5-11 \mu$  (Lyngmarken). The hymenium is high,  $110-120 \mu$ , the coherent paraphyses fusco-capitated,  $4-5 \mu$  thick.

subsp. *nodulosa* LYNGE subsp. nov.

Disko: Laksebugten on a basaltic rock. Nûgssuaq Peninsula: Atanikerdluk on a weathered granitic rock.

Thallus valde incrassatus, verrucosus usque irregulariter papilliformis, nodulosus, nitidus vel subnitidus, albidus vel leviter in flavescenscentem vel cinerascenscentem vergens.

Apothecia numerosa vel numerosissima, supra thallum elevata et anguste affixa, diam. 0.5—0.8 mm, discus epruinosis, aterrimus, rugulosus, ab initio subplanus marginatusque, margine disco concolori, crasso,

subintegro, deinde mox valde convexus, margine evanescenti. Excipulum cupulare, hypothecium fusconigrescens. Hymenium 90—100  $\mu$  altum, plus minusve in fusciscentem vergens, superne obscurius coloratum, ob paraphyses cohaerentes fusco-capitatas (5  $\mu$ ). Sporae octonae, fuscae, subrectae vel fabaceae vel rectae, dyblastae, 15—25  $\times$  7.5—10  $\mu$ . Episporium sat tenue, aequaliter incrassatum.

Pycnides non visae.

Medulla J non caerulescens, KOH non coloratus vel leviter solum flavescens, CaCl<sub>2</sub>O<sub>2</sub> distincte, sed dilute flavo-aurantiacus. Hymenium J caeruleo-nigricans.

I have been much inclined to regard it a proper species, on account of its very peculiar habitus. It clearly belongs to the *Parasema*-section of TH. FRIES Lich. Scand., 1874, p. 589. In this section it is sufficiently distinct from "*B. myriocarpa*", as limited by FRIES, on account of its larger spores. It is not so clear whether it ought to be distinguished specifically from the present species, or not. The numerous formae of that species are either corticolous or muscicolous, if the present plants are included into that very polymorphous species they would be the first saxicolous ones. Amongst its formae the present plants should be compared with the *papillata* (*Lecidea papillata* SOMRFT. Supplem. Flor. Lapp., 1826, p. 154), often regarded a proper species.

The papillose thallus is not a little different from the more areolated, laevigated thallus of the corticolous formae. The present saxicolous Greenland plants are more related to the common muscicolous plants with their more verrucose thallus which have often been separated specifically from the corticolous plants on account of this different habitus.

In sections, containing so nearly related and so variable types as the present does it is, perhaps, quite as wise to give the species a rather wide limitation.

There is a certain difference between the spores of the plants from the two localities. The plants from Laksebugten have slightly larger spores which are often fabaceous, narrower at the ends, and hardly constricted at the septum. In the other plants the spores were very broadly rounded, constricted at the septum, and quite straight.

6. *Buellia geophila* (SOMRFT.) LYNGE, comb. nov.

*Lecidea geophila* SOMRFT. Supplem. Flor. Lapp., 1826, p. 157.

*Lecidea lauri-cassiae* Fée Supplem. Essai Cryptog. Écorces Officin., 1837, p. 101, tab. XLII, fig. 2.

*Lecidea triphragmia* NYL. Prodr. Lich., 1857, p. 141.

Disko Island: Mellemfjorden, very scarce, on dead mosses.

Several names have been attributed to the plants with three-septated spores, the best known being, perhaps, *triphragmia* NYL. But in TH. FRIES Lich. Arct., 1860, p. 229, the author expressly states: "In

spec. autem Sommerfeltianis *geophila* eas (i. e. sporas) vidi senas l. octonas, oblongas l. subfusiformes, tetrablastas, fuligineo-fuscas, 0.028—36 mm longas et 0.009—12 mm latas, ascos subventricosos-clavatos, paraphyses capillatae, laxe cohaerentes, apice fuscescenti-capitatae”, and in Lich. Scand., II, 1874, p. 592 he again states that *Buellia parasema*  $\gamma$  *triphragmia* “omnino est *Lecidea geophila* SOMMERF. Suppl., p. 157 (*B. insignis*  $\gamma$  *geophila* TH. FR. Arct. p. 228)”.

Unfortunately SOMMERFELT's plant is now lacking in his herb., but TH. FRIES's statement is perfectly clear, he must have seen and studied SOMMERFELT's authentic plant. The specific and fully valid name *geophila* dates from SOMMERF. Suppl. Fl. Lapp., Christianiae 1826, p. 257. It is, accordingly, the oldest specific name, and preference must be given to it.

7. *Buellia occidentalis* LYNGE n. sp. (Plate X, fig. 2).

Disko: Malingiaq, on a granitic rock, very scarce.

Thallus crustaceus, crassitudine mediocri, areolatus, areolis 0.3—0.5 mm latis, rotundatis vel angulatis, contiguus vel subcontiguus.

Apothecia numerosa, approximata, rotundata vel mutua pressione angulata, majuscula: diam. circ. 1.0 mm, sed usque ad 1.3 mm, adpressa, sed sub lente visa ( $\times 32$ ) basi constricta. Discus alte convexus, epruinus, aterrimus, scabrosus, margo evanescens. Excipulum obscure violaceo-fuligineum, hypothecium pulchre roseo-violascens, in hymenium concolorem, sed dilutius coloratum sine limite distincto transiens. Hymenium 100—110  $\mu$  altum, superne violaceo-fuligineum, strato amorpho incolorato tectum. Paraphyses cohaerentes, in KOH superne haud incrassatae vel nonnihil clavatae, septatae. Sporae saepe male evolutae, usque ad 8:nae, sed vulgo pauciores, obscuratae, impellucidae, dyblastae vel diu indivisae, late ellipsoideae, rarius usque ad subglobosae, medio non constrictae, parvae: 12—14 (—16)  $\times$  7.5—9  $\mu$ . Episporium satis tenue vel deinde magis (aequaliter) incrassatum.

Pycnides non visae.

Hymenium J e caeruleo nigricans, KOH primo intensius roseo-violascens, deinde dilutius, solutione roseo-violascenti effudenti, hypothecium KOH magis caeruleo-violascens. Medulla J et KOH non coloratur.

Its thallus is little conspicuous, in spite of the considerable thickness of its verrucose areolae. Its rather large and very convex apothecia call to mind *Rhizocarpon Copelandii*, and I have carefully considered the possibility of a *Rhizocarpon*. The plant was sent to Dr. MALME, the eminent expert on that genus, but he preferred to refer it to the genus *Buellia*. No distinct “halo” could be found around the spores.

I cannot identify it with any other Arctic *Buellia*, known to me. The spore size, habitus and chemical reaction suggest a species of the *Buellia Myriocarpa* section, but it differs from the saxicolous *B. stigmatea* in the

colour of epithecium and hypothecium, in the thin paraphyses, very little incrassated at their tips, and in the verrucose thallus.

8. *Buellia stigmatea* KÖRB.

Nûgssuaq Peninsula: Atanikerdluk (TH. FR.) and Atâ (GRÖNTVED), on weathered sandstone.

Planta athallina. — Apothecia minuta, diam. 0.3—0.4 mm, subplana, deinde depresso convexa, margine excluso. Hypothecium obscurum, paraphyses haud cohaerentes, apice capitato-vel clavato-incrassatae et fusciscentes, sporae parvae, 10—11  $\mu$  longae, medio levissime solum constrictae.

9. *Buellia*, cfr. *septentrionalis* VAIN.

Nûgssuaq Peninsula: Atanikerdluk, on concreted sand, a very small plant.

The thallus is densely covered with apothecia. I can find no difference between the Greenland plant and VAINIO's diagnosis. On the other hand I am unable to grasp the difference between this species and *B. punctiformis* (HOFFM.) MUDD = *B. myriocarpa* (DC.) MUDD, apart, perhaps, from the substratum, but that cannot account for a specific distinction.

There is no *B. septentrionalis* in the Stockholm herbarium. In herb. VAIN. in Åbo there is only a very poor plant, named *B. borealis*, evidently identical with *B. septentrionalis*, to judge from VAINIO's herb. notes. It has a thinner, more white thallus than the Greenland plant which has a thick, rimoso-areolated, pale grey thallus.

10. *Buellia discoensis* LYNGE n. sp. (Plate X, fig. 1).

Disko: (verisimiliter) Narssaq, on basaltic rocks, very scarce.

