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

NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER
LEDER: ADOLF HOEL

SKRIFTER OM SVALBARD OG ISHAVET

Nr. 39

OLAF HANSSEN AND JOHANNES LID

FLOWERING PLANTS OF FRANZ JOSEF LAND

COLLECTED ON THE NORWEGIAN SCIENTIFIC EXPEDITION 1930

WITH 5 TEXT FIGURES AND 1 MAP

OSLO
I KOMMISJON HOS JACOB DYBWAD
1932

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 Ier, Prince de Monaco, Fasc. XL—XLIV. Monaco.

ISACHSEN, GUNNAR, Première Partie. Récit de voyage. Fasc. XL. 1912. Fr. 120.00.
With map: Spitsberg (Côte Nord-Ouest). Scale 1 : 100 000. (2 sheets.) Charts: De la Partie Nord du Foreland à la Baie Magdalena, and Mouillages de la Côte Ouest du Spitsberg.

ISACHSEN, GUNNAR et ADOLF HOEL, Deuxième Partie. Description du champ d'opération. Fasc. XLI. 1913. Fr. 80.00.

HOEL, ADOLF, Troisième Partie. Géologie. Fasc. XLII. 1914. Fr. 100.00.

SCHETELIC, JAKOB, Quatrième Partie. Les formations primitives. Fasc. XLIII. 1912. Fr. 16.00.

RESVOLL HOLMSEN, HANNA, Cinquième Partie. Observations botaniques. Fasc. XLIV. 1913. Fr. 40.00.

A considerable part of the results of the ISACHSEN expeditions in 1909 and 1910 has been published in Videnskapsselskapets Skrifter. I. Mat.-Naturv. Klasse, Kristiania (Oslo).

ISACHSEN, GUNNAR, Rapport sur l'Expédition Isachsen au Spitsberg. 1912, No. 15. Kr. 5,40.

ALEXANDER, ANTON, Observations astronomiques. 1911, No. 19. Kr. 0,40.

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HOLTEDAHL, OLAF, Zur Kenntnis der Karbonablagerungen des westlichen Spitzbergens. I. Eine Fauna der Moskauer Stufe. 1911, No. 10. Kr. 3,00. II. Allgemeine stratigraphische und tektonische Beobachtungen. 1912, No. 23. Kr. 5,00.

HOEL, ADOLF, Observations sur la vitesse d'écoulement et sur l'ablation du Glacier Lilliehöök au Spitsberg 1907—1912. 1916, No. 4. Kr. 2,20.

VEGARD, L., L'influence du sol sur la glaciation au Spitsberg. 1912, No. 3. Kr. 0,40.

ISACHSEN, GUNNAR, Travaux topographiques. 1915, No. 7. Kr. 10,00.
With map: Spitsberg (Partie Nord-Ouest). Scale 1 : 200 000 (2 sheets).

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.

All the above publications have been collected into two volumes as Expédition Isachsen au Spitsberg 1909—1910. Résultats scientifiques. I, II. Christiania 1916.

As the result of the expeditions of ADOLF HOEL and ARVE STAXRUD 1911—1914 the following memoir has been published in Videnskapsselskapets Skrifter. I. Mat.-Naturv. Klasse.

HOEL, ADOLF, Nouvelles observations sur le district volcanique du Spitsberg du Nord. 1914, No. 9. Kr. 2,50.

The following topographical maps and charts have been published separately:

Bjørnøya (Bear Island). Oslo 1925. Scale 1 : 25 000. Kr. 10,00.

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.

Spitsbergen. Chart, Bellsund—Forlandsrevet including Isfjorden. (No. S3). Scale 1 : 200 000. 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:

Svalbard Commissioner [Kristian Sindballe], Report concerning the claims to land in Svalbard. Part I A, Text; I B, Maps; II A, Text; II B, Maps. Copenhagen and Oslo 1927. Kr. 150,00.

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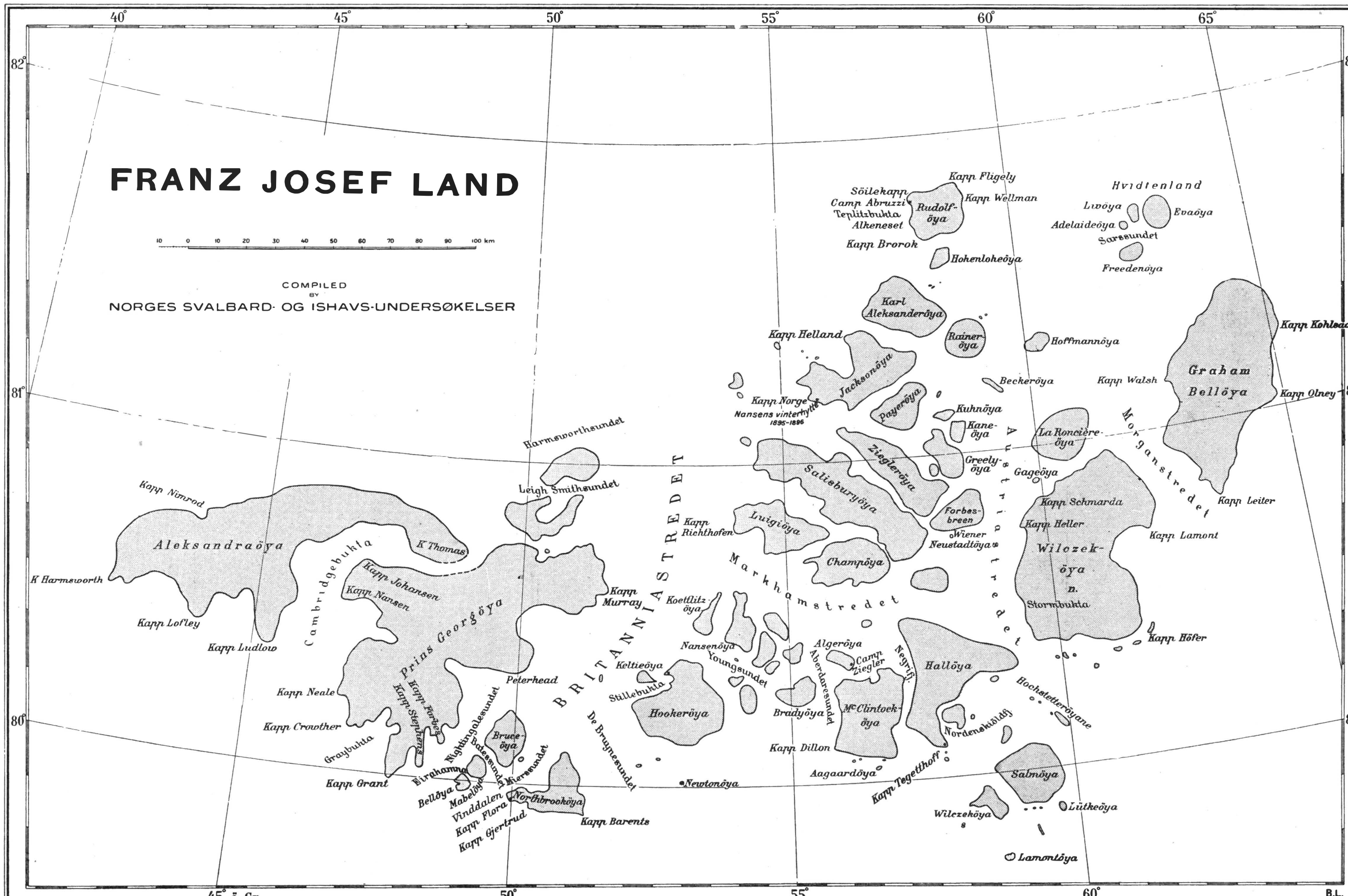
FRANZ JOSEF LAND
COMPILED BY
NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER
10 0 10 20 30 40 50 60 70 80 90 100 km
Rudolföya
Kapp Fligely
Kapp Wellman
Söilekapp
Camp Abruzzi
Teplitzbukta
Alkeneset
Kapp Brorok
Hohenloheöya
Hvidtenland
Livöya
Evaöya
Adelaideöya
Sørsundet
Freedenöya
Karl Aleksanderöya
Rainer öya
Hoffmannöya
Graham Bellöya
Kapp Kohlsaat
Kapp Olney
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Kapp Walsh
Beckeröya
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Jacksonöya
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Kapp Norge
Nansens vinterhytte 1895-1896
Kuhnöya
Kane öya
La Roncière öya
Morganstredet
Austriastredet
Ziegleröya
Greely öya
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Harmsworthsundet
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Kapp Schmarda
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Wilczekøya
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Kapp Höfer
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Wiener Neustadtöya
Luigiöya
Kapp Richthofen
Champöya
Markhamstredet
Britanniastredet
Kapp Nimrod
Aleksandraöya
K Thomas
K Harmsworth
Cambridgebukta
Kapp Johansen
Kapp Nansen
Prins Georgöya
Kapp Murray
Koettlitzöya
Nansenöya
Youngsundet
Algeröya
Camp Ziegler
Aberdaresundet
Negrifj
Hallöya
Keltieöya
Stillebukta
Hookeröya
Bradyöya
McClintocköya
Kapp Dillon
Aagaardöya
Kapp Tegetthoff
Nordenskiöldfj
Hochstetteröyane
Salmöya
Lütkeöya
Wilczeköya
Lamontöya
Kapp Lofley
Kapp Ludlow
Kapp Neale
Kapp Crowther
Graybukta
Kapp Grant
Kapp Forbes
Kapp Stephens
Peterhead
Nightingalesundet
Batesundet
Bruceöya
Eirahamna
Bellöya
Mabelöya
Miersundet
Vinddalen
Kapp Flora
Kapp Gjertrud
Northbrooköya
Kapp Barents
De Bruynesundet
Newtonöya
40° 45° 50° 55° 60° 65°
82° 81° 80°
45° ö. Gr.
B.L.

Preface.

Franz Josef Land, situated to the north-east of Svalbard, was entirely unknown up to the year 1865, when the western part of the archipelago was discovered by the Norwegian sealing skippers Rønnbeck and Aidijärvi.

Since that time a great many hunting expeditions have been fitted out for this part of the Arctic, and a number of scientific expeditions have also explored various parts of the archipelago. Dr. Gunnar Horn has recently given a full account of these expeditions in his paper 'Franz Josef Land, Natural History, Discovery, Exploration and Hunting' (Skrifter om Svalbard og Ishavet, No. 29. Oslo 1930).

In 1930 Gunnar Horn was the leader of the Norwegian Scientific Expedition to Franz Josef Land sent out by *Norges Svalbard- og Ishavs-undersøkelser*. Olaf Hanssen, who was the botanist of the expedition, made collections of flowering plants in various parts of the archipelago. The undersigned has worked up the material and prepared the text. The present paper is to a large extent based upon the collections and observations of Olaf Hanssen. In order to get a general view of the flora, I have, however, excerpted the literature and incorporated in the text what was previously known of the flora of Franz Josef Land.

We are greatly indebted to Mr. Adolf Hoel, the leader of *Norges Svalbard- og Ishavs-undersøkelser* for valuable help and never failing interest in our work. We also wish to thank: Dr. Gunnar Horn, Dr. Carl Christensen at the Botanical Museum of the University of Copenhagen, who kindly placed at our disposal the rich Arctic collections of the Museum, and Professor Dr. Erwin Janchen, director of the Botanical Garden of the University of Vienna for his courtesy in giving us information about Payer's specimen of *Silene acaulis*.

Botanical Museum, Oslo, Nov. 30, 1931.

Johannes Lid.

Botanical Investigations in Franz Josef Land.

