

DET KONGELIGE DEPARTEMENT
FOR HANDEL, SJØFART, INDUSTRI, HÅNDVERK OG FISKERI

NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER

LEDER: ADOLF HOEL

SKRIFTER OM SVALBARD OG ISHAVET

Nr. 38

B. LYNGE

LICHENS

COLLECTED ON THE NORWEGIAN
SCIENTIFIC EXPEDITION TO
FRANZ JOSEF LAND 1930

WITH 2 PLATES AND 1 MAP



OSLO

I KOMMISJON HOS JACOB DYBWAD

1931

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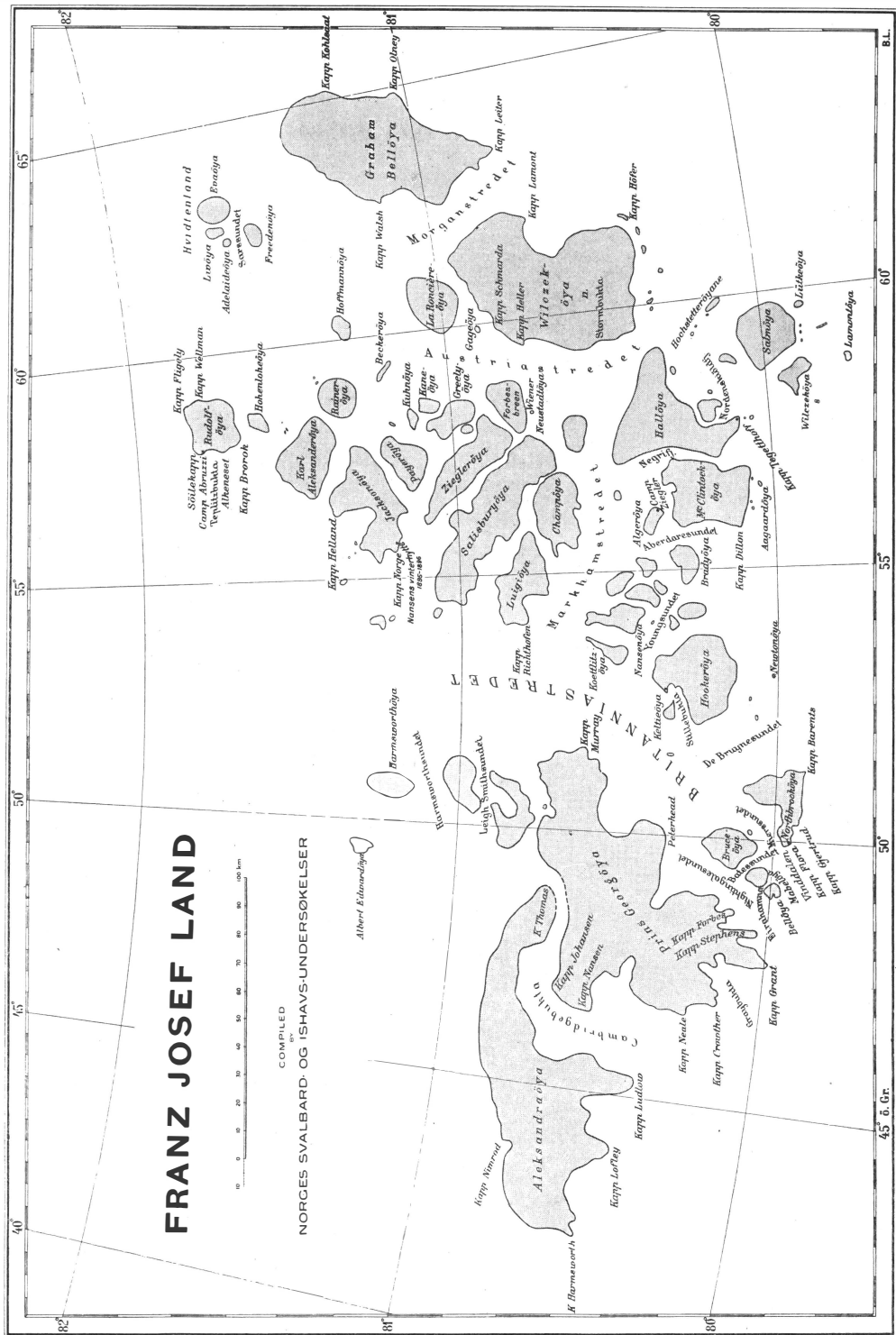


OSLO
I KOMMISJON HOS JACOB DYBWAD
1931

FRANZ JOSEF LAND



COMPILED
BY
NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER



45° 0' Gr.

50°

55°

60°

80°

82°

40°

45°

50°

60°

65°

80°

82°

B.L.

Preface.

Few parts of the world are so difficult of access as is Franz Josef Land. No lichenologist has so far published anything on his own collections from the islands and our scanty knowledge is exclusively based on records relating to collections, brought home by non-lichenologists.

The Jackson-Harmsworth expedition in 1894—97 collected many lichens, to judge from a remark in Frederick G. Jackson's book: *A Thousand Days in the Arctic*, (London 1899). Lichens are mentioned in its vol. II, pp. 416—17. Here we only find seven lichens recorded, all of them common species. Arthur Montefiore delivered a lecture on the expedition in the Royal Geographical Society on Nov. 11, 1895 (see *Geogr. Journ.*, Vol. 6, 1895, p. 499), without, however, mentioning lichens. The lichens collected during this and former British expeditions have not been determined, and I have been unable to trace them.

The Italian "*Spedizione Polare di S. A. R. Luigi Amadeo di Savoia Duca degli Abruzzi 1899—1900*" collected some lichens that have been determined. These lichens, in all 24 different species, are enumerated in the "*Osservazione Scientifiche*" of the expedition, pp. 665—75 (Milano, Ulrico Hoepli, 1903). The paper was published by O. Mattirollo. The lichens were determined with the help of the Italian lichenologist A. Jatta.

A separate print of the botanical results has also been published: "*Note Botaniche sul materiale raccolto dalla spedizione polare di S. A. R. Luigi di Savoia (1899—1900). Estratto dall'opera "Osservazione Scientifiche"*" pp. 1—47, Milano 1903. The authors are O. Mattirollo and S. Belli, the former writes on the cryptogams, the latter on the phanerogams.

This "Estratto" has been cited in the present paper as "Mattirollo et Belli".

The Russian "*Yermak*" expedition in 1901 brought home a considerably greater harvest of lichens, collected by I. V. Palibin, and determined by the eminent Russian lichenologists A. A. Elenkin and V. P. Savicz: "*Lichenes in regionibus arcticis Oceani Glaciali ab. I. V. Palibin*

anno 1901 collecti", Acta Horti Petropolitani Tome XXXII, pp. 69—100, Sept. 1912 (on Franz Josef Land pp. 82—93). They record 41 species from Franz Josef Land and in the present paper their results are cited as "Elenkin et Savicz".

In 1930 the "Norges Svalbard- og Ishavs-Undersøkelser", leader Adolf Hoel, sent an expedition to Franz Josef Land under the command of Dr. Gunnar Horn. The expedition used the Norwegian sealer Bratvaag of Ålesund. The botanical work was done by Mr. Olaf Hanssen, who had formerly collected plants in Bear Island. He collected lichens in Franz Josef Land as well as in the small islands between Spitsbergen and Franz Josef Land.

The first part of this collection, from Franz Josef Land, has now been determined, and the results are found in the present paper, enumerating 69 different species, 42 of them being additions to the flora of the Archipelago. — A report on the other collections will be published as soon as the lichens have been determined.

Olaf Hanssen collected lichens chiefly in the southern part of the archipelago. His localities will be seen on the map. They are:

Cape Harmsworth	visited	August	25
Cape Nansen	—	—	17 and 21
Cape Stephens	—	—	11
Cape Forbes	—	—	11
Bell Island (Eirahamna)	—	—	17
Cape Flora	—	—	16
Vinddalen (Windy Gully)			
near Cape Flora	—	—	12
Camp Ziegler	—	—	15

It will be seen from the summary at the end of this paper that at present we know 94 lichens from Franz Josef Land. Of course these 94 species only represent a certain percentage of the whole lichen flora of the archipelago, but we do not know as yet how large the percentage is.

I understand that the Russian lichenologist V. P. Savicz also explored the flora of Franz Josef Land in 1930. A really satisfactory exploration of the lichen flora of an arctic region can only be done by a scientist who has an extensive knowledge of the micro-lichens, which are so numerous in these high latitudes. We must accordingly look forward to Dr. Savicz's publication with the greatest expectations.

So far north the length of a longitude degree is very small, and we must not be astonished to find that by far the greater part of the Franz Josef Land lichens have a distribution extending over many degrees of longitude, many of them being circumpolar.

In addition to these, there are some lichens of western distribution, viz: *Lecanora melanophthalma*, *Parmelia infumata*, and *Usnea sulphurea*.

There are also some eastern species, at least one: *Lecidea Laurentiana*, perhaps *Lecanora Behringii* and some *Aspicilliae*.

The range of the two new *Lecideae*, *L. Nansenii* and *L. Hoelii*, cannot be fixed to-day. I find an eastern distribution more probable than a western one, but this can only be settled through future investigations.

It is often discussed whether the flora of a certain arctic region is chiefly eastern or chiefly western. This is, of course, a futile question. The distribution belongs to the single species; the distribution of the whole "flora" is only a statistical sum (or average) of the distribution of the species of the area in question.

We are indebted to Rutger Sernander for the fundamental work on nitrophilous (and coprophilous) lichens: Studier öfver lafvarnes biologi. I. Nitrofila lafvar. Svensk Bot. Tidsskr. 1912, p. 803–83. This work is written in the Swedish language. Sernander uses the Swedish words "block" and "bergknalle" for large stones and prominent rocks, where birds like to rest, and where coprophilous lichens are developed (l. c. p. 808, fig. 1).

I have used the English word "bird-stone" as a term for such stones and rocks. These bird-stones are very common in the Arctic. — I understand that the word "bird-cliff" should be used to designate cliffs, where sea-birds build their nests and hatch their eggs. Such bird-cliffs are also very abundant in many arctic regions, and coprophilous lichens are still more plentiful there than on the bird-stones.