Thallus crustaceus, uniformis, parvus, diam. circ. 8 mm, bene evolutus, subcrassus, areolatus, areolis albidis vel albido-cinereis, subnitidis, parvis, 0.2—0.3 mm latis, angulatis, contiguis, sed lineis conspicuis atris hypothallinis separatis, subplanis, sed rimis minutis leviter rugulosis. Thallus hypothallo anguste (0.1 mm), sed distincte circumdatus.

Apothecia numerosissima, minuta vel mediocria, diam. 0.3—0.5 mm, areolis singulis immersa, thallum subaequantia vel deinde leviter emergentia. Discus nudus, ater, planus, ab initio margine concolori circumdatus. Excipulum incoloratum, etiam cum hypothecio. Hymenium angustum, 65—75  $\mu$  altum, superne fuligineum. Paraphyses apice obscuratae, clavato-incrassatae, distincte septatae, non conglutinatae. Sporae octonae, dyblastae, medio constrictae, obscuratae, 12—16  $\times$  7—8 (—10)  $\mu$ , episporium aequaliter incrassatum.

Hymenium J e caeruleo pulchre vinosum, medulla J intense caerulescens, KOH mox vel interjecto tempore rubescens (crystalla minuta, subfarinacea).

Its chemical reaction, as well as the internal structure of its apothecia

cia are almost identical with VAINIO's *Melanaspicilia dubia*. Professor SAMUELSSON, Stockholm, has been kind enough to send me his only specimen of VAINIO's species for comparison. It differs considerably in its habitus. Its areolae are very small and thin, though distinctly convex, dispersed, and of a brownish colour. Its apothecia are more immersed, more aspicilioid than in my species, the fertile areolae are only a thin ring around the apothecia.

After the present material I do not venture to unite the two species, but a larger material may bring intermediate stages. That would only be an advantage, for it is a greater interest to trace the distribution of our plants over such great distances than it is to describe a new species.

The habitus of my species resembles *B. Malmei* LYNGE (Lich. Bear Isl. 1926, p. 65, and Lich. Nov. Zemlya, 1928, p. 246, pl. IV, fig. 23—24 and XIII, fig. 1), differing in its negative reaction with KOH. It also resembles *B. immersa* LYNGE (Lich. Nov. Zemlya, 1928, p. 246, pl. IV, figs. 18—19, and XIII, fig. 3), differing in its negative reaction with J. On the whole these Arctic "*Melanaspiciliae*" are often little different in habitus, separating characters are here to be looked after in their chemical reaction.

It should, however, be stated that in the present plant the reaction with KOH is not always equally intense. At the first examination I obtained a precipitation of characteristic small grains or short, more cylindrical crystals, but on reexamining the plant before the preparation of the manuscript I was unable to obtain the precipitation. Giving preference to the positive find I distinguished the plant from *B. Malmei*. — Unfortunately we know little, if anything, of the causes of the different chemical substances of the lichens. Do they always suggest genotypical differences?

11. *Buellia immersa* LYNGE.

LYNGE Lich. Nov. Zemlya, 1928, p. 246, pl. IV, figs. 18—19, and XIII, fig. 3.

Disko: Lyngmarken (Th. Fr.). Nûgssuaq Peninsula: Atâ (GRONTVED).

The plants were rather poor, but the structure of the apothecia and the chemical reactions (J ÷, KOH sang.) agree so well with my Novaya Zemlya plant that I have ventured the determination. In the Greenland plants the areolae are considerably thicker than in the Novaya Zemlya plant, and the hypothallus (therefore?) less visible, but a difference of that kind is supposed to be within the limits of variation.

It is an addition to the lichen flora of Greenland.

12. *Buellia microplaca* (VAIN.) ERICHS.

*Melanaspicilia microplaca* VAIN. Lich. prope Pitlekai, 1909, p. 77.

Disko: Laksebugten, and Nipisat Harbour (not located), very scarce.

Thallus crassitudine mediocri, rimoso-areolatus, areolae approximate, sed subdiscretae, cinereae vel cinereo-albicantes, opacae, irregulariter angulatae, circ. 0.3—0.5 mm latae, apothecium singulum continentes. Hypothallus ater inter areolas distincte visus.

Apothecia numerosissima, diam. 0.2—0.3 (—0.4) mm, in areolis immersa, thallum aequantia. Discus e concaviusculo persistenter planus vel deinde leviter subconvexus, ater, epruinosis, subscabrosus, “demum saepe annulo maculiformi aut leviter prominente, nigricante, thallo formato, angustissimo ad instar marginis circumdatae” (VAIN. l. c.). Hypothecium incoloratum, hymenium superne olivaceo-fuligineum. Paraphyses cohaerentes, (in KOH) obscure clavatae. Sporae 14—18 × 8—10  $\mu$ , rectae vel subrectae, apice late rotundatae, medio constrictae, episporium aequaliter incrassatum.

Medulla J ÷, KOH ÷, hymenium J caerulescens, KOH et HNO<sub>3</sub> subimmutatum (VAIN. l. c.: “HNO<sub>3</sub> rubescens”).

I have seen VAINIO's plant from Pitlekai. It has a considerably thinner and more dispersed thallus than the present plants, otherwise it agrees well. There is one apothecium in each of the small areolae, at last the thallus only forms an annulus around the disk, as was admirably described by VAINIO.

In Cat. Lich. VII, p. 528 ZAHLBRUCKNER referred it to the genus *Rinodina*, but I found no gonidia in the excipulum.

It is a highly interesting addition to the lichen flora of Greenland, formerly only known from two localities in the Pitlekai Bay just west of the Bering Strait. My Novaya Zemlya collection contained several interesting plants of this section, but not this species. I have (so far) not detected it in very large collections from the Svalbard region and from East Greenland which are under determination, but the determination of the *Buellia* material is far from finished. These data suggest a western Arctic distribution, and the species is recommended to the attention of American lichenologists who work along the American Arctic coast.

13. *Buellia margaritacea* (SOMRFT.) LYNGE.

Diskø: Narssaq and Ritenbenk coal mine. — Nûgssuaq Peninsula: Atanikerdluk. The plants were found on a calcareous sandstone.

Thallus tenuis vel mediocri, albidus, rimoso-areolatus, areolae subfarinaceae, molles, convexae, angulosae, (0.2—) 0.5— (—1.0) mm. Hypothallus indistinctus.

Apothecia numerosa, parva, diam. 0.4—0.7 mm, crebra, primum innata, albomarginata et levissime pruinosa, deinde (mox) supra thallum elevata, anguste affixa, convexa usque hemisphaerica, epruinosa, aterima, scabra, margine excluso. Hypothecium rufo-fuscescens, hymenium 80—100  $\mu$  altum. Paraphyses validae (2—2.5  $\mu$ ), apicibus solum leviter cohaerentes, apice plus minusve ramosae, fusco-clavatae (5  $\mu$ ), apicem

versus constrictae septatae. Asci late saccati,  $50-60 \times 20 \mu$ , membrana superne incrassata. Sporae octonae, saepe male evolutae, pallide vel obscure fuscae, apice rotundatae, uni- deinde mox tri-septatae, ad septa haud constrictae,  $15-18.5 \times 7-8 \mu$ .

Hymenium J intense et persistenter caerulescens, KOH et  $\text{HNO}_3$  haud mutatum. — Hyphae medullares granulis angulatis valde adspersae.

The first name for this polymorphous species, limited sensu latiore, is evidently *Lichen alboater* HOFFM. if HOFFMAN's plant really is this *Buellia*. VAINIO does not mention it in his Revisio lichenum Hoffmannianorum.

The Greenland plants agree well with SOMMERFELT's Plant. Crypt. Norv. No. 50 (*Lecidea margaritacea* ACH.). ACHARIUS described this species in Syn. Lich., 1814, p. 31. His description agrees fairly well with our species. I have not studied his plant, but according to TH. FRIES Lich. Scand. p. 610 "in herb. ACH. quoque adest spec.  $\beta$  *venustae*" KÖRB.

It seems to me that the southern plants from Central Europe of "*Buellia epipolia*" or "*B. alboatra*" differ so much from the Arctic plants that it is difficult to regard them as specifically identical. They have a cretaceous, very little rimose thallus. — There is very little pruina on the apothecia of the Greenland plants, SOMMERFELT's above mentioned plants are very pruinose, but that character is, perhaps, not so important.

The whole section *Diplotomma* is much in need of a monographic study.

The present collections contained several species, formerly not known from Greenland. On the other side some species have been recorded which were missing in the present collections, viz.:

1. *Buellia epigaea* (PERS.) TUCK. In herb. Copenh. there are two plants, from West Greenland: Æmånârssuk: Maageskær (KOLD. ROS.) and from East Greenland: Scoresby Sound: Taagefjorden (HARTZ). These plants are very miserable, I would not venture a determination of such snuff.