What is known about the flora of Franz Josef Land chiefly consists of remarks and brief notes scattered through literature, many of them in the general accounts of the expeditions. We have therefore thought it useful to give a summary of the botanical investigations of the various expeditions, in so far as this has been possible from the literature available. The plant names quoted in this chapter are those used in the reports of the various authors.

The Austro-Hungarian Expedition 1873—1874.

The first records of plants from Franz Josef Land are due to Julius Payer, one of the leaders of the Austro-Hungarian Expedition 1872—1874, which rediscovered the country in 1873, the Norwegian discoverers having left no description of the country and its natural history.

In the vessel 'Tegetthoff' Payer reached Wilczekøya at the south-eastern corner of the archipelago on Nov. 1, 1873. On landing, Payer found only traces of plants: "Unbeschreiblich dürftig war die Vegetation; sie schien nur auf wenige Flechten beschränkt" (Payer 1876, p. 159).

The expedition wintered on board the 'Tegetthoff' in the vicinity of Wilczekøya, and from March to May 1874 Payer undertook a sledge journey, crossing the archipelago, and reached the northernmost island, Rudolføya. In his book Payer says that he collected plants in several places, but in most cases he does not state the exact localities of his finds. Only once (Payer 1876, p. 348) does he mention the finding of phanerogams, viz. *Papaver nudicaule, Saxifraga oppositifolia* and *Silene acaulis* at Kapp Tirol the north-eastern promontory of Wiener Neustadtøya, April 18, 1874.

Payer's plants were not many, and the specimens were rather poor as stated by E. Fenzl and H. W. Reichard, who examined the botanical material of the expedition. Some of the plants were quite indeterminable, the specimens falling to pieces when unpacked. This is quite reasonable as the plants were mostly collected during the winter. 'Everything was 'dead' when Payer made his collection' (Fisher 1896, p. 563).

Besides one moss and nine lichens, Payer enumerates five flowering plants from Franz Josef Land (Payer 1876, p. 273):

Catabrosa algida (Soland.) Th. Fr.
Cerastium alpinum L.
Papaver nudicaule L.
Saxifraga oppositifolia L.
Silene acaulis L.

The first four species mentioned have since then been found in many places in Franz Josef Land. The record of *Silene acaulis* is, however, so far the only one from the archipelago. Payer's plants are said to have been preserved at the Museum of the 'Botanischer Garten der Universität' Wien (Payer 1876, p. 274). The present director of the Garden, Professor Erwin Janchen, has been good enough to make a search for the plants of Payer in the Viennese museums, but without success. The explanation is, we suppose, that the plants were so badly preserved that it was not found worth while to place them in the herbarium.

The botanical records of Payer were reviewed in Petermanns Mitteilungen (1876, p. 108), and in Just's Botanischer Jahresbericht (1882, p. 885).

Leigh Smith Expedition 1880.

The English explorer Leigh Smith visited Franz Josef Land in the steam yacht 'Eira' in 1880 and 1881—1882. In 1880 Leigh Smith visited a more westerly part of the country than did Payer in 1873. At Belløya, W. G. A. Grant, who accompanied Leigh Smith that year, collected on August 22, eleven phanerogams (not 12 as misstated by Fisher 1896, p. 563), eight of which were new to the country:

Alopecurus alpinus Sm.
Cochlearia fenestrata R. Br.
Poa flexuosa Wahlenb.
Ranunculus nivalis L.
Saxifraga caespitosa L.
— *cernua* L.
— *nivalis* L.
Stellaria sp.

The three others were *Cerastium alpinum* L., *Papaver nudicaule* L. and *Saxifraga oppositifolia* L.

We are here quoting the account of Grant's plant collecting (Markham 1881, p. 134):

'At noon of the 22nd, Mr. Grant went away for a long walk, and made a collection of plants, which as a first instalment partially illu-

strates the flora of this new region. His collection consists of nine species of flowering plants, two grasses, and a lichen. The former include the *Ranunculus nivalis,* a very common and widely distributed Arctic plant; the yellow poppy, *Papaver nudicaule,* which Dr. Brown called the hardiest of all Arctic plants, and one of the most widely distributed; four saxifrages *S. nivalis, S. caespitosa, S. cernua* and *S. oppositifolia,* a little *Stellaria,* the *Cerastium alpinum,* and the scurvy grass, *Cochlearia fenestrata.* The two grasses were *Alopecurus alpinus* and *Poa flexuosa,* the lichen *Peltidea aphtosa*'.

We have not seen Grant's plants, and do not know where they are kept if they still exist. The *Stellaria* must undoubtedly be referred to *Stellaria longipes* Goldie, the only *Stellaria* found in the country by later collectors. With regard to *Ranunculus* it is somewhat surprising that Markham termed it *R. nivalis.* As Markham does not mention *R. sulphureus,* now proved to be very common in Franz Josef Land, we consider it rather probable that he has mistaken *R. nivalis* for *R. sulphureus. Ranunculus sulphureus,* being closely related to *Ranunculus nivalis,* was in former days treated as a variety of this latter species, as was also done by Harry Fisher on the labels in the Herbarium of Copenhagen (see below).

Jackson-Harmsworth Expedition 1894—1897.

This expedition under the leadership of Frederick G. Jackson wintered for three years on Kapp Flora on the south coast, and mainly explored the western part of the archipelago.

The botanist of the expedition, Harry Fisher, brought together rich collections of both phanerogams and cryptogams. Fisher gathered his plants at the following localities: Kapp Neale, Kapp Crowther, Kapp Grant, Cooke Rocks (east of Kapp Grant), and Kapp Stephen[1] (all situated in the southern part of Prins Georgøya); Belløya; Mabeløya; Kapp Flora, Kapp Gjertrud and Kapp Barents (on Northbrookøya). In the last mentioned locality, Fisher found on Sept. 9, 1894 'one solitary flowering plant' (Fisher 1899 *b,* p. 549). This phanerogam from Kapp Barents was not identified: 'No phanerogams were seen except a solitary stunted grass, which was much too imperfect to identify' (Jackson 1899 I, p. 126).

Fisher gives only special localities for the more rare plants. As regards the others, he says (1899 *a,* p. 415): 'There are fourteen common Arctic plants, which find a home here in every possible place for a plant to grow'. He than gives the names of 10 of these species. In another paper (1899 *b,* p. 552) Fisher enumerates 16 common plants:

[1] On the map of Fiala (1907) it is called Stephens, but on referring to the orginal map by Leigh Smith the name was found spelt Stephen, wich will be retained.

'I need only mention the plants which are generally distributed — that is to say, on every cape and island from Cape Gertrude to Cape Neale, both included. They are all common in Arctic regions generally. *Ranunculus nivalis* L., *Papaver alpinum* L., *Cardamine bellidifolia* L., *Draba alpina* L., *Cochlearia anglica* L. var. *fenestrata* (Br.), *Stellaria* sp. *Cerastium alpium* L., *Saxifraga oppositifolia* L., *Saxifraga caespitosa,* L., *Saxifraga cernua* L., *Saxifraga rivularis* L., *Saxifraga nivalis* L., *Alopecurus alpinus* L., *Poa flexuosa* Wahl., *Poa vivipara* and *Dupontia Fisheri* R. Br.'. The latter species is at any rate not so common as stated above, and the expression 'that is to say, on every cape and island' must not be taken too literally. In the enumeration of the plants we have therefore not given all these localities for these species.

The investigations of Mr. Fisher greatly increased the number of Phanerogams from Franz Josef Land, and has up to now been the chief source of our knowledge about the flora of Franz Josef Land. Fisher himself says once (1899 *b,* p. 547, but dated Febr. 19, 1896) that he found 23 phanerogams in Franz Josef Land. He adds, however, (p. 548) that 'when 250 specimens of Draba from Franz Josef Land have all been examined, I shall find it necessary to increase the total number of species to 25 or 26'. In another paper (1896, p. 563) he says that he found 27 phanerogams in Franz Josef Land.

Fisher announced (1899 *a,* p. 419) that 'A full report is now ready for presentation to the Linnean Society of the flowering plants of Franz Josef Archipelago'. We have not succeeded in finding this report in the publications of the Linnean Society, and we are inclined to believe that Fisher meant the report printed in the book by Jackson: A Thousand Days in the Arctic. Vol. II, pp. 547—553.

The botanical collections of Fisher never seem to have been thoroughly worked up, and the results of his botanical investigations were only published fragmentarily. Thus Fisher in his 'full report' (see above), has only given the names of 21 of the 23 phanerogams indicated. As his nomenclature and treatment of the subject in general vary from paper to paper, we are not able to identify Fisher's plants in every case. We do not know where the main part of his collections is now to be found. We have, however, had the opportunity of examining a fairly complete set of duplicates of his phanerogams from Franz Josef Land, preserved in the Botanical Museum of the University of Copenhagen. These plants were labelled by Fisher himself, the labels being supplied with many useful notes and partly with other names than those used by Fisher in his publications. By studying his various papers, the plant specimens, and those names and notes in the Copenhagen Herbarium, we have been able to compile the following revised list of Fisher's phanerogams, containing 29 species.

Alopecurus alpinus Sm.
Cardamine bellidifolia L.
Cerastium hyperboreum Tolm.
— *Regelii* Ostenf.
Cochlearia groenlandica L.
Draba macrocarpa Adams.
— *oblongata* R. Br.
— *subcapitata* Simm.
Dupontia Fisheri R. Br.
Juncus biglumis L.
Luzula confusa Lindeb.
— *nivalis* Beurl.
Minuartia verna (L.) Hiern.
Papaver radicatum Rottb.
Phippsia algida (Soland.) R. Br.
Pleuropogon Sabinei R. Br.
Poa abbreviata R. Br.
— *alpigena* Lindm. × *rigens* Hartm.
— rigens *Hartm.*
Potentilla emarginata R. Br.
Ranunculus sulphureus Soland.
Sagina intermedia Fenzl.
Saxifraga cernua L.
— *comosa* (Retz.) Fellm.
— *groenlandica* L.
— *nivalis* L.
— *oppositifolia* L.
— *rivularis* L.
Stellaria longipes Goldie.

Four Species not formerly published, are here added to the plants of Fisher. Two of them, *Cerastium Regelii* and *Luzula confusa,* are both correctly interpreted by Fisher in the Copenhagen collection, respectively as *Cerastium alpinum* L. var. *caespitosum* Malmgr. and *Luzula hyperborea* R. Br. The remaining two, *Draba oblongata* and *Draba subcapitata,* are both treated by Fisher in his various papers as belonging to *Draba alpina.* These two species are also represented in the Copenhagen collection, the former termed *Draba leptopetala* Th. Fr., the latter *Draba Martinsiana* J. Gay.

Fisher thus adds, in all, 17 phanerogams to the flora of Franz Josef Land, the total number being increased to 30.

Nansen Expedition 1895.

From the Norwegian Polar Expedition of Fridtjof Nansen 1893—1896 we have a record of three flowering plants from Franz Josef Land. On their sledge journey across the Polar Sea in the summer of 1895, Nansen and Johansen reached the north coast of Franz Josef Land. They went ashore on the small island of Houenøya (between Karl Aleksanderøya and Hohenloheøya) on August 16, and there they observed flowering specimens of *Papaver radicatum, Saxifraga nivalis,* and a *Stellaria* growing amoing the stones (Nansen 1897 II, p. 207). The *Stellaria* is undoubtedly *Stellaria longipes* Goldie. Our thanks are due to Professor Jens Holmboe who has drawn our attention to this passage.

Duke of the Abruzzi Expedition 1899—1900.

An Italian Polar Expedition in the ship Stella Polare visited Franz Josef Land in 1899—1900. After having reached Kapp Flora on July 20, 1899, the ship forced its way to the northernmost island of the archi-

pelago, Rudolføya situated in about 81° 45′ N. Lat. There the expedition wintered and returned in August 1900, passing the last station, Kapp Flora, on August 31.

