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Vascular plants from Novaya Zemlya

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REPORT OF THE SCIENTIFIC RESULTS OF THE NORWEGIAN EXPEDITION TO NOVAYA ZEMLYA 1921. No. 13.

B. LYNGE

VASCULAR PLANTS FROM NOVAYA ZEMLYA

WITH XLVII PLATES

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KRISTIANIA

A. W. BRØGGERS BOKTRYKKERI A/S

1923

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A. *Introduction.*

Botanical Exploration of Novaya Zemlya.

The first systematic work of scientific importance on the vascular plants of Novaya Zemlya was published by TRAUTVETTER[1] in 1870—71. His plants were chiefly collected by VON BAER and ZIWOLKA (1837), some of them by MIDDENDORFF at Kostin Shar (1870).

VON BAER has done extraordinary services to the botanical exploration of Novaya Zemlya. He was the first scientist to visit the country. Together with the Russian pilot ZIWOLKA he made his journey at a time when the Arctic traveller had to do without the experience and the technical facilities that have entirely revolutionized Arctic exploration. In the Russian Bull. Scient.[1] he has given an interesting account of the most important of the earlier Russian geographical voyages to Novaya Zemlya, and also of his own voyage.

In vol. II p. 137—172 he has written on former travellers; there is a map indicating the course of exploration, pursued by Russians: LÜTKE, PAKHTUSOFF, ZIWOLKA, BASCHMAKOFF, ROSSMYSLOFF, LOSCHKIN and several (unnamed) walrus-hunters.

In the same vol. p. 172—173 his own expedition is announced, and in vol. III p. 95—107 (printed 26. 11. 1837) he reports on it. He first explored Matotchkin Shar, two of his men were sent to Serebryanka Fjord. He then proceeded eastward to the Kara Sea, spending some time at Belushii Bay, the excellent harbour where so many Novaya Zemlya expeditions have anchored. Ice and bad weather obliged the expedition to return through the Shar again, he was not the only man to have experienced that fate. At the western entrance they met north wind, accordingly they sailed southward, investigated Bessimyannii Fjord ("sinus innominatus", a curious name that this fjord has retained to this day), and Neckwatowa Bay in Kostin Shar. Fog and strong gales delayed his work at the latter bay, and on Aug. 31st he left Novaya Zemlya.

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[1] For the full titles of this and following works see "Bibliography".

VON BAER was satisfied with his results. After his own estimate he brought back about 90 different species of phanerogamous plants. (TRAUTVETTER enumerates 105 vascular plants), nearly half the number that has been recorded from Novaya Zemlya (+Waigatsch) up to the present day.

VON BAER compares the vegetation of Novaya Zemlya to that of Spitzbergen. This first botanical expedition to Novaya Zemlya was sufficient to prove that the former is by far the richer. Then only ca. 30 phanerog. plants were recorded from Spitzbergen (now 128).

He vividly described the dangers which then threatened Novaya Zemlya expeditions. Out of 10 expeditions, commanded by experienced Russian officers, 6 had suffered heavy losses, some had lost their ships, others men, and one expedition (KROTOW) disappeared, leaving no trace[1].

In the same periodical, vol. III p. 171—192 VON BAER has written his famous description of the vegetation of Novaya Zemlya (Végétation et climat de Novaïa-Zemlia).

The country "ist noch immer in der Vorbereitung zur Bildung einer organischen Decke begriffen". The vegetation is poor. He did not find many plants, characteristic of Lapland: *Empetrum*, *Arbutus alpina*, *Diapensia*, *Betula nana*, *Ledum palustre*, *Rubus Chamaemorus*, *Cornus suecica*. The rocks were naked or covered with lichens, most of them crustaceous lichens. The vegetation on gravel and in the rock-falls was better. But he also found "geschmückte Stellen, wo Flora allen Reichtum ihrer Farbenpracht auf den Boden ausgeschüttet zu haben scheint", the flower-gardens of Novaya Zemlya where vegetation concentrates. The beauty of these gardens is in part due to the contrast with the surrounding naked ground, in part to the rich development of fine flowers at the cost of the leaves, which is characteristic of Arctic plants.

VON BAER writes that „der wärmste Monat in Nowaja-Semlja nur so viel Wärme entwickelt als der October in Drontheim, der December in Edinburgh und der Januar im mittleren Frankreich". Only spring plants can flourish in a country with so short a time of vegetation. When the winter set in he found ripe seeds only in two plants (*Dryas octopetala* and *Silene acaulis*), but in *Draba*, *Platypetalum*, *Ranunculus*, *Saxifraga*, *Arenaria*, *Caltha palustris*, *Eriophorum caespitosum*[2] and *capitatum*, *Polygonum viviparum* and *Myosotis villosa* the plants were so far advanced that seeds were near to maturity. Less developed were *Polemonium Richardsonii*, *Lychnis apetala*, and especially

[1] Pieces of the wreck were later found north of Matotchkin Shar (SPÖRER p. 39).
[2] A mistake, *Eriophorum caespitosum* has never been found in Novaya Zemlya.

Polemonium caeruleum and *Valeriana capitata*. He thinks it "völlig unbegreiflich" that the two latter plants could develop seeds.

He concludes from this that the vegetation of Novaya Zemlya "von Strandungen aus der Nachbarschaft unterhalten wird".

He discusses the influence of climatic factors on the vegetation, and arrives at the conclusion that the entire vegetation is restricted to the uppermost part of the ground and the lowest part of the air. The roots may be powerfully developed, but they do not grow far down in the ground. He contrasts these "subterraneous" forests with the high forests of tropical countries, palms and epiphytes.

In Eastern Greenland Scoresby and Sabine collected some plants which he did not find in Novaya Zemlya though they are found in Lapland: *Veronica alpina*, *Andromeda tetragona*, *Empetrum nigrum*, *Stellaria humifusa*, *Rhododendron lapponicum*, *Arnica angustifolia*, *Epilobium latifolium*, *Statice Armeria* and *Arenaria peploides*, "welch letztere schon wegen des Mangels an Seesand nicht in Nowaja-Semlja vorkommen kann[1]". He supposes that "nicht viele Phanerogamen uns entgangen sind", ... "viel unvollständiger muss das Einsammeln der Cryptogamen ausgefallen seyn".

I 1870 E. VON GRÜNWALD collected plants in Novaya Zemlya, in 1877 E. A. and A. J. TJAGIN and in 1879 H. GØBEL, Dr. SJERIKOW and Prince UCHTOMSKI. They worked at Karmakuli, Kostin Shar, and at River Puchowaja. TRAUTVETTER determined their collections. Unfortunately I was unable to obtain this important work before the printing of my plates.

In 1871 Novaya Zemlya was investigated by an expedition, equipped by ROSENTHAL, under the command of HEUGLIN. A Norwegian student AAGAARD collected several plants at Matotchkin Shar (also in Waigatsch and at Jugor Shar). The vascular plants were determined by A. BLYTT (1872—73), TH. M. FRIES (1873), and AHLES (in HEUGLIN 1874, p. 286—306). BLYTT also mentions 5 plants, collected by captain HELLBERG at Cape Nassau: *Saxifraga oppositifolia*, *Papaver nudicaule*, *Draba alpina*, *Oxyria digyna*, and *Cetraria (= Dufourea) madreporiformis*.

Four years later (1875) A. E. NORDENSKIÖLD visited Novaya Zemlya on his Jenissei expedition. He landed at North Gusini Noss (22. 6), Bessimyannii Bay, tried to penetrate Matotchkin Shar, but was checked by ice (13. 7), returned and sailed southward for the Kara Strait. He stopped at Gribovii Bay, North and South Gusini Noss; at the latter place *Pleuropogon* was collected. On his return he tried to circumnavigate Novaya Zemlya, but was unsuccessful, he investigated Udde Bay (74° 15′) and returned by Matotchkin Shar. At Udde Bay he collected *Lagotis*

[1] Detected in Novaya Zemlya by HOLM.

glauca var. *Stelleri*, an Asiatic plant, not otherwise obtained in Novaya Zemlya. On Sept. 11th he left Matotchkin Shar, bound for Norway.

The Vega-Expedition under the command of A. E. NORDENSKIÖLD (1878—79) did not stop at Novaya Zemlya proper, but the south coast of Waigatsch was examined.

The results of these two Swedish expeditions, as far as the vascular plants of Novaya Zemlya (and Waigatsch) are concerned, were presented before the public in several works by KJELLMAN and LUNDSTRÖM (see bibliography). Since the publication of TRAUTVETTER no other works have so largely contributed to the knowledge of the vascular plants of Novaya Zemlya (and Waigatsch) as these. This is due to the fact that able botanists accompanied the expeditions and made the collections themselves: in 1875 F. R. KJELLMAN and A. N. LUNDSTRÖM, in 1878—79 F. R. KJELLMAN and E. ALMQUIST.

The British MARKHAM expedition in 1879 first landed in Bessimyannii Fjord, from which fjord it proceeded northward to Matotchkin Shar. As early as June 19th he there found *Saxifraga oppositifolia*, *Papaver*, *Myosotis* (most probably *Eritrichium villosum*) in flower, On the 27th of June they sailed northward, passed Admiralty Peninsula and Berkh Islands and stopped at "Lystina Bay" (= Lichutin?). They "thoroughly investigated" Berg, Lystina and Tern Islands" also Cross Island where TOBIESEN and his son died in 1873. Checked by ice they returned (18. 7) southward to Matotchkin Shar where they arrived on the 21st of July. They visited Serebryanka, happily penetrated Matotchkin Shar and sailed southward along the Kara Sea coast as far as to "Lissadell Harbour" north of Cape Hessen, where ice obliged them to return. They again passed Matotchkin Shar, sailed northward along the west coast of Lütke Land, passed Admiralty Peninsula, "Lystina Channel", west of Pankratyeff "Island". They happily passed the difficult point Cape Nassau and found *Salix arctica* and *Papaver nudicaule* at Russia Bay. They circumnavigated Ice Cape and the Orange Islands and sailed southward on the east side of Lütke Land as far as to Vlissinger Hooft.

No other expedition to Novaya Zemlya had collected plants from such a wide range as this. It is, therefore, much to be deplored that I was unable to consult MARKHAM's book before my maps had been printed[1].

In 1881 Max Weber brought home some vascular plants from Novaya Zemlya. They were determined by C. A. J. A. OUDEMANS. He records *Saxifraga granulata* which is most improbable, and *Carex atrata* (is *C. misandra*) and *Carex Goodenoughii* (is *C. rigida*) which nobody else has claimed to have found there.[2]

[1] It was neither to be obtained in Copenhagen, nor in and Stockholm and Kristiania, but ultimately our Univ. Libr. procured a copy for me.

[2] Cfr. EKSTAM: Nachträgt. Bemerkungen 1897.

The Dutch Polar Expedition in 1882 made a short unintentional visit at the western end of Matotchkin Shar. The naturalist of the expedition, J. MAR. RUJS, collected a few plants (RUJS 1884).

In the same year the Danish Dijmphna-Expedition was obliged to spend some time at the south-western part of Novaya-Zemlya (and at Jugor Shar). In spite of bad weather its botanist, TH. HOLM, made valuable collections which he described in 1885.

The Swedish botanist OTTO EKSTAM investigated Matotchkin Shar in 1891 and in 1895 again Matotchkin Shar, and further Gribovii Bay and Karmakuli. He has published some preliminary reports (1894 and 1897) on his large collections, in addition to his large works on flower biology (1894 and 1897). Dr. SAMUELSSON has told me that EKSTAM also collected plants in Novaya Zemlya in 1901 and in Waigatsch in 1902. I have seen no publication on these collections. I am glad to hear, from Swedish friends, that a more complete work is in preparation.

The British PEARSON-FEILDEN Expeditions visited Novaya Zemlya in 1895 and 1897.

In 1895 they investigated Kostin Shar at Neckwatowa River and Lake, and then Belushii Bay south of Goose Land. Their travel in 1897 was more extensive. They passed Meshdusharsky Island and worked at Belushii Bay of Goose Land, at Pomorskaya, in Matotchkin Shar, Belushii Bay of Lütke Land, and in Gubina and Farassova Bays. They then entered the Kara Sea and, favoured by an exceptional summer, they advanced northward as far as Ziwolka Fjord and Pakhtusoff Island. They returned by Matotchkin Shar, investigated Bessimyannii Bay and left Novaya Zemlya.

The vascular plants were determined by FEILDEN (1898—99). The results substantially increased our knowledge of the flora of the dual island, but unfortunately the distribution of several species is only described in common terms, the accurate stations are not always given.

The Russian "Ermak"-Expedition (1901) paid some short visits at the west coast of Lütke Land (2 days at Smirnoff Peninsula in Krestovii Fjord and 1 day at Cape Schanz in Mashigin). The botanist of the expedition, PALIBINE, has published his results (1903—1906), describing the vegetation from an ecological point of view and adding a list of the few plants which he obtained during his short visit.

The French naval officer CHARLES-MARIE-EUGÈNE-PIERRE BÉNARD investigated Novaya Zemlya in 1908 and 1914. In 1908 he worked in Kostin Shar, on the Goose Land and in Matotchkin Shar and some members of his expedition crossed the southern part of Lütke Land from the Kara Sea to Krestovii Fjord. In 1914 he crossed Novaya Zemlya from the southern part of Kostin Shar and the Goose Land from Belushii Bay to Karmakuli.

The first expedition was described in CHARLES BÉNARD'S book: "Dans l'océan Glaciale et en Nouvelle-Zemble", Albin Michel, on the second CHARLES BÉNARD has written another book: Un été chez les Samoyèdes. Paris 1921. PAUL DANGY has determined the plants of the first expedition (1908), I have seen no publication on the botanical results of 1914.

In 1911 Novaya Zemlya was visited by four botanists who came for the purpose of collecting *Salices:* the Rev. S. J. ENANDER, Dr. BJØRN FLODERUS, Dr. P. LACKSCHEWITSCH and Dr. TH. HVASS. They first visited Belushii Bay of Goose Land, then Karmakuli ("Malo-Karmakúly"), Pomorskaya, and Krestovii Fjord. They had in all only one week at their disposal, but collected largely. Their results have been published by FLODERUS (1912).

In this short survey I have only mentioned expeditions that have brought to Europe botanical collections of scientific value from Novaya Zemlya (*north of Waiyatsch*) with adjacent inlets. In addition to them the dual island has been explored by numerous expeditions, geographical, hydrographical and so on. Most probably some of them have collected vascular plants, but if anything has been published on them, it has escaped my notice.

The botanical result of this work of investigation is that the west coast of Novaya Zemlya proper (the southern island), especially Kostin Shar, and the coasts of Matotchkin Shar and Serebryanka Fjord has been fairly well explored, but even here botanical investigation is far from complete. There is no reason to suppose that all the vascular plants from this part of Novaya Zemlya are known. Our know ledge of their cryptogams is speaking broadly so imperfect that every new expedition paying the slightest attention to that branch of botany cannot fail to add much to our knowledge.

North of Serebryanka the whole west coast of the much larger Lütke Land (the northern island) and the entire Kara Sea coast have been so poorly botanically investigated that it is not far from a "virgin land", at least the difficultly accessible Kara Sea coast.

It was the chief object of our expedition to investigate the northern island (Lütke Land) and Matotchkin Shar.

We took land north of Goose Land, in a fjord east of North Gusinii Noss. A few days were spent in this fjord, but bad weather prevented us from doing much there. We went northward to Matotchkin Shar, which was penetrated. Splendid weather allowed us to investigate the Shar as well as our limited time would allow us to do. At the Kara Sea entrance we were repulsed by ice. After a narrow escape westward through the Shar we went northward on the Barents Sea coast,

devoted some days to Serebryanka and paid a short visit to the south coast of Sukhoi Noss and another to Krestovii Fjord. We spent 14 days in Mashigin Fjord, favoured by good weather. Eight happy days in splendid weather were devoted to the Archangel Bay district, where much attention was paid to a large rookery south of the bay, perhaps the largest on the Arctic coast. The islands north of the bay and Pankratyeff Peninsula (it is not an island) were thoroughly investigated. We then returned southward, passed one day in Admiralty Peninsula, and four days in and near Mashigin Fjord. Pomorskaya was again visited, and ultimately six days were spent in Grebovii Fjord, one of them being devoted to the north coast of Bessimyannii Fjord.

We arrived in Novaya Zemlya on July 3d and left on Sept. 3d. Weather and ice were extremely favourable. We had estimated to loose something like half our time from bad weather and ice difficulties, in reality I only lost three days. — Accordingly we succeeded in bringing home large collections. The botanical result was more than 3 500 sheets of vascular plants and 6—7 boxes of lichens, several of them large.

It was my original object to collect lichens, and only to devote spare time to other plants. But from my first landing I found it impossible to resist to the beauty of *Eritrichium* and the many other wonderful flowers of this fairy country, and in all about half the time was given to the vascular plants.

Besides some fungi were collected, *Sphagnum* wherever possible and some samples of freshwater algae.

Our ship, the motor cutter "Blaafjell", proved excellent as an expedition ship, but I had great difficulties in drying my plants. My paper retained its moisture with great tenacity, sunshine made no impression on it, nor did the wind. My press and my paper were tended with the utmost care, placed near a little stove or on the cook's kitchener as soon as its temperature would allow of it, but all in vain. My despair increased with the mould on my plants till at last a happy arrangement saved them. They were only left for about a week in the press, then the sheets with the half-dry plants were arranged in small parcels with a cover of porous paper. These parcels were hung over the kitchener to dry, much to the annoyance of the cook, for nothing is more characteristic of the caboose of an Arctic motor cutter than its small size. I think I am indebted to our excellent photographer for this wise scheme.

All the lichens were more or less moist when collected. Each stone or lichen or bit of earth with lichens was carefully packed in a scrap of porous paper (newspaper serves well for the purpose) and put into small linen bags. These were placed to dry everywhere, over a petroleum cooking apparatus, in the caboose over the kitchener, on the very benches in the small room where we lived. I am greatly

indebted to every member of the expedition for their patience. By far the greater part of the lichens was thus saved, but the contents of some bags were destroyed by mould.

We were "pursued" by good weather. But it is most discomforting to think of the plants that we could have brought home in case of continuously bad weather, or only in an ordinary summer. — In a steamer there is no such difficulty with the plants, but another Arctic expedition, where the plants shall be prepared on board a motor cutter will act wisely to make some special arrangement for their drying.

I am happy to express my profound gratitude to many men and institutions, who have made the preparation of this work possible.

First of all to the leader of the expedition, my old friend professor OLAF HOLTEDAHL. His great experience in Arctic travelling enabled him to equip our expedition in the best manner possible. On our return we found that nothing had been wanting and that all superfluous things had been left at home. And during the whole summer he gave every member of the expedition every chance of working at the proper places, surely often at the cost of his own geological interests. — During my rambles ashore our photographer, REIDAR LUND, often accompanied me. He was a keen observer, gave valuable and much appreciated photographical advice with respect to the time of exposition of my plates, he developed them on board, repaired my camera and helped me in preparing my plants. — Help and friendship from all the other members of the expedition in many ways facilitated my work.

It was only with great hesitation that I ventured to undertake the determination of the vascular plants, for my chief interest has always been with the lichens. I could not have made the attempt if not three Scandinavian botanists had generously undertaken the determination of the three most difficult genera: Prof. C. A. M. LINDMAN in Stockholm the genus *Poa*, prof. J. HOLMBOE, Bergen, the genus *Taraxacum* and JOHS. LID, Kristiania, the genus *Salix*.

I have got much valuable advice and information from other Scandinavian botanists: prof. OSTENFELD, Copenhagen, dr. THORE C. E. FRIES and dr. G. SAMUELSSON, Upsala, dr. HARALD LINDBERG, Helsingfors and OVE DAHL, Kristiania.

The University library, Copenhagen, and the library of the Botanical museum, Copenhagen, have generously lent me some books not accessible in Kristiania, and the Bot. Dept. of the Riksmuseum, Stockholm, and the Bot. Dept. of the Naturhistorisches Staatsmuseum, Vienna, herbarium material for comparison.

The board of the University Jubilee Fund, Kristiania, has granted a sum of money which enabled me to compare critical plants in the

rich herbarium of the Botanical museum in Copenhagen, and to discuss them with prof. OSTENFELD.

I am indebted to prof. HOLTEDAHL for generous permission to equip my work so well, to the two artists who have drawn the plates: Miss SIGFRID BERGH, Kristiania (pl. XXI—XXVIII) and XXX and Mr. H. BUCHER, Bergen (pl. XXIX), to Mrs. JOHANNE LYNGE who has prepared my maps, and to *Kristiania Kemigrafiske Anstalt* and to the printer A. W. BRØGGER for skillful work.

IVAR JØRSTAD, Norwegian state mycologist, has kindly undertaken to determine my *Uredineae* and *Ustilagineae*, dr. J. LIND, Østbirk, Denmark, the other microfungi, JOHN EGELAND, Kristiania, my *Hymenomycetes*, if their state of preservation (in alcohol) will allow of a determination. JOHS. LID, Kristiania, will determine my *Sphagna*, and dr. HENRIK PRINTZ, Trondhjem, my freshwater algae.

In the special part I have designated the southern of the two main islands as Novaya Zemlya proper, the northern one as Lütke Land. I have arranged my stations in the following 6 main divisions. Their accurate position will be seen from the maps in OLAF HOLTEDAHL: Brief Account of the Expedition. Rep. of the Scientif. Res. of the Norw. Exp. to Novaya Zemlya, No. 1, Kristiania 1922.

I. *The Southern Fjords:*

Goose Bay, July 3—6 th.

Bessimyannii Fjord, Aug. 31 st.

Gribovii Fjord: South coast Aug. 28th and 30th, Veselago Island Aug. 29th, North coast Sept. 2nd.

II. *The Matotchkin Shar district:*

Matotchkin Shar: Pomorskaya July 7—8th and Aug. 27th, At the foot of Mt. Wilczek with a visit to the south coast of the Shar July 10—11th, Near Tretyakoff Glacier 12th, Chalhonik Valley 13th, East of Cape Jouravlev 14th, At the foot of Mt. Syernaia 15th, Belushii Bay 16—19th, South side of the Kara Sea entrance 20th, Matotchkin Shar westbound, (ice-difficulties) 21—22nd, 22nd ashore near Vasnetsoff Glacier.

Serebryanka Fjord July 23—25th, and Sukhoi Noss 26th.

III. *Krestovii Fjord*: July 27th.

IV. *Mashigin Fjord:*

Point Basis July 28th, Moraines before Junior Glacier 29th, Mt. Dietrichson (not to the top) July 30th, Glacier trip to a nunatak east of Blaafjell Basin July 31st and Aug. 1st, Blaafjell River Delta Aug.

2nd, Blomster Bay and Mt. Tveten 3—4th, Rækved Bay 5th, Dal Bay 6th, Strømsnes Bay and Mt. Golovin 8th, Fram Bay 10th. Sol Bay and Dal Bay Aug. 23—25th.

North of the entrance to Mashigin Fjord Aug. 22nd.

V. *Admiralty Peninsula:* Aug. 21st.

VI. *Farthest north:*

Rookery south of Arkhangel Bay Aug. 12—13th, Northern Krestovii Island 14th, Eastern Krestovii Island 15th, Lichutin Island 16th, Mainland east of Lichutin Island 17th, Berkh Island 18th, Pankratyeff Peninsula 19th.

B. Special Part.

Polypodiaceae.

1. *Cystopteris fragilis* (L.) BERNH.

Pl. I, 1.