Now that we have Zahlbruckner's inestimable *Catalogus Lichenum* it is not necessary to give full literary citations. But it is nevertheless desirable to collect citations from works on the flora of adjacent regions, as they help to throw light on the distribution of the species in question. In this paper I have quoted a few leading works on arctic lichens in general, and also some papers on the lichen flora of regions between Cape Chelyuskin and the Svalbard region, especially papers that have appeared so recently that they could not be included in Zahlbruckner's *Catalogus*.

Botanical Museum, Oslo, 29. 1. 1931.

Verrucaria (Wigg.) Th. Fr.

1. *Verrucaria aethiobola* Wbg.

Verrucaria aethiobola Wbg. Vain. Lich. Fenn. I (1921) p. 27. Th. Fries Lich. Arct. (1860) p. 270. Lich. Spitsb. (1867) p. 49 (s. n. *V. margacea*). Vainio Lich. Pitl. (1909) p. 158. Lynge Lich. Bear Island (1926) p. 9, Lich. Nov. Zeml. (1928) p. 11.

Cape Harmsworth. Bell Island.

There is only a very thin, cracked thallus visible, the former plant is almost athalline. I do not venture to refer the plants to any of the many formae described. The apothecia are protruding, the spores: $22-27 \times 11-13 \mu$.

Thelidium Mass.

2. *Thelidium papulare* (E. Fr.) Arn.

Thelidium papulare (E. Fr.) Vain. Lich. Fenn. I (1921) p. 121, 250. Lynge Lich. Nov. Zeml. (1928) p. 23.

Camp Ziegler.

Thallus very thin, whitish. Spores uncoloured, triseptate, large: $40-52 \times 16-20 \mu$.

Peltigera Willd.

3. *Peltigera canina* (L.) Hoffm.

Peltigera canina (L.) Th. Fries Lich. Arct. (1860) p. 44, Lich. Spitsb. (1867) p. 15. Vain. Lich. Pitlek. (1909) p. 91. Elenk. Lich. côt. pol. (1909) p. 40. Lynge Lich. Bear Island (1926) p. 9, Lich. Nov. Zeml. (1928) p. 61.

Cape Nansen.

The plants are not large. They must be referred to f. *leucorrhiza*, with distinct white veins and concolorous rhizinae. The upper side is pale greyish-brown, with somewhat undulated margins.

Former investigations. Cape Flora, var. *carnea* Delise (Mattiolo et Belli p. 33), Cape Flora and Hochstetter Island (Elenk. et Savicz p. 92).

4. *Peltigera rufescens* Hoffm.

Peltigera rufescens (Hoffm.) Th. Fries Lich. Arct. (1860) p. 45, Lich. Spitsb. (1867) p. 15. Nyl. Lich. Freti Behr. (1888) p. 215. Lynge Lich. Spitsb. I (1924) p. 16, Lich. Bear Island (1926) p. 50, Lich. Nov. Zeml. (1928) p. 61, s. n. *P. canina* var. *rufescens*.

Cape Nansen.

Former investigations. Northbrook Island and Cape Flora¹ (Elenk. et Savicz p. 93).

5. *Peltigera variolosa* (Mass.) Gyelnik.

Peltigera variolosa (Mass.) Gyelnik Peltigeren-Daten aus Japan. Ungar. Bot. Blätter (1926) p. 252, ubi syn, Anders Strauch- und Laubflechten (1928) p. 41.

Cape Flora.

The arctic material of "*Peltigera apthosa*" which I have studied, is altogether *P. variolosa*. The Franz Josef Land plant is a f. *complicata*, as usual in the arctic.

Former investigations. "*Peltigera apthosa*" has repeatedly been recorded from Franz Josef Land: Markham p. 134, Jackson p. 417, Elenk. et Savicz p. 92 from Northbrook Island and Cape Flora¹.

Lecidea (Ach.) A. Zahlbr.6. *Lecidea atrobrunnea* (Ram.) Schär.

Lecidea atrobrunnea (Ram.). Th. Fries Lich. Arct. (1860) p. 218, Lich. Spitsb. (1867) p. 41. Lynge Lich. Spitsb. I (1924) p. 13, Lich. Nov. Zemlya (1928) p. 63.

Cape Flora, very scarce.

7. *Lecidea cyanea* (Ach.) Roehl.

Lecidea cyanea (Ach.) Lynge Lich. Spitsb. I (1924) p. 13, Lich. Nov. Zemlya (1928) p. 70. *Lecidea spilota* Th. Fries Lich. Arct. (1860) p. 210.

Bell Island, very scarce.

A small plant, growing between or perhaps parasitically on *Lecanora mastrucata* and *Lecidea Dicksonii*. It has a thin areolated thallus with plane, marginated apothecia. Medulla J + blue, KOH ÷. Hypothecium quite uncoloured, hymenium bluish-green (aeruginose) in the upper part, spores 9–10 × 4.5 μ.

¹ Cape Flora is the western extremity of Northbrook Island.

8. *Lecidea Dicksonii* Ach.

Lecidea Dicksonii Ach. Vain. Lich. Pitlek. (1909) p. 139. Elenk. Lich. côt. pol. (1909) p. 35. Lynge Lich. Bear Island (1926) p. 22, Lich. Nov. Zemlya (1928) p. 83. *Lecanora Dicksonii* (Ach.) Th. Fries Lich. Spitsb. (1867) p. 24. Nyl. Lich. Freti Behr. (1888) p. 226.

Cape Harmsworth. Bell Island. Camp Ziegler.

Evidently one of the commonest crustaceous lichens in this part of the arctic, for there were many plants, especially from Bell Island.

9. *Lecidea flavocaerulescens* (Hornem.).

Lecidea flavocaerulescens (Hornem.). Lynge Lich. Spitsb. I (1924) p. 14, Lich. Bear Island (1928) p. 22. *Lecidea contigua* β . *flavicunda* Ach. Th. Fries Lich. Arct. (1860) p. 208, Lich. Spitsb. (1867) p. 38. Nyl. Lich. Freti Behr. (1888) p. 207, 230. *Lecidea albocaerulescens* var. *flavocaerulescens* (Hornem.) Lynge Lich. Nov. Zeml. (1928) p. 79.

Cape Harmsworth.

There are minute black, often crateriform soredia on the thallus. I have not been able to identify this forma with certainty, but it is quite identical with Th. Fries's β *flavicunda* from Spitsbergen.

10. *Lecidea goniophila* Flk.

Cape Nansen. Bell Island. Cape Flora.

I only detected four plants, but there is every reason to suppose that it should be common in Franz Josef Land, as it is in Novaya Zemlya and Spitsbergen.

All the plants have an entirely uncoloured hypothecium, easily discrete paraphyses, and broad elliptical spores of the usual size: $14-18 \times 9-12 \mu$. The upper part of the hymenium is pale rosy in the Bell Island plant, bluish in the other three. The thallus is white, verrucose or verrucoso-areolate, suggesting var. *incongrua* (Nyl.), as limited by Vainio in his *Adjumenta* II p. 91. Generally it is thick, agreeing well with the the plants, which Dusén collected in Jan Mayen, det. Malme: var. *incongrua*. My Novaya Zemlya material largely consisted of similar plants, I called them var. *granulosa* (Arn.) Vain, a forma of Vainio's var. *incongrua* (*Adjumenta* II, p. 91-92).

Former investigations. Cape Fligely (Mattirolo et Belli p. 36).

11. *Lecidea Hoelii* n. sp.

Pl. I, fig. 1.

Bell Island.

Thallus *albidus*, *leviter in glauco-cinerascentem vergens*, *areolatus*, areolae subcontiguae vel lineis hypothallinis plus minusve latis separatae, planiusculae vel leviter convexae. Thallus epruinus, opacus, laevigatus, isidiis sorediisque destitutus. Hypothallus ad peripheriam thalli haud visus.

Apothecia numerosa, dispersa vel suis locis conferta, 0.5—0.7 (—1.0) mm, rotundata vel mutua pressione angulata, atra, epruinosa, persistenter plana et tenuiter marginata. Apothecia inter areolis sita, thallum subaequantia. Hypothecium pallide flavo-fuscescens, hymenium 80 μ altum, superne caeruleo-fuligineum. Paraphyses cohaerentes, clavato-incrassatae. *Sporae* octonae, *late ellipsoideae vel subglobosae*, 9—10.5 \times 7.5—10 μ .

Pycnides non visae.

Medulla J optime caerulescens, KOH et CaCl₂O₂ immutata, hymenium J persistenter caeruleo-nigricans.

It is quite evident that this species belongs to the *Lecidea silacea* section of Th. Fries Lich. Scand. II p. 487. It is conspicuously different from any other species of that section known to me, by its very broad spores. — The apothecia are often infested and destroyed by *Torulae*-hyphae.

I take great pleasure in naming this species in honour of Mr. Adolf Hoel, leader of Norges Svalbard- og Ishavs-undersøkelser (The Norwegian Svalbard- and Polar Sea Research), eminent organizer of Norwegian arctic expeditions.

12. *Lecidea Laurentiana* Nyl.

Pl. II.

Lecidea Laurentiana Nyl. Lich. Freti Behr. (1888) p. 245.

Bell Island.

Thallus *albidus vel osseo-albidus*, *squamuloso-areolatus*, areolae planae, angulosae vel crenatae, saepe discretae vel etiam dispersae et hypothallo atro impositae. Thallus subnitidus, sorediis isidiisque destitutus, epruinus. Thallus zona atra hypothallina circumdatus.

Apothecia numerosa, dispersa, rotundata, diam. 0.6—0.8 (—1.0) mm, atra, epruinosa, subnitida, persistenter plana et distincte elevato-marginata. Apothecia inter areolis sita, late affixa, thallum distincte superantia. Cortex excipuli subfuligineum, excipulum fusco-fuligineum vel in centro apotheciorum subincolor. Hypothecium pallide vel obscure rosaceo-violaceum. Hymenium altum: 105—120 μ , in parte superiori pulchre

et intense caeruleo-nigricans. Paraphyses arcte cohaerentes, in apice leviter clavatae. *Sporae* (octonae?) simplices, *late ellipsoideae*, $10-13 \times 7-9 \mu$.

Medulla J ÷, KOH ÷, CaCl₂O₂ ÷, hymenium J persistenter caeruleo-nigricans.

On hard rocks, with *Candelariella vitellina*.