The plants collected by this expedition were gathered by Cavalli-Molinelli. The phanerogams were determined by S. Belli, most of them being collected at Alkeneset and Søilekapp on Rudolføya, a few also at Kapp Flora. They consisted of the following species (Belli 1903, pp. 643—647; in the reprint pp. 5—9):

Alopecurus alpinus Sm.
Catabrosa concinna Th. Fr.
Cerastium Edmondstoni Wats.
Cochlearia groenlandica L.
Draba corymbosa R. Br.
Papaver radicatum Rottb.
Ranunculus sulphureus Soland.
Saxifraga cernua L.
— *nivalis* L.
— *oppositifolia* L.
— *rivularis* L.
Stellaria longipes Goldie.

We here find a new species recorded, *Catabrosa concinna,* a record which seems to be somewhat problematic. We have discussed the matter on p. 34 in the enumeration of plants under *Phippsia concinna.* The *Draba corymbosa* R. Br. must be referred to *Draba macrocarpa* Adams.

The botanical results of the Italian expedition were reviewed by Mattirolo in 'Malpighia' Vol. 16, pp. 482—486 under the heading: La raccolte botaniche della Stella Polare. The phanerogams are enumerated on p. 483, but no exact localities are given. Vol. 16 of 'Malpighia' has the year 1902 printed on the title-page, the article of Mattirolo is, however, signed 'Torino Gennaio 1903' and printed that year.

'Yermak' Expedition 1901.

A Russian expedition in the ice-breaker 'Yermak' under the leadership of S. Makarov visted Franz Josef Land i 1901. According to I. V. Palibin (1903 p. 140) botanical material was collected in two localities: Kapp Flora in Northbrookøya on July 27 (old style) and in Hochstetterøya on August 2.

At Kapp Flora Palibin found the following plants (Palibin, pp. 141—142):

Alopecurus alpinus Sw.
Cochlearia officinalis L. *β groenlandica* Gel.
Draba alpina L.
Papaver radicatum Rottb.
Poa pratensis L. v. *alpigena* Blytt.
Ranunculus nivalis L.
Saxifraga caespitosa L.
— *cernua* L.
— *oppositifolia* L.
— *rivularis* L.
Stellaria longipes Goldie v. *humilis* Fzl.

In Hochstetterøya there seems to be a rather rich flora, 14 species being enumerated by Palibin (1903, p. 145):

Alopecurus alpinus Sm.
Catabrosa concinna Fr.
Cerastium alpinum L.
Draba alpina L.
Draba glacialis Ad.
(Dr. *aspera* Ad.)
Luzula arcuata Wahlb.
Papaver radicatum Rottb.
Poa pratensis L. v. *alpigena* Blytt.
Ranunculus nivalis L.
Saxifraga caespitosa L.
— *cernua* L.
— *oppositifolia* L.
— *rivularis* L.
Stellaria longipes Goldie v. *humilis* Fzl.

Ranunculus nivalis was probably mistaken for *R. sulphureus,* and *Catabrosa concinna* for *Phippsia algida. Draba alpina* and *D. glacialis* is in our list treated as *D. macrocarpa,* and *Poa pratensis* v. *alpigena* as *Poa alpigena* × *rigens.*

Various Expeditions 1901—1929.

A number of Russian expeditions visited Franz Josef Land in 1912—1914, 1915, 1927, 1928 and 1929. We find no records of phanerogams from these expeditions in the literature available; nor have we found any record of Franz Josef Land phanerogams from other expeditions during these years. From the Ziegler Expeditions of 1901—1902 and 1903—1905 we find the following note (Fleming 1907, p. VI): 'No discoveries were made in the flora of the Islands during the two brief summers of work.'

The Russian Expedition 1930.

A Russian expedition in the steamer 'Sedov' visited Franz Josef Land in 1930 and landed at Tikhaya Bay on the western side of Hookerøya on July 22. After having visited Northbrook-, Bell-, McClintock-, Aagaard- ('Aagadinsel') and Algerøya, the expedition returned on Aug. 3 to Novaya Zemlya (Samoilowitsch 1931, p. 58).

According to the preliminary report, the botanist of the expedition, Dr. V. P. Savicz, collected 20 species of flowering plants, including one new inhabitant of the flora, *Salix* sp. (Samoilowitsch, p. 61). There is every reason to believe that this *Salix* sp. is *Salix polaris* Wahlenb. which was also found (on Prins Georgøya) by the Norwegian expedition in 1930. As shown below, Samoilowitsch enumerates ten of the flowering plants. Except for the *Salix,* he gives no exact localities for the finds, and consequently we have not been able to insert any localities for these plants.

We are here quoting the passage dealing with the botanical investigations (Samoilowitsch, p. 61): 'Die bakteriologischen Arbeiten von Prof.

B. Issatschenko und die botanischen von V. Savicz bieten eine Grundlage zum Studium der Flora von Franz-Josef-Land. Es wurden zwanzig Arten von Blütenpflanzen, über fünfzig Arten von Moosen, über hundert von Flechten, marinen und Süsswasseralgen und Pilzen gesammelt sowie eine geobotanische Registrierung der Pflanzen durchgeführt. V. Savicz hat auf der Hookerinsel zum erstenmal die Polarweide (*Salix* sp.) gefunden, die sich auf dem Südabhange des Kap Sedow ausbreitet. Unter den Vogelbergen breitet sich eine dichte Grasdecke aus — dank des stark gedüngten Bodens —, darunter *Alopecurus alpinus, Poa alpigena, Cochlearia officinalis* f. *groenlandica* u. a. Sämtliche Abhänge sind mit einzelnen Büschen von *Papaver radicatum* und *Saxifraga oppositifolia, S. caespitosa, S. cernua, S. rivularis, Cochlearia officinalis* f. *groenlandica* — einem trefflichen Antiskorbutmittel — bedeckt. An Bächen oder dort, wo der Boden stark mit Wasser getränkt ist, sind *Ranunculus nivalis, Saxifraga cernua, S. rivularis* u. a. vorhanden.'

Ranunculus nivalis probably is mistaken for *Ranunculus sulphureus;* see also above p. 8. *Poa alpigena* possibly is *Poa alpigena* × *rigens.*

The Norwegian Expedition 1930.

The Norwegian Scientific Expedition to Franz Josef Land in 1930 in the sealer 'Bratvaag' of Ålesund was fitted out by *Norges Svalbard- og Ishavs-undersøkelser,* and was under the leadership of Dr. Gunnar Horn. The botanical work of the expedition was carried out by Olaf Hanssen [1].

After short visits to various places in Eastern Svalbard: Hopen and Kong Karls Land, August 3, Storøya, August 5, Kvitøya, August 5 and 6, and Victoriaøya, August 8, the 'Bratvaag' arrived at Kapp Forbes on Prins Georgøya (Franz Josef Land) on August 11.

During a fortnight in August the expedition landed at various points in Franz Josef Land. The last locality visited was Kapp Harmsworth (August 25). Thence the expedition returned to Norway via the islands visited on the outward voyage.

In the following list of botanical excursions made, the localities are enumerated in their order from west to east. The localities will be seen in the map, p. 4. Photos of some of the best localities visited by the Norwegian expedition are reproduced in the text (figs. 1—3).

Kapp Harmsworth on Aleksandraøya, which is the westernmost point of the Archipelago, was visited for a few hours on August 25. The ground consisted of boulders and pebbles with an exceedingly sparse vegetation comprising only two phanerogams, *Phippsia algida* and *Saxifraga cernua.* These are the first plants recorded from this island.

[1] The lichens collected in Franz Josef Land by Olaf Hanssen were worked up and published by Dr. Bernt Lynge (Lynge 1931).

The south-western point of Kapp Nansen in the western part of Prins Georgøya was visited on August 17, and two hours were spent in collecting plants. The basalt cliffs are covered with the beautiful red lichen *Caloplaca elegans,* as is also the case in most of the other localities visited in 1930. On a slope with a western aspect there were growing eight phanerogams, the most noteworthy one being *Luzula confusa.*

On the beach east of Kapp Nansen a longer excursion of five hours was made on August 21. There a very rich locality was found, harbouring rarer plants such as *Cardamine bellidifolia, Luzula nivalis, Minuartia verna* and *Potentilla emarginata.* The most remarkable finds

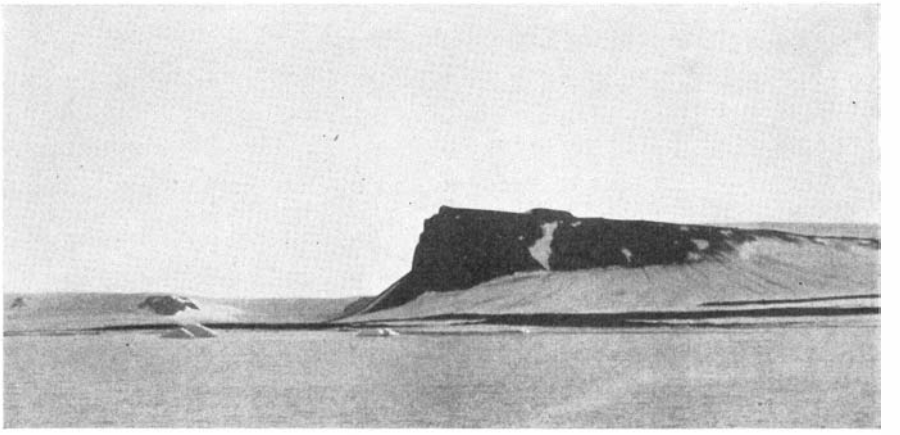

Fig. 1. Kapp Forbes. View to the West. Olaf Hanssen phot. Aug. 11, 1930.

there, however, were *Puccinellia angustata* and *Salix polaris,* both formerly being unknown in Franz Josef Land. 19 phanerogams were gathered here.

Kapp Stephen on the south coast of Prins Georgøya, was visited on August 11 at 11 p. m. Only a quarter of an hour was spent ashore here, and only four phanerogams were obtained, viz. *Phippsia algida, Ranunculus sulphureus, Saxifraga nivalis* and *Stellaria longipes.* It is worth noting that Fisher (1899 *b*, p. 550) says about Kapp Stephen: 'On the south-eastern side there are more species than on any other cape, the only absentee being *Pleuropogon.* On the other side of the cape it is extremely barren'. It was on this barren side that Olaf Hanssen collected his plants on Aug. 11.

The same day a four-hours' excursion was made on Kapp Forbes across the raised beaches, consisting chiefly of pebbles, to the bird-cliffs, the cape itself. In the talus below the cliff there was found a luxuriant and rich flora, one of the richest located in Franz Josef Land. The most luxurious vegetation was found on the stony slopes about 50 metres

above sea-level. There were splendid specimens of *Alopecurus alpinus, Cerastium hyperboreum, Papaver radicatum, Puccinellia angustata* and *Saxifraga cernua.* 21 phanerogams were gathered here, the greatest number at any of the nine localities visited in Franz Josef Land in 1930.

Eirahamna on the north side of Belløya, August 17. Duration of excursion: three hours. The vegetation on the pebble deposits was rather sparse, only seven common species being found.