I. Bessimyanni Fjord, north side; Gribovii Fjord, north side.
IV. Mashigin: Dal Bay and Blomster Bay.

Scattered and rare, only at Blomster Bay in some abundance, otherwise only a few plants seen. In clefts of the rocks or in slopes of debris, at the first locality mentioned on calcareous rocks, otherwise on hard rocks.

The fronds are pinnate, and the pinnae pinnatifid, indicating the f. *dentata* HOOK. The best developed plants (Blomster Bay) are 13 cm. long. Spores were developed in the Bessimyannii plants. They were quite as large as in Norwegian plants or even larger, 50 up to 65 μ long. Their surface was coarsely and irregularly corrugated, the Norwegian spores examined were spinose, not corrugated.

Former investigations: There are but few records of its distribution in Novaya Zemlya: In ins. N. S. (BAER sec. TRAUTV.), Kostin Shar (BLYTT), Bessimyannii Fjord and Belushii Bay of Lütke Land (FEILDEN).

Recorded also from Waigatsch: Liamshina Bay (Blytt), and Dolga Bay (Feilden).

Equisetaceae.

2. *Equisetum arvense* L.

Pl. I, 2.

I. Goose Bay; Bessimyanni Fjord; Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya. Serebryanka Bay. Sukhoi Noss.
IV. Mashigin: Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Reidar River Delta in Blaafjell Basin, Fram Bay.

Common and general, but not so common as *Equisetum variegatum*. Not met with north of Mashigin Fjord. This is surprising, for it is a very hardy plant, able to subsist in the "ice-box", called Blaafjell Basin, in Mashigin Fjord.

It prefers gravelly places in and along small brooks, and other irrigated places.

Fertile stems are very rare, collected only at Goose Bay and at Pomorskaya.

Former investigations: There are but few Novaya Zemlya stations recorded in literature. But HOLM writes that it "is fairly common at moist places", and FEILDEN that it is "distributed all over Novaya Zemlya" (proper):

Olenje Isl. and Meshdosharski N. coast (HOLM), Gribovii Fjord (EKST.), Matotchkin Shar (EKST.), Belushii Bay and Lütke Land (FEILDEN). var. *arctica* LEDEB.: "in ins. Novaya Zemlya", (BAER sec. TRAUTV.)

3. *Equisetum variegatum* SCHLEICH.
f. anceps MILDE.

Pl. I, 3. (only my own stations).

I. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Near the base of Mt. Wilczek, on the moraine before the Vasnetsoff glaciers, Chalhonik Valley, Belushii Bay. Serebryanka Fjord.
IV. Mashigin: Sol Bay, Strömsnes Bay, Near the base of Mt. Dietrichson, Fram Bay.
V. Berkh Island, Abundant on the mainland east of Lichutin Island.

This plant has a wide distribution in Novaya Zemlya. It is supposed to be common and general all over the districts, investigated by us, and undoubtedly the most frequent *Equisetum* there. It was met with farther north than *E. scirpoides,* and nowhere more abundant than on the mainland east of Lichutin Island. It there covered a large area of dry ground associated with *Dryas octopetala*, *Taraxacum platylepium a. o.*

In Novaya Zemlya it distinctly prefers dry ground, in Norway this plant as well as *E. scirpoides* prefer moist ground.

The Novaya Zemlya plants are small, up to 8—10 cm. above the ground. The number of ribs never exceeds 4—5 (in Norway 5—8). Always „easily recognisable by the ribs which in *E. variegatum* are only slightly furrowed, in *E. scirpoides* so deeply furrowed that the plant has double as many equal furrows and sharp ribs as teeth[1]."

Former investigations: It is astonishing that this really frequent species should have escaped the attention of the Novaya Zemlya investigators, the only statement of its presence in the country is found in OSTENF. Fl. Arct. p. 9: "Novaya Zemlya *(Ekstam* as *E. scirpoides*)." BLYTT's *E. scirpoides* from Matotchkin Shar is correctly determined.

Dr. SAMUELSSON has kindly revised the Upsala material from Novaya Zemlya for me. This herb. possesses: *E. variegatum* (s. n. *E. scirpoides*) from Matotchkin Shar (leg. *Ekstam*), and *E. scirpoides* verum from Rogatscheff and Bessimyanni Fjords (KJELLM. et LUNDSTR.)

4. *Equisetum scirpoides* MICHX.

Pl. I, 4 (only my own stations).

I. Bessimyannii Fjord; Gribovii Fjord: Veselago Island.
II. Matotchkin Shar: Pomorskaya, Belushii Bay, Serebryanka.
IV. Mashigin Fjord: Blomster Bay. North of the entrance to the Mashigin Fjord.

Supposed to be common in Novaya Zemlya proper and in the Matotchkin Shar districts. Farther north it must be scarce and rare, for it was only met with at two stations.

Former investigations: Matotchkin Shar (BLYTT), according to EKSTAM[2] also between 72—73° (Karmakuli?). Vide supra.

Lycopodiaceae.

5. *Lycopodium Selago.* L.

Pl. I, 1.

I. Goose Bay.
II. Serebryanka Bay.

A very rare plant in the districts investigated by us. No other vascular plant was so poorly represented in my collections, only two specimens from Goose Bay, and one poor plant from Serebryanka Bay.

Evidently more common in more southern districts. HOLM directly calls it "fairly common at moist places" ("nogenlunde hyppig paa fugtige steder").

Former investigations: Recorded from Nicholskoi Shar (HOLM), Karmakuli (EKST.), and Matotchkin Shar (EKST.).

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[1] OSTENF. Fl. Arct I, p. 9.
[2] Engl. Jahrb. vol. XXII (1897) p. 199.

Betulaceae.

6. *Betula nana* L.

Pl. I, 5.

II. Matotchkin Shar: Belushii Bay.

A few plants only were found on a dry hill, together with *Arctostaphylos alpina*, *Vaccinium uliginosum* and *Pyrola grandiflora*. None of them were met with at other places. It is probable that Belushii Bay is also their northernmost station in Novaya Zemlya. As far as we know their nearest locality is a great way off from Belushii Bay, and none of them had a flower-bud (July 16th). FEILDEN, however, found *Pyrola grandiflora* in flower at the same place in the middle of July, 1897.

It is a well-known fact that in Arctic countries vast areas of ground is entirely destitute of plants or only adorned with a very poor and scarce vegation. The rich vegetation concentrates at favourable places, as well exposed hills, small brooks &c, often situated like oases in the desert. In Belushii Bay I found a beautiful flora, quite a flower-garden, consisting of ca. 45 different species, on the south side of a pyramidal hill. (The same hill — seen form the north — is represented in PEARSON's book „Beyond Petsora Eastward", plate 87, facing pag. 272.)

It is, therefore, not so astonishing to find these rare plants on the same small hill, not 20 m. long. But it may suggest the same manner of spreading. Little of exact value is to be said of the spreading factor, but there were many geese on this hill. In the middle of July they are bad fliers, owing to the moulting of their feathers, and they have a habit of roaming the field.

Former investigations. It is common on Waigatsch and Dolgoi (BLYTT, FEILDEN, and HOLM), but there are few stations recorded from Novaya Zemlya, as far north as Matotchkin Shar (EKST.). FEILDEN says that it is „rarer on Novaya Zemlya" proper, he did not find it on Lütke Land.

Salicaceae.

By JOHS. LID.

7. *Salix arctica* PALLAS.

I. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya, East of Cape Jouravlev, West of Mr. Syernaia, and at several places on the east side of Belushii Bay. Serebryanka, common.
III. Krestovii Fjord.

IV. Mashigin Fjord: Rækved Bay, Dal Bay, on a moraine before the Blaafjell glacier, and Fram Bay. North of the entrance to Mashigin Fjord.
VI. Mainland east of Lichutin Island.

A common species as far north as Mashigin Fjord, here as otherwise profusely fruiting.

8. *Salix lanata* L.

I. Grebovii Fjord, north side.

The under side of the leaves and especially the main nerve yellowish, otherwise it agrees well with Scandinavian formae of this species. Only collected sterile.

9. *Salix polaris* WAHLENB.

I. Goose Bay. Bessimyannii Fjord.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, West of Mt. Syernaia, and South side of the Kara Sea entrance. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Eastern Krestovii Island.

A very common species. It well deserves its name, for it is quite as common in the northernmost districts visited by us, as in the southern fjords. Everywhere profusely fruiting.

FLODERUS calls attention to the leaves which are often slightly serrate. The same is the case with these plants.

10. *Salix reptans* RUPR.

PL. XXXVI.

I. Bessimyannii Fjord. Gribovii Fjord, inland end, and north side.
II. Matotchkin Shar: Pomorskaya, Strand near Mt. Wilczek, Moraine in front of Vasnetsoff glaciers, East of Cape Jouravlev, and Belushii Bay. Serebryanka Fjord.
IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, lowland south of Mt. Dietrichson, moraine before Blaafjell Glacier, Fram Bay, North of the entrance to Mashigin Fjord.

Common and plentiful everywhere as far north as Mashigin Fjord. This is a considerable extension of its range, it was formerly not recorded from stations north of Matotchkin Shar.

Everywhere profusely fruiting.

11. *Salix reticulata* L.

I. Bessimyannii Fjord. Gribovii Fjord, north side.

A rare species, only met with as a scarce plant in two of the southernmost fjords. FEILDEN found it as far north as Belushii Bay of Lütke Land, and in Serebryanka.

On tufts in the bogs, only the tops of the shoots visible above the ground. Well fertile.

Almost the entire material had its leaves slightly 2—3 serrate towards the base (var. *denticulata* LUNDSTR.). It is difficult to decide whether this is due to immixture from any other species (e. g. *S. reptans* or *S. rotundifolia*) or not, the plants otherwise being quite typical.

All the plants collected were female, but without catkins.

12. *Salix rotundifolia* TRAUTV.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: north side, inland end, and Veselago Island.
II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord.

This beautiful species was not rare on windtortured sandy strands in the fjords of Novaya Zemlya proper. On Lütke Land only recorded from Serebryanka (FEILDEN).

Imbedded in sand and gravel, only the tops of the richly branched shoots with a few leaves each visible above the ground. Male as well as female plants were everywhere well fertile.

13. *Salix taimyrensis* TRAUTV.

II. Matotchkin Shar: Pomorskaya.

The plants were female.

Supposed to be a rare species. FEILDEN found it farther north than LYNGE did: at Belushii Bay and at Serebryanka Fjord

Hybrids of Salices.

A rich material of hybrids was collected, more than 100 plants. This material also comprises a hybrid of *Salix glauca* L., a species that was not otherwise present in the collection.

These "formae" are sometimes doubtful and difficult of determination. Like ENANDER and FLODERUS I have preferred to treat them as hybrids, rather than to describe them as independent formae of some species. I have done this from practical reasons and I do not mean to maintain that they really always are hybrids.

Salix arctica PALLAS × *glauca* L.

f. *medians.*

II. Gribovii Fjord, north side.

The plants are entirely intermediate between *S. arctica* and *S. glauca.* The hybrid differs from the former by its lateral catkins, its yellowish-brown, very pale scales, its straight pale slightly hairy shoots, and its straight leaf-tip, from the latter by the very long stalk of its catkins, its acute capsules with long styles, and by its very long leaf-stalk, its slightly hairy leaves, on their upper side almost entirely glabrous with prominent nerves, and slightly serrate at the base.

The plants are female.

Salix arctica PALLAS × *polaris* WAHLENB.

f. *subarctica.*

II. Matotchkin Shar: Lowland s. w. of the Syernaia Mt.
IV. South of Arkhangel Bay.

The plants approach very much to *S. arctica.* But the twigs (almost imbedded in the ground) are thin and pale green (colour almost like that of *Vaccinium Myrtillus*), and the leaves are small and rounded.

f. *medians.*

II. Matotchkin Shar: At the foot of Mt. Wilczek, and at Belushii Bay.
III. Krestovii Fjord.

The plants are quite intermediate between the supposed parents.

f. *subpolaris.*

II. Matotchkin Shar: Moraine before Vasnetsoff Glacier, and Belushii Bay. Serebryanka.
IV. Mashigin Fjord: Rækved Bay.
V. Admiralty Peninsula.
VI. Berkh Island, Mainland east of Lichutin Island.

Differs from *S. polaris* by its coarser growth, larger leaves and catkins and its bracts which are often pale.

Salix arctica PALLAS × *reptans* RUPR.

f. *subarctica.*

I. Goose Bay. Gribovii Fjord: Veselago Island.
II. Matotchkin Shar: Pomorskaya, East of Cape Jouravlev, Lowland s. w. of Syernaia Mt., and Belushii Bay. Serebryanka.
III. Krestovii Fjord.
IV. Mashigin: Sol Bay very luxuriant in a rookery, Reidar River Delta, and Fram Bay.

Male as well as female plants were everywhere well fertile. Differs from *S. arctica* by ist ± lateral catkins, shorter leaf-stalk, darker and often more rounded bracts and by its more developed pubescence. Otherwise it is not a little variable. Some of these many formae agree with *S. Brownei* (ANDERS.) LUNDSTR.

f. *medians.*

I. Goose Bay.
II. Matotchkin Shar: Belushii Bay.

These plants an fairly intermediate between the two supposed parent species. They are destitute of the distinctly prominent nerves on the upper side of the leaves that are seen in f. *subarctica.*

f. *subreptans.*

II. Matotchkin Shar: Pomorskaya.
IV. Mashigin Fjord: Dal Bay, Strömsnes Bay, Blomster Bay, lowland before Mt. Dietrichson, and Fram Bay.
IV. South of Arkhangel Bay.

It approaches to *S. reptans,* but differs from the type of that species by its ± terminal catkins, paler bracts and longer styles, and by its more rugged twigs and ± glabrous twigs and leaves.

Salix arctica PALLAS × *polaris* WAHLENB. × *reptans* RUPR.

Pl. XXXVIII.

I. Bessimyannii Fjord. Gribovii Fjord: Veselago Island and at the head of the fjord.
II. Matotchkin Shar: Pomorkaya, East of Cape Jouravlev, S. w. of Mt. Syernaia, and at Belushii Bay.
III. Krestovii Fjord.

These plants combine characters from the three type species, perhaps more from *S. reptans* and *S. arctica* than from *S. polaris*. Such triple hybrids are to be expected from the frequent hybridization between either of the three species.

Salix polaris WAHLENB. × *reptans* RUPR.

f. *subpolaris*.

I. Goose Bay.

Differs from *S. polaris* by its palmate nectaries, larger, dark, "subterraneous" twigs, and hairy leaves with impressed nerves.

f. *subreptans*.

II. Matotchkin Shar: East of Cape Jouravlev. Serebryanka Fjord.
III. Krestovii Fjord.

These formae approach very much to *S. reptans*. But they have fewer flowers in their catkins, narrow and slender nectaries, and smaller leaves.

Salix reptans RUPR. × *rotundifolia* TRAUTV.

f. *subreptans*.

II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord, pluribi.

Only female plants obtained. They agree fairly well with FLODERUS' description of a forma from Karmakuli.

Habitus and pubescence agree quite well with *S. reptans*, but the hybrid is characterized by its small catkins and especially by its ± glabrous capsules.

f. *medians*.

II. Matotchkin Shar: East of Cape Jouravlev.

Quite intermediate as to size and habitus between the parental species.

The plants were female. Catkins lateral as well as terminal, subrotundate with 8—12 capsules each. Capsules acutish, tomentose, only

the uppermost ones in each catkin glabrous. Style short, stigmata long. Nectaries palmate, bracts black and broad with a tuft of hairs at their tip. — Twigs ca. 1,5 mm. thick. Leaves with a short stalk, ovate; nervation and pubescence as in *S. reptans*, size ca. 10×6 mm.

f. *subrotundifolia.*

II. Matotchkin Shar: Pomorskaya.

Male as well as female plants were obtained on a sandy beach near the Samoyede colony. Female catkins with 2—4 flowers each.

Like *S. rotundifolia* it has a coarse tuber-like root, long thin branches, and small rounded leaves, ca. 6×5 mm. The very hairy leaves, especially on the lower side, but in part also on the upper side, and the always (though sometimes only slightly) pubescent capsules must be inherited from *S. reptans*.

These plants are very like a form, described by FLODERUS, but the serrature is not so developed, the capsules are smaller, though more pubescent than in FLODERUS' plants.

Salix cfr. *reptans* RUPR. (or *arctica* PALLAS) × *taimyrensis* TRAUTV.

II. Matotchkin Shar: Pomorskaya.
IV. Mashigin Fjord: Fram Bay.

Polygonaceae.

14. *Koenigia islandica* L.

Pl. I, 5.

I. Bessimyannii Fjord. Gribovii Fjord: North side, and Veselago Island.
II. Matotchkin Shar: Belushii Bay.
IV. Mashigin Fjord: Rækved Bay, and Sol Bay.
V. Admiralty Peninsula.

Met with at many places and in considerable abundance. It is a fairly common plant at the beach as far north as the Admiralty Peninsula.

Minute, almost uniflorous plants were first collected at Belushii Bay on July 16th. Of course this annual plant must propagate by seeds, but I did not find quite full-grown seeds.

Former investigations. It has been recorded from a few stations as far north as the north side of Matotchkin Shar (FEILDEN). The above stations represent a considerable extension of its range.

15. *Oxyria digyna* (L.) HILL.

Pl. I, 6.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, S. w. of Syernaya Mt., and South side of the Kara Sea entrance. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, P. Basis, Blaafjell Basin, (north side), and Fram Bay. North of the Mashigin entrance.
V. Admiralty Peninsula.
IV. Rookery south of Arkhangel Bay, Berkh Island, Eastern Krestovii Island, Lichutin Island, Mainland east of Lichutin Island, and Pankratyeff Peninsula.

It is only to be expected that *Oxyria digyna* should be one of the commonest and most widespread plants of Novaya Zemlya. It is one of the 4 vascular plants that were formerly brought home from Cape Nassau (76° 30′ n. l., 61° 25′ e. l.) by capt. HELLBERG. It is equally common all over the districts investigated by us, even farthest north; it was there found at every station with the exception of the wind-tortured low and flat Northern Krestovii Island, where a plant of this size could impossibly exist.

Oxyria digyna prefers moist hills and screes. Best developed in the upper part of the screes, under the vertical mountain-wall. The plants are smaller than in Norway, 10—12 cm. is the usual size, I have only once seen a plant of 25 cm.

In Goose Bay it flowered freely on July 5th. Fullgrown nuts were collected in the southern fjords towards the end of August, and most probably they would ripen all over Novaya Zemlya, even farthest north. Capt. HELLBERG'S plants from Cape Nassau (12—7—1869) are very small, the flowers are not yet open.

Former investigations. All authors agree that *Oxyria digyna* is one of the commonest plants in all the districts visited by botanists. Recorded as far north as Cape Nassau (HELLBERG).

16. *Polygonum viviparum* L.

Pl. II, 1; XXXI sin.; XXXIII; XXXIV dext.; XXXV, XXXVI, XXXVII.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, S. w. of Syernaia Mt., Belushii Bay, and south side of the Kara Sea entrance. Serebryanka Fjord. Sukhoi Noss.

III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Dal Bay, Strömsnes Bay, Blomster Bay, P. Basis, Lowland south of Mt. Dietrichson, Reidar River Delta, Moraine before Junior Glacier, Fram Bay. North of the entrance to Mashigin Fjord.
IV. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

Polygonum viviparum is common and abundant everywhere. Hardly any other phanerogamous plant is more common. Most probably met with every day that we went ashore.

It prefers dry gravelly hills and rock-falls, often associated with *Astagalus alpinus* and *Myosotis*. But it is not peculiar as to its substratum, it was also seen at moister places, on gravelly soil at the brooks &c, but never on clayey field (The *Braya*-field).

It was not in flower in Goose Bay 3.7, but in Matotchkin Shar flowering plants were found towards the middle of July. Ripe bulbils were produced in profusion, even at the northernmost places visited by us.

Former investigations: All authors agree that *Polygonum viviparum* is a very frequent plant all over the country, as far as the country has been investigated. The terms used are "ubiquitous, abundant, all over, one of the commonest plants."

But it has formerly not been collected north of Cape Shanz, Mashigin Fjord 74° 40,5′ (PALIBINE) on the west coast, and Ziwolka Fjord 74°25′ (FEILDEN) on the east coast.

17. *Rumex Acetosa* L.
* *arifolius* (ALL.)

Pl. II, 2.

II. Matotchkin Shar: Pomorskaya.

Evidently very rare. Only two plants obtained, with their flowers in bud (8. 7.).

Former investigations: Recorded from a few places as far north as Matotchkin Shar (TRAUTV., EKSTAM and DANGUY).

18. *Rumex Acetosella* L.
var. integrifolia WALLR.

Pl. II, 2.

II. Matotchkin Shar: Albert Hill in Belushii Bay.

This is an addition to the flora of Novaya Zemlya. It was very scarce, only a few plants seen. They were not yet in full flower (large buds). My plants agree entirely with specimens from Finmarken in Norway.

Caryophyllaceae.

19. *Cerastium alpinum* L.

Pl. II, 3 (only my own stations).

I. Goose Bay. Gribovii Bay, north side.
II. Matotchkin Shar: Belushii Bay.
VI. Rookery south of Arkhangel Bay.

Cerastium alpinum has a wide distribution in Novaya Zemlya. It may possibly be a rather common plant in Novaya Zemlya proper, but it must be rare in Lütke Land, I only found it once north of the Shar. By far the greater part of the plants that former investigators referred to *Cerastiun alpinum*, must be *C. Regelii*, which is most abundant all over either island.

Only on dry well exposed hills at a few of the best stations; the rookery far north is very isolated. Some of my plants, especially from this rookery, approach to *C. nigrescens*. They are few-flowered and more compact than it is usual with *C. alpinum*, but their leaves are too narrow and their sepals too acute for *C. nigrescens*. I never saw the latter species in Novaya Zemlya.

Not in flower at Goose Bay 3. 7. 1921, but there were ripe seed-pods from 1920. I found ripe seed-pods at Grebovii Fjord 2. 9. 1921.

Vide *C. Regelii*.

20. *Cerastium Regelii* OSTENF.

Pl. II, 4. (only my own stations); XXXIII; XXXIV sin. et dext.; XXXVIII.

Cerastium Regelii OSTENF. Vascular Plants collected in Arctic North America. Vid. Selsk. Skr. Math. Naturv. Kl. 1909, No. 8, p. 10. Christiania 1910, ubi syn.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, West of Tretyakoff Glacier, Chalhonik Valley, Moraine before Vasnetsoff Glacier, East of Cape Jouravlev, S. w. of Syernaia Mt., Belushii Bay, and South side of the Kara entrance. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, Blaafjell Basin, north and south side, and Fram Bay. North of the Mashigin Fjord entrance.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands, Pankratyeff Peninsula.

It is not sufficient to say that *Cerastium Regelii* is common in Novaya Zemlya. It was met with every day ashore, and it is abundant everywhere, even farthest north. The other species of *Cerastium* are rare in comparison with this one.

Cerastium Regelii is very little peculiar as to its substratum: it is met with on moist irrigated clayey soil, and on sand and gravel, but it develop its finest plants on well exposed dry hills, the flower- gardens of Novaya Zemlya.

It is a very plastic species that adapts itself wonderfully to its different substrata: on moist cold soil it develops the well known compact, often flowerless f. *caespitosa* MALMGR. If the soil is very unfavourable, only a few leaves are formed each year, and the persistent leaves from the preceeding year are very conspicuous (always infested by microfungi). On the flower-hills the dense caespites relax, and branched, often many-flowered (normally 3–5, rarely up to 6–8 flowers each) stems are formed. It then attains some resemblance to *C. alpinum*.