2. *Buellia groenlandica* VAIN. Lich. exped. G. AMDRUP, 1905, p. 133, collected in Turner Sound, East Greenland. Not seen.

3. *Buellia saxatilis* (SCHÄR.) KÖRB. East Greenland: Scoresby Sound: Taagefjorden (leg. HARTZ). The thallus is ochroleucous, but the spores are rather large for the species, I have measured  $15-17.5 \times 10 \mu$  (TH. FR. Lich. Scand. II, p. 601:  $9-14 \times 4-6 \mu$ ).

### Rinodina (ACH.) S. GRAY, p. p.

#### *Clavis specierum.*

1. Thallus uniformiter crustaceus.
2. Supra terram, muscos vel plantas vasculares emortuas.

3. *Discus margineque albo- vel caesiopruinosi*, apothecia minora, 0.3—0.5 (—0.6) mm.  
 3. *R. roscida* (SOMRFT.) ARN., p. 187
- 3\*. Apothecia epruinosi, majora, circ. 1—1.5 mm.  
 4. Apothecia plana, hymenium (vulgo) circ. 100  $\mu$  altum.  
 1. *R. turfacea* (WHBG.) KÖRB., p. 187
- 4\*. Apothecia convexa, hymenium circ. 120  $\mu$  altum.  
 2. *R. mniaraea* (ACH.) KÖRB., p. 187
- 2\*. Ad saxa calcarea.  
 3. Thallus subevanescentis, albido-cinerascens.  
 4. *R. occidentalis* LYNGE, p. 188
- 3\*. Thallus crassus, verrucosus, ochraceus.  
 5. *R. ochracea* LYNGE, p. 188
- 1\*. Thallus ambitu laciniato-effiguratus.  
 2. Supra terram nudam, thallus fuscescens vel cervinus.  
 6. *R. nimbosea* (FR.) TH. FR., p. 189
- 2\*. Ad saxa duriora, thallus ochroleucus vel stramineus.  
 7. *R. Hueana* VAIN., p. 190

All the species of *Rinodina* in the present collection were tested with paraphenyldiamin, and found to be P —. But the southern *Rinodina oreina* (ACH.) VAIN. is P orange, then cinnabar or blood-red.

1. *Rinodina turfacea* (WHBG.) KÖRB.

Godthaab (Nük) and Kookøerne (Kitsigsut). — Disko: Godhavn (TH. FR.), Skarvefjæld (GRØNTVED), Mellemfjorden and Blaa fjeld (Uivfaq) (TH. FR.).

At Disko: Nordfjorden TH. FRIES detected the lignicolous f. *ecrustacea*.

There was a considerable number of plants, and it is supposed to be quite as common in West Greenland as in most other Arctic regions.

VAINIO introduced the name *R. orbata* (ACH.) VAIN. (Lich. Pitlek., 1909, p. 71), based on Acharii *Lecanora sophodes*  $\varsigma$  *orbata*, Lich. Univ., 1810, p. 678. But according to our present rules of nomenclature preference must be given to *turfacea*, the first specific name, dating from *Lichen turfaceus* WHBG. Flora Lappon., 1812, p. 408.

2. *Rinodina mniaraea* (ACH.) KÖRB.

Disko: Godhavn, Mellemfjorden and Blaa fjeld (Uivfaq).

There were but few plants, it is less common by far than the preceding species.

3. *Rinodina roscida* (SOMRFT.) ARN.

Disko: Sinigfik (GRØNTVED), Nordfjorden and Blaa fjeld (Uivfaq), (TH. FR.).

The plants of the present collection were found on organic substra-

tum, such as decaying plants of *Saxifraga oppositifolia* and on the droppings of animals, it is considerably more nitrophilous than the two preceding species. In the Arctic it is generally very common, associated with *Caloplaca subolivacea*, *C. stillicidiorum* a. o. lichens.

4. *Rinodina occidentalis* LYNGE, n. sp. (Plate X, fig. 3).

Nûgssuaq Peninsula: Atanikerdluk, on calcareous rocks, many plants.

Thallus male evolutus vel subevanescent, granulatus, granulis diam. 0.3—0.5 mm, plus minusve discretis, interdum si melius evolutus rimoso-areolatus. Thallus albido-cinereus.

Apothecia supra saxa elevata, approximata, rotundata, diam. 0.3—0.5 mm, rarius usque ad 0.7 mm, margine thallo concolori, persistenti, integro, epruinoso instructa, discus ater, epruinosis, convexus, scabrosus. Excipulum incoloratum, cortex excipuli 15—17  $\mu$  altus, superne haud attenuatus, hyphis constrictis septatis formatus, articulis rotundatis. Gonidia diam. 10—15  $\mu$ , in margine numerosa, infra hypothecio sparsius evoluta. Hypothecium omnino incoloratum. Hymenium 100—120  $\mu$  altum, superne fuscescens, paraphyses apice clavato-incrassatae: 4—5  $\mu$  crassae, ramosae, cohaerentes, distincte septatae. Sporae 8: nae, maturae fusciscentes et satis impellucidae, (juveniles) episporio aequaliter incrassato, satis tenui (1—2  $\mu$ ) instructae, medio haud constrictae vel leviter solum constrictae, 19—23  $\times$  10—12  $\mu$ .

Hymenium J caerulescens, stratum corticale excipuli J haud reagens. Hymenium KOH immutatum, HNO<sub>3</sub> immutatum.

If studied under a binocular lens of high power the apothecia stand forth from the soft calcareous rock much like an earth pyramide, the thallus is generally so poorly developed that it is difficult to see. This may to some degree be due to the soft, weathered substratum, for in crevices and other protected places the thallus sometimes develops into an irregularly rimose crusta, at more exposed places only the scattered small granules are left.

The structure of the apothecia calls to mind *R. nimbosea*, a soil lichen with a placodioid thallus, entirely different from that of our species. Amongst the saxicolous *Rinodinae* we might compare *R. occidentalis* with *R. milvina* (WBG.) TH. FR., but that species has a well developed, (dark) brown areolated thallus, and to my knowledge it has only been found on hard rocks, see MALME Lich. Suec. No. 716.

A plant was submitted to Dr. MALME, the eminent Swedish expert on the genus *Rinodina*. He declared that the plant was entirely unknown to him. — It may be an American species in the lichen flora of Greenland, this possibility has been suggested by its name. The species is recommended to the interest of American lichenologists.

5. *Rinodina ochracea* LYNGE, n. sp.

Disko: Ritenbenk coal mine, very scarce on a calcareous rock.

Thallus areolis discretis vel magis contiguis formatus, areolis rotundatis, vulgo varie crenatis, diam. usque ad 0.7 mm, verrucosis vel bullato-verrucosis, hydrate ferrico tinctis, epruinosis, sore-diis isidiisque destitutis.

Apothecia juvenilia subinnata, sed discus valde convexus, deinde sese supra thallum expandentia, adnata, disco elevato, prominulo, rotundato, apotheciorum diam. usque ad 0.4 mm. Discus ater, epruinosis, sub lente scabrosus, margo deinde exclusus. Gonidia in margine adsunt, infra hypothecium sparsa vel deficientia. Hypothecium omnino incoloratum, hyphis p. m. p. erectis vel hinc inde, praecipue marginem versus, subplectenchymaticis formatum. Hymenium 80—85  $\mu$  altum, superne fuscens. Paraphyses satis cohaerentes, capitatae, apice 5—6  $\mu$  crassae et summo capite sat obscure fuscescentes, constrictae septatae, hinc inde ramosae. Sporae 8-nae, obscuratae, medio dilutius coloratae, impellucidae, dyblastae, medio distincte constrictae, apicibus valde obtusae, parvulae: 13—15  $\times$  8—10  $\mu$ . Episporium aequaliter incrassatum. — Hyphae corticis thallini valde adpersae et eam ob causam valde indistinctae.

Hymenium J intense caeruleo-nigrescens, medulla J  $\div$  (etiam cum excipulo), et KOH  $\div$ .

The habitus of *Rinodina ochracea* is not unlike a *Lecidea silacea*, or perhaps an *Acarospora sinopica*. I was much astonished to find those dark, constricted spores with almost rounded cell-halves. The margin of the apothecia is very indistinct, but the plant can hardly be a *Buellia*, for there were gonidia close to the marginal part of hymenium and hypothecium.