Kapp Flora at the westernmost point of Northbrookøya was visited on August 16, and during a four-hours' excursion 11 species were collected. On the sites of the old huts was found in abundance the

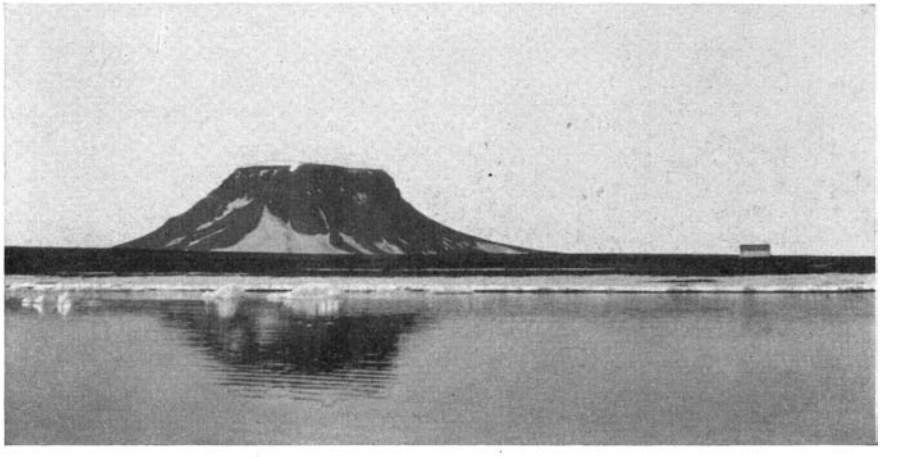

Fig. 2. Belløya from the North. The house of Leigh Smith to the right. A. Sørensen phot. Aug. 17, 1930.

most luxuriantly developed *Saxifraga cernua.* In an almost dry oozy pool was found a single flowering specimen of *Pleuropogon Sabinei,* hitherto only known from Mabeløya.

In Vinddalen (Windy Gully) a four-hours' excursion was made on August 12. Small sterile tufts of *Cerastium Regelii* were found everywhere on the clayey ground. The vegetation here was very poor, with only nine species.

Camp Ziegler on the south-east side of Algerøya was visited on August 15. Three hours were spent here on the beach of the south-eastern part of the island. *Papaver radicatum* was well developed here, growing in abundant numbers on morainic gravel. On the bank of a small glacier brook was found a colony of *Oxyria digyna,* not formerly known from that country. *Draba macrocarpa* and *Poa abbreviata* were found in small numbers at the same brook. Otherwise the vegetation was comparatively poor with only 12 species.

During the Norwegian expedition of 1930 a total of 31 phanerogams was found in Franz Josef Land:

Alopecurus alpinus Sm.
Cardamine bellidifolia L.
Cerastium hyperboreum Tolm.
— *Regelii* Ostenf.
Cochlearia groenlandica L.
Draba lactea Adams.
— *macrocarpa* Adams.
— *oblongata* R. Br.
— *subcapitata* Simm.
Pleuropogon Sabinei R. Br.
Poa abbreviata R. Br.
— *alpigena* Lindm. × *rigens* Hartm.
— *rigens* Hartm.
Potentilla emarginata R. Br.
Puccinellia angustata R. Br.
Ranunculus sulphureus Soland.
Salix polaris Wahlenb.

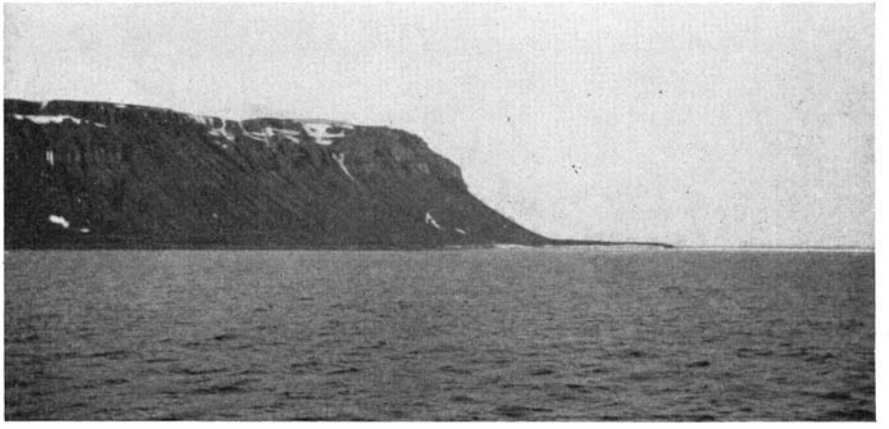

Fig. 3. Kapp Flora from the West. G. Horn phot. Aug. 16, 1930.

Luzula confusa Lindeb.
— nivalis *Beurl.*
Saxifraga cernua L.
Minuartia verna (L.) Hiern.
Oxyria digyna (L.) Hill.
Papaver radicatum Rottb.
Phippsia algida (Soland.) R. Br.
Saxifraga comosa (Retz.) Fellm.
— *groenlandica* L.
— *nivalis* L.
— *oppositifolia* L.
— *rivularis* L.
— *tenuis* (Wahlenb.) H.Smith.
Stellaria longipes Goldie.

Five of these species were new in Franz Josef Land, viz. *Draba lactea, Oxyria digyna, Puccinellia angustata, Salix polaris* (also found by the Russian expedition in 1930) and *Saxifraga tenuis*. Thus the number of phanerogams of Franz Josef Land was increased to 36.

The plants collected during the expedition in 1930 were presented by *Norges Svalbard- og Ishavs-undersøkelser* to the Botanical Museum of the University of Oslo.

Enumeration of The Flowering Plants of Franz Josef Land.

In order to get a general view of the distribution of flowering plants in Franz Josef Land, we have here listed together our localities from 1930 and all known localities of the older expeditions. Under each species the localities are arranged in their order from west to east and north. The localities will be seen on the map p. 4. The following localities are not inserted in the map: Cooke Rocks, situated on the western side of the bay between Kapp Grant and Kapp Stephen. Houenøya, one of the small islets between Karl Aleksander- and Hohenloheøya. Kapp Tirol, the northeastern promontory of Wiener Neustadtøya. Kapp Sedov on Hookerøya.

The collectors are indicated thus:

J. P., Julius Payer, 1874.
W. G., W. G. A. Grant, 1880.
H. F., Harry Fisher, 1894—1897.
F. N., Fridtjof Nansen, 1895.
C. M., Cavalli-Molinelli, 1899—1900.
I. P., I. V. Palibin, 1901.
V. S., V. P. Savicz, 1930.
O. H., Olaf Hanssen, 1930.

The Copenhagen herbarium is quoted as Herb. Copenh.

Dicotyledones.

1. *Ranunculus sulphureus Soland.*

East of Kapp Nansen, Aug. 21, 1930 O. H.

Cooke Rocks, Aug. 8, 1895 H. F. Herb. Copenh.

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550; Aug. 11, 1930 O. H.)

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134, sub nomen *Ranunculus nivalis* L.).

Kapp Flora, July 10, 1895 H. F. and July 11, 1896 H. F. Herb. Copenh. (sub nomen *Ranunculus nivalis* L. *β sulphureus* Sol.); July 22, 1899 C. M. (Belli 1903, p. 645); July 27, 1901 I. P. (Palibin 1903, p. 141, sub nomen *Ranunculus nivalis* L.); Aug. 16, 1930 O. H.

Camp Ziegler, Aug. 15, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145, sub nomen *Ranunculus nivalis* L.).

Generally distributed in Franz Josef Land (Fisher 1899 *b,* p. 552, sub nomen *Ranunculus nivalis* L.). In 1930 it was found in abundance in five localities, everywhere flowering abundantly.

Markham records *Ranunculus nivalis* from Belløya, Palibin from Kapp Flora, and Hochstetterøya, and Samoilowitsch records it from Franz Josef Land in general, see pp. 7, 11, 12 and 13. As shown on p. 8 there is every reason to believe that these records refer to *Ranunculus sulphureus* and that, at least for the present, *Ranunculus nivalis* should not be included in the flora of Franz Josef Land.

2. *Saxifraga cernua* L.

Kapp Harmsworth, Aug. 25, 1930 O. H.

Kapp Nansen, Aug.17, 1930 O. H.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, 1895 H. F. (Jackson 1899 I, p. 343).

Kapp Grant, Aug. 5, 1895 H. F. (Jackson 1899 I, p. 334).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b,* p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134).

Kapp Flora, Aug. 13, 1895 H. F. and July 5, 1896 H. F. Herb. Copenh. (Jackson 1899 I, p. 127); July 27, 1901, I. P. (Palibin 1903, p. 142); Aug. 16, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145).

Alkeneset and Søilekapp in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 644).

Generally distributed in Franz Josef Land (Fisher 1899 *b*, p. 552). Growing almost everywhere on morainic gravel and stony slopes as well as on the nutritive soil under bird-cliffs, where it is strongly developed. The best developed specimens were seen on the sites of the old huts of Kapp Flora. Specimens measuring up to 24 cm in height were found here in 1930.

3. *Saxifraga comosa* (Retz.) Fellm.

Saxifraga stellaris L. var. *comosa* Retz.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Stephen, Aug. 7, 1895 H. F. Herb. Copenh.

Kapp Forbes, Aug. 11, 1930 O. H.

Mabeløya, Aug. 11, 1895 H. F. Herb. Copenh.

Kapp Gjertrud, June 1896 H. F. (Fisher 1899 *b*, p. 549, sub nomen *Saxifraga stellaris* L. var. *vivipara*; Jackson I, p. 304).

Growing in wet places and rather sparsely. Flowers were never seen. At Kapp Gjertrud *Saxifraga comosa* 'grows on a little stony bank on the raised beach about twenty feet above sea-level and about four hundred yards from the edge of the present sea-shore' (Fisher 1899 *b*, p. 549).

The northern limit of *Saxifraga comosa* was assumed to be in Franz Josef Land (Fisher 1899 *a*, p. 418). Later on this *Saxifraga* was found further north in Greenland (Ostenfeld 1923, p. 227).

4. *Saxifraga groenlandica* L.

Saxifraga caespitosa L.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh. (sub nomen *Saxifraga caespitosa* L. f. *decipiens* Ehrh.).

Cooke Rocks, Aug. 6, 1895 H. F. Herb. Copenh. (as above).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134, sub nomen *Saxifraga caespitosa*); Aug. 17, 1930 O. H.

Kapp Flora, June 6, 1895 Herb. Copenh. (as above); July 27, 1901 I. P. (Palibin 1903, p. 142, sub nomen *Saxifraga caespitosa* L.).

Kapp Gjertrud, June 1896 H. F. Herb. Copenh. (as above).

Camp Ziegler, Aug. 15, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145, as above).

Generally distributed in Franz Josef Land (Fisher 1899 *b*, p. 552, sub nomen *Saxifraga caespitosa* L.). In our opinion this species is less common than *Saxifraga cernua* and *S. oppositifolia*. It does not require much of a growing place and seems to prefer morainic gravel.

5. *Saxifraga nivalis* L.

Kapp Nansen, Aug. 17, 1930 O. H.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh.

Cooke Rocks, Aug. 6, 1895 H. F. Herb. Copenh.

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550); Aug. 11, 1930 O. H.

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134); Aug. 17, 1930 O. H.

Kapp Flora, June 20, 1895 H. F. and July 1896 H. F. Herb. Copenh.

Camp Ziegler, Aug. 15, 1930 O. H.

Houenøya, Aug. 16, 1895 F. N. (Nansen 1897 I, p. 207).

Alkeneset and Søilekapp in Rudolføya, July 1899 C. M. (Belli 1903, p. 643).

Generally distributed in Franz Josef Land (Fisher 1899 *b*, p. 553). We had the same impression of the distribution of this plant in 1930. In the localities visited it seemed, however, to occur somewhat sparsely. The most luxuriant specimens were found below the bird-cliffs, elsewhere it grows on moraines and in rocky places, not too moist.

The basal leaves of some specimens of *Saxifraga nivalis* gathered east of Kapp Nansen, Aug. 21, 1930 were infested by the rust fungus *Puccinia saxifragae* Schlecht. (det. Ivar Jørstad). As far as we know this is the first record of an Uredinée from Franz Josef Land.