But even then its caespitose habitus is preserved, owing to its numerous short sterile shoots. The small leaves are very characteristic. On the sterile shoots they rarely surpass 5 mm., on the fertile shoots they are slightly larger, but hardly longer than 7—8 mm. As stated by OSTENFELD l. c. the leaves are "broadly elliptic or broadly ovate".

The flowering shoots are more robust than the (etiolated?) shoots, depicted by OSTENFELD (l. c. pl. II, 11), the pedicels are thin, but not "capillary" in normal plants.

Cerastium Regelii is less hairy than *C. alpinum* and *C. nigrescens*. The stems of the sterile shoots are normally glabrous, sometimes with a stripe of hairs (as in *Stellaria media*). The stems of the flowering shoots are always pubescent, in their upper part yellowish glandular, but the pubescence may be more or less dense. The hairiness of the leaves is very variable: Sometimes the lamina is hairy on its upper side towards its apex, but usually it is entirely glabrous or almost glabrous, only with some almost ciliate marginal hairs. Overfed plants from the rookeries have quite glabrous, often slightly succulent leaves.

Sepals always small, not surpassing 5—5,5 mm. In *Cerastium nigrescens*, its nearest relative, they are up to 8 mm. They are pubescent, but not so rigidly hairy as in the latter species, obtuse, with broadly membranous margins, green or reddish-violet on their under (exterior) side.

Petals large, up to 10—11 mm., more or less emarginate, up to 3 mm.

It flowers late in the summer. The first few flowers were seen at Pomorskaya 8.7, but in Matotchkin Shar flowers were rare during the whole middle of July, even at Belushii Bay, the best station on

the north side of the Shar. Profusely flowering plants were first seen in Serebryanka Bay 23. 7; during August it was in flower everywhere. The flowering season is supposed to be long, for even on Sept. 2nd. it was in full flower as far south as Grebovii Fjord.

I did not collect ripe seeds, but most probably I have only overlooked them. For even farthest north ripe seeds are developed. Mature seed-pods from 1920 were often seen, and young seedlings were quite common, e. g. on Lichutin Island.

Cerastium Regelii is a very good species. It is much easier to distinguish this species from *C. alpinum* and *C. nigrescens* than to distinguish the two latter species from each other. It is unnecessary to refer it to either of them as a subspecies or as a f. *glabrata* or a f. *caespitosa*.

Former investigations. All the botanists who have studied the flora of Novaya Zemlya mention *Cerastium alpinum* f. *caespitosa*, f. *glabrata*, f. plures, or simply *C. alpinum*. It is not always possible to decide from literature whether *C. alpinum* or *C. Regelii* is meant, but it is evident that the latter species is common also in the southern parts of Novaya Zemlya, not visited by us.

BLYTT'S *C. alpinum* from Jugor Shar and Matotchkin Shar are *C. Regelii*. I have not seen MARKHAM'S *Cerastium alpinum* from Lichutin Bay, but suppose that it is *C. Regelii*.

21. *Melandrium affine* J. VAHL.

Pl. II, 3.

II. Matotchkin Shar: Belushii Bay. Sukhoi Noss.

Rare and scarce, only at Sukhoi Noss in some quantity on a rookery. On dry rocks.

At Belushii Bay I found ripe seeds of the year as early as July 17th.

Former investigations. There are several stations for this species on Waigatsch, but very few from Novaya Zemlya: Kostin Shar and Ziwolka Fjord (FEILDEN), and "Novaya Semlja" (OUDEM).

22. *Melandrium apetalum* (L.) FENZL.

Pl. II, 5; XXXV.

I. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, Moraine before Vasnetsoff Glacier, Belushii Bay and South side of the Kara entrance. Serebryanka. Sukhoi Noss.

III. Krestovii Fjord.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, north and south side of Blaafjell Basin, and Fram Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

Melandrium apetalum is common and general, even farthest north. I did not meet with it in Pankratyeff Peninsula.

It prefers moist places, as peaty ridges and bogs a. o. places that are occasionally irrigated.

A very hardy plant, that produce ripe seeds all over the districts investigated. In the islands farthest north mature seeds were profusely produced as early as the middle of August. No plants were better developed than those collected in Berkh Island and in the "ice-box" (Blaafjell Basin) in Mashigin Fjord.

Usually developed as f. *arctica* TH. FR. with all transitional stages to the "type".

Former investigations. HOLM calls it a rare plant, but this is not supposed to be correct. FEILDEN calls it abundant, and the Vega expedition frequently met with it. It is evidently quite as common in southern districts of Novaya Zemlya as in the regions visited by us. Recorded as far north as Krestovii Fjord (PALIBINE) on the west coast and Pakhtusoff Islands on the east coast (FEILDEN).

23. *Minuartia biflora* (L.) SCHINZ *et* THELL.

Pl. II, 6.

II. Matotchkin Shar: Pomorskaya, and Belushii Bay.

Rare and scarce, only a few plants met with.

It was in flower at Pomorskaya on July 8th, it had also empty seed-pods from the preceeding year.

Former investigations. There are but few stations recorded for this species from Novaya Zemlya: L. Olenje (HOLM), Neckwatowa and Belushii Bay (FEILDEN). Also on Waigatsch and at Chabarova (FEILDEN).

24. *Minuartia macrocarpa* (PURSH) OSTENF.

Pl. II, 6.

OSTENF. A List of Arct. Caryoph. Meddel. om Grönland vol. XXXVII. (1921) p. 226.

Alsine imbricata C. A. M. FEILDEN Flowering Plants of Novaya Zemlya, in PEARSON Beyond Petsora Eastward p. 199.

II. Matotchkin Shar: Belushii Bay.

The station described by FEILDEN agrees so entirely with mine that we most probably found it at the same water course. But FEILDEN was not the first to find it in Novaya Zemlya, for "*Cerastium trigynum* VILL." in BLYTT. Bidrag til Kjendskaben om Vegationen paa Novaya Semlya p. 22 is *Minuartia macrocarpa*. There are no other stations known from Novaya Zemlya.

25. *Minuartia stricta* (SW.) HIERN.

Pl. III, 1.

II. Serebryanka Fjord.

Only found here. A few plants on a dry gravelly hill. It is an addition to the flora of Novaya Zemlya.

The plants were perfectly developed, out of flower, with open seed-pods and full-grown seeds (23. 7.) There were also empty seed-pods from the preceeding year.

26. *Minuartia verna* (L.) HIERN.
var. *rubella* (WBG.)

Pl. III, 1.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.

II. Matotchkin Shar: Pomorskaya, Near Mt. Wilczek, Chalhonik Valley, East of Cape Jouravlev, S. w. of Mt. Syernaia, and in Belushii Bay at Albert Hill and other places. Serebryanka. Sukhoi Noss.

IV. Mashigin Fjord: Rækved Bay, Sol Bay, Blomster Bay, North and south side of Blaafjell Basin. North of Cape Borisoff.

V. Admiralty Peninsula.

VI. Rookery south of Arkhangel Bay, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island.

Not found at the most unfavourable places farthest north (Northern Krestovii Island, Pankratyeff Peninsula), but otherwise it is common, though not plentiful, all over the land investigated by us, even farthest north.

On gravelly hills. It is not much dependent on moisture, but it affects dry stations rather than moist ones. It flowers early: In full flower at Goose Bay 5. 7. Its flowering time must be very short, for mature seed were profusely developed farthest north as early as in the middle of August. A plant like this is well adapted to Arctic conditions.

Former investigations. *Minuartia verna* var. *rubella* was formerly recorded from numerous stations, in Waigatsch, Novaya Zemlya

proper and Matotchkin Shar; but there were very few stations from Lütke Land north of the Shar: Serebryanka (FEILDEN), and Krestovii Fjord (PALIBINE). Our investigations have brought a very considerable extension of its range.

27. *Sagina intermedia* FENZL.

Pl. III, 2.

I. Gribovii Fjord: Veselago Island.
II. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin: North side of Blaafjell Basin.
VI. Eastern Krestovii Island.

Sagina intermedia has a wide distribution, but it is evidently scarce at each station, at least I only brought home few plants.

Ripe seed pods were found at Serebryanka 23. 7; farthest north it was out of flower 15. 8, and there were ripe seed-pods from the preceeding year.

Former investigations. Formerly recorded from a few stations on the west coast of Novaya Zemlya proper and from Matotchkin Shar, but not from Lütke Land north of the Shar.

28. *Silene acaulis* L.

Pl. III, 3; XXXV; XXXVI.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, West of Tretyakoff Glacier, Chalhonik Valley, Moraine before Vasnetsoff Glacier, East of Cape Jouravlev, S. w. of Syernaia Mt., Belushii Bay several stations, and south side of the Kara Sea entrance. Serebryanka, fl. albo. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Point Basis, and south and north side of Blaafjell Basin.
VI. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

Silene acaulis is a common plant all over Novaya Zemlya as far north as the country has been investigated. On Novaya Zemlya proper and at Matotchkin Shar it is directly abundant, north of Serebryanka it is common, but more scarce, restricted to well exposed flower-hills, and the like.

In full flower in Goose Bay on July 3d, also farthest north in the middle of August. As far north as the Shar I have seen ripe seed-pods in great abundance, farther north I have overseen them, at least there are no positive statements. But I think it very probable that seeds ripen as far north as Lichutin Island in good years.

Former investigations. There are stations from practically all places investigated as far north as Cape Schanz on the west coast (PALIBINE) and Pakhtusoff Islands on the eastern (FEILDEN). All authors agree that it is "universally distributed" all over the country.

29. *Stellaria longipes* GOLDIE
γ. *humilis* FENZL.

Pl. III, 4.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, West of Tretyakoff Glacier, Chalhonik Valley, Near Vasnetsoff Glacier, S. w. of Mt., Syernaia Belushii Bay and south side of the Kara Sea entrance. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
VI. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, Point Basis, Blaafjell Basin, north and south side, and Fram Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island, Pankratyeff Peninsula.

A very common plant all over the regions investigated by us. — On gravelly soil, on hills, and the like, not much dependent on moisture.

In Novaya Zemlya *Stellaria longipes* is a variable plant: its branching is more or less dense, it is usually entirely glabrous, sometimes pubescent towards the tops of the branches, on the leaves, and especially at the nodes (vide *β. peduncularis*).

It flowers late. No flowers were observed in Goose Bay, July 5th, and only a few ones in Matotchkin Shar in the middle of July. The first well developed flowers were collected in Serebryanka on July 23d.

Though it is so frequent its propagation by seeds must be difficult. The flowers usually fall off without producing fruit. I have no positive statements with respect to seeds produced in 1921, there are no capsules from 1921 on the plants which I brought home, but a few from 1920 (e. g. from Sukhoi Noss). The anthers are violet.

Former investigations. All authors agree that it is "a very common plant over the the entire areals visited "(FEILDEN) — as far north as Krestovii Fjord (PALIBINE) and Ziwolka Fjord (FEILDEN).

β peduncularis (BUNGE) LEDEB.

Pl. III, 4; XXVI, 1; XXX, 4—5.

Ledebour Flora Rossica I p. 387, ubi syn.

I. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya.

The most typical plant (from Grebovii Fjord) was collected on a dry sandy hill. — It is an addition to the flora of Novaya Zemlya, but FEILDEN's plants from Bessimyannii Fjord (herb. Copenhagen) approach much to it.

My plants agree entirely with plants from Obdorsk in Sibiria (leg. HAGE, herb. Copenhagen).

Stem *caespitose, elongated*, up to 20 cm., *slender* and meek, minutely striped to deeply furrowed. Internodes long, with scattered hairs, *nodes and sterile shoots densely pubescent.*

Leaves *linear*, narrow and elongated: 18—20 mm., glabrous or with scattered marginal hairs, especially towards the base. Bracts, if well developed, with a distinct, often broad membraneous margin.

Flowering shoot long, erect, one-flowered, or occasionally up to three-flowered. Pedicels elongated, up to 30 mm. or more, slightly dilated under the flower.

Sepals 4 mm. long, broadest at their base, tapering into a ± obtuse apex, glabrous or with marginal hairs, especially in the buds. Petals well developed, white, one and a half as long as the sepals.

Fruits were not developed.

The green parts of the plant were of a vivid green colour, not glaucous as in var. *humilis*. It is quite unlike the latter, owing to its elongated, meek stems and caespitose growth, largely due to its numerous erect (not spreading) sterile shoots. Habitually it approaches to a narrowly leaved *Stellaria borealis*.

The flowers were bisexual, but the ovary was still in its flower stadium (size) as late as Sept. 2nd. It must, accordingly, be very difficult, if possible, for this plant to ripen its seeds, even as far south as in Gribovii Fjord and in a year as favourable as 1921. It is evidently a southern and eastern plant.

Ranunculaceae.

30. *Caltha palustris* L.

Pl. III, 5.

I. Goose Bay. Gribovii Bay, north and south side, and Veselago Island.

II. Matotchkin Shar: Pomorskaya, Chalhonik Valley and Belushii Bay. Serebryanka.

IV. Mashigin Fjord: Rækved Bay, Strömsnes Bay, North side of Blaafjell Basin and Fram Bay. North of the Mashigin entrance.

V. Admiralty Peninsula.

VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Eastern Krestovii Island.

I did not find it in Northern Krestovii Island and not on Pankratyeff Peninsula, the northernmost places attained, but otherwise it was quite common all over the regions visited.

Farthest north it is reduced in size and often it is almost imbedded in the moss, only the flowers and the small leaves being visible. — Farthest north it affects stations where birds are numerous (nitrophilous plant).

It was in full flower on aur arrival in Goose Bay on July 3d. It continued flowering throughout the month of July. In the first days of August it was out of flower even in the "ice-box" (Blaafjell Basin) in Mashigin Fjord, and later it was everywhere seen with capsules in different stages of development. It requires no short time to ripen its seeds. North of the Mashigin Fjord entrance some ripe capsules were seen 23. 8, but even in Gribovii Fjord there were but few ripe capsules 2. 9. Its wide distribution indicates that seeds ripen everywhere in warm summers, as in 1921.

Former investigations. All authors agree that it is a common plant. It seems to me that it must be much more common in Novaya Zemlya proper than in Lütke Land. FEILDEN says that it is "extremely common throughout the regions visited." — In the southern fjords I found it everywhere in ponds and on peaty ground. But such stations are less common northwards. The ponds are there filled with cold water from the glaciers and often quite destitute of plants. Recorded as far north as Lichutin Bay (MARKHAM).

31. *Ranunculus acer* L.
f. *borealis* TRAUTV.

Pl. III, 6.

I. Bessimyannii Fjord. Gribovii Fjord: north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, and Albert Hill in Belushii Bay. Serebryanka. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, and Fram Bay. North of the Mashigin Fjord entrance.

I has a considerable distribution over the land investigated by us. FEILDEN says that it is "the commonest buttercup throughout the regions visited". This evidently refers to Novaya Zemlya proper. On Lütke Land it is fairly common as far north as Mashigin Fjord, but it was not met with on Admiralty Peninsula and not "farthest north." The commonest Lütke Land buttercup is *Ranunculus sulphureus*.

In Lütke Land it affects sheltered and well exposed stations, as sunny hills and other dry places on gravelly ground.

In Gribovii Fjord and at Serebryanka magnificent plants were found, up to 30 cm. high, with flowers 25—28 mm. in diam. In Mashigin it was common in the middle part of the fjord, rare on the coast and not found in the inner part (Blaafjell Basin).

The few plants that were found just north of the Mashigin entrance had small leaves, one plant had two small nuts.

This suggests that this fjord really is its northern limit of distribution.

Ranunculus acer is not of the early spring flowers. At Pomorskaya (8. 7) only small rosettes were developed and no flowers, at Belushii Bay it was in flower 17. 7, but the leaves were still small. Fully developed plants were not seen before the end of July (Serebryanka 23. 7).

Happily for the plant its fruits evidently ripen quickly. In Mashigin it was in flower in the beginning of August, and as early as 8. 8, full-grown nuts were seen at Strömsnes Bay (the best station in Mashigin), towards the end of August ripe nuts were common in Mashigin, and about 1. 9 it had generally discharged its nuts in the southern fjords.

Usually densely hairy, only at Fram Bay in Mashigin I found a few almost glabrous large plants.

Former investigations. There are numerous stations from all places investigated in Novaya Zemlya proper, but few stations on Lütke Land. FEILDEN has no record of it north of 74° n. l.; its northernmost station before 1921 was Krestovii Fjord, just north of 74° (PALIBINE).

32. *Ranunculus affinis* R. Br.

Pl. IV, 1; XXI.

II. Matotchkin Shar: Albert Hill in Belushii Bay.

Plants 10—12 cm. high, unbranched or almost unbranched, the unbranched stems and the (few) main branches one-flowered. Stems loosely caespitose, at their lower part densely pubescent with soft long spreading hairs. Higher up the hairs are shorter and more scattered, under the flowers the shoots are densely pubescent with very short hairs.

The basal leaves have rather long petioles (2,5—3, rarely 3,5 cm. long) their persistent brown sheaths (from former years) densely envelop the base of the stems. Petioles with long soft spreading hairs. Basal leaves longer than broad (17 × 14 mm.), pedatifid, profound incisions, rounded at their base, divide them into 7 narrowly elliptical or almost linear leaflets. Leaflets rounded at their ends, undivided or sometimes divided into 2—3 narrow sections. Basal leaves only with a few scattered long hairs at their margin and on their under side. Stem leaves sessile or with very short petioles, with 3—5 narrow sections.

Sepals 5—6 mm. long, broadly ovate with rounded ends, ± densely pubescent, with a tinge of violet. Petals shining, yellow, 7—10 mm. long, broad, but in fully developed flowers not imbricate, discrete or contiguous at their base. Ovaries minutely pubescent.

At Belushii Bay the plants were in full flower, and it was not possible to decide whether the receptacle would become elongated. Dr. SVERDRUP (ROALD AMUNDSEN: *Maud Expedition*) collected just the same plant in fruit at Aioon Island, Northern Siberia. The receptacle of his plant was not elongated.

Cfr. the next species.

33. *Ranunculus auricomus* L.
var. *glabrata* nov. var.

Pl. IV, 2; XXII.

I. Gribovii Fjord, north side.
II. Matotchkin Shar: Belushii Bay. Sukhoi Noss.

Plants considerably larger than *R. affinis*, up to 30 cm. Stems not or very laxely caespitose, unbranched or little branched, branches (and undivided stems) one-flowered. Subterraneous parts very slender. Stems entirely glabrous at their lower part, pubescent, between the uppermost leaf and the flower most so under the flower, with white wollen hairs.

Basal leaves with long glabrous petioles, up to 8 or even 10 cm. long, without persistent sheaths. Basal leaves reniform, broader than long (e. g. 20 × 28 mm., 22 × 33 mm.), base cordate. By 2 profound incisions divided into 3, ± contiguous, broadly cuneiform main sections. Less profound incisions (often 2 in each section) into the main sections form oblique, acute lobes. Basal leaves entirely glabrous or with a few short marginal hairs at the base of the incisions. Generally 2 stem leaves, sessile, with linear leaflets, as in *R. auricomus* (type).

Sepals 5—6 mm. long, as in *R. affinis*, but not so hairy. Petals 10—12 mm. long, broad, imbricate. Receptaculum hairy. Ovaries glabrous with long arcuate styles. *Capsule* inflated, *absolutely glabrous*.

Habitually the plants agree entirely with *R. auricomus, β sibiricus*[1] GLEHN, as represented in our herb. by Finnish and Swedish plants viz. DÖRFLER. l. c., and Kemi in Østerbotten (leg. HARALD LINDEBERG), But the ovaries and capsules are entirely glabrous. It is only with great hesitation that I have ventured to refer a plant with glabrous capsules to *R. auricomus*.

HOLM's plants from Novaya Zemlya: 70° 34′ n. l., 56° 18′ e. l., are the same as my plants (*Ranunculus affinis* from Petuchowsköj Shar).

There has been much confusion with respect to *R. affinis* and *R. auricomus* in Novaya Zemlya.

TRAUTVETTER determined v. BAER's plants from "Sinus innominatus" (= Bessimyannii Fjord) as *R. affinis* R. BR., the Vega expedition recorded *R. affinis* from Waigatsch (Cape Greben) and from Chabarova and HOLM from Petuchowsköj Shar (for his plants see above). — FEILDEN contested these determinations, and referred the plants, which he obtained at Boronoff Noss on Waigatsch and at Belushii Bay of Lütke Land, to *R. auricomus* type. He also referred the Vega plants from Waigatsch, which he had seen at Kew, to *R. auricomus*. There is no reason to doubt that FEILDEN's *R. auricomus* is identical with mine.

I have seen no authentic specimen of R. BROWN's *R. affinis*, and in herbaria this name covers several different species. The plants, which I have referred to this species, will be understood from my description and the figure.

They are entirely identical with *R. affinis* from Auk Horn, Sassen Bay and Cross Bay of Spitzbergen (leg. RESVOLL-DIESET), and from Tempel Bay (leg. ASPLUND). SIMMON's *R. affinis* from Ellesmereland agrees with these plants, only that his plants are coarser and with a longer receptacle. — But *R. affinis* subsp. *Wilanderi* NATH., collected by JØRGENSEN at Cape Thorsen, Spitzbergen, is more like my *R. auricomus* plants.

[1] GLEHN in Acta Horti Petrop. vol. IV (1876) p. 16. LINDBERG in Meddel. Soc. pro fauna et flora Fennica vol. XXVII, (1901) p. 65. DÖRFLER Herb. Norm. 4806.

34. *Ranunculus hyperboreus* L.

Pl. IV, 1.

I. Bessimyannii Fjord. Gribovii Fjord: North, and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay. Serebryanka. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, and Blaafjell Basin, north and south side. North of the Mashigin Fjord entrance.
V. Admiralty Peninsula.
VI. Eastern and Northern Krestovii Islands.

Supposed to be common or — in places — very common all over the land investigated by us.

As it was to be expected a plant from subaquatic stations must be a late summer plant in Arctic countries and *Ranunculus hyperboreus* was not observed before on July 16th in Belushii Bay. It was then not yet in flower. The first flowering plants were seen at Sukhoi Noss on July 26th. In full flower, and often out of flower in Mashigin Fjord in the first week of August. In Northern Krestovii Island in the greatest abundance in a pond together with *Cardamine pratensis* var. *dentata* (undivided leaves) and *Chrysosplenium tetrandrum*. On this wind-tortured island all the vascular plants were low; the above mentioned plants were quite imbedded in the mosses.

Former investigations. Many stations are recorded from Novaya Zemlya proper, but few from Lütke Land; the northernmost being Cape Schanz in Mashigin (PALIBINE).

35. *Ranunculus lapponicus* L.

Pl. IV, 2.

I. Gribovii Fjord: North side.
II. Serebryanka: Rosmysloff Valley. Sukhoi Noss.

Undoubtedly scarce and rare. In moist bogs, at Serebryanka together with *Pedicularis lapponica*.

It was in full flower and several plants were out of flower at Serebryanka and Sukhoi Noss (23d and 26th of July).

I neither found *R. Pallasii* not the hybrid between the two species. The hybrid has been recorded from Spitzbergen. — FEILDEN found *R. Pallasii* at Notchuyeff River, near the entrance to the Kara Sea.

Former investigations. *Ranunculus lapponicus* was found in Novaya Zemlya by v. BAER. Since then a few stations have been added (Vega Expedition, and EKSTAM), none of them north of Matotchkin Shar.

36. *Ranunculus nivalis* L.

Pl. IV, 3.

I. Goose Bay. Bessimyannii Fjord.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, Belushii Bay, and on the south side near the entrance to the Kara Sea. Serebryanka Fjord.
IV. Mashigin Fjord: Blomster Bay.