I have compared this plant with Nylander's type in herb. Helsingfors, and found them absolutely identical. It was very interesting to find this species in a Franz Josef Land collection. It suggests an eastern connection of this species. It is also fairly probable that the two new *Lecideae* are of eastern origin. They have so far not been identified in Spitsbergen collections, and the lichen flora of (western) Spitsbergen has now been well studied.

13. *Lecidea lulensis* Hellb.

Lecidea lulensis Hellb. Th. Fries Lich. Spitsb. (1867) p. 37. Lyngé Lich. Bear Island (1926) p. 25, Lich. Nov. Zemlya (1928) p. 115, Lich. Maud Exped., Taimir, (1929) p. 11.

Bell Island. Camp Ziegler.

This species is very common in these parts of the arctic, and I was glad to find it also in the Franz Josef Land collection.

14. *Lecidea macrocarpa* (DC.) Steud.

Lecidea macrocarpa (DC.). — Lyngé Lich. Nov. Zemlya (1928) p. 76. *Lecidea contigua* (Hoffm.) Th. Fries Lich. Arct. (1860) p. 208. Nyl. Lich. Freti Behr. (1888) p. 207, 230, 253. *Lecidea steriza* (Ach.) Vain. Lich. Pitlek. (1909) p. 144. Lyngé Lich. Bear Island (1926) p. 31.

Camp Ziegler.

The whitish thallus is so well developed that the plants must be referred to β *superba* (Kbr.) Th. Fr. = f. *contigua* (Nyl.) Vain. Adjum. II p. 67. There are two plants, in one of them the areolae are quite contiguous, in the other the areolae are more discrete.

15. *Lecidea Nansenii* Lyngé n. sp.

Pl. I, fig. 2.

Cape Nansen.

Thallus osseo-albidus, nitidus, crassus, irregulariter rimosus, subareolatus, areolis plus minusve convexis, ad peripheriam thalli interdum subsquamiformibus. Thallus epruinosis, laevigatus, isidiis sorediisque destitutus. Hypothallus haud visus.

Apothecia numerosissima, conferta, conglomerataque, diam. 0.5—1.0 mm, omnino atra, etiam madefacta, *valde nitida*, primo late

adnata, plana et marginata, sed dein mox convexa, elevata, immarginata. Hypothecium omnino incolor, hymenium 45–50 μ altum, *superne caeruleo-nigricans*. Paraphyses cohaerentes, ramosissimae, tenues, apice leviter solum incrassatae. Asci saccati, sporas octonas, biserialia continentes. *Sporae* simplices, *late ellipsoideae, fere subglobosae*, parvae: 7–9 \times (5) 5.5–6.5 μ . Episporium tenue.

Pycnides non visae.

Medulla J non caerulescens, thallus KOH et CaCl_2O_2 et his reagentiis unitis omnino immutatus, J e caeruleo mox vinosum.

It is difficult to find a place for this species in any of the sections, mentioned in Th. Fries's Lich. Scand.

Its purely black apothecia must exclude a *Biatora*.

In the *Eu-Lecidea* sections its nitidous surface suggests the *armeniaca* section, near *Lecidea bullata* (Kbr.) Th. Fr. But there is not the slightest yellow in its purely white thallus, and *L. bullata* has a very different thallus, well described by its name: rotundated, contiguous verrucae, and a different reaction: KOH intensely yellow.

The species of the *lithophila* section have the white thallus, but very narrow spores, with the exception of *L. lithophila*, which is here quite out of the question.

There is no comparable species in Vainio's (unpublished) manuscript on the Finnish *Lecideae*, and none in my Novaya Zemlya collection.

In the *Vega* collections I have found no comparable species in Nylander's Lich. Freti Behringii. *Lecideae subcongruella* Vain. Lich. Pitlek, p. 135, differs (ex descr.) by a thinner verrucose thallus, a somewhat different reaction: "KOH leviter flavescens, CaCl_2O_2 + KOH leviter aurantiacus", and especially by its narrow, elliptical spores (10–12 \times 5–7 μ).

16. *Lecidea neglecta* Nyl.

Lecidea neglecta Nyl. Vain. Lich. Pitlek. (1909) p. 130. Lynge Lich. Spitsb. I (1924) p. 14, Lich. Bear Island (1926) p. 27, Lich. Nov. Zeml. (1928) p. 87.

Cape Flora.

Only a minute fragment, detached from the base of a vascular plant.

17. *Lecidea pantherina* Ach.

Lecidea pantherina Ach. Vain. Lich. Pitlek. (1909) p. 142. Lynge Lich. Spitsb. I (1924), p. 14, Lich. Bear Island (1926) p. 27, Lich. Nov. Zemlya (1928) p. 71, Lich. Maud Exped., Taimir, (1929) p. 11. *Lecidea variegata* Th. Fries Lich. Arct. (1860) p. 211 p.p. *Lecidea poly-*

carpa Th. Fries Lich. Arct. (1860) p. 211 p.p. Lich. Spitsb. (1867) p. 39. Nyl. Lich. Freti Behr. 1888) p. 230.

Cape Flora. Camp Ziegler.

18. *Lecidea vorticosa* (Flk.) Kbr.

var. *Ivalensis* (Vain.) Lyng.

Lecidea vorticosa (Flk.) Kbr. Lyng. Lich. Nov. Zemlya (1928) p. 82. *Lecidea pullulans* Th. Fr. Lich. Spitsb. (1867) p. 40.

Camp Harmsworth. Bell Island.

There is hardly any visible thallus. The apothecia are very characteristic: nitidous, hypothecium black, hymenium intensely smaragdine in the upper part, less intensely coloured in the lower part, paraphyses coherent, spores small: $8-12 \times 4-4.5 \mu$. Excipulum more violet with KOH.

Rhizocarpon (Ram.) Th. Fr.

19. *Rhizocarpon disporum* (Naeg.) Müller Arg.

Rhizocarpon disporum (Naeg.) Müll. Arg. Lyng. Lich. Nov. Zemlya (1928) p. 142. *Rhizocarpon geminatum* (Flot.) Th. Fr. Lich. Arct. (1860) p. 234, Lich. Spitsb. (1867) p. 45. Lyng. Lich. Spitsb. I (1924) p. 19, Lich. Bear Island (1926) p. 36. *Lecidea geminata* Flot. Nyl. Lich. Freti Behr. (1888) p. 246.

Cape Nansen. Bell Island.

This species is almost inevitable in arctic collections. From Cape Nansen there was only a minute untypical fragment, small, pulvinate, almost like *Lecidea atrobrunnea*. But the internal structure of its apothecia and its chemical reaction leave no doubt.

20. *Rhizocarpon geographicum* (L.) DC.

Rhizocarpon geographicum (L.) DC. Th. Fries Lich. Arct. (1860) p. 236, Lich. Spitsb. (1867) p. 46. Vain. Lich. Pittek. (1909) p. 110. Lyng. Lich. Spitsb. I (1924) p. 19, Lich. Bear Island (1926) p. 36, Lich. Nov. Zemlya (1928) p. 139, Lich. Maud Expedition, Taimjr, (1929) p. 12. *Lecidea geographica* Nyl. Lich. Freti Behr. (1888) p. 210 (f. *atrovirens*) et 254.

Cape Harmsworth. Bell Island. Camp Ziegler.

Former investigations. Franz Josef Land: "The only lichen, which is conspicuous at 900 ft". (Jackson p. 417). Cape Germania. (Mattiolo et Belli p. 37, s. n. *Rhizocarpon viridi-atrum* Kbr.). Hochstetter Island (Elenkin et Savicz p. 89).

21. *Rhizocarpon grande* (Flk.) Arn.

Rhizocarpon grande (Flk.) Arn. Lyng. Lich. Spitsb. I (1924) p. 19, Lich. Bear Island (1926) p. 36, Lich. Nov. Zemlya (1928) p. 139, Lich. Maud Expedition, Taimir, (1929) p. 12. *Rhizocarpon petraeum* (Wulf.) Th. Fries Lich. Arct. (1860) p. 235, Lich. Spitsb. (1867) p. 46. *Lecidea grandis* (Flk.) Vain. Lich. Pittek. (1909) p. 111.

Bell Island.

The medulla is $\text{CaCl}_2\text{O}_2 \div$.

22. *Rhizocarpon jemtlandicum* Malme.

Rhizocarpon jemtlandicum Malme. Lyng. Lich. Spitsb. I (1924) p. 19, Lich. Nov. Zemlya (1928) p. 133, Lich. Maud Expedition, Taimir, (1929) p. 12.

Bell Island. Camp Ziegler.

Cladonia (Hill) Vain.23. *Cladonia pyxidata* (L.) Fr. var.

Cladonia pyxidata (L.) Fr. f.f. Th. Fries Lich. Arct. (1860) p. 101, Lich. Spitsb. (1867) p. 28. Nyl. Lich. Freti Behr. (1888) p. 213, 248. Vain. Lich. Pittek. (1909) p. 101. Elenkin Lich. cõt. pol. (1909) p. 38. Lyng. Lich. Spitsb. I (1924) p. 9, Lich. Bear Island (1926) p. 40, Lich. Nov. Zemlya (1928) p. 160.

Cape Nansen.

The podetia are not sorediate, so the var. *chlorophaea* is out of the question. The basal squamules are appressed, and very thick, I have therefore referred the plants to var. *Pocillum*. But the squamules are smaller than usual in that variety, almost granular.

Former investigations. Var. *Pocillum*: Hochstetter Island (Elenkin et Savicz p. 90), var. *chlorophaea*: same locality (Elenkin et Savicz l. c.).

Several other *Cladoniae* have been recorded from Franz Josef Land:

Cladonia bellidiflora var. *coccocephala* (Ach.) Vain. from Hochstetter Island (Elenkin et Savicz p. 89).

Cladonia coccifera var. *stematina* Ach. from Hochstetter Island (Elenkin et Savicz p. 89).

Cladonia rangiferina (L.) from Hochstetter Island (Elenkin et Savicz p. 90). — The commonest *Cladonia* of the *rangiferina* section in the arctic is *Cladonia mitis* Sandst.

Cladonia uncialis var. *paradoxa* Elenkin et Savicz from Hochstetter Island (Elenkin et Savicz p. 90).

Stereocaulon Schreb.

24. *Stereocaulon alpinum* Laur.