6. *Saxifraga oppositifolia* L.

Kapp Nansen, Aug. 17, 1930 O. H.

Kapp Neale, July 23, 1895 H. F. (Fisher 1899 *b*, p. 552; Jackson 1899 I, pp. 334 and 348).

Kapp Crowther, H. F. (Jackson 1899 I, p. 336).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134).

Kapp Flora, East side, Aug. 19, 1895 H. F. and July 1896 H. F. Herb. Copenh. (Jackson 1899 I, p. 127); July 27, 1901 I. P. (Palibin 1903, p. 142); West side, Aug. 16, 1930 O. H.

Vinddalen, aug. 12, 1930 O. H.

Camp Ziegler, Aug. 15, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145).

Kapp Tirol in Wiener Neustadtøya, April 28, 1874 J. P. (Payer 1876, p. 348).

Alkeneset in Rudolføya, July 5, 1899 C. M. and Aug. 1899 C. M. (Belli 1903, p. 643).

Søilekapp in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 643).

Generally distributed in Franz Josef Land (Fisher 1899 *b*, p. 552). Under the locality Cape Neale, Fisher notes that '*Saxifraga oppositifolia* is much scarcer here than on any other cape. It is worthy of remark that this plant is scarce on all the three most western capes. There is more on the plateau at the summit of Cape Neale (altitude 700 feet by aneroid) than there is on the beaches below. There is apparently no reason why this should be so'.

In 1930 this *Saxifraga* proved to be common and abundant in most places, thus also on Kapp Nansen situated far west. It grows right up to the glaciers, and was the plant that reached the highest altitude on Kapp Forbes. Appears to prefer lean soil on moraines and gravel, and is rather scarce below the bird-cliffs. Everywhere bearing flowers or more or less mature capsules.

7. *Saxifraga rivularis* L.

Kapp Nansen, Aug. 17, 1930 O. H.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, H. F. (Jackson 1899 I, p. 348).

Kapp Crowther, July 1895 H. F. Herb. Copenh.

Kapp Grant, Aug. 5, 1895 H. F. Herb. Copenh.

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Kapp Flora, July 5, 1896 H. F. Herb. Copenh.; July 27, 1901 I. P. (Palibin 1903, p. 142).

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145).

Alkeneset in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 644).

Common and generally distributed in Franz Josef Land (Fisher 1899 *a*, p. 416 and 1899 *b*, p. 553). In 1930 *Saxifraga rivularis* was found rather scantily at the localities visited. Grows in wet mosses.

8. *Saxifraga tenuis* (Wahlenb.) H. Smith.

Saxifraga nivalis L. var. *tenuis* Wahlenb.

Kapp Forbes, Aug. 11, 1930 O. H.

A single specimen was found among the collection of *Saxifraga nivalis* which were brought home from Kapp Forbes. *Saxifraga tenuis* is an easily distinguishable plant when found in flowering or fruiting state. In the Copenhagen collection there is a specimen of a *Saxifraga* with no stem, collected by Fisher on Kapp Forbes June 20, 1895, the radical leaves of which somewat resemble *Saxifraga tenuis*. Through the failure of a definitive determination of this plant, we have referred it to the more common species *Saxifraga nivalis*.

9. *Potentilla emarginata* Pursh.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Grant, Aug. 5, 1895 H. F. (Jackson 1899 I, p. 370).

Cooke Rocks, Aug. 7, 1895 H. F. (Fisher 1899 *b*, p. 551).

Kapp Stephen, Aug. 8, 1895 H. F. Herb. Copenh. (Jackson 1899 I, p. 373; Fisher 1899 *b*, p. 551).

Mabeløya, Aug. 10, 1895 H. F. (A single specimen, Fisher 1899 *b*, p. 550).

Fisher has not determined his *Potentilla* more closely, he only calls it *Potentilla* sp. His specimen in Copenhagen is *Potentilla emarginata,* and we have taken it for granted that it is the same species, he has found also in the other localities. Fisher found it first at Cooke Rocks, 'It was on this beach that I first noticed *Potentilla,* about a dozen plants on dry sandy soil, close to the crumbling edge'. At Kapp Stephen it was 'much more luxuriant than elsewhere in this part of Franz Josef Land' (Fisher 1899 *b*, p. 551). At Kapp Nansen it grows on dry slopes, and there it was flowering abundantly in August 1930.

Potentilla emarginata seems to be rather scarce in Franz Josef Land and is hitherto only observed west of Kapp Flora. In Svalbard and Nowaya Zemlya some other *Potentillas* occur. One would think that such a plant as *Potentilla pulchella* R. Br. will eventually also be found in Franz Josef Land.

10. *Papaver radicatum* Rottb.

Papaver nudicaule L. p. p.

Kapp Nansen, Aug. 17, 1930 O. H.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh.

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134, sub nomen *Papaver nudicaule*); Aug. 17, 1930 O. H.

Kapp Flora, Aug. 14, and Aug. 15, 1895 H. F. and July 3, 1896 H. F. Herb. Copenh.; July 22, 1899 C. M. (Belli 1903, p. 645); July 27, 1901 I. P. (Palibin 1903, p. 142).

Vinddalen, Aug. 22, 1930 O. H.

Camp Ziegler, Aug. 15, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145).

Kapp Tirol in Wiener Neustadtøya, April 18, 1874 J. P. (Payer 1876, p. 348, sub nomen *Papaver nudicaule*).

Houenøya, Aug. 16, 1895 F. N. (Nansen 1897 II, p. 207, sub nomen *Papaver nudicaule*).

Alkeneset and Søilekapp in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 645).

Common and generally distributed in Franz Josef Land (Fisher 1899 *a*, p. 416, sub nomen *Papaver nudicaule;* 1899 *b,* p.452, sub nomen *Papaver alpinum* L.).

When flowering, *Papaver radicatum* is an easily noticeable plant, which may perhaps be characterized as the most common phanerogam in Franz Josef Land. It grows everywhere on clayey or morainic ground on the level tundra as well as in slopes and talus. Only near the bird-

cliffs does it seem to be somewhat scarcer. At Kapp Neale *Papaver* was found on the plateau of the summit of the mountain 700 feet above sea-level (Jackson 1899 I, p. 343), to the east of Kapp Nansen it was found up to 140 metres above sea-level (O. H. 1930).

The flowers are usually of a deep sulphureous colour. The colour may, however, sometimes be paler, without, however, turning quite white. The petals of the largest flower found in 1930 measured 38 mm in length.

Lundström (1923), Tolmatchew (1923 and 1927), and especially Nordhagen (1931), treat *Papaver radicatum* as a very polymorphus plant which should be divided into several species. As the colour of the juice was not examined, and no matured capsules were obtained, we have not succeeded in interpreting the *Papaver* of Franz Josef Land otherwise than in the wider sense under the name of *Papaver radicatum* Rottb. Judging from the general appearance, the hairs and the form of the leaves, we are inclined to believe that it is the same as, or at any rate very closely related to, the *Papaver* found in Svalbard.

11. *Cardamine bellidifolia* L.

East of Kapp Nansen, Aug. 21, 1930 O. H.
Kapp Neale, July 24, 1895 H. F. Herb. Copenh.
Kapp Grant, Aug. 5, 1895 H. F. (Jackson 1899 I, p. 329).
Cooke Rocks, Aug. 6—7, 1895 H. F. Herb. Copenh.
Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b,* p. 550).
Kapp Flora, July 9, 1896 H. F. Herb. Copenh.

Common and generally distributed in Franz Josef Land (Fisher 1899 *a,* p. 416 and 1899 *b,* p. 552).

In 1930 *Cardamine* was found once, on Kapp Nansen, where it was growing in dry talus under the bird-cliffs. It was here flowering abundantly.

12. *Cochlearia groenlandica* L.

Cochlearia officinalis L. var. *groenlandica* L.
Cochlearia fenestrata R. Br.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh. (sub nomen *Cochlearia fenestrata* R. Br.).

Kapp Grant, Aug. 5, 1895 H. F. (Fisher 1899 *b*, p. 551, sub nomen *Cochlearia anglica,* L. var. *fenestrata* R. Br.).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134, sub nomen *Cochlearia fenestrata.*)

Kapp Flora, July 22, 1899 C. M. (Belli 1903, p. 644, sub nomen *Cochlearia officinalis* var. *groenlandica* L.); July 27, 1901 I. P. (Palibin 1903, p. 141, sub nomen *C. officinalis* L. *β groenlandica* Gel.); Aug. 11, 1930 O. H.

Vinddalen, Aug. 12, 1930 O. H.

Camp Ziegler, Aug. 15, 1930 O. H.

Alkeneset and Søilekapp in Rudolføya, July—Aug. 1899 C. M. (Belli 1903, p. 644).

Common and generally distributed in Franz Josef Land (Fisher 1899 *a*, p.416, sub nomen *Cochlearia fenestrata,* and 1899 *b,* p. 552, sub nomen *Cochlearia anglica* L. var. *fenestrata* (Br.). In 1930 it was found rather scarce in four localities, growing in gravel and between stones. The most luxuriant specimens were found under the bird-cliffs. *Cochlearia* is fruiting abundantly in Franz Josef Land.

13. *Draba lactea* Adams.

Draba Wahlenbergii Hartm.

Kapp Forbes, Aug. 11, 1930 O. H.

Three specimens with flowers and young fruits were gathered under the bird-cliffs, growing together with *Draba oblongata* and *Draba subcapitata.*

14. *Draba macrocarpa* Adams.

Draba glacialis Auctt., non Adams 1817. *Draba lasiocarpa* Adams 1834, non Rochel 1819. *Draba alpina* L. f. *glacialis* Kjellm. 1882. *Draba alpina* L. var. *Adamsii* O. E. Schulz 1927, non *Draba Adamsii* Ledeb. 1842. Icon.: Ekman 1926, Taf. 3. Nr. 10 and 13; Lynge 1929, Pl. II, fig. 4; Tolmatchew 1931, figures 1 and 2.

Kapp Neale, July 24, 1895 H. F. (Jackson 1899 I, pp. 343 and 348, sub nomen *Draba alpina*).

Kapp Grant, July 19, 1895 H. F. (Jackson 1899 I, p. 334, sub nomen *Draba alpina*).

Kapp Flora, July 10, 1895 H. F. Herb. Copenh. (one specimen together with two specimens of *Draba oblongata* R. Br., sub nomen *Draba leptopetala* Th. Fr.); July 27, 1901 I. P. (Palibin 1903, p. 142, sub nomen *Draba alpina* L.).

Camp Ziegler, Aug. 15, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145, sub nomen *Draba alpina* L. and *Draba glacialis* Ad. (*Dr. aspera* Ad.)).

Alkeneset and Søilekapp in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 645, sub nomen *Draba corymbosa* R. Br.).

Common, and generally distributed in Franz Josef Land (Fisher 1899 *a,* p. 416 and 1899 *b*, p. 552, sub nomen *Draba alpina* L.).

We had some trouble in inferpreting the above-quoted specimens. This yellow-flowered Arctic *Draba* with hairy siliculae has in course of time been treated in widely different manners, passing under a series of names; see above. It was also often confounded or connected with other yellow-flowered species, such as *Draba barbata* Pohle, *Draba Bellii* Holm, *Draba corymbosa* R. Br. and *Draba oblongata* R. Br.