Fairly common on the west coast of Novaya Zemlya proper and in Matotchkin Shar; in places it is there met with in considerable abundance. But north of the strait I only found a few plants at one station.

It flowers at the same time as *Ranunculus sulphureus*: Half-grown plants in full flower in Goose Bay 5. 7, full-grown plants from Matotchkin Shar in the middle of July, plants out of flower at Serebryanka 23. 7 and Mashigin 3. 8, and ripe dehiscent nuts at Pomorskaya 27. 8, and in Bessimyannii Fjord 31. 8.

Former investigations. Recorded from many stations on the west coast of Novaya Zemlya proper and in Matotchkin Shar. North of the Shar the stations are less numerous.

FEILDEN states it to be " A common species, extending from the shores of the Russian Mainland to the extreme point visited in Lütke Land." This suggests it to be a common plant even far north which is contrary to my observations.

PALIBINE records it from Krestovii Fjord and from Cape Schanz in Mashigin Fjord. But he makes no mention of *Ranunculus sulphureus* which is much more common, especially in Lütke Land. The same is the case with MARKHAM from Lichutin Bay.

37. *Ranunculus pygmaeus* WBG.

Pl. IV, 4.

I. Goose Bay.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, Belushii Bay, and on the south side of the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Blomster Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay.

A common and generally distributed plant as far north as Sukhoi Noss. Farther north it is supposed to be less common or rare, though occasionally found in the greatest abundance, e. g. in the said rookery.

Few species are more variable: Flowers sometimes almost sessile in some specimens, in others the stem is up to 10 or even 14 cm. high.

A spring plant, in full flower on our arrival in Goose Bay 3. 7; it flowered to the middle of July in Matotchkin Shar. Out of flower and some plants with ripe seeds at Sukhoi Noss as early as 26. 7. Even farthest north I found plants out of flower in the middle of August. In the last weeks of August everywhere with ripe seeds.

Former investigations. All authors agree that *Ranunculus pygmaeus* is a generally distributed plant as far north as the flora was investigated by them, but few botanists visited Lütke Land north of Sukhoi Noss. Not recorded north of Serebryanka Bay (v. BAER) and Ziwolka Fjord (FEILDEN).

38. *Ranunculus reptans* L.

Pl. IV, 4.

I. Goose Bay.

On clayey mud in a small lake, then (5. 7) quite immersed, but of course the water level would sink during the summer. No trace of flowers were seen, the plants had only developed small rosettes of leaves, the runners were quite small and developed only in a few plants. Plants from so cold soil cannot be spring plants in Arctic countries.

Ranunculus reptans is an addition to the flora of Novaya Zemlya.

39. *Ranunculus sulphureus* SOL.

Pl. IV, 5.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Underneath Mt. Lasareff, At the foot of Mt. Wilczek, Belushii Bay, and on the south side of the entrance to the Kara Sea. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, north side of Blaafjell Basin, and Fram Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island, and Pankratyeff Peninsula.

One of the commonest plants all over Novaya Zemlya and Lütke Land. Most probably I have seen it every day ashore, and in great abundance. It is equally frequent farthest north as in the southern

districts; in the rookeries south of Arkhangel Bay I collected my finest specimens. In my opinion the commonest buttercup of the whole country.

Ranunculus sulphureus is a type plant on soil, irrigated by cold water from melting snow and ice (Norwegian: "sneleier"). In spite of this cold substratum it is an early spring plant, and it develops its fruits in an extraordinarily short time. It was in full flower, but far from full-grown, on our arrival in Goose Bay as early as July 5th and later it flowered during the month of July in Matotchkin Shar. On the west coast the plants are earlier developed than in the Shar: at Serebryanka I found plants that had entirely done their flowering on July 23d. In the first week of August the flowering had culminated in Mashigin Fjord, in Fram Bay of Mashigin I found the first ripe dehiscent nuts on July 10th. Its fruits ripen to the extremest point northwards visited by us. Even in Pankratyeff Peninsula, the most desolate part of the earth which I have ever seen ripe nuts were collected on August 19th. — Plants with delayed flowers were seen to the last day of our visit.

Former investigations. All authors agree that *Ranunculus sulphureus* is a very frequent plant all over the area investigated, but it was formerly not recorded from places north of Ziwolka Fjord (74° 25 n. l. FEILDEN).

40. *Thalictrum alpinum* L.

Pl. IV, 6.

I. Bessimyannii Fjord. Gribovii Fjord: north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, and at Belushii Bay. Serebryanka.

A very common plant in the southern fjords, more scarce in Matotchkin Shar, and not seen north of Serebryanka.

FEILDEN has excellently described its stations:[1] "it affects protected spots, growing under the sides of runnels, on sheltered banks, or in the clefts of rock exposures".

It is easily understood that this plant does not advance farther north, for it flowers late in the summer. The first flowers were seen in Belushii Bay on July 19th. The flowers are generally quickly shed, and no seeds developed. But at Bessimyannii and Gribovii Fjords I found capsules that were supposed to arrive to maturity (30th and 31st of August).

[1] Flowering Plants of Novaya Zemlya, p. 195.

Papaveraceae.

41. *Papaver radicatum* ROTTB.

Pl. V, 1; XXXIV, dext.; XXXV, XLIV.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Grebovii Island.
II. Matotchkin Shar: Pomorskaya, Lowland before Mt. Wilczek, Chalhonik Valley, East of Cape Jouravlev, S. w. of Mt. Syernaia, Belushii Bay, and south side of the entrance to the Kara Sea. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, Point Basis, Blaafjell Basin, south and north side, and Fram Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands, Pankratyeff Peninsula.

Few plants, if any, are more frequent and widespread all over Novaya Zemlya proper and Lütke Land than *Papaver radicatum*, even to the extremest point northwards attained by us. On the desolate Pankratyeff Peninsula we could stroll about for miles without seeing a single vascular plant, but even in this desert some scattered poppies were seen in depressions, cut by rivers and runnels.

Few other plants ascend higher on the mountains. On the ridge between Gribovii and Bessimyannii Fjords I found *Papaver radicatum*, up to 320 m. s. m. I did not find it on the highest defile, but that may have been my mishap. On the highest defile I only found *Cerastium Regelii*, *Saxifraga oppositifolia* and *Catabrosa concinna* to be common plants, more scattered were *Draba alpina*, *Saxifraga cernua* and *Poa alpina vivipara*. Other vascular plants were not observed there.

Papaver radicatum was in full flower on our arrival in Goose Bay on July 3d., and flowering plants were seen during the whole summer. The petals often dry up and persist for a long time, apparently prolonging the inflorescence.

I never found ripe capsules from 1921, but capsules with full-grown seeds, developed in 1920, were common everywhere, even farthest north. Accordingly *Papaver radicatum* attains so high latitudes because it starts ist growth and ripens its seeds at low temperatures, but its summer work is evidently not accomplished in a very short time. Many *Caryophyllaceous* plants ripen their seeds in an incredibly

short time and that is the principal reason why they can subsist in high Arctic regions.

Several authors (e. g. TRAUTVETTER, and LUNDSTRÖM) have called attention to the great variability of *Papaver radicatum*. Also in Novaya Zemlya the hairiness was variable, usually dense and spreading, but in some plants less dense, in others the hairs were more appressed. Usually the stamens were longer than the capsule. The typical colour of the petals was some tinge of yellow, occasionally yellowish-green, almost white or pale rose.

SV. MURBECK has unraveled the difference between this species and *Papaver nudicaule* with wonted mastery.[1] ERIK LUNDSTRÖM has further discussed the question in a preliminary paper[2] that throws little light on it, and his final revision has not yet appeared.

Former investigations. All authors agree that *Papaver radicatum* is a very common plant all over the area investigated. It is one of the 4 vascular plants that Capt. HELLBERG brought home from Cape Nassau.

Cruciferae.

42. *Arabis alpina* L.

Pl. V, 2.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side and Veselago Island.
IV. Mashigin Fjord: Strömsnes Bay.

Common in the fjords of Novaya Zemlya proper, but certainly very rare in Lütke Land. I only found it at one station north of Matotchkin Shar, well developed and in some abundance.

In the southern fjords I found quite ripe seeds in the last days of August. In Strömsnes Bay it was quite out of flower and its seeds almost full-grown as early as Aug. 8th. These seeds would certainly attain to maturity. Climatic causes do not limit its present distribution. We may perhaps venture to suppose that it is spreading.

It affects gravelly soil, near runnels and the like.

Former investigations. Recorded from some stations in the western fjords of Novaya Zemlya proper, and from Matotchkin Shar, but not from Lütke Land north of the Shar.

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1 *Neue Hybriden*, Acta Horti Bergiani Vol. II, No. 5, p. 6—9.
2 *Plantae in Hort. Berg.*, Acta Horti Bergiani Vol. V, No. 3, p. 40—50.

43. *Arabis petraea* (L.) LAM.

Pl. V, 3.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Under Mt. Wilczek, East of Cape Jouravlev, Near Vasnetsoff Glacier. Serebryanka. Sukhoi Noss.

Common in the fjords of Novaya Zemlya proper and in Matotchkin Shar, but north of the Shar it must be rare; I never found it north of Sukhoi Noss. It is much more common than *Arabis alpina*. It affects dry well exposed gravelly hills, fissures in the rocks, and the like.

It is very variable. Luxuriant plants from southern well exposed stations were tall (up to 25 cm.), with few (1—2) shoots from a loose rosette with thin, deeply incised lyrate leaves. Much shorter at unfavourable stations, with several shoots from a firmer rosette formed of thicker, little incised or almost entire leaves.

Arabis petraea was in full flower on our arrival in Goose Bay on July 5th. J found ripe seeds in the southern fjords in the last days of August. The plants from Sukhoi Noss were poorly developed, the oldest flowers had only just shed their flowers on July 26th.

Former investigations. Recorded from several stations on the west side of Novaya Zemlya proper, and from Matotchkin Shar, but not from Lütke Land north of the Shar.

44. *Braya purpurascens* (R. BR.) BUNGE.

Pl. V, 4; XXXII, sin.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North side, and Veselago Island.
II. Matotchkin Shar: Near Mt. Wilczek, Chalhonik Valley, East of Cape Jouravlev and S. w. of Mt. Syernaia. Serebryanka.
III. Krestovii Fjord.
IV. Mashigin Fjord: Sol Bay, Blomster Bay, Point Basis, South side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island, Pankratyeff Peninsula.

A common plant over the entire area investigated by us and met with even in the desolate Pankratyeff Peninsula.

Its roots are very long, and that enables it to maintain itself on moist clayey ground. It is quite a type plant of this unattractive substratum, often associated with *Eutrema Edwardsii*. Also found on dryer, gravelly ground. It is very resisive against the heavy Arctic gales.

A plant from this substratum could not be of the earliest spring plants. It came into flower in Matotchkin Shar in the middle of July. Farthest north some plants were in flower in the middle of August, and many plants had almost full-grown siliques with half-grown seeds; the frames of siliques from 1920 were quite common. I am convinced that it would ripen its seeds everywhere in good years, as in 1921. Ripe seeds were abundant in Mashigin Fjord in the first days of August.

Former investigations. Recorded from several stations in Novaya Zemlya proper, and from a few places in Lütke Land as far north as Lichutin Bay (MARKHAM). Often cited as *Braya alpina*.

45. *Cardamine bellidifolia* L.

Pl. V, 5.

I. Goose Bay. Bessimyannii Bay.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, Belushii Bay, South side of the entrance to the Kara Sea. Serebryanka. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, North side of Blaafjell Basin, Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Lichutin Island.

Common and widespread, but nowhere plentiful. Farthest north evidently less common.

It affects moist gravelly and slaty substratum.

One of the earliest spring plants. On our arrival in Goose Bay (July 3d) many flowers had already lost their petals, and developed siliques of 5—6 mm. At the Kara Sea I found full-grown siliques on July 20th. The first ripe seeds were observed in Mashigin Fjord on August 3d. In the middle of August ripe seeds were common even farthest north.

Former investigations. Generally stated to be common all over the area investigated, FEILDEN found it to be so "extremely common" that he only mentioned one station, Ziwolka Fjord, then its northern limit.

46. *Cardamine pratensis* L.
var. *dentata* (SCHULTES).

Pl. V, 6.

I. Bessimyannii Fjord. Gribovii Fjord: North side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, and Strömsnes Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Berkh Island, Eastern and Northern Krestovii Islands.

Somewhat scattered, but quite common, even farthest north.

On the gravelly sides of runnels and water courses, often in the water, also in bogs, and other moist places.

As far north as Admiralty Peninsula I collected plants with the common showy flowers. Father north the plants were reduced in size, their leaves only with a few small pinnae, sometimes only the ultimate pinna developed, or in the most reduced plants, narrowly linear and quite undivided. North of Admiralty Peninsula no flowers were seen. In Northern Krestovii Island the plants were very small, almost imbedded in the mosses.

The leaflets of the radical leaves are more or less petiolate, indicating the var. *dentata* and not the type of *C. pratensis*. The petals are more often lilac than white, the veins are distinct, though not conspicuous.

Even as far south as in Gribovii Fjord I found no ripe siliques as late as Sept. 2nd. A few small siliques contained half-grown seeds that most probably would not attain to maturity. By far the greater part of the siliques were sterile. The propagation of this plant depends on its vegetative buds.

Former investigations. All authors agree that "*Cardamine pratensis*" is "Generally distributed in suitable places" (FEILDEN), but in literature I have found no stations recorded north of Ziwolka Fjord.

47. *Cochlearia officinalis* L.
var. *arctica* (SCHLECHT.) GEL.

Pl. VI, 1.

I. Goose Bay. Bessimyannii Fjord.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay. Sukhoi Noss.

It cannot be common. I only found it at a few places in Novaya Zemlya proper, and in the Matotchkin Shar district.

In flower on our arrival in Goose Bay, 3d of July, ripe seeds were collected at Pomorskaya on Aug. 27th.

Former investigations. There are but few records on its presence in Novaya Zemlya: Kostin Shar, and Matotchkin Shar (TRAUTV., EKSTAM).

var. *groenlandica* (L.) GEL.

Pl. VI, 1; XXXVIII; XLII; XLIII, sin.

I. Goose Bay. Gribovii Fjord: North side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Strand near Mt. Wilczek, Moraine before Vasnetsoff Glacier, East of Cape Jouravlev, Belushii Bay, South side of the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, and Blaafjell Basin, north side. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands.

Very common all over Novaya Zemlya proper and Lütke Land as far north as we came. It is a nitrophilous plant and affects rookeries and other places where birds like to rest.

In full flower on our arrival in Goose Bay (July 3d.) Even farthest north in Northern Krestovii Island I found ripe seeds as early as August 14th.

Former investigations. Mentioned by many authors as a common plant as far north as the country had been investigated: Lichutin Bay on the west coast (MARKHAM), and Ziwolka Fjord on the east coast (FEILDEN).

48. *Draba alpina* L.[1]

Pl. VI, 2.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Strand before Mt. Wilczek, Near Tretyakoff Glacier, Chalhonik Valley, East of Cape Jouravlev,

[1] I am much indebted to prof. OSTENFELD, Copenhagen, for valuable advice on the difficult genus *Draba*.

Strand near Mt. Syernaia, Belushii Bay everywhere, and South side of the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.

III. Krestovii Fjord.

IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Point Basis, Blaafjell Basin, south and north side, and Fram Bay. North of the entrance to Mashigin Fjord.

V. Admiralty Peninsula.

VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands, Pankratyeff Peninsula.

Most abundant everywhere, and quite as frequent farthest north as in the southern fjords.

As it was to be expected a plant of this frequency is variable, and *Draba alpina* varies with respect to almost each and every of its characters. Several formae have been described, var.'s *caulescens* TRAUTV., *legitima* LINDBL. and *hebecarpa* LINDBL. There is also little doubt that plants of hybrid nature occur where *Draba alpina* is one of the parents.

In full flower on our arrival in Goose Bay, on July 3d—5th. Farthest north I found full-grown siliques in the middle of August. They had not yet opened their valves, but the seeds were full-grown and they would certainly attain to maturity. Siliques that had shed their valves were collected as early as the first days of August in Mashigin Fjord, even in its "ice-box", the Blaafjell Basin.

Former investigations. All authors agree that *Draba alpina* is a very frequent plant as far north as the country has been investigated. It is "the commonest and most widely distributed of the *Drabae*" (FEILDEN), and was obtained at Cape Nassau by Capt. HELLBERG (BLYTT).

var. *glacialis* (ADAMS) KJELLM.

Pl. VI, 3.

I. Goose Bay.

II. Matotchkin Shar: near Mt. Syernaia, and Belushii Bay.

IV. Mashigin: Sun Bay.

It has a wide distribution, but it is supposed to be rare. I only found a few specimens. — The plants from Mashigin had ripe seeds (24. 8. 1921).

Former investigations. Von BAER collected it in Matotchkin Shar.

var. *oblongata* (R. BR.) GEL.

Pl. VI, 3.

I. Goose Bay.
II. Matotchkin Shar: Pomorskaya, and South of the entrance to the Kara Sea.
V. Admiralty Peninsula (?).

It is quite as rare as var. *glacialis*. The plants from Admiralty Peninsula had ripe seeds, and the determination is not quite certain.

Former investigations. EKSTAM collected it in Matotchkin Shar, and von BAER possibly "in insulis Novaja Semlja".

49. *Draba magellanica* LAM.
subsp. *borea* ELIS. EKMAN.

Pl. VI, 5.

II. Matotchkin Shar: Belushii Bay.
IV. Mashigin Fjord: Sol Bay, Dal Bay, and Blomster Bay.

Not common. On dry and well exposed hills (flower-hills), at Sol Bay in some abundance in a rookery.

The siliques were full-grown in Mashigin in the first half of August, but they had not yet shed their valves. There is no reason to doubt that these seeds would mature.

Former investigations. "*Draba hirta*" has been recorded from some stations as far north as Krestovii fjord (PALIBINE). FEILDEN writes that *Draba hirta*, the type and its var. *rupestris* is "abundant over Waigats, common on Novaya Zemlya, but not met with in Lütke Land."

50. *Draba nivalis* LILJEBL.

Pl. VI, 6.

I. Goose Bay. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya and Belushii Bay (Albert Hill). Serebryanka.
IV. Mashigin Fjord: Rækved Bay, Dal Bay, Strømsnes Bay, and Blomster Bay. North of the entrance to Mashigin Fjord.

A fairly common plant on dry gravelly well exposed hills (the flower-hills) as far north as Mashigin. But it has not the wide distribution of *Draba alpina* and *Draba Wahlenbergii*.

In flower in Goose Bay on July 5th, and in Belushii Bay in the middle of July. In Mashigin I found ripe seeds in the first days of August.

The hybrid *Draba fladnizensis* × *D. nivalis* (*Draba curtisiliqua* J. E. ZETT.) was collected at Belushii Bay, Matotchkin Shar.

Former investigations. There are but a few stations recorded for this plant. FEILDEN suggests it to be a rare plant; he did not find it in Lütke Land.

51. *Draba rupestris* R. BR.

Pl. VII, 1 (only my own stations).

I. Gribovii Fjord, inland end of the south side.
II. Matotchkin Shar: Pomorskaya, and South side of the Shar east of Cape Jouravlev.
IV. Mashigin Fjord: Strömsnes Bay.

Draba rupestris is no common plant in Novaya Zemlya. It affects the same stations as the latter species.

In literature the distribution of either species is generally included under the head of *D. hirta*.

52. *Draba subcapitata* SIMMONS.

Pl. VII, 1.

SIMMONS, Vascular Plants of Ellesmereland. Sec. Arct. Exp. Fram 1898—1902, No. 2, p. 87, tab. I, fig. 3—8. Kristiania 1906 (ubi syn).

II. Matotchkin Shar: Pomorskaya, Near Mt. Wilczek, East of Cape Jouravlev, Near Mt. Syernaia, Belushii Bay, and South side near the entrance to the Kara Sea.
III. Krestovii Fjord.
IV. Mashigin Fjord: Fram Bay.

Scarce, but not rare, at least in the Matotchkin Shar district.

Former investigations. Collected by von BAER, "in Novaia Semlja", Vega Expedition at Bessimyannii, and at Rogatscheff Fjords.

53. *Draba Wahlenbergii* HN. p. p.

Pl. VI, 4.

Draba Wahlenbergii HN. p. p. HARTMAN Skandinaviens Flora (1820) p. 249. EKMAN, ELIS. Nomencl. of Drabae p. 9, in Svensk Bot. Tidsskr. vol. XII, No. 7, (1912), and Zur Kenntniss der nodr. Hochgebirgsdrabae p. 13, in Kgl. Sv. Vet. Akad. Handl. vol. LVII, No. 3 (1917). LINDMAN Svensk Fanerogamflora p. 289 and 290. Stockholm 1918.

Draba fladnizensis WULF., used by authors on the Novaya Zemlya flora.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya, Near Tretyakoff Glacier, Chalhonik Valley, East of Cape Jouravlev, Near Mt. Syernaia. Belushii Bay, and South side of the entrance to the Kara Sea. Serebryanka.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, Blaafjell Basin, north and south side.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay.

Almost as widespread as *Draba alpina*, but by far less common. Found in abundance at some places, e. g. Pomorskaya, otherwise generally rather scarce. In Mashigin Fjord I found fine plants in the "ice-box", Blaafjell Basin, but it is supposed to be rare north of this fjord.

It affects moist grass-land, runnels, and the like, but it is also found on dry gravelly soil, e. g. on the flower-hills.

The specific value of this plant is contested. Every plant of my *Draba fladnizensis*-material is *D. Wahlenbergii* with larger petals (ca. 3,5 mm. long) and heterotrichous basal leaves. In the regions investigated by us *D. Wahlenbergii* must be more common than the true *D. fladnizensis*. Some stations on the map perhaps represent the latter species. — I am indebted to Dr. TH. C. E. FRIES and Dr. G. SAMUELSSON for valuable information on this species.

Profusely flowering in Goose Bay on July 5th; it then flowered in Matotchkin Shar in the first three weeks of July. At Serebryanka (July 23d) and in Mashigin Fjord (1—10 of August) it was generally out of flower and with full-grown siliques, but they had not yet shed their valves. The same was the case "farthest north" in the middle of August. At Gribovii Bay I found ripe seeds in the last days of August. It requires a considerable time to ripen its seeds, and this is perhaps the reason why it is so rare farthest north. I think it probable that it will produce ripe seeds at well exposed places at Arkhangel Bay, in good years.

Former investigations. "Widely spread from the mainland of Arctic Russia to 74° 25′ N." (FEILDEN on *D. fladnizensis*) i. e. as far north as the country had been investigated.

54. *Eutrema Edwardsii* R. BR.

Pl. VII, 2.

I. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, Near Vasnetsoff Glacier, East of Cape Jouravlev, Near Mt. Syernaia. Serebryanka Fjord.

IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, Blomster Bay, Blaafjell Basin, north side, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Berkh Island, Lichutin Island.

Widely distributed all over the area explored by us, and quite common. Supposed, however, to be less common farthest north.

Moist, often irrigated clayey ground, moist grass-land, and the like.

It is not to be expected that a plant from this moist substratum should be an early spring plant. In the first 3 weeks of July it was found flowering, but not always full-grown, in Matotchkin Shar. The first ripe seeds were collected in Mashigin in the first days of July, but they were not common, so early. Farthest north the seeds were not ripe in the middle of August, but most probably they would attain to maturity.

Former investigations. Formerly recorded from many stations as far north as the country had been explored i. e. to Cape Schanz (PALIBINE).

55. *Parrya nudicaulis* (L.) REGEL.

Pl. VII, 3; XXXV.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka.
III. Krestovii Fjord.
IV. Ziwolka Fjord (HOLTEDAHL).