Stereocaulon alpinum Laur. Nyl. Lich. Freti Behr. (1888) p. 201, 213, 238, 248. Vain. Lich. Pitlek. (1909) p. 34. Lyngé Lich. Spitsb. I (1924) p. 20, Lich. Bear Island (1926) p. 41, Lich. Nov. Zemlya (1928) p. 163. *Stereocaulon tomentosum* β *alpinum* (Laur.) Th. Fr. Lich. Arct. (1860) p. 144, Lich. Spitsb. (1867) p. 27.

Camp Flora. Camp Ziegler.

The plants are sterile. I have referred them to this species and not to *S. rivulorum* for the reason that I have found their phyllocladia too large for the latter species. The plant from Camp Ziegler has the more erect habitus of *S. alpinum*. But if sterile the compact arctic plants of these two species cannot always be distinguished with certainty.

Former investigations. Cape Flora and Cape Säulen (Mattirolo et Belli p. 31), Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 87).

25. *Stereocaulon*, cfr. *fastigiatum* Anzi.

Stereocaulon fastigiatum Anzi. Lyngé Lich. Bear Island (1926) p. 41, Lich. Nov. Zemlya (1928) p. 165.

Cape Harmsworth.

It can hardly be determined with certainty, for it is a poor sterile plant. I have suggested this determination on account of its habitus, a saxicolous pulvinate plant.

26. *Stereocaulon rivulorum* Magn.

Stereocaulon rivulorum Magn. Boreal Stereocaula (1926) p. 23 et 63. Lyngé Lich. Nov. Zemlya (1928) p. 164.

Cape Harmsworth. Bell Island.

The latter plants are well fertile.

Some other *Stereocaulons* have been recorded from Franz Josef Land:

Stereocaulon denudatum var. *genuinum* Th. Fr. from Northbrook Island and Cape Flora (Elenkin et Savicz p. 87).

Stereocaulon paschale (L.) Ach. from Northbrook Island and Hochstetter Island (Elenkin et Savicz p. 87). Well determined plants of this species are otherwise very rare so far north.

Gyrophora Ach.27. *Gyrophora arctica* Ach.

Gyrophora arctica Ach. Th. Fries Lich. Arct. (1860) p. 165, Lich. Spitsb. (1867) p. 32. Lyngé Lich. Spitsb. I (1924) p. 10, Lich. Bear Island (1926) p. 42, Lich. Nov. Zemlya (1928) p. 174, Lich. Maud Exped., Taimir, (1929) p. 12.

Cape Nansen. Bell Island. Cape Flora.

There were several plants, all of them small. The large plants, seen in the birds cliffs, were entirely lacking.

Former investigations. Cape Säulen (Mattiolo et Belli p. 33), Northbrook Island and Cape Flora (Elenkin et Savicz p. 82).

28. *Gyrophora cylindrica* (L.) Ach.

var. *Delisei* (Despr.) Th. Fr.

Gyrophora cylindrica (L.) Ach. Th. Fries Lich. Arct. (1860) p. 166, Lich. Spitsb. (1867) p. 32. Lyngé Lich. Spitsb. I (1924) p. 10, Lich. Bear Island (1926), p. 43, Lich. Nov. Zemlya (1928) p. 171, Lich. Maud Exped., Taimir, (1929) p. 12.

Cape Nansen, some fine plants.

Former investigations. Cape Säulen (Mattiolo et Belli p. 33), Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 82).

It is a relatively western plant, never recorded from the Eastern Siberian coast.

29. *Gyrophora decussata* (Vill.) Zahlbr.

Gyrophora decussata (Vill.) Zahlbr. — Lyngé Lich. Nov. Zemlya (1928) p. 168. *Gyrophora anthracina* (Wulf.) Th. Fries Lich. Arct. (1860) p. 163 (p.p.). *Gyrophora anthracina** *discolor* Th. Fries Lich. Spitsb. (1867) p. 31.

Cape Forbes. Bell Island. Cape Flora. Camp Ziegler.

The plants tested were $\text{CaCl}_2\text{O}_2 \div$. The plant from Camp Ziegler is a mighty coarse plant, more than 10 cms., the others are of a more moderate size, up to 5 cms.

30. *Gyrophora erosa* (Web.) Ach.

Gyrophora erosa (Web.) Ach. Th. Fries Lich. Arct. (1860) p. 164, Lich. Spitsb. (1867) p. 33. Nyl. Lich. Freti Behr. (1888) p. 222. Lyngé Lich. Spitsb. I (1924) p. 11, Lich. Bear Island (1926) p. 43, Lich. Nov.

Zemlya (1928) p. 172, Lich. Maud Exped., Taimir, (1929) p. 12. *Umbilicaria erosa* (Web.) Hoffm. Vain. Lich. Pittek. (1909) p. 12.

Bell Island. Camp Ziegler.

All the plants are small, only a few mms. in diam.

31. *Gyrophora hyperborea* Ach.

Gyrophora hyperborea Ach. Th. Fries Lich. Arct. (1860) p. 164, Lich. Spitsb. (1867) p. 33. Nyl. Lich. Freti Behr. (1888) p. 223, 250. Lynge Lich. Spitsb. I (1924) p. 11, Lich. Bear Island (1926) p. 43, Lich. Nov. Zemlya (1928) p. 173, Lich. Maud Exped., Taimir, (1929) p. 12.

Bell Island. Camp Ziegler.

Only some small, badly developed plants.

32. *Gyrophora proboscidea* (L.) Ach.

Gyrophora proboscidea (L.) Ach. Th. Fries Lich. Arct. (1860) p. 166, Lich. Spitsb. (1867) p. 32. Nyl. Lich. Freti Behr. (1888) p. 222, 244. Lynge Lich. Spitsb. I (1924) p. 11, Lich. Bear Island (1926) p. 43, Lich. Nov. Zemlya (1928) p. 174, Lich. Maud Exped., Taimir, (1929) p. 12. *Umbilicaria proboscidea* (L.) DC. Vain. Lich. Pittek. (1909) p. 11.

Cape Forbes.

Only one plant. It is so rugose all over that the typical central rugi are less conspicuous than usual.

Former investigations. *Gyrophora proboscidea* is one of the commonest lichens in this part of the arctic. It has been recorded from Cape Säulen (Mattirolo et Belli p. 32), Northbrook Island and Cape Flora (Elenkin et Savicz p. 83).

33. *Gyrophora virginis* (Schaer.) Frey.

Gyrophora virginis (Schaer.) Frey Beitr. zur . . . Systematik d. Umbilic. (1929) p. 248. *Gyrophora rugifera* (Nyl.) Th. Fr. Lynge Lich. Nov. Zemlya (1928) p. 168.

Cape Nansen. Cape Forbes. Bell Island. Cape Flora: Vinddalen,

A common and widespread arctic species, represented in this collection by many plants.

Biatorella Th. Fr.

34. *Biatorella coracina* (Somrft.) Lynge.

Biatorella coracina (Somrft.) Lynge Lich. Spitsb. I (1924) p. 5, Lich. Bear Island (1926) p. 44, Lich. Nov. Zemlya (1928) p. 176, Lich. Maud Exped., Taimir, (1929) p. 12. *Sporastatio Morio* β *coracina* (Somrft.) Th. Fr. Lich. Arct. (1860) p. 224, Lich. Spitsb. (1867) p. 42.

Cape Harmsworth.

It was to be expected that *Biatorella coracina* should be found in this collection as it is almost inevitable in this part of the arctic. But as far as I can see it has not formerly been recorded from Franz Josef Land.

Lecanora (Ach.) Zahlbr.

35. *Lecanora Behringii* Nyl.

Lecanora Behringii Nyl. Lich. novi e Freti Behr. (1885) p. 439, Lich. Fret. Behr. (1888) p. 251. Vainio Lich. Pitlek. (1909) p. 47. Zahlbr. Lecanora, Nov. Zemlya (1928) p. 21. *Lecanora Hageni* var. *Behringii* (Nyl.) Lynge Lich. Bear Island (1926) p. 53.

Cape Flora.

The plant was found on the remnants of an old felt-hat, together with *Xanthoria candelaria*, *Caloplaca stillicidiorum* and *C. Jungermanniae*. It was evidently a very attractive substratum for these more or less nitrophilous plants, for I have never seen them better developed.

I found a cortex in the "summo margine apotheciorum" (Vain. l. c.), and I have therefore referred the plant to *Lecanora Behringii*; anyhow, it is a species of the *Lecanora Hageni* section. I have formerly expressed my doubts as to the specific value of *L. Behringii* (Lynge l. c.). The arctic *Lecanora Hageni* section is much in need of a monographical study.

36. *Lecanora lacustris* (Wither) Nyl.

Lecanora lacustris (Wither) Th. Fries Lich. Spitsb. (1867) p. 24. Zahlbr. Lecanora, Novaya Zemlya (1928) p. 3. *Aspicilia lacustris* (Wither) Th. Fries Lich. Arct. (1860) p. 136.

Cape Harmsworth.

A very inconspicuous plant. The size of its gonidia refer it to the genus *Lecanora*, and not to *Ionaspis*.

37. *Lecanora leproscens* Sandst.

Cape Nansen. Cape Flora.

It has formerly not been recorded from the arctic. — I found it in Spitsbergen in 1926 (unpublished).

38. *Lecanora mastrucata* (Wbg.) Th. Fr.

Lecanora mastrucata (Wbg.) Th. Fries Lich. Spitsb. (1867) p. 24. Lynge Lich. Bear Island (1926) p. 55. Zahlbr. Lecanora, Novaya Zemlya (1928) p. 4. *Aspicilia mastrucata* (Wbg.) Th. Fries Lich. Arct. (1860) p. 134.

Bell Island.

The plants are sterile, but they have the characteristic habitus of this species, and the red reaction with KOH.

39. *Lecanora melanophthalma* (DC).

Lecanora melanophthalma (DC.) — Lynge Lich. Spitsb. I (1924) p. 12. *Lecanora chrysoleuca* β *opaca* Th. Fries. Lich. Arct. (1860) p. 84, Lich. Spitsb. (1867) p. 18.

Cape Nansen. Cape Stephens. Cape Forbes. Cape Flora.