It is difficult to find related species. The structure of the apothecia somewhat resembles that of *R. lecanorina* MASS. This species belongs to a section *Lecanorina* JATTA Lich. Flor. Ital. crypt., 1909—11 which also includes some "oxydated" species, otherwise a very rare occurrence in this genus. Some of these species are endemic Italian plants, *R. lecanorina* itself advances northwards to the calcareous rocks of Southern and Central Sweden. From the Arctic I have never seen a lichen that resembles the present plant.

6. *Rinodina nimbose* (FR.) TH. FR.

Disko: Godhavn, Blæsedalen and Mellemfjorden, rather scarce.

The spores which I measured were from 17—20  $\mu$  long.

VAINIO is of opinion that "*Lecidea phaeocarpa*" SOMRFT. Supplem. Flor. Lapp., 1826, p. 159 is this species, he therefore names it *Rinodina phaeocarpa* (SOMRFT.) VAIN. Lich. e Cauc., 1899, p. 302. But that is a mistake, for SOMMERFELT'S type plant of *phaeocarpa* is, unfortunately, only a *Psoroma hypnorum* with a parasitic fungus, the small apothecia of which suggested the name "*Lecidea phaeocarpa*  $\beta$  *microcarpa*" SOMRFT., l. c.

7. *Rinodina Hueana* VAIN.

Disko: Narssaq, several plants. — Nûgssuaq Peninsula: Atanikerdluk, many plants. — Found on hard rocks.

NYLANDER found that the old species *Rinodina* (or *Lecanora*) *oreina* included two species, one which he named *Lecanora oreina*, with a negative reaction of the thallus with KOH, and another with the reaction KOH ‡, to which he gave the name *Lecanora Mougeotioides* NYL. Flora, 1872, p. 364. NYLANDER had evidently not studied the type plant of ACHARIUS. — This was done by VAINIO who found that "*Lecanora straminea* \* *L. oreina* ACH.", the type plant of our *Rinodina oreina*, had the reaction "thallus extus intusque KOH lutescens", accordingly he reduced NYLANDER'S *Lecanora Mougeotioides* to a synonym of *Lecanora oreina*, and created a new species, *Rinodina Hueana* VAIN. with the reaction: "Thallus hydrate kalico non reagens" (VAIN. Lich. in Erythr. a Dr. LEVANDER a. 1895 collecti, HEDWIGIA, 1898, p. 138, and Lich. Cauc., 1899, p. 301). The latter species is a synonym of *Lecanora oreina* NYL., Flora 1872, p. 374, but it is not Acharii *oreina*.

I have examined the apothecia of the two species, without finding differences of specific importance. But the new paraphenyldiamin gave a valuable distinction: no colour in *R. Hueana*, but an intensely yellow to cinnabar or blood-red colour in *R. oreina* (ACH.) VAIN.

According to HARMAND Lich. France, p. 879, *R. Hueana* has not been found in Central Europe. This is, perhaps, not quite probable, for in the Caucasus collection VAINIO identified either species (l. c., p. 301).

SIMMONS collected *R. Hueana* in Ellesmere Land 1900, the plant in Herb. Oslo. The present West Greenland collections only contained *R. Hueana*. I also collected it in North East Greenland in 1929. There are several plants in the Copenh. herb., but I have not examined them. In Spitsbergen I collected *R. Hueana* in Bellsund in 1926, it is very rare there. To my knowledge it has never been collected in Franz Josef Land or in Novaya Zemlya, and it has not been mentioned in NYLANDER'S and VAINIO'S papers on the Vega collection from Siberia. Our present knowledge suggests *R. Hueana* to be the only species of this section, found in the Arctic where it is distributed between Ellesmere Land and the west coast of Spitsbergen.

Dr. BOULY DE LESDAIN identified *R. Hueana* in a collection from New Mexico, leg. Frère Arsène Brouard. — Unfortunately there is no information on the chemical reaction of "*Rinodina oreina*" in FINK'S new Lichen Flora of the U. S. A.

I have examined several plants in the Norwegian herb. (not all plants) from many localities and only found *R. Hueana*, evidently our only species of the section. These facts have given me the impression that *R. oreina* (ACH.) VAIN. is a species of a more restricted distribution

than the other species. This different distribution is in support of the specific difference of the two species.

## PHYSCIACEAE.

### *Physcia* (ACH.) VAIN.

1. *Physcia dubia* (HOFFM.) LETTAU, LYNGE emend.

LYNGE *Physciaceae*, in RABENHORSTS *Kryptogamenflora*, 1935, p. 110, pl. II, fig. 2, IV, fig. 2, IX, figs. 1 and 4.

*Physcia tribacia*, in Scandinavian literature and in my previous papers on Arctic lichens.

Not *Lecanora tribacia* ACH. *Lich. Univ.*, 1810, p. 415 (see LYNGE, l. c.).

Disko: Qigdlüssat (GRØNTVED), on whale bones.

Curiously enough this species was lacking in TH. FRIES's collection. It is common enough all over the Arctic in places where Nitrogen is plentiful, such as on birds' stones and the like. There is every reason to suppose that it should be equally common in West Greenland.

Acharii plant of *Lecanora tribacia* differs from the present species in the development of a plectenchymatous lower cortex which is lacking in *Physcia dubia*. *Physcia tribacia* (ACH.) NYL. genuina is a southern species, evidently lacking in Scandinavia, and not to be expected in the Arctic.

2. *Physcia caesia* (HOFFM.) HAMPE.

Disko: Skarvefjæld and Sinigfik (GRØNTVED), Mellemfjorden and Kuánerssuit (TH. FR.). — Nügssuaq Peninsula: Atanikerdluk and Atâ (GRØNTVED).

As is often the case in the Arctic the soredia are often poorly developed and sometimes lacking (Sinigfik). But the habitus will always enable us to distinguish this species from the esorediated *Physcia melops* which has never been collected in Greenland.

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

Disko: Mellemfjorden (TH. FR.).

The plants had grown over mosses which they had killed. If this species is found on such substratum its habitus changes considerably, a more open branching, narrower lobes, reduced development of isidia.

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

Disko: Ujaragssugssuk, Blæsedalen and Blaa fjeld or Uivfaq (TH. FR.). — Nügssuaq Peninsula: Atâ (GRØNTVED).

I was astonished to find only a few poorly developed plants in TH. FRIES's collection. GRØNTVED's plants should be referred to f. *squarrosa*.

5. *Physcia grisea* (LAM.) ZAHLBR.

Disko: Kuánit east of Blæsedalen, under a resting-place for birds (GRØNTVED).

This is a very interesting addition to the lichen flora of Greenland, and as far as I can find also to the lichen flora of the Arctic in general. — The under side is quite black (“*Physcia leucoleiptes*”), I will refer the plant to f. *pityrea* (ACH.) FLAG., but the plants are so intensely pruinose that they represent a transitional stage to f. *alphiphora* (ACH.) LYNGE.

The reaction with paraphenyldiamin is of little interest in this genus. Though several species were tested, I did not detect reactions of specific importance. In no species did I find a positive reaction at once, but the white species generally stained yellow when the solution had dried up. The following species were tested:

- Ph. aipolia*: —, deinde flavescens.
- *ascendens*: —, deinde flavescens.
- *caesia*: —, deinde flavescens.
- *ciliata*: —.
- *dubia*: —, deinde flavescens.
- *grisea*: —.
- *intermedia*: —, medulla deinde flavescens.
- *muscigena*: —, medulla deinde flavescens.
- *orbicularis*: —.
- *pulverulenta*: —.
- *sciastra*: —, medulla deinde flavescens.
- *stellaris*: —, deinde dilute flavescens.
- *subobscura*: —.
- *tenella*: —, deinde flavescens.

## LICHENES IMPERFECTI.

### *Crocynia* MASS.

#### 1. *Crocynia neglecta* (NYL.) HUE.

Disko: Skarvefjæld, very scarce, with *Ochrolechia frigida* (GRØNTVED).  
E. A. VAINIO Lich. Fenn. IV, p. 418, ubi syn.

The apothecia of this species have repeatedly been described, but they belong to a parasitic fungus and not to the lichen. HUE referred it to the genus *Crocynia*. MONTAGNE described and depicted the apothecia of *Crocynia gossypina*, but according to ZAHLBRUCKNER Flechten, in ENGLER-PRANTL MONTAGNE's observations are not unobjectionable, l.c., 1926, p. 136. As long as this question is open, and as long as we do not know with certainty whether the present species really is a *Crocynia*, we might, perhaps, quite as well list it among the *Lichenes imperfecti*.