Very common on moist grass-land on the west side of Novaya Zemlya proper, and in places in Matotchkin Shar. But it is a rare plant north of the Shar.

The colour of the petals is very variable, from white to mauve or reddish-violet.

It was in full flower in Goose Bay on July 5th. On the "Flower-Hill" (Albert Hill) in Belushii Bay it had long siliques (70 mm.) on July 17th; some siliques already had dihiscent valves, but there were only small, undeveloped, certainly sterile seeds in them. In Gribovii Fjord (Sept. 2nd) the siliques were generally sterile, or they contained poorly developed, unripe seeds. Evidently the propagation by seeds is difficult for *Parrya nudicaulis* in Novaya Zemlya.

Former investigations. FEILDEN justly remarks: "Extremely abundant over Waigats and Novaya Zemlya, decreasing, however, as soon as we cross Matotchkin Shar and enter Lütke Land." Formerly recorded as far north as Krestovii Fjord (PALIBINE), and Ziwolka Fjord (FEILDEN), we were unable to find it farther north.

Crassulaceae.

56. *Sedum roseum* (L.)

Pl. VII, 4; XXXVIII.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, and west of Fram Bay.
VI. South of Arkhangel Bay.

Quite common as far north as Mashigin Fjord. North of this fjord I only found it near the great rookery south of Arkhangel Bay. — Otherwise it was not connected with rookeries or with birds' resting-places.

I only found it on prominent rocks in the cliff.

In the last days of August before any frost was observed it lost its turgor and took a deep red colour, making the plants very conspicuous, and visible from our ship.

It had young (male) flowers in Goose Bay on July 3d. In good years it will most probably ripen its seeds even farthest north, for I found almost full-grown green capsules at Arkhangel Bay on August 12th.

Former investigations. Recorded from many stations as far north as Cape Schanz in Mashigin (PALIBINE).

Saxifragaceae.

57. *Chrysosplenium alternfolium* L. var. *tetrandrum* (LUND).

Pl. VII, 5.

HEINTZE AUG.: Om Chrysosplenium alternifolium L. v. tetrandrum Lund och dess utbredning inom Skandinavien. Bot. Not. 1907. p. 231—237.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay. Sukhoi Noss.
IV. Mashigin Fjord: Strömsnes Bay. North of the entrance to Mashigin Fjord.
VI. Rookery south of Arkhangel Bay, Berkh Island, Northern Krestovii Island.

Fairly common on the coast. On moist mossy ground, tufts of grass in the bogs, and nowhere more plentiful than on the strand before the great northern rookeries. In Northern Krestovii Island there was no rookery, but birds assembled in great numbers to rest. In

this flat wind-tortured island it was imbedded in the mosses, only the flowers and the leaves were visible. — *Chrysosplenium* is a nitrophilous plant in Novaya Zemlya.

Its seeds mature rapidly, I found ripe seeds in Northern Krestovii Island on Aug. 14th.

58. *Saxifraga aizoides* L.

Pl. VII, 6.

I. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: West of Tretyakoff Glacier, Near Vasnetsoff Glacier, Chalhonik Valley, East of Cape Jouravlev. Serebryanka common.
III. Krestovii Fjord.
IV. Mashigin Fjord: Flower Bay, Trehörningen, and South side of Blaafjell Basin.

Quite common and in places abundant as far north as Serebryanka or Krestovii Fjord. In Mashigin the least common of the *Saxifragae*, farther north it was eagerly searched for, but in vain.

It does not require much warmth to subsist and grow, for it affects cold, at times irrigated ground, and in Mashigin I only found it in the inland end of the fjord, at stations irrigated by water from melting ice.

Never the less it has great difficulties in the ripening of its seeds. I never found ripe seeds from 1921, even as far south as Gribovii and Bessimyannii Fjords it was in full flower in the end of August, and only young and quite immature capsules were seen. But I found open, evidently mature capsules from the preceeding year in Matotchkin Shar and in Serebryanka. This suggests that the seeds can ripen during the autumn at low temperatures.

Former investigations. Generally stated to be common or even abundant, but I have found no records of it from stations north of Serebryanka. The stations in Mashigin represent a considerable extension of its range.

59. *Saxifraga caespitosa* L.
subsp. *eucaespitosa* ENGL. et. IRMSCH.

Pl. VIII, 3.

Saxifraga caespitosa subsp. *eucaespitosa* ENGL. et IRMSCH. vide *A. Engler* und *E. Irmscher* Saxifragaceae — Saxifraga, in *A. Engler* Das Pflanzenreich IV. 117 (1919) p. 369—375, ubi syn.

S. caespitosa f. *decipiens*, *S. decipiens*, *S. decipiens* f. *caespitosa* in literature on the Novaya Zemlya flora.

S. groenlandica L. autorum.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, Strand before Mt. Syernaia, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Point Basis, North and south side of Blaafjell Basin, and Fram Bay.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands.

One of the commonest and most wide-spread plants of Novaya Zemlya and Lütke Land. Next to *Saxifraga Hirculus* it is the commonest of all *Saxifragae*. At the pass between Gribovii and Bessimyannii Fjords it attains 320 m. s. m.

It is a social species that often covers areas of some extent, at Belushii Bay a level strand was quite white from its beautiful blossoms.

The greater part of my material is the typical one-flowered f. *uniflora* (R. BR.) ENGL., but more luxuriant plants are quite common.

As it was to be expected a plant of this distribution and frequency must have a rapid life cyclus. It was in full flower at Goose Bay in the first days of July. Even as far north as at Arkhangel Bay I found ripe seeds as early as August 12th.

Former investigations. All authors agree that it is common and generally distributed as far as the country has been investigated (Lichutin Island — MARKHAM).

60. *Saxifraga cernua* L.

Pl. VIII, 1; XXXIX.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, S. w. of Mt. Syernaia, Belushii Bay, South side of the shar near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, Point Basis, Blaafjell Basin, north side, and Fram Bay. North of the entrance to Mashigin Fjord.

V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Isand, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands, Pankratyeff Peninsula.

One of the commonest and most wide-spread plants all over the area investigated. The individual plants are, however, scattered, it is not so plentiful at each station as several other plants.

It affects moist gravelly places, as river-sides, fissures in the rocks, and the like. If well fed, it develops quite luxuriant plants even farthest north, I obtained my finest specimens in the rookeries south of Arkhangel Bay, plants of 25 cm. with large, white blossoms. — One of the very few species that developed fine plants in Northern Krestovii Island.

It has a very rapid cyclus. At Goose Bay it was in flower on July 5th, and its bulbilli were half-grown. At Arkhangel Bay its bulbilli were full-grown and easily detached on August 12—13th.

Former investigations. Recorded from numerous stations and as far north as Lichutin Bay (MARKHAM). All authors agree that it is extremely common over the entire area investigated.

61. *Saxifraga flagellaris* WILLD.

Pl. VIII, 2; XLII.

I. Goose Bay. Gribovii Bay, north and south side.
II. Matotchkin Shar: Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, and near the Lake Trehörningen.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Eastern Krestovii Island.

Quite common on the coast, much less common or lacking in the inland end of the fjords.

It affects level, clayey ground, tesselated with small stones, on the strand. I have only once obtained it from a station somewhat remote from the sea (at Belushii Bay on a shore-line, 100 m. above the present level of the sea).

It was in full flower on our arrival in Goose Bay in the first days of July, and it flowered in Gribovii Bay on Sept. 2nd, our last day ashore. I never found ripe seeds, but I think it quite probable that some capsules from 1920 could have contained ripe seeds. Its well known vegetative propagation makes it quite independent of its seeds for local spreading.

Former investigations. Mentioned by many authors as a common plant all over Novaya Zemlya proper and Lütke Land as far north as Fern Island (OLIV.).

62. *Saxifraga hieraciifolia* W. et K.

Pl. VIII, 4.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, and Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Strömsnes Bay, Flower Bay, North side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Berkh Island.

Supposed to be rare north of Mashigin, but as far north as that fjord it is common, more common than *Saxifraga nivalis*, even if *Saxifraga tenuis* is included under the latter species. It is, however, not so frequent as many other *Saxifragae*.

It affects moist grass-land. It is not social, but the large scattered plants are conspicuous enough.

It must have some difficulties with the maturation of its seeds. At Goose Bay the flowers were partly in bud, partly expanded in the first days of July. I only found flowers in Matotchkin in the first 3 weeks of July, and in Mashigin in the first 10 days of August. Farthest north they began to fade in Berkh Island. (August 18th). I only obtained few ripe capsules: north of Mashigin (23/8), and at Gribovii Bay (2/9). It is supposed to produce sufficient of ripe seeds (how far north?) in good summers, if the seeds can mature during the late autumn (September) at low temperatures.

Former investigations. Many stations are recorded for this plant as far north as Ziwolka Fjord (FEILDEN), but the authors agree that it is not so abundant as several of the other *Saxifragae*. EKSTAM obtained the hybrid *Saxifraga hieraciifolia* × *S. nivalis* at Karmakola and in Matotchkin Shar.

63. *Saxifraga Hirculus* L.
f. *propinqua* R. BR.

Pl. VIII, 5; XLIII dext.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Near Mt. Wilczek, Chalhonik Valley, Before Mt. Syernaia, Belushii Bay, South side near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, North and south side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island.

I did not find this species in Northern Krestovii Island, and not in Pankratyeff Peninsula. But otherwise I fully subscribe to FEILDEN'S words: it is "the most widely distributed and commonest plant of the region visited" . . . . it gives a "yellow tinge to the tundra." Even as far north as in the Rækved Bay in Mashigin it was so abundant that it coloured large areas. I is most astonishing to find a flowery pride like this so far north, in an Arctic, glaciated country.

It affects moist tundra land, but it is not particular with respect to its substratum, it is also found on the dry flower-hills.

Saxifraga Hirculus is a protandrous entomophilous plant, the flowers were often quite filled up with small insects (*Diptera* a. o.).

In spite of this extraordinary distribution *Saxifraga Hirculus* is no early spring plant. At Goose Bay its drooping flower buds were more common than expanded flowers in the first days of July. In Matotchkin Shar it was in an early flowering stage in the first half part of July, at Chalhonik Valley many plants were hardly green as late as on the 13th of July. It generally had fully expanded flowers in the second half part of July between Matotchkin Shar and Mashigin Fjord. The same was the case in Mashigin in the first 10 days of August, and farthest north about the middle of August.

I have no observations of its seeds from the southern fjords, visited by us 28/8 — 2/9. But open ripe capsules from 1920 were common everywhere, also farthest north. This suggests that the seeds mature in the late autumn at low temperatures.

Former investigations. All authors use high superlatives in describing the distribution and frequency of *Saxifraga Hirculus*. Obtained as far north as Cape Schanz (PALIBINE) on the west coast, and Ziwolka Fjord on the east coast (FEILDEN).

64. *Saxifraga nivalis* L.

Pl. VIII, 6, (only my own stations).

I. Goose Bay. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya, East of Cape Jouravlev, Near Mt. Syernaia, Belushii Bay, South side of the entrance to the Kara Sea. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Strömsnes Bay, Blomster Bay, North side of Blaafjell Basin, and Fram Bay.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Eastern and Northern Krestovii Islands.

Common all over the area investigated by us, but nowhere plentiful. Supposed to be one of the least abundant *Saxifragae* of Novaya Zemlya.

I found full-grown, but not quite ripe capsules at Arkhangel Bay on Aug. 12th. It is, accordingly, supposed to mature its seeds even farthest north.

Former investigations. Numerous stations have been recorded, and it is stated to be common and generally distributed. But the authors have not distinguished between this species and *Saxifraga tenuis*.

65. *Saxifraga oppositifolia* L.

Pl. IX, 1; XXXI.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Strand before Mt. Wilczek, West of Tretyakoff Glacier, Chalhonik Valley, East of Cape Jouravlev, West of Mt. Syernaia, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Strömsnes Bay, Blomster Bay, North and south side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands, Pankratyeff Peninsula.

Common all over the area investigated by us, and in places abundant, also farthest north. Most probably I have seen this plant every

day ashore. It attains very high altitudes. In the pass between Gribovii and Bessimyannii Fjords it was obtained at the highest passage, 350 m. s. m., as a common plant.

It affects moist slopes, sandy strands, and the like.

Generally recognized to be one of the earliest flowering spring plants. It flowered profusely on our arrival in Goose Bay in the first days of July. But it is not of the earliest plants to ripen its seeds. It was in full flower farthest north in the middle of August, and flowering plants were seen to the last day of our visit. — It is supposed to ripen its seeds during the autumn (september). I have seen ripe capsules from the preceeding year at many places, but I have no observations on ripe seeds from 1921.

Former investigations. Recorded from many stations as far north as Cape Nassau (HELLBERG). But it is evidently not equally common over the whole area. FEILDEN says that it is "by no means" common in Novaya Zemlya, and "not uncommon" at Belushii Bay of Lütke Land.

66. *Saxifraga rivularis* L.

PL. IX, 2; XLII.

I. Goose Bay. Gribovii Fjord, north side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay. Serebryanka. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, and Blomster Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Eastern and Northern Krestovii Islands.

Somewhat scattered, but in places very abundant, e. g. in the rookeries south of Arkhangel Bay.

It affects moist gravelly or mossy slopes, river banks, and the like. Farthest north it is a very nitrophilous plant, in the rookeries it covers the ground like few other plants.

Saxifraga rivularis was in full flower on our arrival in Goose Bay in the first days of July. But unlike the other *Saxifragae* it ripens its seeds very early. I found ripe seeds of 1921 in Belushii Bay as early as July 16th, and farthest north ripe seeds were obtained at all stations in the middle of August.

Former investigations. It is astonishing that so few stations have been recorded for this plant. FEILDEN, however, states that it is "dispersed over . . . Novaya Zemlya and Lütke Land", as far north as Ziwolka Fjord.

67. *Saxifraga stellaris* L.
**comosa* RETZ.

Pl. IX, 3.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Strömsnes Bay, Blomster Bay, North side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

Widely distributed over the whole area with the exception of the poorest stations farthest north. It is rather common, but nowhere abundant.

It affects very moist stations, wet bogs, and other stations that are at times irrigated.

In the middle of August its bulbilli were so far developed at Arkhangel Bay that they would surely attain to maturity.

Former investigations. Obtained at many stations in Novaya Zemlya proper as well as in Lütke Land, as far north as Pakhtusoff Island. FEILDEN says that it is very common

68. *Saxifraga tenuis* (WBG.) SMITH.

Pl. IX, 4 (only my own stations.)

I. Goose Bay.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, and South side near the entrance to the Kara Sea. Serebryanka.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Strömsnes Bay, Blomster Bay, and Fram Bay.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Lichutin Island, Mainland east of Lichutin Island, Eastern and Northern Krestovii Islands.

Quite common, and universally distributed over the whole area investigated by us.

It is not of the earliest plants to flower. In the first two weeks of July I found it more in bud than with expanded flowers. But it

ripens its seeds in a remarkably short time. I obtained ripe seeds in Mashigin on the 5th of August. Farthest north it was in flower or out of flower in the middle of August. I did not find ripe capsules of the year, but ripe capsules from the preceeding year were quite common.

Rosaceae.

69. *Dryas octopetala* L. var *minor* HOOK.

Pl. IX, 5; XXIII—XXIV; XXVI, 2 (se also XXVI, 3.)

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Strand before Mt. Wilczek, Chalhonik Valley, Near Vasnetsoff Glacier, East of Cape Jouravlev, Strand before Mt. Syernaia, Belushii Bay, and South side of the entrance to the Kara Sea. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, Blomster Bay, Point Basis, South side of Blaafjell Basin and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

Abundant over the whole area investigated by us. Supposed to be lacking in the wind-tortured Krestovii Islands, and in Pankratyeff Peninsula, but otherwise I think it probable that I could have found it every day ashore on slaty and chalky substratum. Even farthest north it was found in the greatest abundance. On the mainland east of Lichutin Island it covered a slope for several hundred metres.

I only found var. *minor* HOOK., never the type as represented in our mountains. Var. *minor* was described by HOOKER in Transact. Lin. Soc. vol. XIV p. 387. I have not seen the authentic diagnosis, but HARTZ[1] cites: "foliis parvis, angustis, profunde crenatis",and he adds: "margine interdum involuto, foliis vix 1 cm. longis, 1—2 mm. latis, absque petiolo brevi". In Flora Boreali Americana vol. I p. 174, London 1840, HOOKER writes "foliis oblongo-ovatis, profunde crenato-serratis, basi obtusis, subtus albo-tomentosis venis nudiusculis prominentibus, calycis segmentis linearibus (floribus albis)".

Several characters separate it from the type, as seen in Norway.

[1] HARTZ: Fanerog. og Karkrypt. & c. p. 319.

The colour of the petals is always yellowish. I have seen thousands of flowers, but never a purely white flower. *Their size is small*: Diam. of the expanded flower from 10—15 mm., I have never measured more than 15 mm. The petals are contiguous or with imbricate margins, rounded or slightly emarginate, with distinct dark veins.

On the sepals there are ± prominent, reticulate, reddish-brown or dark nerves, and on them rigid black spreading hairs often with a glandular head. Besides there is also a white pubescence on the sepals and on the pedicels. On the sepals it is chiefly apical and marginal, sometimes almost absent. The pedicel is densely pubescent, especially underneath the flower.

The style is short, I have never seen it longer than 10 mm. It is longer than the sepals, but in our Norwegian plants the style is generally several times as long as the sepals. In var. *minor the pistils are generally condensed into almost globular heads*, enclosed in the sepals. Spreading sepals with open, free pistils are quite rare.

It only produces a few leaves every year. The leaves are (functionally?) perennial.

The leaves are small, even the largest leaves rarely surpass 10×3—4(5) mm. Their upper side is glabrous or with a few scattered hairs; their lower side is densely villous, often so densely that the nerves are hidden. The leaves are incised halfway to the main nerve or more, the lobes are rounded or somewhat angular with acute tips. *The margins are always involute*, giving the leaves a still narrower contour than they really have. The length of the lower laciniae varies.

This variety deserves attention. Even farthest north it is so vigorous that it must be extremely well adapted to its conditions of life. It has certainly not the appearance of being our common *Dryas octopetala*, suppressed and reduced by hard conditions of life.

It was profusely flowering on our arrival in Goose Bay on July 3d. It was found in flower during the first 3 weeks of July in Matotchkin Shar, and "farthest north" it was still in flower in the middle of August. Fruits from 1920 were everywhere seen, and towards the end of August the fruits of 1921 ripened, at least in the southern fjords.

Former investigations. Recorded from numerous stations, FEILDEN says that it is "one of the most common and generally distributed" plants. In his enumeration FEILDEN records it from "75—76°"; I have found no special stations recorded north of Pakhtusoff Island (FEILDEN).

70. *Potentilla alpestris* HALL. fil.

Pl. IX, 4.

Potentilla alpestris. WOLF Monogr. d. Gatt. *Potentilla*. Bibl. Bot. H. 71, 1908, p. 541, ubi syn.

Potentilla maculata E. M. in JESSEN Rosaceae, p. 42.

I. Bessimyannii Fjord.
IV. Mashigin Fjord: Rækved Bay, Strømsnes Bay, and Blomster Bay.

Found in some abundance at 3 of my best Mashigin stations. Otherwise it is evidently rare. There are only a few records of its presence in Novaya Zemlya proper: Kostin Shar (TRAUTV.), Rogatschew Bay (Vega-Expedition), and Petuchowskøy Shar (HOLM). It was a wide extension of its range to find it in Mashigin Fjord.

My plants agree well with plants from Spitzbergen and Greenland.

In Mashigin Fjord it was in flower (Aug. 3—8th); there were many unopened buds and a few flowers that had shed their petals. I found ripe seeds from 1920 there; in Bessimyannii Fjord I collected ripe seeds from 1921 on August 31st.

71. *Potentilla emarginata* PURSH.

Pl. IX, 6.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strømsnes Bay, Blomster Bay, South and north side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Mainland east of Lichutin Island.

With the exception of Pankratyeff Peninsula and the islands farthest north *Potentilla emarginata* is common all over the area investigated by us. It is by far the commonest *Potentilla* in these districts.

It affects dry stations, but it is not restricted to the protected, well exposed and relatively warm hills. It is also found on common even, gravelly and stony ground, also on the tops of the hills, exposed to the terrible Arctic gales.

The greater part of my plants belongs to var. *typica* ABR. (WOLF Mon. p. 535): cespitose plants with short, 5—6 cm. long flower stems. But longer plants were also collected.

The petals were saturated yellow, the diam. of the flower up to 20 mm., usually about 15 mm. Spitzbergen plants (leg. HANNA RESVOLL—DIESET) of f. *elatior* ABR. have larger flowers (diam. up to 25 mm.) with discrete petals, in f. *typica* the petals are contiguous.

Potentilla gelida has been recorded from Spitzbergen, but not from Novaya Zemlya, nor did I find it there. The inner sepals of *Potentilla emarginata* are more obtuse than in the former species, and the radical leaves always trifoliate.

Each rhizome produced several flower shoots, but there were only 1—3 flowers on each shoot. The flower stems are very hairy in *Potentilla emarginata*. *Potentilla gelida* has much longer styles and longer filaments than *Potentilla emarginata*.

It flowered profusely on our arrival in Goose Bay on July 3d. It was seen in flower throughout the greater part of July, towards the end of July it was often out of flower, and in Mashigin (from the first of August) it was generally out of flower. The first ripe seeds were collected in Mashigin as early as the third of August in the Blomster Bay. Farthest north the plants were out of flower; the seeds were not yet ripe (Aug. 12—17th). but undoubtedly they would attain to maturity.

Former investigations. All authors agree that *Potentilla emarginata* is "widely spread and common . . . to the farthest north reached" (FEILDEN), but formerly there were no stations recorded north of Cape Schanz (PALIBINE).

72. *Potentilla nivea* L.

var. *pinnatifida* LEHM.

Pl. X, 1.

I. Gribovii Bay, north side.

It cannot be common, I only found one plant. It was out of flower (Sept. 2nd), the seeds of the year were not yet ripe, but the erect persistent sepals enclosed well developed seeds from 1920.

Former investigations. FEILDEN was the first to find *Potentilla nivea*, at Gubina Bay, there is no other record of it from Novaya Zemlya.

73. *Potentilla palustris* SCOP.

Pl. X, 1.

Syn. *Comarum palustre L.*

Potentilla palustris must be a rare species in Novaya Zemlya. I only obtained it once, from the sandy banks of the Matotchka River near the Samoyede colony, on August 27th.

The leaves were intensely red, the flowers very scarce, some of them in bud and a few out of flower. I find it doubtful whether these seeds would attain to maturity, and 1921 was a very favourable year.

Former investigations. Stated to be common on Dolgoi and Waigatsch (FEILDEN), but there is only one record of its presence in Novaya Zemlya: North Gusinnoi Cape (See Vega Expedition).

74. *Potentilla pulchella* R. BR.

Pl. X, 2.

IV. Mashigin Fjord: On a rookery in Sol Bay.
VI. Near a large rookery south of Arkhangel Bay, Berkh Island, Mainland east of Lichutin Island.

This Arctic plant is one of the very few vascular plants that I found to be more common farthest north than in the southern fjords. My plants were perfectly developed; even farthest north there were few flowers left and ripe seeds were developed as early as August 12—18th.

Former investigations: I have only found two records of its presence in Novaya Zemlya (Lütke Land): Belushii Bay (FEILDEN), and Cape Schanz (PALIBINE).

75. *Potentilla sericea* L. var. *dasyphylla* LEDEB.

Pl. X, 1; XXV; XXXV.