I have found it abundantly in Th. Fries's collections from West Greenland (1871), and in my own from East Greenland (1929) and from Spitsbergen (1926), and also in the Swedish Spitsbergen collections. It has also been recorded from North America. But it has never been recorded east of Franz Josef Land, and it was not found in my Novaya Zemlya collections. It is evidently a species of western arctic distribution.

Former investigations. Cape Flora (Mattiolo et Belli p. 34), Northbrook Island and Cape Flora (Elenkin et Savicz p. 87).

40. *Lecanora perradiata* Nyl.

Lecanora perradiata Nyl. Lich. Freti Behringii (1888) p. 224. Vain. Lich. Pitlek. (1909) p. 52. Zahlbr. Lecanora, Novaya Zemlya (1928) p. 9, ubi syn.

Camp Ziegler.

The plant is small and little developed, and it is with much hesitation that I have ventured the determination.

41. *Lecanora polytropa* (Ehrh.) Th. Fr.

Lecanora polytropa (Ehrh.) Th. Fries Lich. Arct. (1860) p. 110, Lich. Spitsb. (1867) p. 22. Nyl. Lich. Freti Behringii (1888) p. 205, 224, 251. Vain. Lich. Pitlek. (1909) p. 40. Elenkin Lich. cõt. pol. (1909) p. 26. Lynge Lich. Spitsb. I (1924) p. 12, Lich. Bear Island (1926) p. 55, Lich. Maud Exped., Taimir (1829) p. 13. Zahlbr. Lecanora, Novaya Zemlya (1928) p. 27.

Cape Harmsworth. Bell Island.

It was only collected in two localities, but there were a number of plants, suggesting it to be quite as common in Franz Josef Land as in all other arctic regions.

Some of the plants are either quite acrustaceous or with a few very inconspicuous small white, scattered areolae; var. *alpigena* (Ach.) Dalla Torre et Sarnth. = f. *ecrustacea* Schaer. — One plant from Cape

Harmsworth has a much better developed thallus with almost contiguous areolae, and very numerous, conglobate apothecia.

Former investigations. Cape Fligely on Prince Rudolph Island (Mattiolo et Belli p. 35).

42. *Lecanora proserpens* Nyl.

Lecanora proserpens Nyl. Lich. Freti Behringii (1888) p. 281. Vain. Lich. Pitlek. (1909) p. 51. Zahlbr. Lecanora, Novaya Zemlya (1928) p. 11. Bell Island.

Only one plant. It is not too well developed, but it agrees fairly well with a plant from Matotchkin Shar at the Kara Sea entrance in my Novaya Zemlya collection, which Zahlbruckner referred to this species.

"*Lecanora subsulphurea* Nyl." has been recorded from Cape Fligely on Prince Rudolph Island (Mattiolo et Belli p. 35).

Ochrolechia Mass.

43. *Ochrolechia frigida* (Sw.) Lyng.

Ochrolechia frigida (Sw.) Lyng. Lich. Nov. Zemlya (1928) p. 182. *Lecanora tartarea* (L.) Th. Fries Lich. Arct. (1860) p. 99, Lich. Spitsb. (1867) p. 21. Nyl. Lich. Freti Behringii (1888) p. 203, 215, 249, 258. *Ochrolechia tartarea* (L.) Vain. Lich. Pitlek. (1909) p. 55. Elenkin Lich. cõt. pol. (1909) p. 28. Lyng. Lich. Spitsb. I (1924) p. 15, Lich. Bear Island (1926) p. 56.

Cape Harmsworth. Cape Nassau.

Former investigations. Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 88, s. n. *Ochrolechia tartarea*).

Candelariella Müll. Arg.

44. *Candelariella crenulata* (Wbg.).

Candelariella crenulata (Wbg.) Lyng. Lich. Nov. Zemlya (1928) p. 191. *Xanthoria crenulata* (Wbg.) Th. Fr. Lich. Arct. (1860) p. 70. *Gyalolechia crenulata* (Wbg.) Th. Fries Lich. Spitsb. (1867) p. 19.

Cape Nansen.

Very sparingly, with other ornithocoprophilous lichens, as *Lecanora melanophthalma*, *Physcia tribacia* and *Parmelia infumata*.

45. *Candelariella vitellina* (Ehrh.) Müll. Arg.

Candelariella vitellina (Ehrh.) Müll. Arg. — Lyng. Lich. Spitsb. I (1924) p. 7, Lich. Bear Island (1926) p. 57, Lich. Nov. Zemlya (1928) p. 190, Lich. Maud Exped., Taimir (1929) p. 14. *Xanthoria vitellina*

(Ehrh.) Th. Fries Lich. Arct. (1860) p. 70. *Gyalolechia vitellina* (Ehrh.) Th. Fries Lich. Spitsb. (1867) p. 19. *Lecanora vitellina* Ach. Nyl. Lich. Freti Behringii (1888) p. 38.

Cape Nansen. Bell Island. Camp Ziegler.

Candelariella epixantha (Ach.) Sandst. has been recorded from Franz Josef Land: Cape Fligely (Mattirolo et Belli p. 35, s. n. *Caloplaca subsimilis*).

Parmelia (Ach.) De Notrs.

46. *Parmelia infumata* Nyl.

Parmelia infumata Nyl. — Lynge Lich. Nov. Zemlya (1928) p. 201. Cape Nansen.

In the arctic this species is strictly ornithocoprophilous, restricted to the upper parts of the bird-stones. It is there found together with species as *Xanthoria candelaria*, *Lecanora melanophthalma*, *Physcia tribacia*, a.o.

As stated in my Novaya Zemlya paper it has never been recorded east of the Novaya Zemlya region. I have there stated it to be common in Spitsbergen and now I can add, from the (unpublished) results of the Norwegian expeditions to East Greenland in 1929 and 1930 that it is quite as common there as in Spitsbergen. — I have also found it in Th. Fries's collections from West Greenland (1871, results as yet unpublished).

These facts are interesting and they have confirmed my suggestion that it should be a species of western arctic distribution.

47. *Parmelia minuscula* Nyl.

Parmelia minuscula Nyl. Lich. Freti Behringii (1888) p. 205. Vain. Lich. Pitlek. (1909) p. 29 (ubi syn.). Lynge Lich. Nov. Zemlya (1928) p. 193, Lich. Maud Exped., Taimir, (1929) p. 14.

Bell Island. Camp Ziegler.

There were several small plants, all of them typically *Parmelia minuscula* and not *P. pubescens*.

Parmelia minuscula has never been recorded from Franz Josef Land, but it is quite probable that (some of) the records of *Parmelia pubescens* (Northbrook Island, Cape Flora and Hochstetter Island, Elenkin et Savicz p. 86) also cover *P. minuscula*.

48. *Parmelia omphalodes* (L.) Ach.

Parmelia omphalodes (L.) Ach. Nyl. Lich. Freti Behringii (1888) p. 200, 202, 239. Vain. Lich. Pitlek. (1909) p. 27. Elenkin Lich. cõt. pol. (1909) p. 18. Lynge Lich. Bear Island (1926) p. 58, Lich. Nov. Zemlya (1928) p. 201.

Cape Flora.

Former investigations. Hochstetter Island (Elenkin et Savicz p. 86).

49. *Parmelia saxatilis* (L.) Ach.

Parmelia saxatilis (L.) Ach. Th. Fries Lich. Arct. (1860) p. 52, Lich. Spitsb. (1867) p. 12. Vain. Lich. Pitlek. (1909) p. 27. Elenkin Lich. cõt. pol. (1909) p. 18. Lynge Lich. Spitsb. I (1924) p. 16, Lich. Bear Island (1926) p. 58, Lich. Nov. Zemlya (1928) p. 201.

Cape Flora.

A few minute tips of the lobes of a species of this section were detached from the stem of a vascular plant. One of them has some decayed isidia, suggesting this species and not *P. omphalodes*, but the determination is not certain.

The *Parmelia*-flora of Franz Josef Land is extremely poor. The Italian Expedition did not find a single species and the Russians only two, *P. omphalodes* and *P. pubescens*.

Cetraria Ach.50. *Cetraria crispa* (Ach.) Nyl.

Cetraria crispa (Ach.) Nyl. Lich. Freti Behringii (1888) p. 202, 248, 256. Lynge Lich. Bear Island (1926) p. 58, Lich. Nov. Zemlya (1928) p. 206. *Cetraria islandica* var. *crispa* (Ach.) Th. Fries Lich. Arct. (1860) p. 35, Lich. Spitsb. (1867) p. 10. *Cetraria islandica* var. *tenuifolia* (Retz.) Vain. Lich. Pitlek. (1909) p. 21.

Bell Island. Cape Flora: Vinddalen.

Former investigations. This common arctic species has been recorded from Cape Flora and Cape Säulen (Mattirolo et Belli), Hochstetter Island (Elenkin et Savicz p. 86).

51. *Cetraria cucullata* (Bell.) Ach.

Cetraria cucullata (Bell.) Ach. — Th. Fries. Lich. Arct. (1860) p. 36, Lich. Spitsb. (1867) p. 11. Vain. Lich. Pitlek. (1909) p. 26. Elenkin Lich. cõt. pol. (1909) p. 14. Lynge Lich. Spitsb. I (1924) p. 7, Lich.

Nov. Zemlya (1928) p. 205. *Platysma cucullatum* (Bell.) Nyl. Lich. Freti Behringii (1888) p. 202, 248.

Cape Flora, pluribi.

Former investigations. Northbrook Island (Elenkin et Savicz p. 84).

52. *Cetraria Delisei* (Bory) Th. Fr.

Cetraria Delisei (Bory) Nyl. Lich. Freti Behringii (1888) p. 214, 239. Th. Fries Lich. Spitsb. (1867) p. 11. Lynge Lich. Spitsb. I (1924) p. 7, Lich. Bear Island (1926) p. 58, Lich. Nov. Zemlya (1928) p. 206. *Cetraria islandica* γ. *Delisei* (Bory) Th. Fries Lich. Arct. (1860) p. 35. *Cetraria hiascens* (Fr.) Th. Fr. Vain. Lich. Pitlek. (1909) p. 22. Elenkin Lich. cõt. pol. (1909) p. 13.

Cape Harmsworth. Camp Ziegler.

Former investigations. Hochstetter Island (Elenkin et Savicz p. 86).