Often difficult of distinction from small plants of *Ochrolechia frigida* after its habitus. But it is stained intensely yellow by paraphenyldiamin,

the latter plant is not stained, at least not at once. After some time it may obtain an impure, and very faint, orange-yellowish colour.

### **Thamnolia** ACH.

#### 1. *Thamnolia vermicularis* (Sw.) SCHAER.

Disko: Skarvefjæld, slender plants (GRØNTVED), Ujaragssugsuk, Mellemfjorden, Nordfjorden and Kuánerssuit (TH. FR.).

This species is evidently quite as common in West Greenland as it is in all other Arctic regions where it has been looked after. — Several of TH. FRIES's plants are very coarse, approaching var. *taurica*.

Its apothecia have repeatedly been described, RÄSÄNEN was the last to give us a description (*Thamnolia vermicularis* (Sw.) SCHAER. mit Apothecien und Sporen gefunden, Annales Botanici Societatis Vanamo, vol. II, No. 6, HELSINKI 1932). The former items of information have been proved to be incorrect. The author has not seen RÄSÄNEN's fertile plants. Even if they should belong to the lichen, the taxonomical place of the genus *Thamnolia* is very unclear. ZAHLBRUCKNER placed it near the *Usneaceae*, VAINIO (after NYLANDER) near the genus *Roccella*, and RÄSÄNEN followed his countrymen in that view.

It stains intensely yellow-orange with paraphenylendiamin.

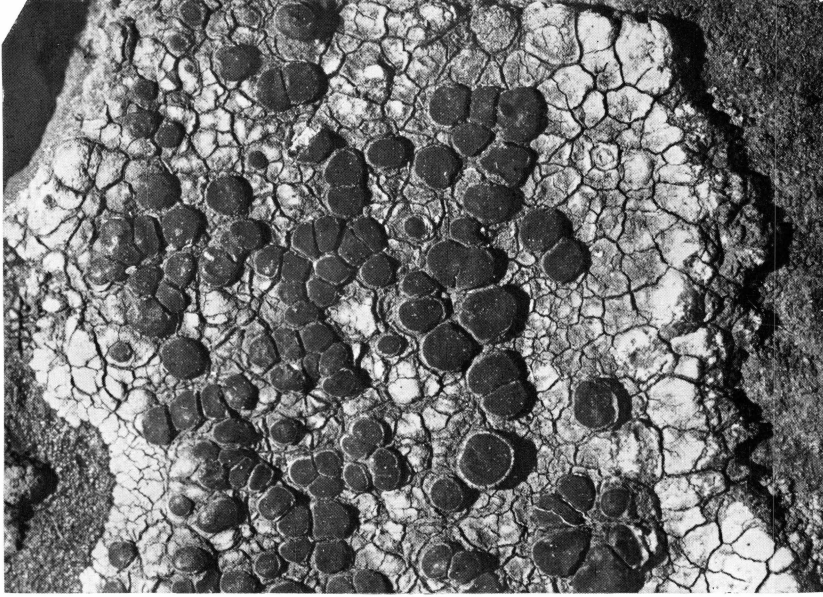
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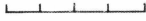


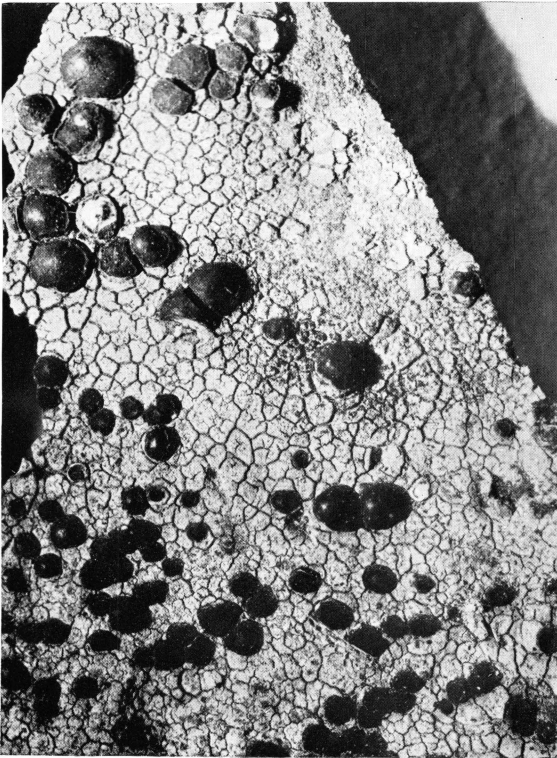
## EXPLANATION OF THE PLATES

### Plate I.

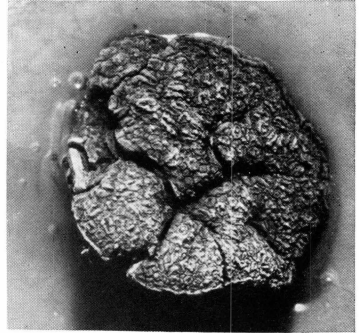
- Fig. 1. *Lecidea atromarginata* H. MAGN. var. *groenlandica* H. MAGN. (not whitened), Disko: Narssaq, 13.7.1871, TH. M. FRIES.
- 2. *Sarcogyne rugosa* LYNGE (whitened), Disko: Lyngmarken, 23.7.1871, TH. M. FRIES.
- 3. *Lecidea cyanescens* LYNGE (not whitened), Disko: Laksebugten in Mellemfjorden, 7.7.1871, TH. M. FRIES.
- 4. *Staurothele perradiata* LYNGE (not whitened), Disko: Asuk, 12.7.1871, TH. M. FRIES.




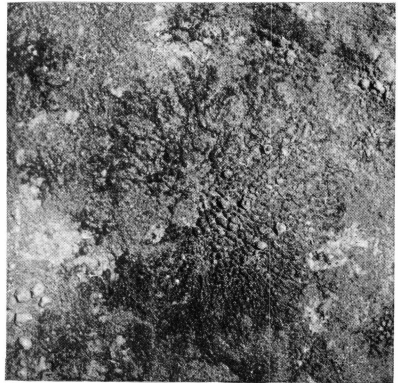
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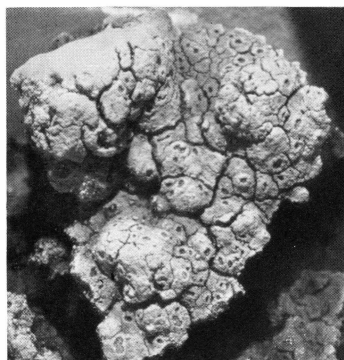
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## Plate II.

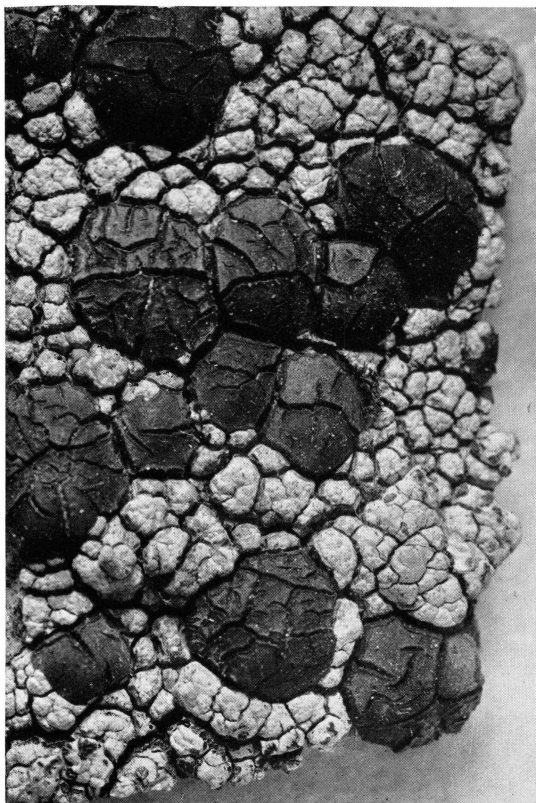
- Fig. 1. *Lecidea atromarginata* H. MAGN. var. *groenlandica* H. MAGN. (whitened),  
Disko: Mellemfjorden, 8.7.1871, TH. M. FRIES.
- 2. *Lecidea convallium* LYNGE (whitened), Disko: Blæsedalen, 3.7.1871, TH. M.  
FRIES.
- 3. *Lecidea magna* LYNGE (not whitened), Disko: Kuánerssuit, 22.6.1871, TH. M.  
FRIES.
- 4. *Lecidea membranacea* LYNGE (whitened), Disko: Uivfaq or Blaafjeld, 19.6.  
1871, TH. M. FRIES.