II. Matotchkin Shar: Albert Hill in Belushii Bay.
IV. Mashigin Fjord: Strømsnes Bay and Blomster Bay.

This beautiful species cannot be common in Novaya Zemlya (incl. of Lütke Land). I only obtained it on 3 well protected, sunny "flower-hills", it was not scarce there, and well developed.

It is easily distinguished from *Potentilla pulchella.* It flowers much later than that species. In Mashigin *Potentilla sericea* was in

full flower on Aug. 8th, some flowers had only just shed their petals. Few days later (12—18th of August) *Potentilla pulchella* had ripe seeds, lying loose within the sepals, at Arkhangel Bay, a much more Arctic region, one degree of latitude farther north.

Potentilla sericea develops up to 20 flowers or more in a plant, *Potentilla pulchella* had fewer flowers, I hardly saw more than 10 in one plant.

Potentilla sericea has large broad petals, twice as long as the sepals, and the exterior sepals are much narrower (1/3-1/4) than the proper sepals. *Potentilla pulchella* has narrower petals, about as long as the sepals, the exterior sepals are much broader than in the former species.

Potentilla sericea has 3—4 pairs of leaflets to each leaf. The leaflets are pectinately cut with 4—5 pairs of almost equally long lobes or with shorter terminal lobe. Sometimes the lobes are so broad that the term "pectinate" is not quite appropriate. *Potentilla pulchella* has more irregular leaves, with only 2 pairs of leaflets. The leaflets generally have 3 coarse unequally large indentations, and the terminal one is not smaller than the others.

PRINTZ collected *Potentilla sericea* on the Abakan Steppe in Siberia; it is of common occurrence on dry Devonian sandstone cliffs there.[1] His plants are smaller than mine, their leaves are thick, compact and densely whitish hairy. His plants agree exactly with plants in our herb., collected at Sadok in India, "reg. temp. et alp. alt. 10—18000 ped." — My plants have larger leaves, less hairy and accordingly more green than white on the upper side. They agree well with plants in our herb., collected at Krasnojarsk in Siberia by TURCZANINOW.

Former investigations. Obtained at Kostin Shar (v. BAER), and Matotchkin Shar (Vega-Expedition) — also at Cape Greben on Waigatsch (Vega). I have found no other records of its presence on Novaya Zemlya.

76. *Rubus Chamaemorus* L.

Pl. X, 2.

I. Observed only once, at Sukhoi Noss, by another member of the expedition, and not collected.

Former investigations. Common in the islands south of Novaya Zemlya and in the south part of Novaya Zemlya proper. FEILDEN obtained it in South Goose Land, and in the Vega Expedition it is recorded from North Goose Cape. Its northern limit of distribution on Novaya Zemlya is Matotchkin Shar (EKSTAM).

[1] PRINTZ, H. Contrib. ad flor. Asiae Int. III. The Vegetation of the Siber. Mong. Frontiers p. 283, Trondhjem 1921.

Papilionaceae.

77. *Astragalus alpinus* L.

Pl. X, 3; XXXIII; XXXV; XXXVI; XXXVII.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Moraine near Vasnetsoff Glacier, Chalhonik Valley, S. w. of Mt. Syernaia, Belushii Bay, and South side of the entrance to the Kara Sea. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Point Basis, Blaafjell Basin, north and south side, and Fram Bay. North of the entrance to Mashigin Fjord.
VI. Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

Quite a type plant of dry and well exposed hills. Common and very plentiful as far north as Mashigin Fjord. Farther north I only saw small colonies at especially favourable and well protected stations.

It was generally in bud and it commenced flowering at Pomorskaya on the 7th of July. It then flowered during the whole of July and August, in the later part of August it was often out of flower. I did not obtain ripe seeds.

At some places the flowers attained an unusual size, e. g. at Serebryanka where I found petals of 15 mm.

Cfr. *A. arcticus* BUNGE Mon. Astrag. p. 27. In my plants the alae are never shorter than the carina, but either as long as the carina or generally distinctly longer. I have not seen well determined plants of *A. arcticus*.

Former investigations. Recorded from many stations, as far north as Ziwolka Fjord (FEILDEN) on the east coast. On the west coast there were formerly no stations north of Matotchkin Shar. FEILDEN says that it is very commonly dispersed over Waigatsch, Novaya Zemlya and Lütke Land.

78. *Hedysarum obscurum* L.

Pl. X, 4; XXXVII.

I. Bessimyannii Fjord. North side of Gribovii Fjord.
II. Serebryanka.
IV. Mashigin: Blomster Bay.

It is no common plant in the parts of Novaya Zemlya investigated by us, but it was quite plentiful at the few places where I found it.

It affects dry, gravelly places, well exposed flower hills, and the like

In full flower at Serebryanka (July 25th), at the two southern fjords its characteristic legumens were developing about Sept. 1st.

Former investigations. This beautiful plant was detected in Novaya Zemlya by VON BAER ("In ins. Novaya Semlja", sec. TRAUTVETTER). It is abundant on the Russian mainland, and in the southern islands Dolgoi and Waigatsch. It is common in the southern part of Novaya Zemlya proper, but evidently very scattered north of the Goose Land. Formerly recorded as far north as Serebryanka Fjord. (FEILDEN).

79. *Oxytropis campestris* DC.
var. *sordida* (WILLD).

Pl. X, 5; XLIII, dext.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, On moraine before Vasnetsoff Glacier, East of Cape Jouravlev, Strand S. w. of Mt. Syernaia, and Belushii Bay. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Point Basis, and South side of Blaafjell Basin. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Mainland east of Lichutin Island.

Not two common farthest north, but otherwise it is a very common plant all over the area investigated by us.

Its requirements must by very modest. It is found on almost every sort of soil, except on the pure clayey BRAYA ground, even on the moraines in front of "living" glaciers. It can subsist on the tops of the hills, exposed to the most violent Arctic gales, and on the poorest gravelly soil. It has an enormous system of roots, firmly anchoring it in the ground, and enabling it to collect its mineral food from a large part of the poor soil. Of course it also grows on better ground, strands, moist slopes, flower hills, and the like.

At the worst wind tortured places it is absolutely appressed to the ground, at better stations its shoots are more ascending.

In full flower, but far from full-grown, on our arrival in Goose Bay (July 3d). Towards the middle of July full-grown flowering plants were collected in Matotchkin Shar and in Mashigin Fjord in the first days of August. Farthest north it was in full flower in the middle of August, and it commenced deflowering. The first ripe seeds were obtained at Admiralty Peninsula on August 21st. — The ripe seeds are preserved for a long time in the legumens. Legumens from the preceeding year still enclosing seeds were seen during the greater part of the summer.

The plants from Novaya Zemlya agree well with our Finmarken plants. They have an atro-violaceous spot on the carina. The spot is usually sharply defined, but in some plants it is larger and more diffuse; sometimes it is so large that the whole carina takes a violet tinge. It seems to me that the var. *caerulea* KOCH[1] is only an individual variation of no importance.

The hairs of the sepals vary in colour. Usually they are dark or even fuliginose, pale hairs occur, but they are less common.

Former investigations. Generally acknowledged to be "universally distributed over Waigats, Novaya Zemlya, and Lütke Land" (FEILDEN), as far north as Lichutin Bay (MARKHAM).

80. *Phaca frigida* L.

Pl. X, 6.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: south side.
II. Matotchkin Shar: Belushii Bay, several stations.
IV. Mashigin Fjord: Strömsnes Bay.

Perhaps common in the southern fjords, but in Lütke Land it is certainly rare, and the station in Mashigin Fjord represent a considerable extension of its range.

I found it on river-banks and the like stations.

It flowers very early: in full flower at Goose Bay on July 5th, at Strömsnes Bay almost out of flower on Aug. 8th. At Bessimyannii Fjord the seeds were almost full-grown on Aug. 31st, but the legumens were not yet open.

Former investigations. Evidently common on the west side of Novaya Zemlya proper. But I have found no other station recorded from Lütke Land than Belushii Bay (FEILDEN).

Oenotheraceae.

81. *Epilobium arcticum* SAM.

Pl. XI, 1; XXVI 4—5; XXVII; XXX, 1, 2.

Epilobium arcticum SAMUELSSON Zwei neue *Epilobium*-Arten aus der Arktis. Bot. Not., 1922 p. 259—267, fig. 1—2.

I. Gribovii Fjord: North side.

Only obtained once: in considerable quantity on very moist ground, irrigated by water from an adjacent glacier with a large snow-drift underneath (in our language "sneleie plante").

[1] LEDEBOUR Fr. Ross. I. p. 59.

A cespitose plant with basal rosettes, up to 10 flowering shoots in each tuft.

The rosettes separate it from *E. palustre* and *E. alpinum* (sensu latiore). And *E. palustre* has hairy capsules, *E. arcticum* almost entirely glabrous ones. — It approaches more to *E. davuricum*. These two species have the rosettes in common, but the latter species is much longer and more slender, its leaves are narrower, usually quite linear, and its seeds are narrower.

The stem of *E. arcticum* is not above 12 cm. and strictly erect. It does not possess glandular hairs. The stem is hairy, the hairs are arranged in stripes, alternating with the leaves. In *E. davuricum* similar stripes are developed, but they are less conspicuous, their hairs are often scarce.

It was the last plant that I collected in Novaya Zemlya. (Sept. 2nd). It was then out of flower, only one small reddish nodding flower was obtained. It was profusely fruiting, one capsule on each stem, with ripe seeds.

Former investigations. According to SAMUELSSON *E. arcticum* has formerly been collected in Novaya Zemlya at Nicholsköj Shar (HOLM) and in the Farassowa Valley (FEILDEN), and also on Waigatsch, at the mouth of the Lena River in Sibiria, and in Grönland.

82. *Epilobium latifolium* L.

Pl. XI, 1.

I. Gribovii Fjord, north side.
II. Matotchkin Shar: Near Vasnetsoff Glacier, and Belushii Bay. Serebryanka.
IV. Mashigin Fjord: Strömsnes Bay, and Fram Bay.

Not common in the districts investigated by us, but usually quite plentiful where I found it.

It affects sandy and gravelly soil, but it is quite independent of the soil moisture. At Belushii Bay I found it in a rapid watercourse as well as on the extremely dry sandy side of Albert Hill, a formation looking like a quadrangular pyramide with its top cut off. (Picture in PEARSON Beyond Petsora, plate 87, facing p. 272). But as stated by FEILDEN, it is most flourishing in "dry watercourses".

Epilobium latifolium flowers late. At Belushii Bay I only found small young flower buds. (July 17th), at Strömsnes Bay (Aug. 8th), and in Gribovii Fjord (Sept. 2nd) it was in full flower and its large brilliant flowers gave a purplish tinge to the ground. I never found its

fruits, not even young capsules. If its seeds mature in the regions visited by us, it must be late in the autumn.

Former investigations. Evidently common on the west side of Novaya Zemlya proper and at Matotchkin Shar. But there are few special stations stated in literature, as far north as Matotchkin Shar (See Vega Expedition, and FEILDEN).

Hippuridaceae.

83. *Hippuris vulgaris* L.

Pl. XI, 1.

I. Goose Bay.

Obtained only once; some young plants in shallow water in a lake not far from the sea.

Former investigations. Obtained by GØBEL and UCHTOMSKI at Karmakuli. Recorded (Sce Vega expedition) at North Gusini Noss, not far from Goose Bay. These are the only stations recorded from Novaya Zemlya. It has never been found in Lütke Land.

Umbelliferae.

84. *Pachypleurum alpinum* LEDEB.

Pl. XI, 2.

II. Sukhoi Noss.

Obtained only once, on dry rocks, covered with a thin gravelly soil. It was in flower (July 26th).

Former investigations. A southern plant, common and widespread in Waigatsch and at Chabarova, and recorded from many stations in the southern part of Novaya Zemlya proper as far north as Rogatscheff Bay, but formerly not from Lütke Land.

Pyrolaceae.

85. *Pyrola grandiflora* RADDI.

Pl. XI, 2.

II. Matotchkin Shar: Belushii Bay.

I found a few plants on a dry hill at Belushii Bay (July 16th). Neither flowers nor buds were developed. But FEILDEN found *Pyrola grandiflora* flowering at Belushii Bay, and it is the only species of *Pyrola* that has with certainty been recorded from Novaya Zemlya. BLYTT's "*Pyrola minor* or *P. rotundifolia*[1] does not differ from my plants.

1 BLYTT Bidrag til Kundskaben om Veget. paa Novaya Semlja Forh. Vid. Selsk. Christiania, 1872, p. 21.

I found *Betula nana*, *Arctostaphylos alpina*, and *Vaccinium uliginosum* on the same hill, neither of them with the slightest trace of a flower.

Former investigations. Obtained from a few places on Novaya Zemlya proper, and from Belushii Bay of Lütke Land. It cannot be common.

Ericaceae.

86. *Arctostaphylos alpina* L.

Pl. XI, 3.

II. Matotchkin Shar: Belushii Bay.

Not scarce on a dry hill.

The plants were well developed, but there were neither flowers nor buds.

Former investigations. Formerly only obtained from Karmakuli by EKSTAM.

87. *Vaccinium uliginosum* L. f. *microphylla* LANGE.

Pl. XI, 3.

II. Matotchkin Shar: Belushii Bay.

In some abundance on the same hill as the former species. Quite sterile. Almost embedded in the mossy ground, only the ends of the branches with some small leaves visible.

Former investigations. Only a few stations recorded on Novaya Zemlya, none from Lütke Land: Nowaja Semlja (v. BAER), Karmakuli (EKSTAM), Gubina Bay (FEILDEN). It seems to be more common south of Novaya Zemlya.

88. *Vaccinium Vitis idaea* L. f. *pumila* HORNEM.

Pl. XI, 4.

I. Goose Bay.

Scattered, but not rare, on dry rocks about Goose Bay.

The flowers were still in their buds (July 5th).

Former investigations. This species is not so rare as the other *Ericaceae*. It has been noticed at several stations as far north as Matotchkin Shar (FEILDEN).

Primulaceae.

89. *Androsace triflora* ADAMS.

Pl. XI, 4.

I. Gribovii Fjord, south side.
II. Matotchkin Shar: Belushii Bay, and South side of the entrance to the Kara Sea.

Scattered and rare on dry rocks.

It had young flowers on stalks that were far from full-grown at the two last mentioned stations (16—20 of July). But ripe capsules from 1920 were collected at Matotchkin Shar.

Former investigations. It is a rare plant, obtained only from a few stations as far north as Karmakuli.

— The *Primulaceae* are southern plants on Novaya Zemlya, I found no other species.

Polemoniaceae.

90. *Polemonium boreale* ADAMS.

Pl. XI, 5; XXXVI.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North side and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, S. w. of Mt. Syernaia, and Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, Blomster Bay, and North side of Blaafjell Basin. North of the entrance to Mashigin Fjord.
VI. Rookery south of Arkhangel Bay, Berkh Island.

Common all over the area, investigated by us, in suitable places. It affects sheltered, sunny, dry, gravelly hills (the "Flower-hills" of Novaya Zemlya), slopes of debris, rookeries, and the like. — North of Mashigin such good stations are more scarce.

It is a faithful companion of *Myosotis alpestris*.

At Goose Bay the plants were in flower on July 5th, but they were far from full-grown. In Matotchkin Shar it flowered beautifully and the plants were full-grown about the middle of July. The same was the case in Mashigin during the first ten days of August. Farthest north it had not quite attained the height of its flowering in the middle of August. I collected ripe seeds in the southern fjords in the last days of August, but I suppose that only a few seeds will ripen earlier than

in September. — Its flower stalks break off during the winter, accordindly I found no seeds from 1920.

Former investigations. Recorded from many stations in Novaya Zemlya proper, and from some stations in Lütke Land as far north as the country had been botanically investigated: Cape Schanz (PALIBINE) on the west coast, and Ziwolka Fjord (FEILDEN) on the east coast.

91. *Polemonium campanulatum* TH. FR.

Pl. XI, 6.

Syn. *Polemonium caeruleum* or *P. caeruleum* f. *acutifolia* WILLD.

I. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya and Belushii Bay. Sukhoi Noss.

A rare plant of more southern distribution. Only at Pomorskaya I found it somewhat plentiful.

Like *Polemonium boreale* it affects gravelly stations, but it requires more moisture than the latter species which is a type plant of dry stations. As justly observed by FEILDEN he found his *Polemonium caeruleum* L. f. *acutifolia* WILLD. (should be f. *acutiflora*, supposed to be the same as our plants) at the bottom of the river banks with its roots "in the water of some rill", higher up he found *Polemorium pulchellum* (= *Polemonium boreale*). — But I have always found the two species quite distinct.

My plants agree entirely with *Polemonium campanulatum* from Arctic Norway. They are hairy at the upper part of the stem only. The same is the case with AAGAARD'S plants from Kostin Shar and Jugor Shar (determ. A. BLYTT), with EKSTAM'S plants from Karmakuli, and with LINDSTRÖM'S plants from King Point and Herschell Island on the Arctic American coast.

Its flowering time is not much different from that of *Polemonium boreale*, I found ripe seeds at Pomorskaya on the 27th of July.

Former investigations. Supposing *Polemonium caeruleum* and its differently named formae from Novaya Zemlya to be identical with our species, it must be a very common plant in the islands south of Novaya Zemlya, and on Novaya Zemlya (proper) as far north as Matotchkin Shar; recorded as far north as Cape Schanz (PALIBINE) and Ziwolka Fjord (FEILDEN).

EKSTAM found a hybrid between the two species at Karmakuli.

Boraginaceae.

92. *Eritrichium villosum* BUNGE.

Pl. XII, 1.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, Belushii Bay, and South side of the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay and Flower Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.

A common strand plant as far north as Admiralty Peninsula, never obtained north of that place. It rarely retires much from the sea, at Belushii Bay I once found it 100 m. s. m.

In my opinion *Eritrichium villosum* is the most beautiful of all beautiful Arctic plants. It is an early spring plant: its small tufts were covered with its brilliant flowers on our arrival in Goose Bay (July 3d).

Former investigations. Common all over Novaya Zemlya and Lütke Land as far north, as the country had been botanically explored (Cape Schanz and Ziwolka Fjord, PALIBINE and FEILDEN).

93. *Myosotis alpestris* KOCH.

Pl. XI, 2; XXXI sin; XXXIII; XXXIV, sin. et dext.; XXXV; XXXVI.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, Point Basis, Blaafjell Basin, north and south side, and Fram Bay. North of the entrance to Mashigin Fjord.
VI. Rookery south of Arkhangel Bay, Berkh Island, Mainland east of Lichutin Island.

One of the commonest plants on the flower hills. Only "farthest north" it became scarce, it was there only found at the best stations, rookeries and well protected sunny hills, and not so plentiful as southward. But it was beautifully developed even farthest north, I obtained no plants finer than those collected in Berkh Island at the upper part of a sunny slope of chalky debris.

It is a very hardy plant, perfectly developed even in Blaafjell Basin, the ice-box of Mashigin Fjord.

It does not flower as early as *Eritrichium*. I only saw quite young flower buds at Goose Bay (July 3—4th), but at Pomorskaya it was in full flower on the 8th. It then flowered during our whole visit. — Farthest north it started flowering in the middle of August, at Berkh Island the flowers were at their height on August 18th.

I found some ripe seeds at the southern fjords in the last days of August, but sepals enclosing ripe seeds from the preceeding year were quite common everywhere, at least as far north as Mashigin. It is supposed to ripen its seeds in September.

Former investigations. All authors agree that it is common all over Novaya Zemlya (proper), as well as in Lütke Land, as far as the country has been botanically investigated: Cape Schanz on the west coast (PALIBINE), and Ziwolka Fjord on the east coast (FEILDEN).

Scrophulariaceae.

94. *Pedicularis hirsuta* L.

Pl. XII, 3.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, S. w. of Mt. Syernaia, Belushii Bay, and South side of the entrance to the Kara Sea. Serebryanka. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Strömsnes Bay, Blomster Bay, Blaafjell Basin, north and south side, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Mainland east of Lichutin Island.

I found it somewhat scarce farthest north, but otherwise it is very common all over the land investigated by us. It has a much wider distribution than any other *Pedicularis*. It is the only species of the genus that I found "farthest north". Even as far north as Mashigin the other species are poorly represented, besides *Pedicularis hirsuta* there were only a few stations for *Pedicularis lanata*.

It affects grassy spots, not too dry.

Pedicularis hirsuta was in full flower on our arrival in Goose Bay (July 3d), it then flowered during the greater part of July. In

Krestovii Fjord I found deflowered plants on July 27th, in August it was generally out of flower everywhere. Its seeds ripen very quickly, "farthest north" I found no flowers, only ripe capsules, full of seeds.

Former investigations. All authors state that it is common ("extremely common", "in abundance") as far north as the country has been botanically explored (Cape Schanz by PALIBINE, Ziwolka Fjord by FEILDEN).

95. *Pedicularis lanata* CHAM. et SCHLECHT. var. *dasyantha* TRAUTV.

Pl. XII, 4.

I. Bessimyannii Fjord. Grebovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley and East of Cape Jouravlev.
IV. Mashigin Fjord: Strömsnes Bay, and South side of Blaafjell Basin.

A southern plant, common as far north as Matotchkin Shar, but certainly rare north of the Shar. It affects moist grassy slopes.

It was in full flower in Matotchkin Shar 8-14th of July. In Mashigin 29.7 and 8.8 there was not a flower left, I only found capsules with seeds in profusion. A plant that is able to produce ripe seeds in the "ice-box" of Mashigin as early as July 29th, might be expected to attain higher latitudes.

Former investigations. Recorded only from a few stations as far north as "sub 73 1/2° lat. bor". (ZIWOLKA).

96. *Pedicularis lapponica* L.

Pl. XII, 4.

II. Serebryanka.

Certainly a very rare plant on Novaya Zemlya. I was astonished to find it in very damp peaty soil, associated with *Ranunculus lapponicus*. FEILDEN found it on Dolgoi and Waigatsch "on dry hillocks", EKSTAM at dry protected spots. In our country it is very common in Betuleta and Ericeta, I have never found it in peaty soil.

Former investigations. I have found no other station recorded from Novaya Zemlya than Matotchka Valley (EKSTAM).

97. *Pedicularis sudetica* WILLD.

Pl. XII, 5.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, on the south side.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay. Serebryanka Fjord.

I found this fine plant to be quite common as far north as Matotchkin Shar. But north of the Shar it must be very rare. — At Pomorskaya I found magnificent specimens, 35 cm. high.

On damp ground, in peats, and the like.

Pedicularis sudetica flowers very early. In spite of its cold substratum it was in full flower at Goose Bay (July 3d), it then flowered during the greater part of July. On our return in the southern fjords no flowers were left, and ripe seeds had been produced in profusion (Aug. 27—31th).

Former investigations. A southern plant, common on Novaya Zemlya proper, and recorded from many stations there. North of the Shar PALIBINE found it in Krestovii Fjord, as yet the northern limit of its distribution.

Gentianaceae.

98. *Gentiana tenella* FR.

Pl. XII, 6.

I. Bessimyannii Fjord.
IV. Mashigin Fjord: Blomster Bay.

At either station on dry, well exposed sunny, gravelly or slaty hills or slopes (Flower hills). It was very scarce, at the first station I found a few plants, at the latter only one.

The Mashigin plant was in flower (Aug. 3d), at Bessimyannii Fjord I found ripe seeds (Aug. 31st).

The size (incl. of the flower) varies from 15—55 mm. The pedicel is several times as long as the sepals in the largest plants, and longer than the sepals in the small ones. The sepals are obtuse, the capsule narrowly cylindrical.