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

Cetraria nivalis (L.) Ach. — Th. Fries Lich. Arct. (1860) p. 37, Lich. Spitsb. (1867) p. 11. Vain. Lich. Pitlek. (1909) p. 26. Elenkin Lich. cõt. pol. (1909) p. 14. Lynge Lich. Spitsb. I (1924) p. 8, Lich. Bear Island (1926) p. 59, Lich. Nov. Zemlya (1928) p. 205. *Platysma nivale* Nyl. Lich. Freti Behringii (1888) p. 214, 248.

Bell Island. Cape Flora.

Former investigations. Cape Flora and Cape Auk (Mattiolo et Belli p. 31), Hochstetter Island (Elenkin et Savicz p. 84).

Several other *Cetrariae* have been recorded from Franz Josef Land:

Cetraria hepatizon (Ach.) Vain.: Hochstetter Island (Elenkin et Savicz p. 85).

Cetraria islandica f. *rigida*: Northbrook Island: Cape Flora and Hochstetter Island (Elenkin et Savicz p. 86), f. *maculata*: Northbrook Island and Cape Flora (Elenkin et Savicz l. c.).

Cetraria lacunosa Ach. Prince Rudolph Island: Cape Germania. (Mattiolo et Belli p. 32). — This record is very improbable. *Cetraria lacunosa* is in Norway chiefly a coast plant, never found north of the Lofoten Islands (Andenes in Vesterålen). Arctic records of *Cetraria lacunosa* are sometimes mistakes for *Cetraria chrysantha*.

Cetraria nigricans Nyl. Hochstetter Island (Elenkin et Savicz p. 85).

Cetraria nigricascens Nyl. Hochstetter Island (Elenkin et Savicz p. 85). This species is hardly to be distinguished specifically from *Cetraria Delisei*.

Cornicularia Ach.54. *Cornicularia divergens* Ach.

Cornicularia divergens Ach. — Th. Fries Lich. Arct. (1860) p. 29, Lich. Spitsb. (1867) p. 10. *Alectoria divergens* (Ach.) Nyl. Lich. Freti Behringii (1888) p. 202. Elenkin Lich. côt. pol. (1909) p. 11. Lyngé Lich. Nov. Zemlya (1928) p. 212.

Bell Island. Cape Flora.

The former plant is fine and typical, the latter is so small that I have had to compare it with *C. aculeata*, not found in this collection.

Former investigations. Cape Säulen (Mattirolò et Belli p. 30), Northbrook Island and Cape Flora (Elenkin et Savicz p. 83).

Cornicularia aculeata Schreb. has been recorded from Hochstetter Island (Elenkin et Savicz p. 84).

Alectoria Ach.55. *Alectoria jubata* (L.) Ach.

f. *chalybeiformis* (L.).

Alectoria jubata f. *chalybeiformis* (L.). — Lyngé Lich. Spitsb. I (1924) p. 5, Lich. Bear Island (1926) p. 60, Lich. Nov. Zemlya (1928) p. 213. *Bryopogon jubatus* (L.) — Th. Fries Lich. Arct. (1860) p. 26, Lich. Spitsb. (1867) p. 9.

Cape Flora, very scarce.

56. *Alectoria nigricans* (Ach.) Nyl.

Alectoria nigricans (Ach.) Nyl. — Th. Fries Lich. Spitsb. (1867) p. 10. Nyl. Lich. Freti Behringii (1888) p. 202, 239 (c.fr.), 248. Vain. Lich. Pittek. (1909) p. 14. Elenkin Lich. côt. pol. (1909) p. 11. Lyngé Lich. Spitsb. I (1924) p. 5, Lich. Bear Island (1926) p. 60, Lich. Nov. Zemlya (1928) p. 212. *Alectoria thulensis* Th. Fries Lich. Arct. (1867) p. 28.

Bell Island, several plants.

Former investigations. Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 83).

57. *Alectoria ochroleuca* (Ehrh.) Nyl.

Alectoria ochroleuca (Ehrh.) — Th. Fries Lich. Arct. (1860) p. 27, Lich. Spitsb. (1867) p. 10. Nyl. Lich. Freti Behringii (1888) p. 202, 239, 248. Vain. Lich. Pittek. (1909) p. 15. Elenkin Lich. côt. pol. (1909) p. 10. Lyngé Lich. Nov. Zemlya (1928) p. 211.

Cape Flora, many fine plants.

Former investigations. Northbrook Island and Hochstetter Island (Elenkin et Savicz p. 83).

Alectoria nitidula Th. Fr. has been recorded from Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 84).

Usnea (Dill.) Pers.

58. *Usnea sulphurea* (König) Th. Fr.

Usnea sulphurea (König) Th. Fries Lich. Spitsb. (1867) p. 9. Lynge Lich. Spitsb. I (1924) p. 21, Lich. Nov. Zemlya (1928) p. 213. *Usnea melaxantha* Ach. — Th. Fries Lich. Arct. (1860) p. 24.

Cape Nansen. Bell Island. Cape Flora. Camp Ziegler.

The number of plants suggests it to be common and plentiful. This is very interesting, for in Novaya Zemlya I only found it once, and it was very scarce there. It is plentiful in the western arctic, Franz Josef Land and Novaya Zemlya are its eastern outposts. It has never been found on the European continent and not in Bear Island. Its road of distribution has evidently been a northern one.

Former investigations. Its frequency in Franz Josef Land is also proved by all the former records: "Abundant", without special locality (Jackson p. 417), Cape Flora "numerosi esemplari" and Cape Säulen (Mattiolo et Belli p. 29), Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 84).

Caloplaca Th. Fr.

59. *Caloplaca elegans* (Link) Th. Fr.

Caloplaca elegans (Link) Th. Fries. — Lynge Lich. Spitsb. I (1924) p. 6, Lich. Nov. Zemlya (1928) p. 232, Lich. Maud Exped., Taimir (1929) p. 14. *Xanthoria elegans* (Link) Th. Fries Lich. Arct. (1860) p. 69, Lich. Spitsb. (1867) p. 14. *Lecanora elegans* (Link) Nyl. Lich. Freti Behringi (1888) p. 205, 223, 250. *Placodium elegans* (Link) Ach. Vain. Lich. Pitlek. (1909) p. 62. Elenkin Lich. côt. pol. (1909) p. 33.

Cape Nansen. Cape Forbes. Bell Island. Cape Flora. Camp Ziegler.

Evidently quite as common in Franz Josef Land as in other arctic regions.

Former investigations. Jackson writes that it is very common (A thousand Days in the Arctic, p. 416). — "Numerosi esemplari si trova abbondante in tutte le isole del Gruppo di Francesco Giuseppe", special localities: Cape Flora, Cape Auk, Cape Säulen (Mattiolo et Belli p. 35).

Northbrook Island, Cape Flora and Hochstetter Island (Elenkin et Savicz p. 89).

Var. *tenuis* Wbg. has been recorded from Cape Flora and Northbrook Island (Elenkin et Savicz p. 89). This variety was not present in Olaf Hanssen's collection.

60. *Caloplaca Jungermanniae* (Vahl).

Caloplaca Jungermanniae (Vahl.) Th. Fr. Lyng. Lich. Nov. Zemlya (1928) p. 223, ubi syn. *Placodium Jungermanniae* (Vahl) Tuck. var. *genuina* (Th. Fr.) Vain. Lich. Pitlek. (1909) p. 67, ubi syn.

Cape Flora, on the remains of an old felt-hat.

Caloplaca "Jungermanniae" (Vahl) has been mentioned in many arctic publications, but we cannot always see with certainty, whether the species itself is meant, or its var. *subolivacea* Th. Fr., in my opinion a proper species.

61. *Caloplaca stillicidiorum* (Vahl) Lyng.

Caloplaca stillicidiorum (Vahl.) Lyng. Lich. Nov. Zemlya (1928) p. 219, ubi syn.

Cape Flora, on the remains of an old felt-hat, with *Caloplaca Jungermanniae*, *Xanthoria candelaria* and *Lecanora Behringii*.

62. *Caloplaca vitellinula* (Nyl.) Olivier.

Caloplaca vitellinula (Nyl.) Oliv. — Lyng. Lich. Nov. Zemlya (1928) p. 222, ubi syn.

Cape Nansen.

The spores are broader than in my Novaya Zemlya plants: $12.5-16.3 \times 6.5-7.5 \mu$, and typically polari-dyblastae, septum ca. 4μ broad. This size agrees with the normal size of *Caloplaca pyracea*.

Caloplaca miniata has been recorded from Cape Fligely and Cape Säulen (Mattirolo et Belli p. 36).

Xanthoria Th. Fr.

63. *Xanthoria candelaria* (Ach.) Arn.

Xanthoria candelaria (Ach.) Arn. — Lyng. Lich. Nov. Zemlya (1928) p. 238. *Xanthoria controversa* (Mass.) β . *pygmaea* (Bory) Th. Fries Lich. Arct. (1860) p. 68, Lich. Spitsb. (1867) p. 14. *Phycia lychnea* Nyl. Lich. Freti Behringii (1888) p. 244. *Xanthoria polycarpa* (Ehrh.) Vain. **lychnea* (Ach.) Vain. Lich. Pitlek. (1909) p. 61.

Cape Nansen. Cape Flora.

There were several plants of this species, which is so common on bird-stones in arctic regions.

Former investigations. Cape Fligely and Cape Flora (Mattiolo et Belli p. 34). Northbrook Island and Cape Flora (Elenkin et Savicz p. 88).

Buellia De Notrs.

64. *Buellia coniops* (Wbg.) Th. Fr.

Buellia coniops (Wbg.) Th. Fries Lich. Arct. (1860) p. 231, Lich. Spitsb. (1867) p. 45. Nyl. Lich. Freti Behringii (1888) p. 232. Vain. Lich. Pitlek. (1909) p. 88. Lynge Lich. Spitsb. I (1924) p. 6, Lich. Bear Island (1926) p. 65, Lich. Nov. Zemlya (1928) p. 243.

Cape Flora.

There was only a minute sterile trace, but I was happy enough to find fertile pycnides.

65. *Buellia punctiformis* (Hoffm.) Mass.

f. *stigmatea* (Kbr.) Vain.

Buellia punctiformis f. *stigmatea* (Kbr.) Vain. Lich. Pitlek. (1909) p. 87, ubi syn. *Buellia stigmatea* Kbr. — Lynge Lich. Nov. Zemlya (1928) p. 240, ubi syn.