Our *Draba* is of a certainty identical with the *Draba* which by F. R. Kjellman was named *Draba alpina* L. f. *glacialis*. As the epithet *glacialis*

Fig. 4. *Draba macrocarpa* Adams from Camp Ziegler. Vertical view of the tuft. Nat. size.

was used by Adams for another *Draba,*we made a search for a fresh name. Quite recently, however, Dr. A. Tolmatchew of Leningrad, who has done much excellent research work on Arctic plants, restored the old name *Draba macrocarpa* of Adams to the *Draba alpina* L. f. *glacialis* Kjellm. (Tolmatchew 1931, p. 223). The arguments of Tolmatchew seem to be well founded, and we interpret our specimens as *Draba macrocarpa.*

Tolmatchew (1931, p. 224) points out the differences between the genuine *Draba alpina* L. and *Draba macrocarpa* Adams (i. e. *Draba alpina* L. f. *glacialis* Kjellm.). We shall supplement the scheme of Tolmatchew with some characters derived from the Franz Josef Land specimens. Tufts very densely caespitose. Leaves smaller than in

Draba alpina, 2—3 mm broad. Stems very short, not exceeding the radical leaves. Petioles pilous all round, not glabrous at the upper side as is often the case in *Draba alpina.* Siliculae broad at the base, as in *Draba alpina,* but tapering a little less at the top. Stigma broader, coronate. The exterior of the specimens found in Franz Josef Land closely resembles that of sterile tufts of *Cerastium Regelii,* see figs. 4 and 5.

It may be noted that the siliculae of *Draba alpina* in Scandinavia are usually somewhat narrower at the base than in high Arctic speci-

Fig. 5. *Draba macrocarpa* Adams from Camp Ziegler. A split tuft. Nat. size.

mens. In this respect our *Draba* corresponds with the Arctic form of *Draba alpina.* Sometimes *Draba alpina* may have some short pilous at the margin of the young siliculae. These pilous soon fall off, leaving the mature siliculae quite glabrous. In our *Draba,* on the contrary, the pilous of the siliculae seems to grow out gradually, the young siliculae being almost glabrous, the mature siliculae being strongly hispid all over. The same is the case in *Draba Kjellmanii* Lid (Ekman 1931, p. 478).

As for the geographical distribution of *Draba macrocarpa,* Tolmatchew states (1931, p. 226) that it occurs in Siberia [1], in Arctic America

[1] *Draba alpina* L. var. *Adamsii* (Ledeb.) O. E. Schulz from Maud Harbour and Four Pillar Island (Lynge 1929 p. 7) must be referred to *Draba macrocarpa* Adams, according to manuscript notes by Tolmatchew 1929.

and in Greenland. On the other hand, it seems to be lacking in Svalbard and Novaya Zemlya (1931, p. 228). In Franz Josef Land *Draba macrocarpa* seems to be a rather common plant. We have seen specimens from Kapp Flora and Camp Ziegler (Herb. Copenhagen and Oslo). The other finds in Franz Josef Land quoted above may probably be referred to *Draba macrocarpa*. There is, however, a possibility that some of the finds should be referred to the genuine *Draba alpina* L.

Our specimens from Camp Ziegler were flowering abundantly in the middle of August 1930. The same specimens also wear siliculae containing mature seeds from the preceding year, see figs. 4 and 5.

15. *Draba oblongata* R. Br.

Draba leptopetala Th. Fr. p. p.

Cooke Rocks, Aug. 6—7, 1895 H. F. Herb. Copenh. (sub nomen *Draba leptopetala* Th. Fr.).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, aug. 17, 1930 O. H.

Kapp Flora two gatherings in Herb. Copenh., Aug. 14 and 29, 1895 H. F. (sub nomen *Draba leptopetala* Th. Fr.).

Vinddalen, Aug. 12, 1930 O. H.

The specimens collected in 1930 were growing in dry places below the bird-cliffs on Kapp Forbes, in Belløya and Vinddalen in morainic gravel.

The first gathering of Harry Fisher on Kapp Flora, Aug. 14, 1895, consists in the Copenhagen collection of two typical specimens in fruit, labelled thus (three labels): '1. ? *D. Adamsii* Ledeb.' '1. *Draba oblongata* R. Br. Must not stand as a species. The material is in a far too bad state to name it. No flowers were ever seen, therefore we do not know that *D. oblongata* was not *hirta*. The British Museum specimens are worthless. H. Fisher.' '*Draba leptopetala* Th. Fr.'

The second gathering of Harry Fisher on Kapp Flora, Aug. 29, 1895, one typical specimen in flowering state (together with one specimen of *Draba macrocarpa*) is labelled thus: '2. This is quite as good a species as many of the Arctic plants. The petals are yellow, but that is about the only resemblance to *alpina*. If this is not a species, then there must be very few species in the Arctic regions H. F.' '*Draba leptopetala* Th. Fr.'

From these notes in the herbarium of Copenhagen it will be seen that Fisher finally interpreted his specimens quite correctly as *Draba leptopetala* Th. Fr., which unquestionably is a synonym of *Draba oblongata* R. Br.

16. *Draba subcapitata* Simm.

Draba Martinsiana Gay p. p.

Kapp Forbes, Aug. 11, 1930 O. H.

Kapp Flora, two gatherings in Herb. Copenh., Aug. 13, 1895 and July 1896 H. F. (sub nomen *Draba Martinsiana* J. Gay.).

Vinddalen, Aug. 12, 1930 O. H.

The specimens from Kapp Forbes were found below the bird-cliffs. Both this and the other species of *Draba* appear to have a scattered occurrence in Franz Josef Land, and only few specimens were seen in 1930.

17. *Cerastium hyperboreum* Tolm.

Cerastium alpinum L. p. p., *C. Edmonstonii* Wats. p. p.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh. (sub nomen *Cerastium alpinum*).

Kapp Grant, Aug. 5, 1895 H. F. Herb. Copenh. (sub nomen *Cerastium alpinum;* five specimens with three specimens of *Cerastium Regelii* Ostenf.).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 leg. W. G. (Markham 1881, p. 134, sub nomen *Cerastium alpinum*); Aug. 17, 1930 O. H.

Kapp Flora, July 22, 1899 C. M. (Belli 1903, p. 646, sub nomen *Cerastium Edmonstoni* Wats.).

Camp Ziegler, Aug. 15, 1930 0. H.

Hochstetterøya, Aug. 2, 1901, I. P. (Palibin 1903, p. 145, sub nomen *Cerastium alpinum* L.).

Alkeneset and Søilekapp in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 646, sub nomen *Cerastium Edmonstoni* Wats.).

Common and generally distributed in Franz Josef Land (Fisher 1899 *a*, p. 416 and 1899 *b*, p. 552, sub nomen *Cerastium alpinum* L.). Also in 1930 it was found to be a common plant, especially in slopes and talus near the bird-cliffs, often growing in large tufts together with *Stellaria longipes*.

We have seen no specimen of *Cerastium alpinum* L. proper from Franz Josef Land, all specimens formerly referred to that species, are, in our opinion, either *Cerastium hyperboreum* or *Cerastium Regelii*. The absence of *Cerastium alpinum* L. in Franz Josef Land was pointed out by Tolmatchew (1930, p. 8).

In the Botanical Museum of Oslo there is a large assemblage of specimens of *Cerastium hyperboreum* from Franz Josef Land, Novaya Zemlya, Svalbard, Jan Mayen and East Greenland.

18. *Cerastium Regelii* Ostenf.

Cerastium alpinum L. var. *caespitosum* Malmgr.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Grant, Aug. 5, 1895 H. F. Herb. Copenh. (sub nomen *Cerastium alpinum*).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 17, 1930 O. H.

Kapp Flora, July 5, 1895 and July 11, 1896 H. F. Herb. Copenh. (sub nomen *Cerastium alpinum* L. var. *caespitosum* Malmgr.); Aug. 16, 1930 O. H.

Vinddalen, Aug. 12, 1930 O. H.

Camp Ziegler, Aug. 15, 1930 O. H.

Cerastium Regelii is a fairly common plant in Franz Josef Land, growing in gravel and on clayey ground, but also in mossy slopes and under bird-cliffs. Usually only sterile tufts were found, and only once, in Kapp Forbes, flowering specimens were obtained in the summer 1930.

There is every reason to believe that 'The baldleaved *Cerastium*' of Franz Josef Land (Fisher 1898, p. 136) must be referred to *Cerastium Regelii.*

19. *Minuartia verna* (L.) Hiern.

Alsine verna (L.) Wahlenb.

Arenaria sulcata Schlecht.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 Herb. Copenh. (sub nomen *Arenaria verna* L. var. *rubella* (Wahlenb.) Hook. f.).

Kapp Stephen 1895 H. F. (Cfr. Fisher 1899 *b*, p. 550).

Fisher relates (1899 *a*, p. 416) that he found '*Arenaria sulcata* Schlecht, on three capes, but very scarce indeed'. One of these capes is Kapp Neale, according to specimens preserved in Copenhagen. The second cape is unquestionably Kapp Stephen, of which Fisher (1899 *b*, p. 550) says: 'On the south-eastern side there are more species than on any other cape, the only absentee being *Pleuropogon*'. We have not been able to localize the third cape.

East of Kapp Nansen *Minuartia verna* grew sparingly in dry slopes along with *Potentilla emarginata.* Some specimens have mature seed.

The specimens obtained in Franz Josef Land consist of small compact tufts with very short stems. They correspond exactly with specimens found in Svalbard and Jan Mayen, representing a form which is rather dissimilar from Scandinavian ones.

20. *Sagina intermedia* Fenzl.

Sagina nivalis (Lindbl.) Th. Fr.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh. (sub nomen *Sagina nivalis* (Lindb.) Fries.).

Cooke Rocks 1895 (Fisher 1899 *b*, p. 551, sub nomen *Sagina*).

In the Copenhagen collection there are two small specimens from Kapp Neale. On the label Fisher has noted: 'The most northern station for this plant. Extremely rare. H. F.' The absolute northern limit of this plant is now to be found in Greenland, see p. 38.

In one instance Fisher (1899 *a*, p. 416) names this species '*Sagina Linnæi* Presl., on Cape Neale only.' In a note (1899 *a*, p. 418) Fisher relates that he has concluded a long examination of the flowering plants of Franz Josef Land. He now calls the plant *Sagina nivalis* Fr. Later on (1899 *b*, p. 551) Fisher does not mention *Sagina* under the locality Kapp Neale. Here he mentions, however, a 'sagina' (without any epithet) for the locality Cooke Rocks. This is perhaps due to a mistake.

21. *Silene acaulis* L.

Kapp Tirol in Wiener Neustadtøya, April 4, 1874 J. P. (Payer 1876, pp. 273 and 348; Petermann 1876, p. 208; Just 1882, p. 885).

As mentioned on p. 7, we have not seen Payer's specimens. Dr. Erwin Janchen of Vienna, in a letter dated February 23, 1931, writes us about this matter: 'Wegen der *Silene acaulis* aus dem Franz-Josefs-Land kann ich Ihnen leider keine Mitteilungen machen, da mir nicht einmal bekannt ist, in welche der Wiener Sammlungen die Pflanzen vom Franz-Josefs-Land seinerzeit gekommen sind. Im Herbarium unseres Institutes habe ich keine *Silene acaulis* von dort gefunden. Im Herbarium der botanischen Abteilung des Naturhistorischen Museums sind nach Mitteilung des Herrn Karl Heinz Rechinger gleichfalls keine Pflanzen vom Franz-Josefs-Land (wohl aber sehr viele andere arktische Pflanzen, auch *Silene acaulis)* vorhanden; trotzdem hat der Genannte das ganze umfangreiche Material von *Silene acaulis* genau durchgesehen und sich überzeugt, daß auch dieses eine gesuchte Stück dort tätsächlich fehlt.'

From this it seems that the plants of Payer have gone astray or are lost. As *Silene acaulis* is an easily distinguishable plant, we take it for granted that the determination by Fenzl and Reichart is correct; the more so as *Silene acaulis* in the adjacent regions, Novaya Zemlya and Svalbard, is quite a common plant, extending far north.