It is evident from this that my plants belong to *Gentiana tenella* and not to *Gentiana chrysoneura* EKST. et MURB.[1] They agree with Norwegian plants of *Gentiana tenella*. FEILDEN also found it "quite typical" on Dolgoi and on the south side of Bessimyannii Fjord, but in "peaty soil".

Former investigations. Recorded only from Bessimyannii Fjord (FEILDEN). The station in Mashigin represents a considerable extension of its range.

[1] MURBECK, SV.: Eine neue arktische *Gentiana* aus der Sektion *Comastoma* WETTST. Oesterr. bot. Zeit. XLVIII (1898) p. 124—127, tab. V.

Valerianaceae.

99. *Valeriana capitata* PALL.

Pl. XIII, 1; XXXII, dext.; XXXIII.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: north and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord.

Common on grassy slopes and plains, also on gravelly tundra ground, in Novaya Zemlya proper, but only once observed on Lütke Land. — A social plant; when plentiful its flowers give a whitish tinge to the ground.

The stem leaves vary from almost entire and somewhat apiculate to coarsely dentate and protracted at their summit.

Far from full-grown at Goose Bay and at Pomorskaya (3—8th of July), and with its flowers in their buds. Expanded flowers were collected at Serebryanka (23d of July). Towards the end of August we returned to the southern fjords (Gribovii-Bessimyannii); it was there out of flower, but ripe seeds were not obtained.

Former investigations. Recorded from many stations in Novaya Zemlya proper; it must be common there. But there were formerly no stations north of Matotchkin Shar.

Campanulaceae.

100. *Campanula uniflora* L.

Pl. XIII, 2.

I. Bessimyanni Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, near Vasnetsoff Glacier, and Belushii Bay on Albert Hill. Serebryanka Fjord.
IV. Mashigin Fjord: Dal Bay, Strömsnes Bay, and Blomster Bay.

I found it plentiful on dry, slaty and gravelly hills, on slopes of debris, and the like, in the southern fjords, and in Belushii Bay. North of Matotchkin Shar it was scarce, in Mashigin I only found some plants at my best stations.

It was in full flower in Matotchkin Shar and in Serebryanka Fjord about the middle of July, also in Mashigin in the first week of August. In Mashigin I also found ripe seeds (Aug. 8th), and towards the end of August (27—31st) I found capsules with ripe seeds in profusion in the southern fjords.

Former investigations. I was astonished to find only a few stations recorded in literature, it was recorded as far north as the north side of Matotchkin Shar (FEILDEN).

Compositae.

101. *Antennaria carpathica* (WBG.) R. BR.

Pl. XIII, 3.

I. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Serebryanka Fjord.
IV. Mashigin Fjord. Strömsnes Bay.

Quite plentiful in the two southern fjords, but extremely scarce north of Matotchkin Shar, in Mashigin I only obtained a single plant.

On dry, protected and well exposed slopes and hills.

At Serebryanka (23.7) the radical leaves only were developed, in Mashigin (8.8) I found a flowering plant, at the southern fjords (31.8 and 2.9) I found no flowers, but ripe seeds in profusion.

Former investigations. Recorded from a few stations in Novaya Zemlya proper as far north as Matotchkin Shar. (See Vega Expedition).

102. *Arnica alpina* (L.) OLIN.

Pl. XIII, 3.

IV. Mashigin Fjord: Strömsnes Bay.

The plants were in full flower, and well developed.

Former investigations. Only obtained at Rogatschew Bay (See Vega Expedition), and at Karmakuli and at Matotchkin Shar by EKSTAM.

103. *Artemisia borealis* PALL.

Pl. XIII, 4; XLIII, sin.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay. Serebryanka.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Trehörningen, and Fram Bay. North of the entrance to Mashigin.
V. Admiralty Peninsula.

Common in the southern fjords (Novaya Zemlya proper and Matotchkin Shar), and often quite plentiful. Much less common northward. Obtained from several stations in Mashigin Fjord, but it was nowhere plentiful there, and I never found it north of the Admiralty Peninsula.

One of the most characteristic plant of promontories and the higher parts of the hills, exposed to the severest gales. But it is firmly fixed to the ground by its immense roots, and the texture of its (hairy) leaves and stems is supposed to protect it against exsiccation. — At the best stations it attained a height of 35—40 cm.

It was in flower in Goose Bay on July 3d, in the last days of August ripe seeds were collected in the southern fjords.

Former investigations. Recorded from numerous stations in Novaya Zemlya proper and Matotchkin Shar, and stated to be common there. There were only a few stations from Lütke Land north of the Shar: Krestovii Fjord and Cape Schanz (PALIBINE).

104. *Artemisia Tilesii* LEDEB.

Pl. XIII, 5; XXXIII.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, S. w. of Mt. Syernaya, and Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, and Fram Bay.

Common on well exposed, protected "flower hills", at the upper part of the screes and the like, as far north as Mashigin. It was perfectly developed in that fjord: at Blomster Bay I found plants of 50 cm., together with *Polemonium campanulatum* the highest plants, I saw. But it was never obtained farther north.

Artemisia Tilesii is very different from *A. vulgaris,* as represented in our country. Its habitus is more "compact", its flower-heads much larger, the segments of its leaves much broader and almost equally hairy on either side. It deserves the name of a proper species quite as well as many other pétites éspèces.

It is a very late plant with respect to its development. At Goose Bay (5.7) and Pomorskaya (8.7) the shoots had only just started growing, and as late as the 26th of July — at Serebryanka — the plants were far from full-grown. In Mashigin I collected fine flowering plants in the first 10 days of August. In the southern fjords the plants were generally out of flower in the last days of August, but ripe seeds were not obtained.

Former investigations. Many stations have been recorded from Novaya Zemlya proper and "Matotchkin Shar", but only one north of the shar: Krestovii fjord (PALIBINE).

105. *Erigeron uniflorus* L.
var. *eriocephalus* (VAHL) VIERH.

Pl. XIII, 6; XXVIII; XXX, 3; XXXI, sin., XXXV; XXXVI.

Erigeron uniflorus f. *eriocephalus*. VIERHAPPER Mon. Erig. p. 512.

I. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Matotchkin Shar: Albert Hill in Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, and Blomster Bay.

A type plant of the "flower-hills": dry, well exposed and protected hills and slopes. It is quite common at such stations as far north as Mashigin Fjord, but it was not obtained farther north, though much looked after. On the whole a southern plant, northward strictly restricted to the best flower-hills, southward spreading more over the ground.

It is supposed to be more common in Matotchkin Shar than the above station suggests, for it flowers so late that it may have escaped my attention (we visited Matotchkin Shar 7—22nd of July). But it quickly matures its seeds: I found ripe seeds in Mashigin on the 23 and 24th of August.

It requires some attention to distinguish this plant from *Erigeron unalaschkensis* (DC.) VIERH. — Var. *eriocephalus* is generally more robust, more hairy (especially the flower-heads) with paler, often greyish-white hairs. The best character is derived from the bracts: they are squarrose in var. *eriocephalus*, appressed in *unalaschkensis*, the flower-head of the latter species is accordingly narrower and more conical than in the former. But apart of this the flower-heads are larger in var. *eriocephalus*. The leaves of *Erigeron unalaschkensis* are more distinctly petiolate than in the other species with more spathulate leaves.

It seems to me that the colour of the hairs has been overestimated as a distinctive character. They are, indeed, darker in *E. unalaschkensis*, often quite blackish. In *eriocephalus* they sometimes appear quite greyish-white or white to the naked eye. If studied under a microscope they are seen to be articulate, and even in the "whitest" plants some hairs have a tinge of purple at some nodes towards their base on the bracts as well as on the upper part of the stem. In other plants the colour is intenser and it spreads from the nodes to either side. If the colour is intense enough the flower-heads look like purplish globes. Old flower heads loose much in colour.

The "typical" *eriocephalus* with white hairs is represented in my collections from some southern stations (Bessimyannii Fjord, Matotchkin

Shar, and Sukhoi Noss). Plants with ± purplish hairs were more common and wide-spread, all the Mashigin plants had purplish flower-heads.

The Swedish botanist TH. C. E. FRIES, who has devoted much attention to the genus *Erigeron*, has kindly written to me: "*E. unalaschkensis* is an excellent species, generally habitually easily distinguished from the two others (i. e. *E. uniflorus* and *E. eriocephalus*), but exceptional cases are found. If a plant is doubtful, take some hairs from the bracts, put them in a drop of water on a slide glass, apply a cover glas, and cook quickly. If the cells of the hairs then contain a dark globule, it is *E. unalaschkensis*. The two others occasionally have red ceel-walls or red contents in the cells, but after heating the red globule is never seen. I have made this test for hundreds of times, and it never fails. I have not succeeded in finding any absolutely distinctive characters between *E. eriocephalus* and *E. uniflorus* in spite of keen researches, in nature as well as on herbarium-plants. In my opinion *E. eriocephalus* cannot be maintained as a proper species".

Former investigations. EKSTAM'S plants from Karmakuli and "Matotchkin Shar" (in our herb.) are typical *E. eriocephalus*. According to VIERHAPPER l. c. the same is the case with the Vega-plants from Rogatcheff Bay.

The Vega expedition mentions *Erigeron unalaschkensis* from Waigatsch (VIERHAPPER l. c. p. 493), but I find no record of it from Novaya Zemlya.

"*Erigeron uniflorus*" has been collected at Kostin Shar and Serebryanka by VON BAER, at Gribovii Fjord by EKSTAM, and at Neckwatowa, Gubina Bay and Belushii Bay by FEILDEN. I have not seen these plants, but I think it most probable that they represent var. *eriocephalus*.

HANNA RESVOLL-DIESET'S *Erigeron uniflorus* from Spitzbergen is *Erigeron unalaschkensis*.

106. *Matricaria inodora* L.
var. *grandiflora* (HOOK.) OSTF.

Pl. XIV, 1; XL, dext.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north side and Veselago Island.
II. Matotchkin Shar: Pomorskaya. Sukhoi Noss.

In the regions visited by us *Matricaria inodora* is a scattered plant, almost restricted to the vicinity of human habitations or to the rookeries. At such stations it was generally found in the greatest profusion, at Veselago Island it covered the ground by the acre on the cliff just

above a well stocked rookery. At other stations only a few scattered plants were found.

The size of the stem varies: sometimes the flower-head is almost sessile, but I have also found stems of 15 cm.

At Goose Bay no flowers were developed (July 3d), not even a flower stalk. The first flowers were observed at Sukhoi Noss (July 26th). It then flowered till the last day of our visit (Sept. 2nd); no seeds were obtained.

Former investigations. Recorded from several stations on Novaya Zemlya proper as far north as Gribovii fjord (EKST.), not from Lütke Land.

107. *Petasites frigidus* (L.) FR.

Pl. XIV, 2.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Near Mt. Lasareff, Near Mt. Wilczek, and at Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, and South sdie of Blaafjell Basin.

Quite common in wet bogs as far north as Mashigin Fjord.

At Goose Bay (July 5th) and at Belushii Bay (July 16th) only small leaves were seen. The first flowers were obtained at Sukhoi Noss (July 26th); in Mashigin no flowers were seen. In the southern fjords fruits were quite common towards the end of August.

Former investigations. Recorded from numerous stations in Novaya Zemlya proper, and from a few stations in Lütke Land as far north as Cape Schanz (PALIBINE).

108. *Senecio palustris* L. f. *congesta* (R. BR.) HOOK.

Pl. XIV, 2.

I. Goose Bay.

Obtained only once. Our photographer, Mr. LUND, brought me a flowering plant at Goose Bay. (July 5th).

Former investigations. Found at North Gusinii Cape (See Vega Expedition).

Taraxacum HALLER.

By JENS HOLMBOE, Bergen.

The enumerations of plants from Novaya Zemlya generally mention two species of *Taraxacum*, viz. *T. officinale* WEB. and *T. phymatocarpum* J. VAHL. As is well known more recent investigations, especially by the Swedish botanist H. DAHLSTEDT, have shown that the old collective species *T. officinale* comprises a great number of constant pétites éspèces. DAHLSTEDT has also shown that the so-called *T. phymatocarpum* from Novaya Zemlya and Spitzbergen is not the genuine Greenland plant, but another quite distinct species which he has called *T. arcticum* (TRAUTV.) DAHLSTEDT. On the whole, DAHLSTEDT has done much good service to science by his elucidation also of the Arctic species of this genus. He enumerates the following species from Novaya Zemlya: *T. arcticum* (TRAUTV.) DAHLST., *T. glabrum* DC., *T. platylepium* DAHLST., *T. brevicorne* DAHLST. and in addition from Waigatsch *T. brachyceras* DAHLST. (1905 and 1906).

During the Norwegian expedition to Novaya Zemlya 1921 B. LYNGE collected a large and valuable material of the genus *Taraxacum*. In this material all the species are represented that DAHLSTEDT enumerates from Novaya Zemlya. It is of great interest that the material contains numerous specimens of *T. platylepium* DAHLST., several of them in fruit. DAHLSTEDT never saw ripe fruits of this species which has as yet only been recorded from Novaya Zemlya, and it is, accordingly, possible to supplement his description of the species.

With respect to the synonymy of the different species, also in the formerly published enumerations of plants from Novaya Zemlya, I refer to the detailed account in DAHLSTEDT'S papers.

109. *Taraxacum arcticum* (TRAUTV.) DAHLST.

Pl. XIV, 3.

Taraxacum officinale var. *arctica* TRAUTVETTER in Acta Hort. Petrop. vol. I (1871) p. 72.

Taraxacum phymatocarpum auct., non J. VAHL.

Taraxacum officinale A. BLYTT in Christania Vid. Selsk. Forh. 1872, p. 20, p. p.; non Weber.

Taraxacum arcticum (TRAUTV.) DAHLST. in Ark. f. Botanik vol. IV (1905) No. 8, p. 8, fig. 1.

I. Bessimyannii Fjord.

II. Matotchkin Shar: Pomorskaya, Belushii Bay common at several stations, and South side of the Shar near the entrance to the Kara Sea. Sukhoi Noss.

IV. Mashigin Fjord: Dal Bay, Strömsnes Bay, Blomster Bay, and South side of Blaafjell Basin.
VI. Berkh Island, Mainland east of Lichutin Island.

T. arcticum has a very wide distribution on Novaya Zemlya and it is supposed to be the commonest of all *Taraxaca* there.

Like all other *Taraxaca* from Novaya Zemlya it affects protected and well exposed, dry hills.

It was from Novaya Zemlya that TRAUTVETTER first described his *Taraxacum officinale* var. *arctica*, which DAHLSTEDT later raised to a proper species. DAHLSTEDT has pointed out that this species is identical with TH. M. FRIES's *T. phymatocarpum* from Spitzbergen which he found to be specifically distinct from the genuine *T. phymatocarpum* J. VAHL from Greenland.

The *Taraxaca* are not of the earliest flowering plants on Novaya Zemlya. The first flower-heads of this species were obtained at several stations in Matotchkin Shar in the middle of July. Towards the end of the month they were in full flower at Sukhoi Noss (26.7). In Mashigin many plants were out of flower in the first week of August. Farthest north B. LYNGE found flowers about the middle of August. On Novaya Zemlya they ripen their fruits all over their area of distribution.

Former investigations (for all *Taraxaca* derived from DAHLSTEDT'S papers, 1905 and 1906). Olenje Isl. (HOLM), Kostin Shar (MIDDENDORFF), Rogatscheff Bay (Vega Exped.), Cape Gusinnoi (See Vega Exped.), Karmakuli (EKSTAM), "Matotchkin Shar", many stations (AAGAARD, Vega Exped., EKSTAM). DAHLSTEDT does not mention the station Serebryanka ("ad sinum argenteum"), where it was collected by v. BAER, on the authority of TRAUTVETTER l. c. MARKHAM collected "*Taraxacum officinale*" at Lichutin Bay. It has further been recorded from Krestovii Fjord, and from Cape Schanz, on the authority of PALIBINE. FEILDEN's *T. phymatocarpum* from Ziwolka Fjord, 74° 25′ is most probably identical with *T. arcticum*.

110. *Taraxacum brevicorne* DAHLST.

Pl. XIV, 4.

Taraxacum brevicorne DAHLST. in Ark. f. Botanik vol. V (1906), No. 9, pag. 11, tab. IV.

II. Matotchkin Shar: Belushii Bay.
IV. Mashigin Fjord: Blomster Bay.

This species is not supposed to be common on Novaya Zemlya.

The plants were in flower, but the fruits would undoubtedly attain to maturity.

Former investigations (DAHLST. l. c.). Unnamed station (Swedish Jenissei Exped.), and Karmakuli (EKSTAM).

111. *Taraxacum glabrum* DC.

Pl. XIV, 4.

Taraxacum glabrum DC. Prodr. VII, 1 (1838) p. 147. DAHLST. in Ark. f. Botanik vol. IV (1905) No. 8 pag. 29, fig. 6—7.

Taraxacum officinale A. BLYTT in Chr.a. Vid. Selsk. Forh. 1872, p. 20, p. p.; non WEBER.

Taraxacum nivale LANGE in Medd. af Soc. pro Fauna et Flora Fennica, vol. XVI (1889) p. 67.

I. Bessimyannii Fjord. Gribovii Fjord, north side.

The ripe fruits are nicely chestnut-coloured and almost quite smooth. They agree well with DAHLSTEDT's figure of a specimen from the Kola Peninsula (l. c. fig. 6). In LYNGE's material I have found no fruit with so prominent verrucae as in DAHLSTEDT's fig. 7, representing a plant from Novaya Zemlya.

The plants were collected 31.7 and 2.9 and were in fruit.

Former investigations (DAHLSTEDT l. c.). Recorded from several stations as far north as Matotchkin Shar, indicating a greater frequency than the two above mentioned stations would suggest: Petuchowskoi Island (HOLM), Kostin Shar (AAGAARD and HEUGLIN), Rogatscheff Bay (See Vega Exped.), Karmakuli (EKSTAM), Matotschkin Shar: south side (AAGAARD, EKSTAM) as well as the north side at Belushii Bay (FEILDEN).

112. *Taraxacum Novae Zemliae* HOLMBOE nov. sp.

(Ex sect. *Ceratophora* DAHLST.)

Pl. XIV, 5; XXIX 1—3.

II. Sukhoi Noss.

Radix elongata crassa, in rhizoma validum abiens.

Folia glabra, exteriora vel plurima sat anguste obovato-lanceolata, sat crebre inaequaliter et retrorsum dentata, acutiuscula, interiora profundius incisa, lobis triangulari-deltoideis retroversis, subintegris. Petioli, cum nervis medianis ± roseo-coloratis.

Scapi foliis superantes, sub involucro ± araneosi, ceterum glabriusculi vel glabri.

Involucrum 15—17 mm. longum, validum, atrovirens.

Squamae exteriores ± adpressae, infimae ovato-lanceolatae, sub apice distincte corniculatae, interiores lineari-lanceolatae, margine anguste, sed distincte membranaceae, sub apice corniculis parvulis (ca. 1 mm. longis) obtusiusculis munitae.

Calathium ca. 40 mm. latum, sat obscure luteum.

Ligulae marginales ca. 2 mm. latae, subtus ± olivaceo-striatae.

Antherae obscure luteae, polline carentes.

Stylus et *stigmata* fusco-virescentes.

Achenium ca. 3.5 mm. longum, ca. 1 mm. latum, splendide fulvo-stramineum, basin versus sensim angustatum, superne breviter spinulosum, fere ad medium verruculosum, inferne laeve, pyramide ca. 1 mm. longa, rostro ca. 7—8 mm. longo.

This species was only represented by a few plants from one station. It is undoubtedly nearly related to *T. brevicorne* DAHLST., and perhaps still more to *T. brachyceras* DAHLST. As far as I am aware the latter species has never been obtained from Novaya Zemlya, but (according to DAHLSTEDT) it has been found so near to Novaya Zemlya as on Waigatsch.

From either species it differs especially by the lacking of pollen grains.

Undoubtedly it is also nearly related to *T. similum* BRENN. (and to *T. melanostylum* TH. FRIES fil. which is perhaps identical with *T. similum)* found in Northern Fennoscandia. But it differs from this species by the considerably darker colour of its flower-heads.

One plant contained ripe fruits that germinated perfectly in the Botanical Garden, Kristiania.

113. *Taraxacum platylepium* DAHLST.

PL. XIV, 5; XXIX, 4.

Taraxacum platylepium DAHLST. in Ark. f. Botanik vol. IV, (1905) No. 8, p. 34, fig. 8.

Taraxacum amblylepium DAHLST. l. c. pag. 11 (in descript. ad fig. 1), nomen solum.

I. Gribovii Fjord, north side.
II. Matotchkin Shar: Beach s. w. of Mt. Syernaia. Serebryanka Fjord.
III. Krestovii Fjord.
IV. North of the entrance to Mashigin Fjord.
VI. Mainland east of Lichutin Island.

A very widespread species, nowhere seen in greater abundance than at its northernmost station.

There was a rich material of this species in different stages of development in LYNGE'S collection.

The plants agree exactly with DAHLSTEDT'S description. It is, however, presumed to be a misprint when the leaves in his diagnosis are said to be 20—30 cm. long. The leaves which are depicted in natural size in his fig. 8, are 4.5—5.7 cm. long, inclusive of the stalks. In LYNGE'S material the length of the leaves is generally 4—8 cm.

DAHLSTEDT only had the opportunity of examining this species in a flowering stage. In LYNGE's material there were also several specimens with well developed fruits. I am, accordingly, able to add a description of the fruit to his diagnosis:

Achenium maturum ca. 4,5 mm. longum, ca. 1 mm. latum, sat obscure olivaceo-badium, basin versus sensim angustatum, distincte costulatum, secundum costulas superne muricato-tuberculatum, tuberculis acutis, medio breviter tuberculatum, inferne laeve, rostro achenio breviore vel subaequante.

The form of the fruit does not indicate a near relationship to *T. glabrum* DC. As to colour and armament it calls more to mind the west-arctic *T. hyparcticum* DAHLST. There is a considerable material of the latter species in the university herbarium of Kristiania, collected by H. G. SIMMONS during the Second Norwegian Arctic Expedition in the "Fram". I do not, however, venture to suggest anything concerning the possible relationship between *T. platylepium* and the latter species.

Undoubtedly *T. platylepium* is a very characteristic species, well separated from the other known Arctic *Taraxaca*, as has also been pointed out by DAHLSTEDT.

It flowers at the same time as *T. arcticum*, and matures its achenes as far north as it was obtained by the expedition.

Former investigations (DAHLST. l. c.). It has only been recorded from Novaya Zemlya: Kostin Shar (HEUGLIN), Rogatscheff Bay (See Vega Expedition), and Matotchkin Shar (EKSTAM). — The above stations represent a very considerable extension of its range (with almost $2^1/_2$ degrees).

Juncaceae.

114. *Juncus biglumis* L.

Pl. XIV, 6.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, East of Cape Jouravlev, and Belushii Bay. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, SolBa y, Strömsnes Bay, North and south side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island.

Very common all over the area investigated by us. Farthest north the stations suitable to plants are much reduced in number as well as in extent. With this general reservation *Juncus biglumis* is quite as common farthest north as in the southern fjords.

It affects moist clayey stations, grass-bogs, and the like.

EKSTAM described a large luxuriant form from Pomorskaya: *Juncus biglumis β excellens*[1]: up to 30 cm. high, with 2—4, usually 3 capsules which are more than twice as long as the perianth.

I have found this forma at the same place and also at Serebryanka, at the latter station 20—25. cm. high. Plants with 3 capsules are quite common, the length of the involucral leaf and the position and form of the capsules show that it is *Juncus biglumis* and not *Juncus triglumis*. The length of the stem is very variable. I am unable to attribute much importance to the *β excellens*.