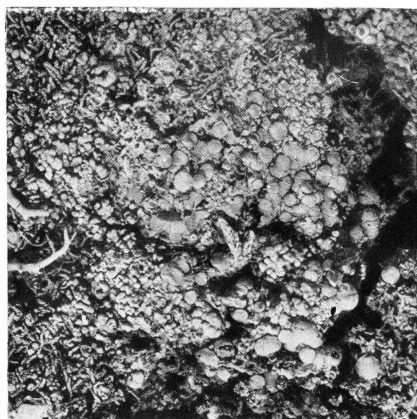
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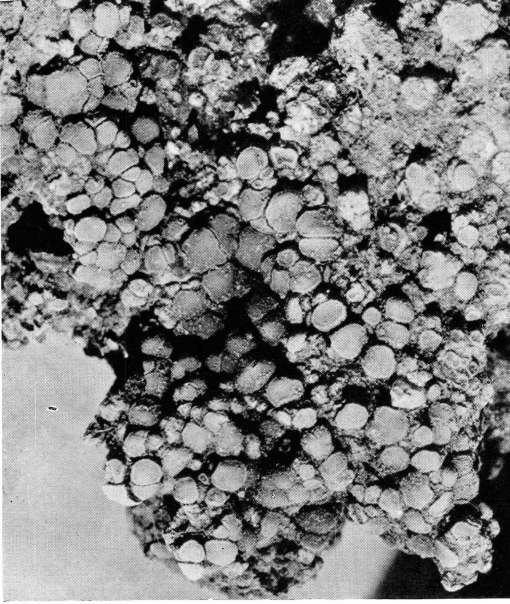
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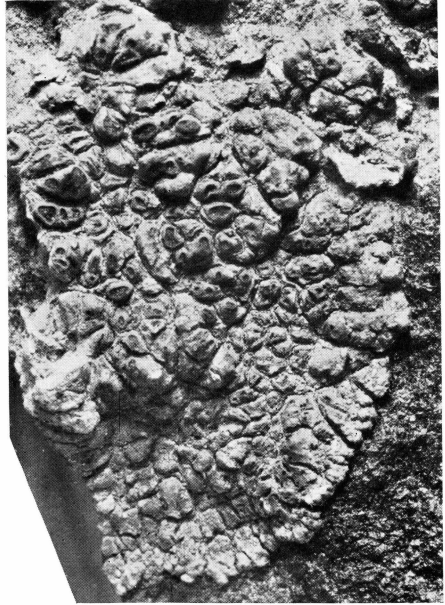
4 

### Plate III.

- Fig. 1. *Lecidea tecta* LYNGE (whitened), Disko: Lyngmarken, 23.7.1871, TH. M. FRIES.
- 2. *Lecanora narssagensis* (not whitened), Disko: Narssaq, 14.7.1871, TH. M. FRIES.
- 3. *Lecidea subrhagadiella* LYNGE (whitened), Disko: Nordfjorden, 9.7.1871, TH. M. FRIES.
- 4. *Lecidea subauriculata* LYNGE (not whitened), Disko: Laksebugten, 7.7.1871, TH. M. FRIES.



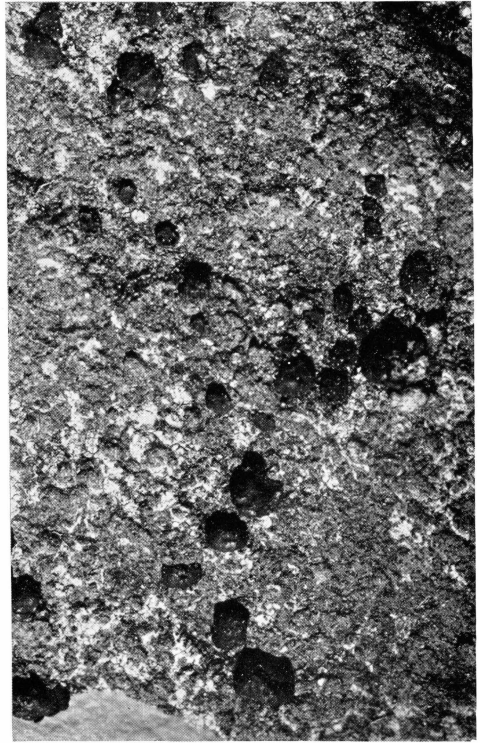
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#### Plate IV.

- Fig. 1. *Catillaria groenlandica* LYNGE (not whitened), Nûgssuaq Peninsula: Atanikerdluk, 16.7.1871, TH. M. FRIES.
- 2. *Catillaria arctica* LYNGE (not whitened), Disko: Ujaragssugssuk, 14.7.1871, TH. M. FRIES.
- 3. *Lecidea occidentalis* LYNGE (whitened), Disko: Kuánerssuit, 22.6.1871, TH. M. FRIES.
- 4. *Lecidea Theodori* LYNGE (whitened), Nûgssuaq Peninsula: Atanikerdluk, 16.7.1871, TH. M. FRIES.



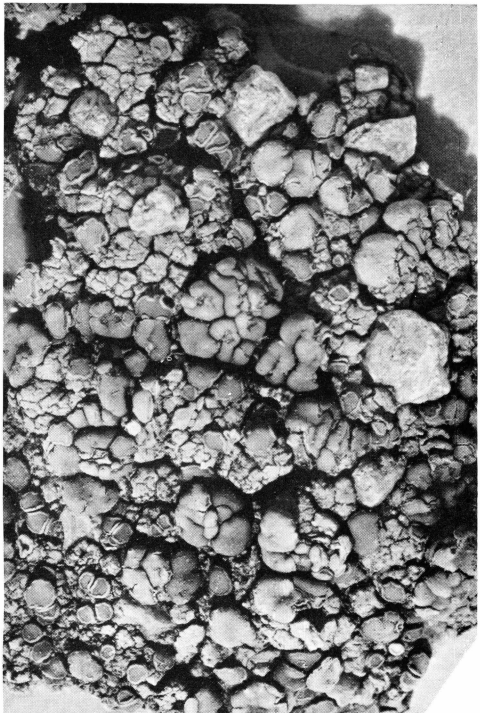
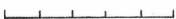
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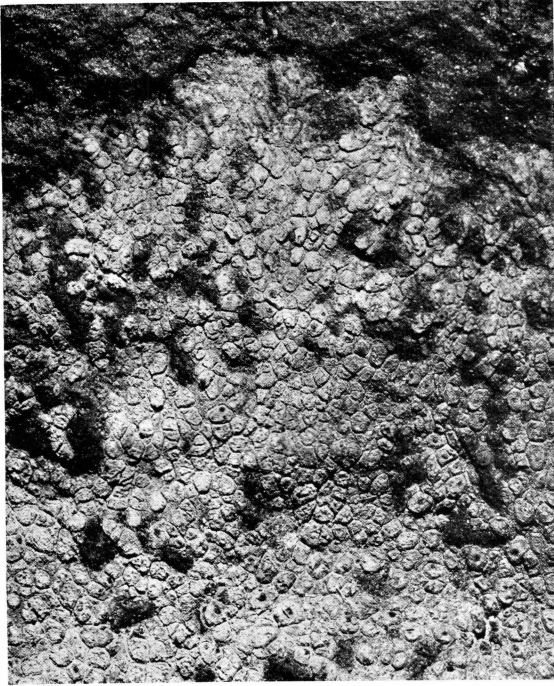



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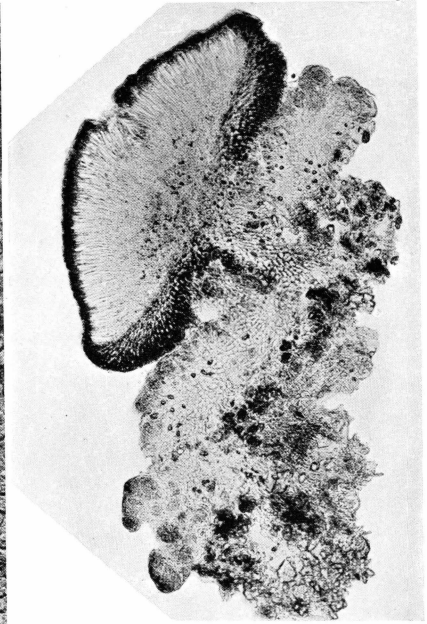