22. *Stellaria longipes* Goldie.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 23, 1895 H. F. (Fisher 1899 *b*, p. 552, sub nomen *Stellaria* sp.).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550); Aug. 11, 1930 O. H.

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134, sub nomen 'a little *Stellaria*'); Aug. 17, 1930 O. H.

Kapp Flora, sept. 1894 H. F. Herb. Copenh.; July 27, 1901 I. P. (Palibin 1903, p. 142); Aug. 16, 1930 O. H.

Vinddalen, Aug. 12, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145).

Houenøya, Aug. 16, 1895 F. N. (Nansen 1897 II, p. 207, sub nomen '*en Stellaria*'.

Alkeneset and Søilekapp in Rudolføya, Aug. 1899 C. M. (Belli 1903, p. 646).

Generally distributed in Franz Josef Land (Fisher 1899 *b*, p. 552, sub nomen *Stellaria* sp.).

Stellaria longipes is a common plant in Franz Josef Land, especially on slopes, where it is growing abundantly, often with *Cerastium hyperboreum*.

Fisher (1899 *b*, p. 552) says that in Kapp Neale 'I found *Stellaria* in bloom, not more than six plants, however. In no other place does this plant flower. Here the *Stellaria* is smaller than usual.' See also Jackson (1899 I, pp. 127, 344 and 348). In 1930 *Stellaria longipes* was found flowering abundantly at several places: East of Kapp Nansen, Kapp Forbes, Kapp Stephen, Belløya, and in Vinddalen.

23. *Oxyria digyna* (L.) Hill.

Camp Ziegler, Aug. 15, 1930 O. H. Growing rather abundantly in large tufts on the bank of a small glacier brook, about 15 metres above sea-level. The accompanying plants were *Alopecurus alpinus* and *Draba macrocarpa*. The specimens had just started to develop their flowers when they were taken on Aug. 15, 1930. The older, dead stems carried dead flowers only, and no fruits could be seen.

As for the distribution of *Oxyria*, see Edman 1929, p. 264.

24. *Salix polaris* Wahlenb.

Kapp Sedov on Hookerøya 1930 V. S. (Samoilowitsch 1931, p. 61).

East of Kapp Nansen, Aug. 21, 1930 O. H.

Growing sparsely east of Kapp Nansen below a morainic ridge about 30 metres above sea-level in company with *Minuartia verna* and *Potentilla emarginata*. No catkins were seen. The leaves had already on Aug. 21 attained the yellow autumn colour so characteristic of this species. On Kapp Sedov it was found at its southern slope.

Salix polaris and the former species, *Oxyria digyna,* were new plants to Franz Josef Land in 1930. It is rather curious that these two species, both very common in Svalbard and Novaya Zemlya, seem to be so exceedingly rare here. Fisher sought in vain for them (1899 *b*, p. 553): 'The most noteworthy facts in relation to the Franz Josef Land flora are: The presence of *Pleuropogon* and the absence of *Compositae, Ericaceae, Pedicularis, Oxyria, Salix,* and *Cyperaceae*.'

Monocotyledones.

25. *Juncus biglumis* L.

Kapp Neale, Aug. 23—25, 1895 H. F. Herb. Copenh. (Fisher 1899 *b*, p. 552; Jackson 1899 I, p. 344).

Kapp Stephen, Aug. 7—8, 1895 H. F. Herb. Copenh. (Fisher 1899 *b*, p. 551).

Mabeløya, Aug. 11, 1895 H. F. Herb. Copenh. (Fisher 1899 *b*, p. 550).

Fisher is the only one who has found *Juncus biglumis* in Franz Josef Land. His specimens in the Copenhagen collection are extremely poor and small, only 2—3 cm in height, but they do carry flowers, and those specimens from Kapp Neale and Mabeløya also bear fruit.

26. *Luzula confusa* Lindeb.

Luzula hyperborea R. Br.

Kapp Nansen, Aug. 17, 1930 O. H.

Mabeløya, Aug. 11, 1895 H. F. Herb. Copenh. (sub nomen *Luzula hyperborea* R. Br.).

On Kapp Nansen *Luzula confusa* was growing sparingly not far from the sea. The flowering specimens in Kapp Nansen were about 8 cm high, in Mabeløya 10 cm.

27. *Luzula nivalis* (Læst.) Beurl.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh. (sub nomen *Luzula hyperborea* R. Br.).

In 1930 but few specimens were found growing in company with *Potentilla emarginata* below a morainic heap east of Kapp Nansen. The material in the Copenhagen collection from Kapp Neale consists of a single specimen, 6 cm in height.

The external of the two species of *Luzula* found in Franz Josef Land are usually very similar, both having stems carrying a single

compact head of darkish brown flowers. They are easily distinguished by the colour and shape of the leaves. Fisher obviously did not distinguish between *Luzula confusa* and *Luzula nivalis,* but termed both *Luzula campestris* var. *congesta* Lej. f. *glabra* (Fisher 1899 *b*, pp. 547, 550, 551 and 552; Jackson 1899 I, pp. 344 and 383). After having written his reports, Fisher must have discovered that *Luzula campestris* was the wrong name, as on the labels of the specimens of *Luzula confusa* and *Luzula nivalis,* now in the Copenhagen collection, he has written: *Luzula hyperborea* R. Br.

Fisher also found a *Luzula* on Cape Stephen (Fisher 1899 *b,* pp. 550 and 551), but as we have not seen his specimen from that locality we will not venture to decide whether it is *Luzula confusa* or *Luzula nivalis.* The same doubt arises upon the *Luzula arcuata* Wahlb. found by Palibin in Hochstetterøya, Aug. 2, 1901 (Palibin 1903, p. 145).

28. *Alopecurus alpinus* Sm.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b,* p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134).

Kapp Flora, July 10, 1895 H. F. Herb. Copenh. (Jackson 1899 I, p. 127); July 22, 1899 C. M. (Belli 1903, p. 646); July 27, 1901 I. P. (Palibin 1903, p. 142); Aug. 16, 1930 O. H.

Vinddalen, Aug. 12, 1930 O. H.

Camp Ziegler, Aug. 15, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145).

Common and generally distributed in Franz Josef Land (Fisher 1899 *a*, p. 416 and 1899 *b*, p. 553). In 1930 *Alopecurus* was found to prefer rather wet soil, but was also growing on the lower parts of talus. In the nutritive soil under bird-cliffs splendid specimens are developed, the highest one, found on Kapp Forbes Aug. 11, 1930, measuring 26 cm in height. This is the tallest plant ever recorded from Franz Josef Land. Next in height comes *Saxifraga cernua* from Kapp Flora, measuring 24 cm, and *Poa rigens,* east of Kapp Nansen, 23 cm. None of Fisher's plants in the Copenhagen collection are higher than 20 cm.

29. *Dupontia Fisheri* R. Br.

Graphephorum Fisheri A. Gray.

Mabeløya, Aug. 10, 1895 H. F. Herb. Copenh. (sub nomen *Graphephorum Fisheri* Asa Gray).

The specimens in the Copenhagen collection are very poorly developed, measuring but 9 cm in height.

Fisher (1899 *a*, p. 416) characterizes this species as being scarce in Franz Josef Land, found only once, viz. in Mabel Island. It must therefore be due to a slip when he subsequently (1899 *b*, p. 553) speaks of it as a generally distributed species.

In a third paper (1897, p. 136) Fisher gives some particulars about the thriving of the *Dupontia* in the Arctic. We shall return to this point in our concluding chapter dealing with points of a more general nature.

30. *Phippsia algida* (Soland.) *R. Br.*

Catabrosa algida (Soland.) Th. Fr.

Kapp Harmsworth, Aug. 28, 1930 O. H.

Kapp Grant, Aug. 5, 1895 H. F. Herb. Copenh.

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550); Aug. 11, 1930 O. H.

Kapp Forbes, Aug. 11, 1930 O. H.

Kapp Flora, July 1896 H. F. Herb. Copenh. Aug. 16, 1930 O. H.

Vinddalen, Aug. 12, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 I. P. (Palibin 1903, p. 145, sub nomen *Catabrosa concinna* Th. Fr. We find it most probable that this record is to be referred to *Phippsia algida*).

Common in Franz Josef Land (Fisher 1899, p. 416).

Payer (1876, p. 273) records *Phippsia algida* from Franz Josef Land. He does not, however, give any particular locality for the plant. Nor does Fisher (1899 *a*, p. 416) give particular localities, he only mentions it as one of his fourteen common plants (Fisher 1899 *a*, p. 416). Fisher appears to have forgotten this species in his full list of the common plants (1899 *b*, pp. 552—553). Perhaps it is this plant which should have been on the list instead of the wrongly listed grass *Dupontia Fisheri*.

Phippsia algida is one of the most common plants of Franz Josef Land, as it is in the adjacent lands of Novaya Zemlya and Svalbard. The plant flowers and bears ripe seed everywhere.

According to Fisher (1899 *a*, p. 417) *Phippsia algida* ascends to a higher elevation than any other phanerogam in Franz Josef Land, 'the only flowering plant which ascends to that height (900 feet) being *Phippsia algida*, a common Arctic grass. This does not flower, however, above 600 ft. Small tufts of leaves nearly an inch long are found at 900 ft. in one place'.

31. *Phippsia concinna* (Th. Fr.) Lindeb.

Catabrosa concinna Th. Fr.

Søilekapp in Rudolføya, July 1900 C. M. (Belli 1903, p. 647).

We have not seen Cavalli-Molinelli's material. As Belli does not mention the very common *Phippsia algida*, we should think that the

material has been wrongly determined. Cavalli-Morinelli's plants have, however, been verified by the eminent expert of Arctic flora O. Kihlman of Helsingfors (Mattirolo & Belli 1903, p. 1 in the reprint). As a temporary measure we therefore find it best to continue this species as a native of Franz Josef Land. See also Palibin's plants above.

32. *Pleuropogon Sabinei* R. Br.

Mabeløya, Aug. 10, 1895 H. F. Herb. Copenh. (Fisher 1899 *b*, p. 549).

Kapp Flora, Aug. 16, 1930 O. H.

On Mabeløya *Pleuropogon* was found to be scarce 'in one pool only' (Fisher 1896, p. 560, and 1899 *a*, pp. 416 and 418). There are six specimens in the Copenhagen collection, the longest one being 20 cm.

At Kapp Flora only a single specimen was obtained in 1930, growing in an almost dry oozy pool, about ten metres from the beach. This specimen measures 14 cm in height.

33. *Poa abbreviata* R. Br.

Camp Ziegler, Aug. 15, 1930 O. H.

Fisher once (1899 *a*, p. 416) mentions *Poa abbreviata* from Franz Josef Land, but without giving any special locality; he only says that it is one of 'the few plants which are scarce here'. Just as in the case of *Minuartia verna* (p. 29) we would hazard the opinion that Fisher has found *Poa abbreviata* on Kapp Stephen, where: 'the only absentee being *Pleuropogon*'. It is lacking in the Copenhagen collection.

In Camp Ziegler *Poa abbreviata* was growing on the bank of a small glacier brook accompanied by *Draba macrocarpa* and *Oxyria digyna*. The specimens are small, but well developed and flowering abundantly.

34. *Poa rigens* Hartman.

Poa flexuosa Wahlenb. *Poa arctica* R. Br.

Kapp Nansen, Aug. 17, 1930 O. H.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Neale, July 24, 1895 H. F. Herb. Copenh. (sub nomen *Poa arctica* R. Br.).

Kapp Stephen, Aug. 8, 1895 H. F. Herb. Copenh. (sub nomen *Poa arctica* R. Br. var. *borealis*).

Kapp Forbes, Aug. 11, 1930 O. H.