Cape Flora. Bell Island.

A saxicolous plant, with white, granular thallus, dark hypothecium, spores $13-16 \times 7-8 \mu$. Medulla $J \div$, $KOH \div$.

Rinodina (S. Gray) Mass.

66. *Rinodina cacuminum* (Th. Fr.) Malme.

Rinodina cacuminum (Th. Fr.) Malme Bidrag till kännedomen om de sydsvenska Rinodina-arterna af sophodes-gruppen (1896) p. 176, ubi syn.

Exsicc. Havås Lich. Norv. 442, Krypt. Vind. 2287 et b, Malme Lich. suec. 198, 874.

Cape Flora.

The plant is small, but well developed and quite typical. The apothecia are concentrated into small pulvinuli, almost covering the thallus. The paraphyses are darkened and clavate at their tips ($4-4.5 \mu$ thick), the spores $12-17 \times 6.5-7.5$ (-9) μ , slightly fabaceous, with rotundated cell-lumen.

It is the first record of this species from the arctic islands. It is common enough along the coast of Norwegian Finnmark, but I did not find a trace of it in my Novaya Zemlya collection.

67. *Rinodina turfacea* (Wbg.) Th. Fr.var. *ecrustacea* Vain.

Rinodina turfacea (Wbg.) Th. Fries Lich. Arct. (1860) p. 126, Lich. Spitsb. (1867) p. 24. Elenkin Lich. cõt. pol. (1909) p. 39. Lyngø Lich. Spitsb. I (1924) p. 20, Lich. Nov. Zemlya (1928) p. 252. *Lecanora turfacea* Ach. Nyl. Lich. Freti Behringii (1888) p. 203, 249, 258. *Rinodina orbata* (Ach.) Vain. Lich. Pitlek. (1909) p. 71, Lyngø Lich. Bear Island (1926) p. 67.

Cape Flora.

A poor apothecium was detected on the thallus of a *Parmelia*.Former investigations. *Rinodina turfacea* var. *nuda* has been recorded from Hochstetter Island (Elenkin et Savicz p. 92).*Physcia* (Ach.) Vain.68. *Physcia caesia* (Hoffm.) Nyl.

Physcia caesia (Hoffm.) Th. Fries Lich. Arct. (1860) p. 64, Lich. Spitsb. (1867) p. 13. Nyl. Lich. Freti Behringii (1888) p. 222. Vain. Lich. Pitlek. (1909) p. 68. Elenkin Lich. cõt. pol. (1909) p. 39. Lyngø Lich. Spitsb. I (1924) p. 17, Lich. Nov. Zemlya (1928) p. 259.

Cape Nansen. Bell Island. Camp Ziegler.

Only some traces, collected with other plants. The laciniae are very narrow.

Former investigations. Northbrook Island and Cape Flora (Elenkin et Savicz p. 92).

69. *Physcia tribacia* (Ach.) Nyl.

Physcia tribacia (Ach.) Nyl. Lich. Freti Behringii (1888) p. 263. Lyngø Lich. Spitsb. I (1924) p. 18, Lich. Nov. Zemlya (1928) p. 256. *Physcia stellaris* **tribacia* (Ach.) Vain. Lich. Pitlek. (1909) p. 68.

Cape Nansen. Cape Flora.

Only small traces, with other ornithocophilous species.

Two other *Physciae* have been recorded from Franz Josef Land:*Physcia muscigena* (Ach.) Nyl.: Hochstetter Island (Elenkin et Savicz p. 92).*Physcia teretiuscula* (Ach.): Cape Fligely (Mattiolo et Belli p. 34). Arctic plants are not always easily distinguished from *Ph. caesia*.

Summary.

In the following summary I have enumerated the lichens hitherto recorded from Franz Josef Land.¹

Name of the lichen	Italian exped.	Russian exped.	Norweg. exped.
1. <i>Verrucaria aethiobola</i> Wbg.....			×
2. <i>Thelidium papulare</i> (E. Fr.) Arn.			×
3. <i>Sphaerophorus globosus</i> (Huds.) Vain.		×	
4. <i>Psoroma hypnorum</i> (Dicks.) Hoffm.		×	
5. <i>Peltigera canina</i> (L.) Hoffm.	×	×	×
6. — <i>rufescens</i> Hoffm.		×	×
7. — <i>variolosa</i> (Mass.) Gyelnik (= <i>aphthosa</i>) ...		×	×
8. <i>Lecidea atrobrunnea</i> (Ram.) Schaer.			×
9. — <i>cyanea</i> (Ach.) Roehl.			×
10. — <i>Dicksonii</i> Ach.			×
11. — <i>flavocaerulescens</i> (Hornem.)			×
12. — <i>goniophila</i> Flk.	×		×
13. — <i>Hoelii</i> Lynge			×
14. — <i>Laurentiana</i> Nyl.			×
15. — <i>lulensis</i> Hellb.			×
16. — <i>macrocarpa</i> (DC.) Steud.			×
17. — <i>Nansenii</i> Lynge			×
18. — <i>neglecta</i> Nyl.			×
19. — <i>pantherina</i> Ach.			×
20. — <i>vorticosa</i> (Flk.) Kbr.			×
21. <i>Rhizocarpon disporum</i> (Naeg.) Müll. Arg.			×
22. — <i>geographicum</i> (L.) D.C. (incl. „ <i>viridi-atrum</i> “)	×	×	×
23. — <i>grande</i> (Flk.) Arn.			×
24. — <i>jemtlandicum</i> Malme			×
25. <i>Cladonia bellidiflora</i> (Ach.) Schaer.		×	
26. — <i>coccifera</i> (L.) Willd.		×	
27. — <i>pyxidata</i> (L.) Fr.		×	×
28. — <i>rangiferina</i> (L.) Web.		×	
29. — <i>uncialis</i> (L.) Web.		×	
30. <i>Stereocaulon alpinum</i> Laur.	×	×	×
31. — <i>denudatum</i> Flk.		×	
32. — <i>fastigiatum</i> Anzi			×
33. — <i>paschale</i> (L.) Ach.		×	
34. — <i>rivulorum</i> Magn.			×
35. <i>Gyrophora arctica</i> Ach.	×	×	×
36. — <i>cylindrica</i> (L.) Ach.	×	×	×
37. — <i>decussata</i> (Vill.) Zahlbr.			×
38. — <i>erosa</i> (Web.) Ach.			×
39. — <i>hyperborea</i> Ach.			×

¹ Cfr. p. 30.

Name of the lichen	Italian exped.	Russian exped.	Norweg. exped.
40. Gyrophora proboscidea (L.) Ach.	×	×	×
41. — tornata	×		
42. — virginis (Schaer.) Frey			×
43. Biatorella coracina (Somrft.) Lyngé			×
44. Pertusaria glomerata (Ach.) Schaer.	×		
45. — oculata (Dicks) Th. Fr.	×		
46. — panyrga (Ach.) Th. Fr.	×		
47. Lecanora Behringii Nyl.			×
48. — lacustris (Wither) Nyl.			×
49. — leproscens Sandst.			×
50. — mastrucata (Wbg.) Th. Fr.			×
51. — melanophthalma (DC.)	×	×	×
52. — perradiata Nyl.			×
53. — polytropa (Ehrh.) Th. Fr.	×		×
54. — proserpens Nyl.			×
55. — subsulphurea Nyl.	×		
56. Ochrolechia frigida (Sw.) Lyngé		×	×
57. Candelariella crenulata (Wbg.) Lyngé			×
58. — epixantha (Ach.) Sandst.	×		
59. — vitellina (Ehrh.) Müll. Arg.			×
60. Parmelia infumata Nyl.			×
61. — minuscula Nyl. (incl. P. pubescens (L.) Vain.)		×	×
62. — omphalodes (L.) Ach.		×	×
63. — saxatilis (L.) Ach.			×
64. Cetraria crispa (Ach.) Nyl.		×	×
65. — cucullata (Bell.) Ach.		×	×
66. — Delisei (Bory) Th. Fr.		×	×
67. — hepatizon (Ach.) Vain.		×	
68. — islandica (L.) Ach.	×	×	
69. — called lacunosa	×		
70. — nigricans Nyl.		×	
71. — nigricascens Nyl.		×	
72. — nivalis (L.) Ach.	×	×	×
73. Cornicularia aculeata Schreb.		×	
74. — divergens Ach.	×	×	×
75. Alectoria jubata (L.) Ach.			×
76. — nigricans (Ach.) Nyl.		×	×
77. — nitidula Th. Fr.		×	
78. — ochroleuca (Ehrh.) Nyl.		×	×
79. Usnea sulphurea (König) Th. Fr.	×	×	×
80. Thamnolia vermicularis (Sw.) Ach.		×	
81. Caloplaca elegans (Link.) Th. Fr.	×	×	×
82. — Jungermanniae (Vahl.)			×
83. — miniata (Hoffm.)	×		
84. — stillicidiorum (Vahl) Lyngé			×
85. — vitellinula (Nyl.) Oliv.			×
86. Xanthoria candelaria (Ach.) Arn.	×	×	×
87. Buellia coniops (Wbg.) Th. Fr.			×
88. — punctiformis (Hoffm.) Mass.			×
89. Rinodina cacuminum (Th. Fr.) Malme			×
90. — turfacea (Wbg.) Th. Fr.		×	×
91. Physcia caesia (Hoffm.) Nyl.		×	×
92. — muscigena (Ach.) Nyl.		×	
93. — teretiuscula (Ach.)	×		
94. — tribacia (Ach.) Nyl.			×
	24	41	69

During the reading of the proofs I received some lichens from the Italian "Spedizione Polare", which Professor O. Mattiolo, Torino, had been kind enough to send me for comparison. I am much obliged to Professor Mattiolo for his courtesy. The lichens are *Cetraria lacunosa*, *Lecanora subsulphurea*, *Caloplaca miniata*, *Pertusaria glomerata* and *Rhizocarpon viridiatrum*.

Cetraria lacunosa. The Franz Josef Land plant is a poor fragment: "Traccie di questo lichene". It consists of two decolorated linear lobes. On the upper side of one of them there is a faint trace of pruina, suggesting *Physcia muscigena*.