### Plate V.

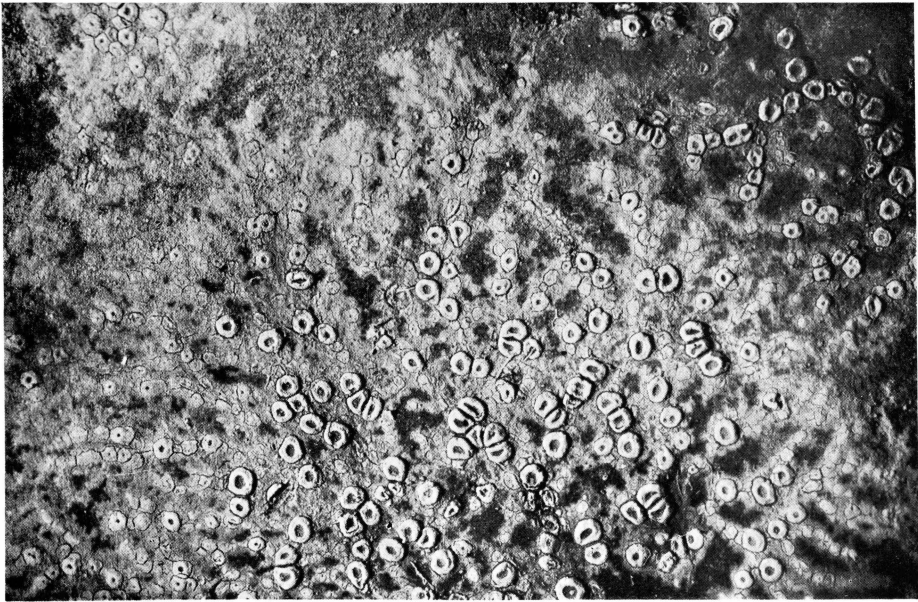
- Fig. 1. *Lecanora basaltica* LYNGE (slightly whitened), Disko: Narssaq, 14.7.1871, TH. M. FRIES.
- 2. *Fernaldia Scholanderi* LYNGE (microphoto), Disko: Kuánerssuit, 22.6.1871, TH. M. FRIES.
- 3. *Lecanora annulata* LYNGE (not whitened), Disko: Asuk, 12.7.1871, TH. M. FRIES.

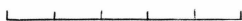


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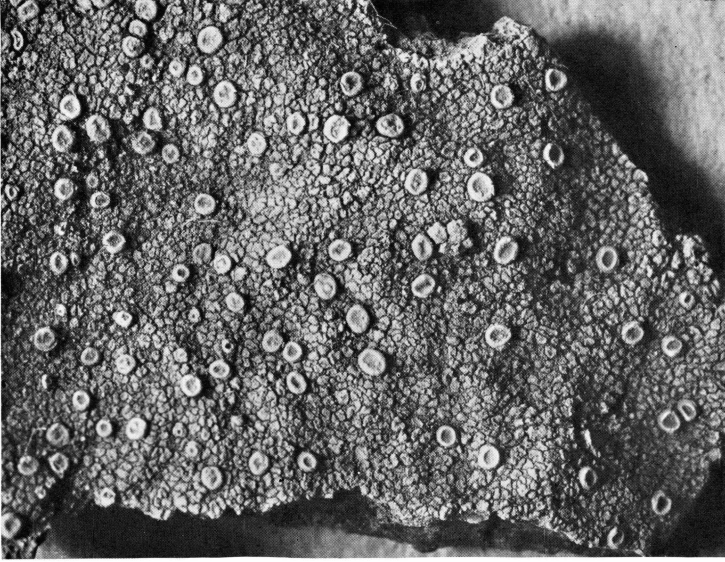
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### Plate VI.

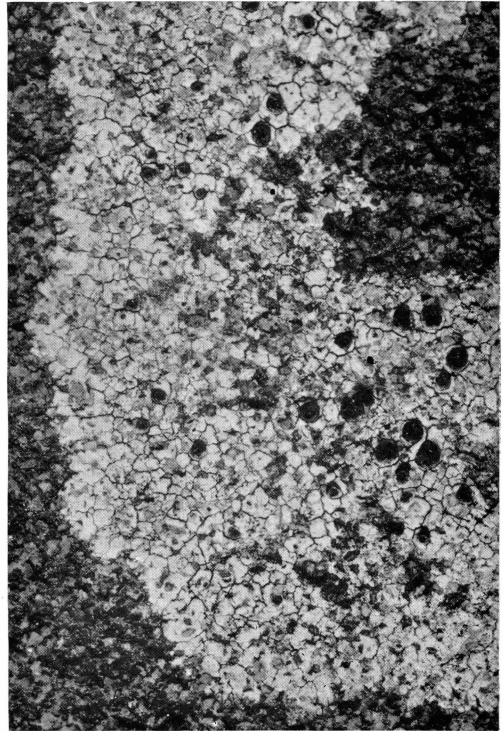
- Fig. 1. *Lecanora elevata* LYNGE (whitened), Disko: Uivfaq or Blaafjeld, 16.6.1871, TH. M. FRIES.
- 2. *Lecanora frustulosa* (DICKS.) KÖRB. var. *occidentalis* LYNGE (whitened), Disko: Laksebugten in Mellemfjorden, 7.7.1871, TH. M. FRIES.
- 3. *Lecidea asukensis* LYNGE (not whitened), Disko: Asuk, 12.7.1871, TH. M. FRIES.




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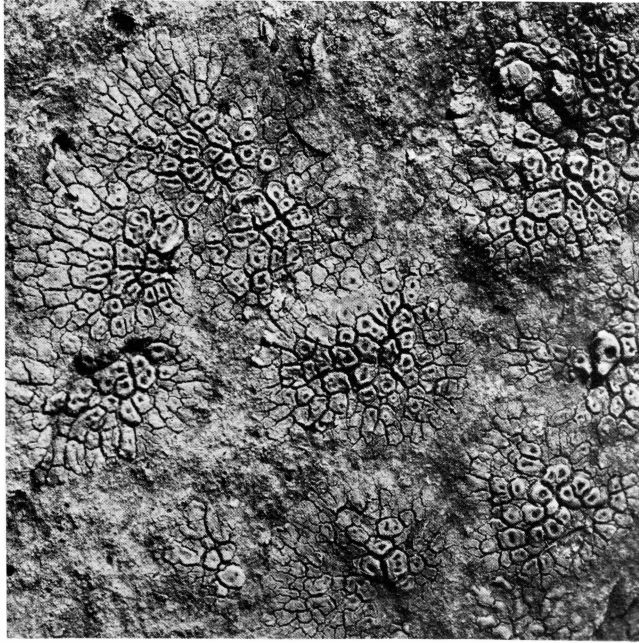
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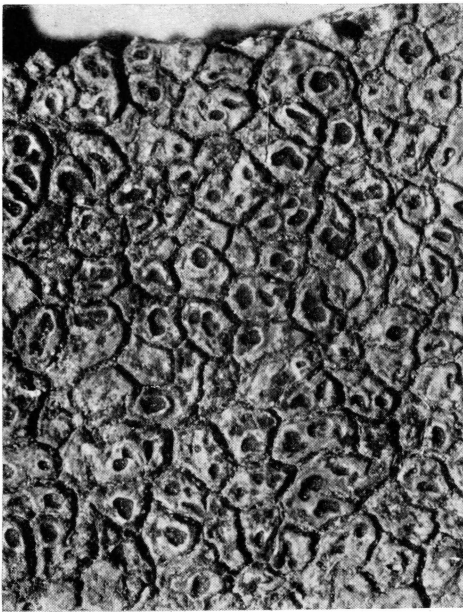
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### Plate VII.

- Fig. 1. *Lecanora Friesii* LYNGE (whitened), Disko: Ritenbenk coal mine, 13.7.1871, TH. M. FRIES.
- 2. *Lecanora subdepressa* NYL. Pyr. Orient.: Supra Valbonne, alt. 700 m, 9.7.1872, leg. W. NYL. (herb. NYL., Helsingfors, No. 25538).
- 3. *Sagedia laevata* ACH. Suecia, one of Acharii type plants, herb. ACHARIUS, Helsingfors.