Belløya, Aug. 22, 1880 W. G. (Markham 1881, p. 134, sub nomen *Poa flexuosa*).

Kapp Flora, Aug. 16, 1930 O. H.

Common and generally distributed in Franz Josef Land (Fisher 1899 *a*, p. 416, sub nomen *Poa cenisia*, All. and 1899 *b*, p. 553, sub nomen *Poa flexuosa*, Wahl). The three localities of Fisher quoted above, were all taken from the labels in the Copenhagen collection.

Also in 1930 *Poa rigens* was found to be a rather common plant, often growing under bird-cliffs. The panicle is well developed with panicle branches horizontally spreading. The tallest specimen, which measured 23 cm in height, was found east of Kapp Nansen.

35. *Poa alpigena* Lindm. × *rigens* Hartm.

Poa colpodea Th. Fr. p. p.

Kapp Nansen, Aug. 17, 1930 O. H.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Cooke Rocks, Aug. 6—7, 1895 H. F. Herb. Copenh. (sub nomen *Poa Colpodea* Th. Fr.).

Kapp Stephen, Aug. 8, 1895 H. F. (Fisher 1899 *b*, p. 550).

Kapp Forbes, Aug. 11, 1930 O. H.

Mabeløya, Aug. 11, 1895 H. F. Herb. Copenh. (sub nomen *Poa colpodea* Th. Fr., *Poa stricta* auct. plur. non Lindeb. r. r. r.).

Kapp Flora, Aug. 19, 1895, H. F., Aug. 25, 1895 H. F., and Sept. 3, 1895 H. F. Herb. Copenh. (sub nomen *Poa colpodea* Th. Fr.); July 27, 1901 I. P. (Palibin 1903, p. 142, sub nomen *Poa Pratensis* L. v. *alpigena* Blytt); Aug. 16, 1930 O. H.

Hochstetterøya, Aug. 2, 1901 (Palibin 1903, p. 145, sub nomen *Poa pratensis* L. v. *alpigena* Blytt).

Generally distributed in Franz Josef Land (Fisher 1899 *b*, p. 553, sub nomen *Poa vivipara*). Judging from the plant lists of Palibin (1903, pp. 141—142 and 145) we find it rather probable that the plant which he names *Poa pratensis* L. v. *alpigena* Blytt is identical with this hybrid being so common in Franz Josef Land. In 1930 it was found in four localities, growing in the nutritive soil in proximity to the bird-cliffs in company with *Poa rigens*. The panicle is erect slender, and the spicelets are always viviparous. Most of the specimens are about 10 cm in height; in Kapp Forbes a specimen was found measuring 21 cm.

Seeing that one of the assigned parents, *Poa alpigena* Lindm., has not hitherto been found in Franz Josef Land, it may appear irrelevant to count this plant as a cross-breed; the plant in question is, however, undoubtedly identical with a plant which is now commonly treated as a cross-breed, and which is generally distributed in the Arctic regions, especially in Novaya Zemlya and Svalbard. We shall here only refer to Professor C. A. M. Lindman's treatment of this cross-breed (in B. Lynge, Vascular Plants from Novaya Zemlya, pp. 122—125).

36. *Puccinellia angustata* R. Br.

East of Kapp Nansen, Aug. 21, 1930 O. H.

Kapp Forbes, Aug. 11, 1930 O. H.

Grows in large tufts on rather dry soil not far from the bird-cliffs. The specimens are well developed, the stems measuring up to 18 cm in height.

Some Remarks on The Flora of Franz Josef Land.

Only the main features of the higher flora of Franz Josef Land are so far fairly well known, and several new species are doubtless yet to be found. For this reason it is too early to venture upon a more elaborate discussion as to the presence or absence of particular plants, as it might easily lead to false conclusions. Thus the discovery in 1930 of two species which are very common elsewhere in the adjacent Arctic, *Oxyria digyna* and *Salix polaris,* partly disproves Fisher's statement (1899 *b*, p. 553), that the absence of these two species (and a few others), and the presence of *Pleuropogon,* are 'the most noteworthy facts in relation to the Franz Josef Land Flora'.

Here we shall therefore restrict ourselves to some short comments on the plants found.

Scantiness of Vegetation.

First we shall draw attention to the extreme scantiness of vegetation. There are but few species, and in each locality the specimens are usually rather few in number. This paucity may partly be ascribed to the short and cold summers. Still more, however, may it be affected by the excessive glacierisation, most of the country being covered with huge ice caps, leaving but small patches free of ice. These bare patches, moreover, are to a large extent almost barren. 'Especially the sea-beach is devoid of vegetation; there are no maritime plants' (Fisher 1899 *a*, p. 414).

Here and there on the morainic gravel one may find solitary specimens of *Phippsia, Cochlearia, Papaver, Cerastium Regelii* and some *Saxifragae*. In some places there may appear a scattered or more or less continuous vegetation, which, however, chiefly consists of mosses and lichens.

Only under the bird-cliffs[1] flowering plants may be found somewhat more accumulated, forming patches, a kind of small flower garden shimmering in yellow and white. Here the specimens are most luxuriantly developed, and here they reach their maximum height in Franz Josef Land, exceeding 25 cm.

[1] Cliffs where sea-birds build their nests and hatch their eggs. (Lynge 1931 p. 5).

Representation of Systematic Groups.

The phanerogams of Franz Josef Land total 36 species according to the foregoing enumeration, most of them having a more or less circumpolar distribution, and all found in the adjacent Arctic countries of Novaya Zemlya and Svalbard.

All plants are perennial, no annual plant was found. It would be no great surprise, however, if the annual *Koenigia islandica* L., which is rather common in Novaya Zemlya and Svalbard, were found also in Franz Josef Land.

As usual in the Arctic, species belonging to the *Saxifragaceae, Cruciferae, Caryophyllaceae* and some other polypetalous dicotyledones are rather copious, making up two-thirds of the total number of species. There are no sympetalous dicotyledones, which has already been pointed out by Fisher (1899 *a*, p. 419). Sympetalous plants are on the whole rather scarce in the Arctic, which is to be attributed to the decrease of insect life towards the north.

Twelve species of monocotyledons have been found, amounting exactly to one-third of the total number of species; this ratio corresponds fairly well with that found in other Arctic countries. There are a few *Juncaceae* and several *Gramineae*. *Cyperaceae* seem to be non-existent, a feature which Franz Josef Land has in common with other isolated Arctic islands, as for instance Bear Island. The next *Cyperaceae* to be found, if any exists at all, we suggest will be *Carex subspathacea* Drej. or *Carex ursina* Dew.

No vascular cryptogams were found. One would think that such plants as *Equisetum arvense* L., *E. variegatum* Schleich. or *Lycopodium selago* L. would some day be discovered in Franz Josef Land.

Northern Limits.

Franz Josef Land is the northernmost offshoot of Eurasia, extending nearly to the 82. degree of northern latitude. In the European-Asiatic sector of he Arctic we find here the northern limits of a series of phanerogams, first the ten species found in Rudolføya, and then several others occurring somewhat more to the south in the archipelago.

In North Greenland within the American sector, however, 28 of the species found in Franz Josef Land attain a still higher latitude, exceeding the 82. degree, 20 of them even the 83. degree N. L. (Ostenfeld 1923, p. 227). These 28 species also include *Sagina intermedia* and *Saxifraga comosa,* for which Fisher (1899 *a*, p. 418) gives the northern limit as being in Franz Josef Land. Of the remaining species, *Dupontia Fisheri* and the crossbreed *Poa alpigena* × *rigens* probably have their northern

limit in Svalbard. *Salix polaris* extends just to the same northern limit, 80° 32′ N. L., in Svalbard as in Franz Josef Land. The other five species, *Cerastium hyperboreum, C. Regelii, Phippsia concinna, Saxifraga rivularis* and *S. tenuis* reach their absolute northern limit in Franz Josef Land.

Thriving of Arctic Plants.

Prompted by a passage in one of Fisher's papers, we may here venture an objection. Fisher (1897, p. 136) says: 'It is difficult to understand why some plants maintain in existence under such unfavorable conditions as the present, unless they are, as they appear to be, dying-out remnants of a typical Arctic flora. I am thinking of the starving colony of *Graphephorum Fisheri* Asa Gray (a grass), composed of about twenty lifeless-looking individuals on Mabel island, and not seen elsewhere; and also of *Stellaria longipes* Goldie, which presents a similarly lifeless appearance'.

In our opinion Fisher has been somewhat misled through the finding of some few starving colonies of plants. He must have observed the plants in an unpropitious year or, in any case, at an unfavorable time of the year. There is no doubt that the two species in question, *Dupontia Fisheri* and *Stellaria longipes,* thrive quite well in the Arctic in general, the latter especially also in Franz Josef Land, which we had the opportunity to ascertain in several localities in 1930.

Of course, only hardy and frugal plants can exist in countries having so short and cold a summer. Just these plants, however, in our opinion suffer less in the extreme North from cold and rough weather, and other 'unfavorable conditions' than they may suffer from heat and drought at the southern limit of their range.

List of Flowering Plants Collected in Franz Josef Land by Various Collectors.

In the following list we have tabulated the phanerogams hitherto recorded from Franz Josef Land.

	Payer 1873—1874	Grant 1880	Fisher 1894—1897	Nansen 1895	Cavalli-Molinelli 1899—1900	Palibin 1901	Savicz 1930	Hanssen 1930
1. Ranunculus sulphureus	-	×	×	-	×	×	×	×
2. Saxifraga cernua	-	×	×	-	×	×	×	×
3. — comosa	-	-	×	-	-	-	-	×
4. — groenlandica...	-	×	×	-	-	×	×	×
5. — nivalis	-	×	×	×	×	-	-	×
6. — oppositifolia ...	×	×	×	-	×	×	×	×
7. — rivularis	-	-	×	-	×	×	×	×
8. — tenuis	-	-	-	-	-	-	-	×
9. Potentilla emarginata...	-	-	×	-	-	-	-	×
10. Papaver radicatum	×	×	×	×	×	×	×	×
11. Cardamine bellidifolia .	-	-	×	-	-	-	-	×
12. Cochlearia groenlandica	-	×	×	-	×	×	×	×
13. Draba lactea	-	-	-	-	-	-	-	×
14. — macrocarpa ...	-	-	×	-	×	×	-	×
15. — oblongata	-	-	×	-	-	-	-	×
16. — subcapitata	-	-	×	-	-	-	-	×
17. Cerastium hyperboreum	×	×	×	-	-	×	-	×
18. — Regelii	-	-	×	-	×	-	-	×
19. Minuartia verna	-	-	×	-	-	-	-	×
20. Sagina intermedia	-	-	×	-	-	-	-	-
21. Silene acaulis	×	-	-	-	-	-	-	-
22. Stellaria longipes	-	×	×	×	×	×	-	×
23. Oxyria digyna	-	-	-	-	-	-	-	×
24. Salix polaris	-	-	-	-	-	-	×	×
25. Juncus biglumis.....	-	-	×	-	-	-	-	-
26. Luzula confusa.....	-	-	×	-	-	×	-	×
27. — nivalis	-	-	×	-	-	-	-	×
28. Alopecurus alpinus	-	×	×	-	×	×	×	×
29. Dupontia Fisheri	-	-	×	-	-	-	-	-
30. Phippsia algida	×	-	×	-	-	×	-	×
31. — concinna.....	-	-	-	-	×	-	-	-
32. Pleuropogon Sabinei ...	-	-	×	-	-	-	-	×
33. Poa abbreviata	-	-	×	-	-	-	-	×
34. — rigens	-	×	×	-	-	-	-	×
35. — alpigena × rigens	-	-	×	-	-	×	×	×
36. Puccinellia angustata...	-	-	-	-	-	-	-	×
	5	11	29	3	12	14	10	31

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