Lecanora subsulphurea. It is an indeterminable fragment, "traccie di questo lichene", as Mattiolo writes. I have compared it with a cotypus of *Lecanora subsulphurea* in our herb. (leg. Lojka, from Hunyad in Transsylvania), but I could not convince myself of their identity. I might suggest a trace of *Lecanora polytropa*, which is so common in these parts of the arctic.

Caloplaca miniata. The plant from Cape Säulen, which Professor Mattiolo sent me, is certainly *Caloplaca elegans*, a species that is very variable with respect to its colour.

Pertusaria glomerata. It is a soil lichen, the Italian plant was collected on a reindeer horn. As stated by Mattiolo it is a "scarsissimo materiale". I would not venture a determination of such a specimen, but in the arctic *Lecanora polytropa* can have a similar habitus.

I am not convinced that *Pertusaria glomerata* is really found in the arctic. All the numerous arctic plants, which I have seen, gave a fine blood-red colour with KOH, and are, accordingly, *Pertusaria coriacea* Th. Fr., and not *Pertusaria glomerata*.

Rhizocarpon viridiatrum. I have examined Koerber's Lich. sel. germ. No. 18 and found it to be an *Eu-Rhizocarpon* with dark muriform spores of rather small size: $21-25 \times 10-12 \mu$. Young spores are three-septated, but I do not agree with Vainio (Lich. Fenn. II, p. 277) that they are "diu triseptatae". The septation of the spores can hardly distinguish this species from *Rhizocarpon geographicum*. The apothecia of Koerber's plant are situated at the margin of the areolae, or be-

tween them. — Habitually Koerber's plant differs from *Rhizocarpon geographicum* by its more convex apothecia (almost as in *Rhizocarpon Copelandii*). As stated by Th. Fries (Lich. Scand. II, p. 623) as well as by Vainio (l. c. p. 284) the medullary reaction of *Rhizocarpon viridiatrum* is "Jodo non caerulescens".

But the Italian plant from Cape Germania is typically an arctic *Rhizocarpon geographicum*. It has a very intense blue medullary reaction, plane apothecia with large spores, larger than usual: 30—40 μ long. As is often the case with arctic plants the areolae are small and scattered, resting on a black, conspicuous hypothallus.

"*Lecidea geographica* β . *atrovirens* Schaer." is not a synonym of *Rhizocarpon viridiatrum* (Flk.) Kbr. Schaerer's Lichenes Helvetici No. 623 has an intensely blue medullary reaction with J.

If these lichens are excluded, the number of lichens, known from Franz Josef Land, will be reduced to 90.

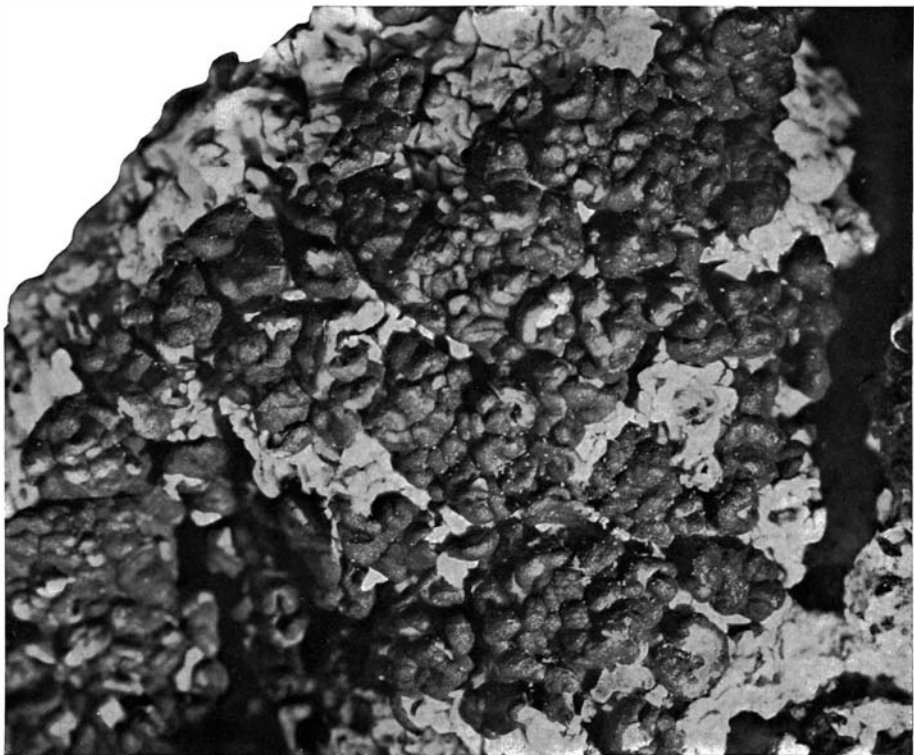
Printed, March 20th, 1931.



Bell Island.

Fig. 1. *Lecidea Hoelii* Lyngby n. sp.

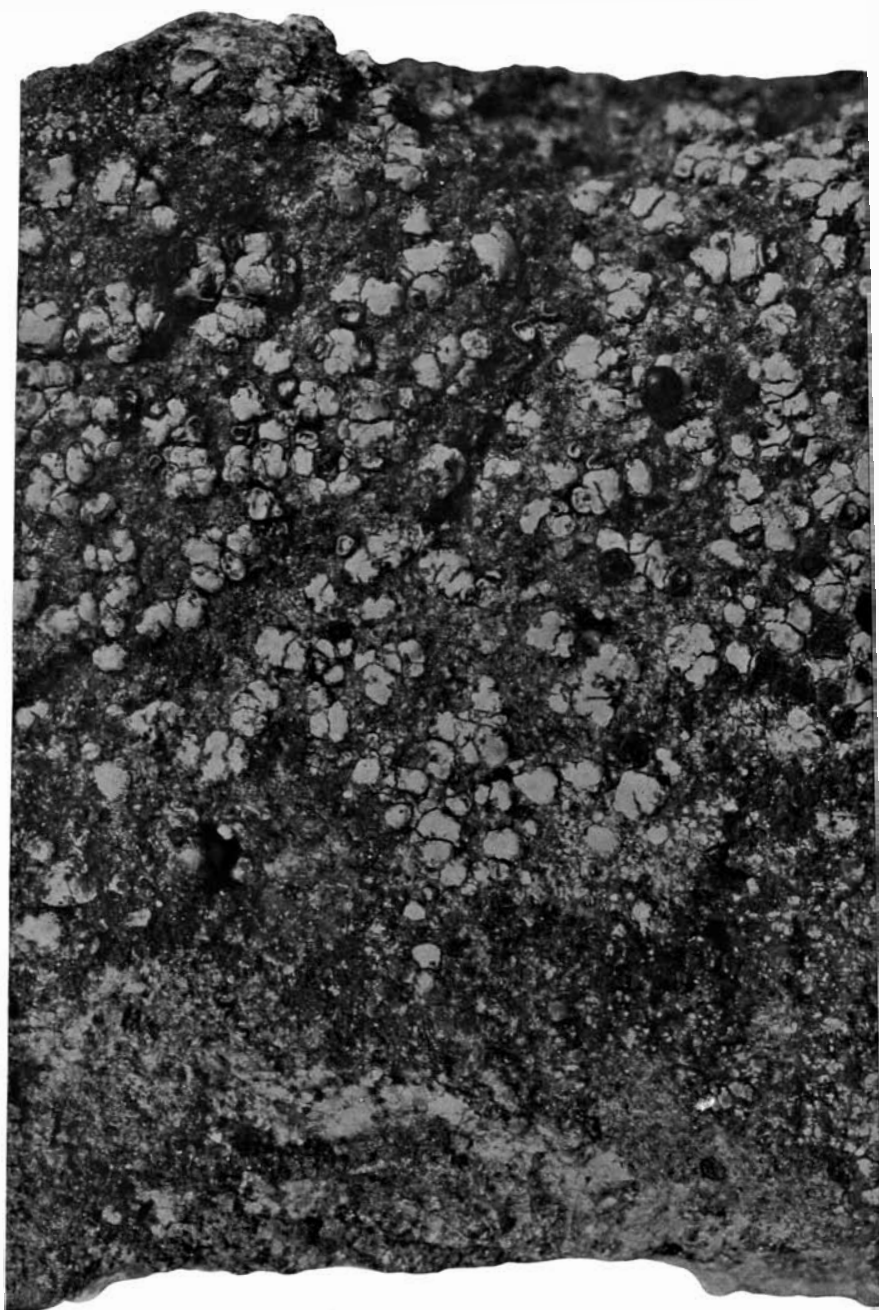
Phot. Lily Monsen ($\times 8$).



Cape Nansen.

Fig. 2. *Lecidea Nansenii* Lyngby n. sp.

Phot. Lily Monsen ($\times 8$).



Bell Island.

Lecidea Laurentiana Nyl.

Phot. Lily Monsen (× 8).

Results of the Norwegian expeditions to Svalbard 1906—1926 published in other series. (See Nr. 1 of this series.)

The results of the Prince of Monaco's expeditions (Mission Isachsen) in 1906 and 1907 were published under the title of 'Exploration du Nord-Ouest du Spitsberg entreprise sous les auspices de S. A. S. le Prince de Monaco par la Mission Isachsen', in *Résultats des Campagnes scientifiques*, Albert I^{er}, Prince de Monaco, Fasc. XL—XLIV. Monaco.

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GUNNAR ISACHSEN has also published: Green Harbour, in *Norsk Geogr. Selsk. Aarb.*, Kristiania, 1912—13, Green Harbour, Spitsbergen, in *Scot. geogr. Mag.*, Edinburgh, 1915, and, Spitsbergen: Notes to accompany map, in *Geogr. Journ.*, London, 1915.

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Bjørnøya (Bear Island). Oslo 1925. Scale 1:10 000. (In six sheets.) Kr. 30,00.

Chart of Bear Island. (No. S1). Oslo 1929. Scale 1:40 000. Kr. 4,00. (With description).

Bear Island Waters. (No. S2). Oslo 1930. Scale 1:350 000. Kr. 5,00.

A preliminary edition of topographical maps on the scale of 1:50 000 covering the regions around Kings Bay, Ice Fjord, and Bell Sound, together with the map of Bear Island, scale 1:25 000, is published in:

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 ” 13. LIND, J., *The Micromycetes of Svalbard*. 1928. Kr. 6,00.
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