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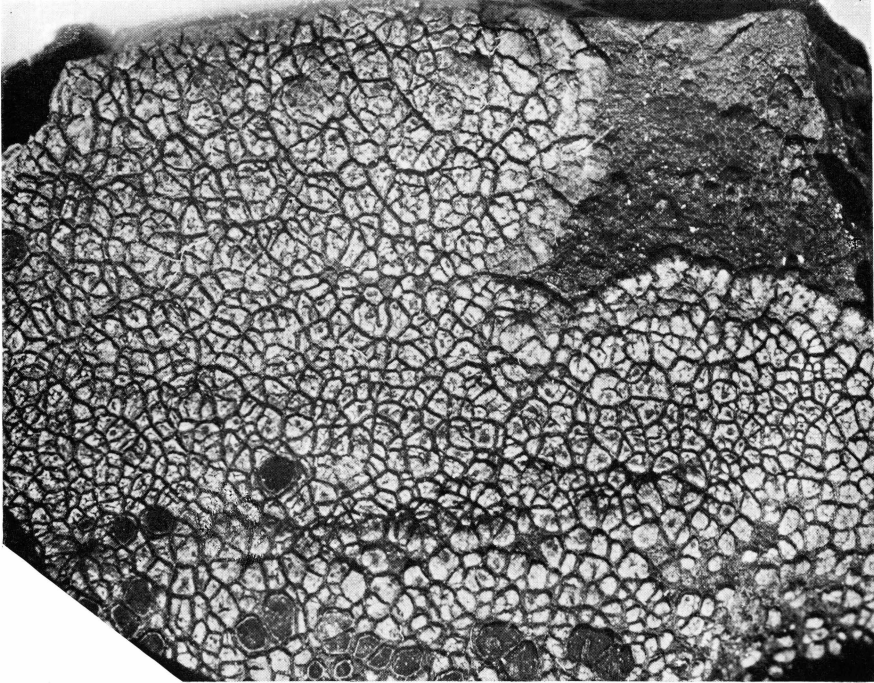
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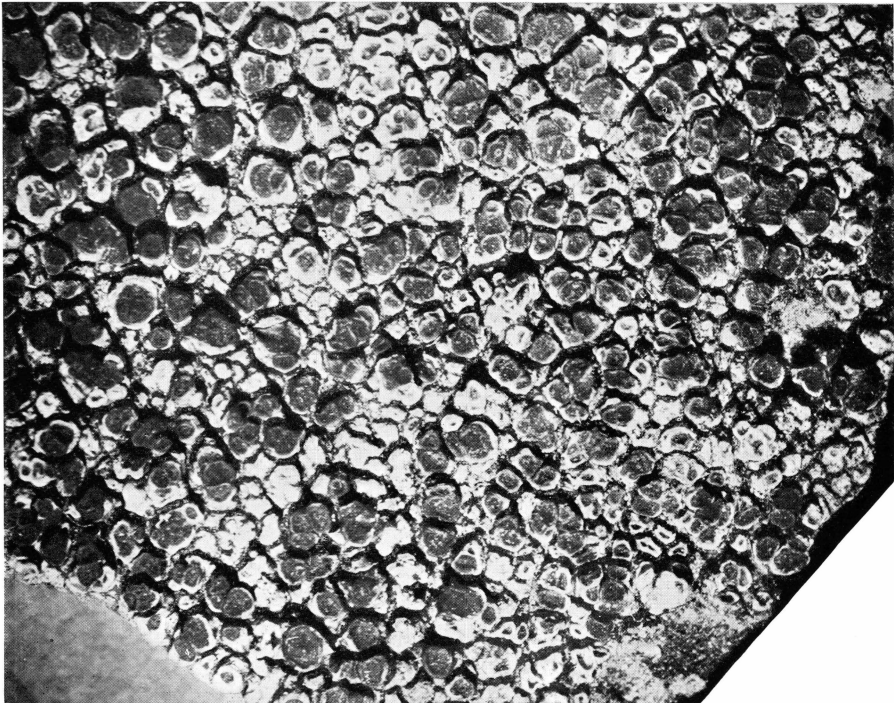
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**Plate VIII.**

- Fig. 1. *Lecanora molariformis* LYNGE (not whitened), Nügssuaq Peninsula: Atanikerdluk, 16.7.1871, TH. M. FRIES.
- 2. *Lecanora arctica* LYNGE (not whitened), Disko: Storøen, 27.6.1871, TH. M. FRIES.



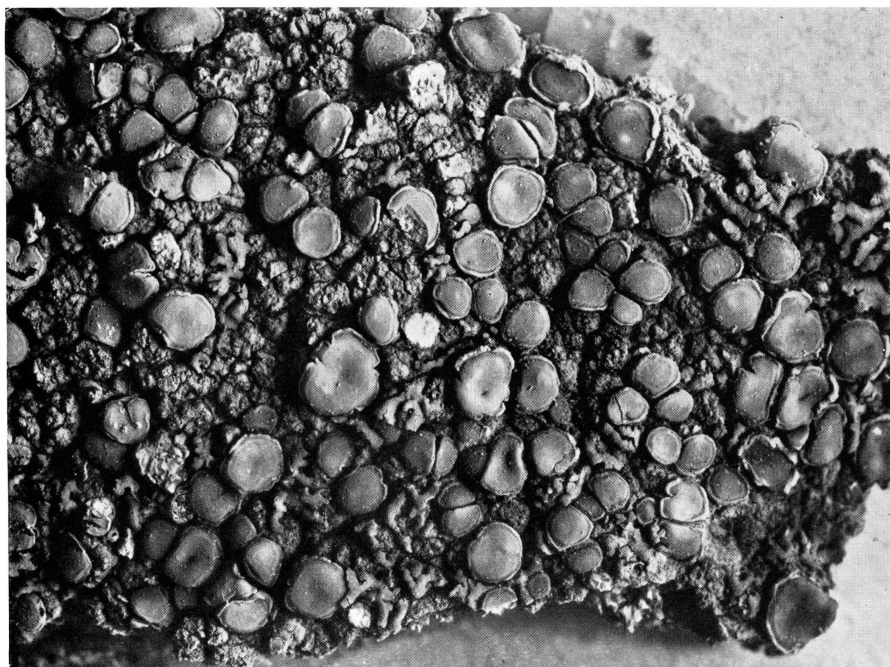
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**Plate IX.**

- Fig. 1. *Lecanora groenlandica* LYNGE (whitened), Nûgssuaq Peninsula: Atanikerdluk, 16.7.1871, TH. M. FRIES.
- 2. *Lecanora maxima* LYNGE (whitened), Disko: Lyngmarken, 23.7.1871, TH. M. FRIES.



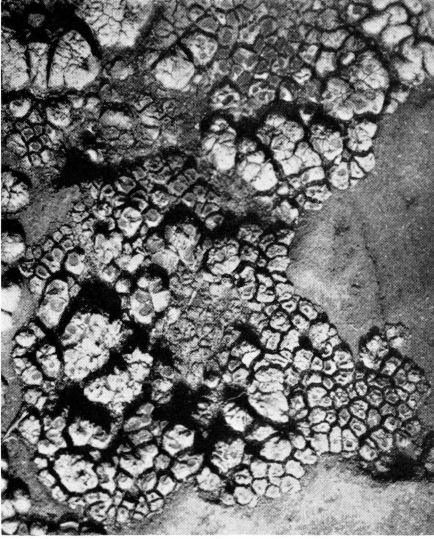
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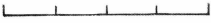
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### Plate X.

- Fig. 1. *Buellia discoensis* LYNGE (whitened), Disko: Narssaq, 14.7.1871, TH. M. FRIES.
- 2. *Buellia occidentalis* LYNGE (whitened), Disko: Malingiaq, 7.7.1871, TH. M. FRIES.
- 3. *Rinodina occidentalis* LYNGE (whitened), Nûgssuaq Peninsula: Atanikerdluk, 16.7.1871, TH. M. FRIES.
- 4. *Rhizocarpon occidentale* LYNGE (not whitened), East Greenland: Ymer Island. Cape Humboldt, 5.8.1929, B. LYNGE.



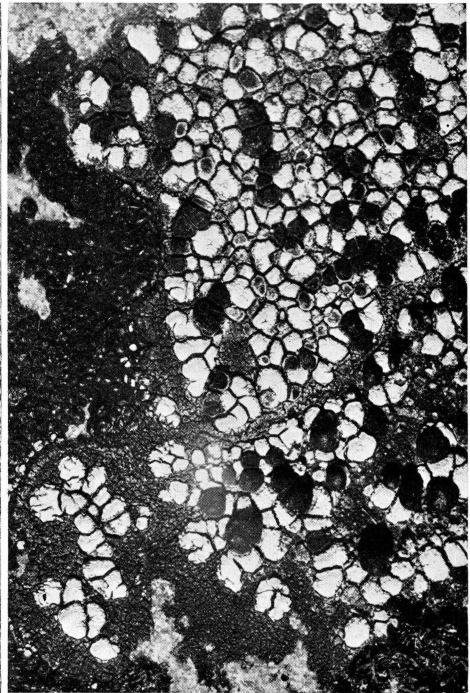
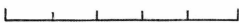
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