In its first flowering stage at Goose Bay on July 5th, in Matotchkin Shar it was in full flower or out of flower in the first 3 weeks of July at the favourable stations, as Belushii Bay, but in Chalhonik Valley (13.7) it was not more advanced than at Goose Bay. It was generally out of flower in Mashigin Fjord in the first days of August, also in the "ice-box" (Blaafjell Basin); the same was the case "farthest north" in the middle of August and at Admiralty Peninsula on the 21st of August. Ripe open capsules with full-grown seeds were first obtained at Pomorskaya (21.8). Open, evidently ripe capsules from the preceeding year were often seen, also farthest north.

Former investigations. Recorded from numerous stations in Novaya Zemlya proper. But there were few stations from Lütke Land, as far north as Pachtusoff Island (FEILDEN).

115. *Luzula confusa* LINDEB.

Pl. XV, 1.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya, Belushii Bay, and South side of the Shar near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Dal Bay, Strömsnes Bay, Blomster Bay, North and south side of Blaafjell Basin, Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay.

[1] EKSTAM in Øfv. Kgl. Svenska Vet. Akad. Förh. 1894, No. 4, p. 174.

One of the commonest of all vascular plants of Novaya Zemlya, (proper) and Lütke Land. Farthest north it is, however, supposed to be less common (or overlooked?). In the rookeries south of Arkhangel Bay it was common and well developed, but the plants were distinctly smaller than otherwise.

It affects dry stony or gravelly ground, and rocks.

Easily distinguished from *Luzula nivalis* by its longer and narrower, acutely subulate leaves with hairy base, and by its ciliated bracts.

At Pomorskaya I found large plants, up to 30 cm. or more, on a *Sphagnum* moor, also at Serebryanka Fjord and at Sukhoi Noss I obtained very large plants. The ciliated leaves of some large plants called to mind *Luzula multiflora*, but *Luzula confusa* differs from that species by its acute leaves. — Some plants with drooping panicle-branches approach to *Luzula arcuata*.

Luzula confusa was in full flower on our arrival in Goose Bay (5.7), towards the end of August it was everywhere seen with ripe capsules.

Former investigations. Recorded from numerous stations on Novaya Zemlya and Lütke Land as far north as Krestovii Fjord (PALIBINE) and Ziwolka Fjord (FEILDEN).

116. *Luzula nivalis* (LÆST.) BEURL.

PL. XV, 2; XXXV.

I. Bessimyannii Fjord. Gribovii Fjord, north and south side.
II. Matotchkin Shar: Pomorskaya, Beach near Mt. Wilczek, Chalhonik Valley, Belushii Bay, and South side of the Shar near the entrance to the Kara Sea. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, North side of Blaafjell Basin, North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Lichutin Island, Mainland east of Lichutin Island.

One of the commonest and most widespread plants of Novaya Zemlya (proper) and Lütke Land. Supposed to be almost as common as *Luzula confusa,* and farthest north to be more common than the latter species.

In flower at the same time as *Luzula confusa*, but its seeds ripen earlier, I found full-grown and in part dehiscent capsules with full-grown seeds in Mashigin as early as Aug. 5th (Rækved Bay), and farthest north in the middle of August. On Aug. 24th I obtained

capsules with spreading valves in Mashigin (Sol Bay). In the last week of August the capsules had already lost many seeds in the southern fjords.

Former investigations. I was astonished to find so few stations recorded in Novaya Zemlya literature for this common species. There were only a few from Novaya Zemlya proper, and one station: Krestovii Fjord (PALIBINE) north of Matotchkin Shar.

117. *Luzula Wahlenbergii* RUPR.

Pl. XV, 2.

I. Goose Bay.
II. Matotchkin Shar: Pomorskaya.

A rare species in the regions visited by us. At Pomorskaya I found it plentiful in a *Sphagnum*-moor. — This is the northernmost *Sphagnum*-moor I saw.

At Goose Bay (July 5th) the stems were far from full-grown, and the flowers in their buds. At Pomorskaya (Aug. 27th) the capsules had spreading valves and ripe seeds.

Former investigations. Recorded from some stations, chiefly southern, neither of them north of Matotchkin Shar. EKSTAM collected it at the Shar.

Cyperaceae.

118. *Carex aquatilis* WBG.

Pl. XV, 3.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya and Belushii Bay. Serebryanka.
IV. Mashigin Fjord: Blomster Bay and South side of Blaafjell Basin. North of the entrance to Mashigin Fjord.
V. Admiralty Bay.
VI. South of Arkhangel Bay.

Quite common on the west coast of Novaya Zemlya proper as far north as Pomorskaya. It is much less common on Lütke Land, but I found it continuously distributed as far north as Arkhangel Bay.

In the two southern fjords and at Pomorskaya it is very plentiful, bordering ponds and lakes and covering the grass-moors. It is also well developed; large plants with several male spikes, narrow long female spikes, and narrow involute leaves. Such specimens must be referred to the type plant.

Farther north suitable stations are less common. The ponds are more and more filled with water from melting glaciers and snow-drifts, and they are often utterly destitute of life. Moors and moist places

with grasses and *Carices* become rarer northward, they are replaced by narrow stripes of *Arctagrostis latifolia* along rivulets, and by scattered plants of *Catabrosa concinna*, *Aira alpina* and *Pleuropogon Sabinei* on the cold, moist, often clayey ground.

The northernmost station where I found hydrophilous associations of some extent was a little north of the entrance to Mashigin Fjord. The banks of a quiet rivulet (a very rare occurrence on these latitudes) were largely covered with grasses (*Dupontia Fisheri*, *Pleuropogon Sabinei*, *Arctophila fulva)* and *Carices* (especially *Carex aquatilis).*

On Lütke Land *Carex aquatilis* diverges more and more from the type as we proceed northward. It there approaches to var. *stans:* lower plants, one male spike, fewer shorter and thicker female spikes, and broader, flat leaves. It is often difficult to distinguish such plants from *Carex rigida* var. *concolor (= Carex hyperborea* DREJER). DR. OSTENFELD has kindly informed me that *Carex aquatilis* (incl. of var. *stans*) has papillae on the upper side of its leaves, and rarely on the lower side, whereas *Carex rigida* (incl. of var. *concolor*) has no papillae on the upper side of its leaves. Hybrids between *Carex aquatilis* and *Carex glauca* are supposed to be common.

As was to be expected from a plant of this cold substratum, it flowers late. The plants from Arkhangel Bay were only in flower (male stage) in the middle of August, and I found no ripe utricles in the southern fjords in the last days of August. Our last day ashorr was Sept. 2nd, I have accordingly, very few data from this month, so important for the ripening of the seeds in Arctic countries, especially for Monocotyledonous plants.

Former investigations. Evidently a southern plant, for there are many stations from Waigatsch, and some from the west coast of Novaya Zemlya proper. — But I have found no stations in literature from Lütke Land north of the Matotchkin Shar district (Belushii Bay, FEILDEN). The above observations, accordingly, represent a very considerable extension of its range.

119. *Carex incurva* LIGHTF.

Pl. XV, 4.

I. Gribovii Fjord: Veselago Island.

One of the rarest plants in the regions visited by us. I detected a few small plants, one of them fertile, in a fissure of the rock on the cliff.

Former investigations. Only obtained by HOLM at Nicholsköj Shar and at Petuchowsköj Shar near the Kara Strait. (Also on Waigatsch: Cape Gribovii, See Vega Expedition).

120. *Carex lagopina* WBG.

Pl. XV, 4.

I. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord. Sukhoi Noss.

Not rare, and plentiful where I found it. It affects the borders of lakes and ponds.

Like so many *Carices* it is a southern species, though not so markedly as former investigations might suggest. — This is at little remarkable, for the utricles obtained between Pomorskaya and Bessimyannii Fjord as early as the last days of August were evidently quite ripe.

I did not find the nearly related *Carex glareosa*, recorded from several stations in Novaya Zemlya, e. g. at Matotchkin Shar, see the Vega Expedition.

Former investigations. Only collected at the Olenje Island by HOLM. (FEILDEN found it on the south shores of Waigatsch).

121. *Carex misandra* R. BR.

Pl. XV, 5.

Carex frigida ALL. var. *β. misandra* (R. BR.) O. F. LANG in KÜKENTHAL Cyperaceae-Caricoideae, Das Pflanzenreich, IV. 20, p. 557, ubi syn.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya and Chalhonik Valley. Serebryanka Fjord.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, Blaafjell Basin north and south side, and Fram Bay.
VI. South of Arkhangel Bay, East of Lichutin Island.

Next to *Carex rigida* this is the commonest and most widespread *Carex* in the regions visited by us. It is very common as far north as Mashigin, some of my finest specimens of this beautiful *Carex* were collected in the very "ice-box" (Blaafjell Basin) of Mashigin. We might, therefore, suppose that it should be common farther north, but that is evidently not the case, for I only found a few small plants at two stations.

It affects tufts in the bogs and moist grass-land. It was only to be expected that a plant from this cold substratum should be a late summer plant. The first plants collected were from Chalhonik Valley (13.7), small rosettes without flower stem or — a few plants — in beginning flowering stage. Even at a place as favourable as Serebryanka I only found few full-grown plants on the 23—25th of July. It was in

flower or out of flower in Mashigin in the first 10 days of August and "farthest north" in the middle of August. — But first in flower it ripens its utricles in a remarkably short time. In Mashigin I found evidently ripe utricles that were easily detatched from their rachis on the 25th of August. In Gribovii and Bessimyannii Fjords ripe utricles were quite common in the last days of August.

Former investigations. The stations, recorded in literature for this common species, are remarkably few and give no adequate idea of its distribution. But no other genus of vascular plants has been so poorly investigated in this country as *Carex*. In his enumeration FEILDEN knows of no station for any species of *Carex* north of 73—74°, i. e. north of the Matotchkin Shar district. During our short visit 6 different *Carices* were collected north of 74° and 3 species were obtained in the Arkhangel Bay district.

122. *Carex parallela* (LÆST.) SOMRFT.

Pl. XV, 6.

Carex parallela. SAMUELSSON, GUNNAR, *Carex dioeca*-gruppen i den nordiska floran. Acta Flora Sueciae, vol I pag. 217—244, Tab. XV. Stockholm 1921.

I. Bessimyannii Fjord. Gribovii Fjord, north side.
II. Serebryanka Fjord.
IV. Mashigin Fjord: Strömsnes Bay and Blomster Bay. North of the entrance to Mashigin Fjord.

It is impossible to call it common, but it was plentiful where I found it.

On wet bogs.

The male plants are much more common than the female ones; north of Mashigin I only found male plants. Otherwise also female plants were found. The male plants were in flower to the last day of our visit. Ripe utricles were not collected.

Former investigations. Only obtained by HOLM at Petuchowsköj Island and Shar. The above stations extend its distribution by 4 degrees of latitude.

123. *Carex pulla* GOOD.

Pl. XV, 6.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Serebryanka Fjord.
IV. Mashigin Fjord: Fram Bay.

It was not rare in the fjords of Novaya Zemlya proper, but it was only obtained from a few stations on Lütke Land.

It affects moist, at times irrigated stations, as moist grass-land, tufts in the bogs, and the like.

The utricles were easily detatched from their axis, and evidently fully ripe, in the southern fjords in the last days of August.

Former investigations. This conspicuous plant has been collected at several stations as far north as Serebryanka.

124. *Carex rariflora* SM.

Pl. XVI, 1.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord.

A southern species, not rare in the fjords on the west coast of Novaya Zemlya proper. At Pomorskaya in abundance in a *Sphagnum*-moor s. w. of our anchorage.

The utricles were supposed to be ripe at Pomorskaya on August 27th.

Former investigations. Recorded from many stations on the west coast as far north as Karmakuli. HOLM who has investigated the southernmost part of Novaya Zemlya, directly says that in the bogs this plant is the commonest species of *Carex pulla*, *hyperborea*, *aquatiles*, *salina*, and *rigida*.

125. *Carex rigida* GOOD.

Pl. XVI, 2.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya, At the foot of Mt. Wilczek, Chalhonik Valley, and Belushii Bay. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, North and south side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay.

Carex rigida is undoubtedly the commonest of all *Carices* in Novaya Zemlya and Lütke Land. It is extremely common as far north as Mashigin Fjord, even in the "ice-box" (Blaafjell Basin) of that fjord. But it must be rare north of Mashigin: I only found it at two stations and quite scarce.

Gynobasical plants were obtained in Gribovii Fjord.

Carex hyperborea DREJ. = *C. rigida* var. *concolor* (R. BR.) KÜKENTH. Cyperaceae-Caricoideae p. 301, ubi syn. is far from common in the regions visited by us. I only found a few plants that could be referred here.

In a year like 1921 *Carex rigida* is supposed to produce ripe utricles as far north as we found it.

Former investigations. There are so many stations recorded from Novaya Zemlya proper that it must be equally common there. But the only station from Lütke Land north of the Matotchkin Shar region was Krestovii Fjord (PALIBINE).

126. *Carex rupestris* ALL.

Pl. XVI, 3.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: At the foot of Mt. Wilczek, On a moraine at Vasnetsoff Glacier, East of Cape Jouravlev, and at several places in Belushii Bay.
IV. Mashigin Fjord: South side of Blaafjell Basin.

In the fjords of Novaya Zemlya proper it must be called a quite common plant, and it was not rare in Matotchkin Shar. Only obtained once north of the Matotchkin Shar region, and curiously enough in the "ice-box" of Mashigin, not at the rich stations. This suggests that it may have escaped my attention there.

It prefers dry, well exposed hillocks on chalky and slaty substratum, associated with *Dryas*, as in Norway.

It was in full flower in Matotchkin Shar in the middle of July.

Former investigations. Recorded from a few stations on the west coast of Novaya Zemlya proper as far north as Matotchkin Shar (EKSTAM).

127. *Carex salina* WBG. var. *subspathacea* (WORMSK.) TUCK.

Pl. XVI, 4.

I. Goose Bay. Gribovii Fjord at the head of the fjord.

A rare plant in the regions visited by us (or overlooked by me?).

Former investigations: Recorded from some stations on the west coast of Novaya Zemlya proper as far north as Pomorskaya (FEILDEN).

128. *Eriophorum Chamissonis* C. A. M.

Pl. XVI, 3.

I. Gribovii Fjord, north side.
II. Matotchkin Shar: Pomorskaya.

Supposed to be a rare plant in the regions visited by us, though it was quite plentiful at either station. At Pomorskaya it gave a yellow tinge to a *Sphagnum* moor at the foot of Mt. Matotchka (on the west side of the mountain), associated with plants as *Luzula Wahlenbergii*, *Carex rariflora*, and others. Quite ripe seeds were not obtained.

Former investigations. It is an addition to the flora of Novaya Zemlya. Formerly collected at Chabarova and at Cape Grebenii (See Vega Expedition), and at Chabarova, Dolgoi Island and the south shores of Waigatsch by FEILDEN. Some of these plants may represent *Eriophorum intercedens*.

I am much indebted to Dr. HARALD LINDBERG, the author of *E. intercedens*, who has determined my material of these two species.

129. *Eriophorum intercedens* LINDB. fil.

Pl. XVI, 4.

Eriophorum intercedens LINDBERG in Plantae Finlandiae exsiccatae No. 99. f. ubi syn.

I. Bessimyannii Fjord.
II. Matotchkin Shar: Pomorskaya and Belushii Bay. Sukhoi Noss.

I do not venture to say much about the relative frequency of this species and the former one. LINDBERG referred the greater part of the *intercedens* material to f. *alba*.

LINDBERG, l. c. explains the difference between *Eriophorum intercedens* and *E. Chamissonis*:

E. intercedens:

Culmo sat humili, sat crasso,
spica lanigera rotundato-obovata, densa (rufa v. pallide rufescens),
squamis mediis triangulari-lanceolatis, acutiusculis vel acutis, margine ± hyalinis,
antheris (in statu sicco) 1.2—1.4 mm. longis.

E. Chamissonis:

Culmo altiore, graciliore,
spica lanigera obovata, minus densa, rufa,
squamis mediis sat latis, ovato-lanceolatis, obtusis, tantum in parte media opacis, ceterum hyalinis,
antheris linearibus, 2.2 mm. longis (in statu sicco).

130. *Eriophorum polystachyum* f. *triste* TH. FR.

Pl. XVI, 5.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, and Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: South side of Blaafjell Basin. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.

Quite common as far north as the Matotchkin Shar district. Farther north I only found it scattered and scarce, but it attains high latitudes.

Often quite luxuriant: in the southern fjords I found plants of 40 cm., even farthest north it was generally 15—20 cm. high.

It was in full flower on our arrival in Goose Bay (5.7). It evidently requires a longer time than *E. Scheuchzeri* to ripen its fruits, I only obtained a few plants with ripe fruits, e. g. at Pomorskaya 27.8.

Former investigations. Recorded from a great number of stations as far north as Matotchkin Shar. North of the Shar district only from Krestovii Fjord (PALIBINE).

131. *Eriophorum Scheuchzeri* HOPPE.

Pl. XVI, 6.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya, Chalhonik Valley, and Belushii Bay. Serebryanka Fjord.
IV. Mashigin Fjord: Strömsnes Bay, Blomster Bay, and South side of Blaafjell Basin. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.

By far the commonest of all the species of *Eriophorum* in Novaya Zemlya. In the southern fjords it gave a white tinge to the moors. In Mashigin Fjord it was more scarce, but not rare. It was obtained in the "ice-box" (Blaafjell Basin) of Mashigin, but I looked after it in vain north of Admiralty Peninsula.

In full flower on our arrival in Goose Bay on July 3d. It develops its fruits in a remarkably short space of time: at Serebryanka the

fruits were not far from ripe on July 23d, and in the southern fjords they were quite ripe in the last days of August (and most probably also earlier), its wool was streaming before the wind everywhere on the moors.

Former investigations. Recorded as a common plant from a great number of stations as far north as Matotchkin Shar; north of the Shar only from Krestovii Fjord (PALIBINE).

132. *Eriophorum vaginatum* L.

Pl. XVII, 1.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side.
II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord.

One of the most southerly species of the genus. It is quite common in the fjords on the west coast of Novaya Zemlya proper. But it is one of the many plants that have not been obtained north of the Matotchkin Shar district.

It flowers rather late in the summer, but I obtained ripe seeds in the southern fjords towards the end of August.

Former investigations. Recorded from many stations as far north as Matotchkin Shar, the northernmost being Belushii Bay (FEILDEN).

Gramineae.

133. *Alopecurus alpinus* SM.

Pl. XVII, 2; XXXIX; XL.

II. Matotchkin Shar: Pomorskaya, and Belushii Bay.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, North side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island, Eastern Krestovii Island, Pankratyeff Peninsula.

It is a very widespread plant in Novaya Zemlya and Lütke Land. It is one of the very few plants that I found to be more common farthest north than in Novaya Zemlya proper. Farthest north it was very common, down to Krestovii Fjord. I have overlooked it in the southern fjords, for FEILDEN obtained it in Bessimyannii and EKSTAM in Gribovii Fjord.

Alopecurus alpinus is generally found along watercourses, even if their water comes from melting ice and snow. But it is far from objecting to better stations, for it was nowhere more plentiful and more luxuriant than in the large rookery south of Arkhangel Bay. It there formed continuous tufts of some extent, a very rare thing at these latitudes where vascular plants grow so scattered.

In spite of its great distribution northward it flowers very late. At Belushii Bay (18.7) its stigmata were visible, but not its anthers, suggesting a protogynous plant. At Krestovii Fjord some anthers were visible (27.7). In full flower in Mashigin Fjord in the first 10 days of August, and farthest north in the middle of August. I have no observations on ripe fruits. Its local spreading is greatly aided by its runners which are profusely developed.

Former investigations. *Alopecurus alpinus* has been obtained from several stations in Lütke Land and Novaya Zemlya proper (also on Waigats and on the Russian mainland). There are few data on its frequency. FEILDEN says that it is "not very common" and HOLM, who investigated the southernmost part of Novaya Zemlya proper, did not find it.

134. *Alopecurus pratensis* L.

f. *alpestris* WBG.

Pl. XVII, 2.

II. Matotchkin Shar: Pomorskaya.

I only obtained a few plants on the cliff near the rivulet that falls into Bakan Bay, west of the great *Sphagnum* moor.

The plants were well developed, 40 cm. high, and agreed perfectly with Finmarken plants in our herbarium.

They were out of flower (withered anthers) on the 27th of August.

Former investigations. Recorded only from Rogatscheff Bay (See Vega Expedition), and from Matotchkin Shar (EKSTAM). — It is evidently more common on Waigats.

135. *Arctagrostis latifolia* (R. BR.) GRISEB.

Pl. XVII, 3.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya and Belushii Bay. Serebryanka Fjord.
III. Krestovii Fjord.

IV. Mashigin Fjord: Sol Bay, Dal Bay, Strömsnes Bay, Blomster Bay, South side of Blaafjell Basin, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Mainland east of Lichutin Island.

One of the commonest vascular plants all over the districts investigated by us. I think I could have found it almost everywhere, with the exception of the Krestovii Islands and Pankratyeff Peninsula, the poorest stations I saw.

It affects moist stations, as small watercourses where water percolates from the mountains or from the glaciers. At such places *Arctagrostis latifolia* is often seen as dark green stripes, visible from a long distance.

In general it flowers late, anthers and stigmata were seen in their flowering stage till the last day of our visit. In Matotchkin Shar the culmes were only half-grown, and neither anthers nor stigmata were visible, during the first 3 weeks of July. (Its glumes and pales remain so closed that it suggests self-fertilization). — In Gribovii Fjord I found ripe fruits.

Former investigations. FEILDEN is contented to say that this common plant is "widely distributed", and he gives no special stations from Novaya Zemlya and Lütke Land. — HOLM writes that it is "very sporadic". If this is correct it might suggest that it is less common in the southernmost part of Novaya Zemlya, visited by him. But there are several stations from Waigats and the Russian Mainland.

136. *Arctophila fulva* (TRIN.) RUPR.

Pl. XVII, 4; XLI.

II. Matotchkin Shar: Pomorskaya and Belushii Bay.
IV. North of the entrance to Mashigin Fjord.

This large and stately grass is far from common in the districts investigated by us. But it is a social plant, plentiful where found. Even at the northernmost station it bordered a quiet rivulet and formed a green turf of some extent.

FEILDEN describes it as an aquatic plant, very abundant "in meres and ponds . . . . affording shelter for . . . water-loving species of birds". As far north as Mashigin I only found it on relatively dry land. *Pleuropogon* and *Dupontia* were the chief components of the subaquatic associations. Their habitat was still so wet (Aug. 21st) that it was a little difficult to gather them, earlier in the summer it must have been quite inundated.

At Belushii Bay I only found its characteristic broad divergent leaves and no culm (July 19th). North of Mashigin the plants were not full-grown (Aug. 23d), but some of them were in full flower. At Pomorskaya (Aug. 28th) the panicle was fully developed and the anthesis at its height, many plants were already out of flower.

Former investigations. In spite of its Mashigin station it is on the whole a southern species, formerly never obtained north of Pomorskaya. But it is "very abundant" on Dolgoi, "very common" at Chabarova, and "common all over Waigats" (FEILDEN).

137. *Calamagrostis neglecta* (EHRH.) f. *borealis* LÆST.

Pl. XVII, 4.

Syn. *Calamagrostis stricta* (WBG.), and *Calamagrostis Holmii* LANGE in TH. HOLM Novaia-Zemlia's Vegetation pag. 16 [20], tab. I, fig. 2. Kjøbenhavn 1885.

I. Bessimyannii Fjord. Gribovii Fjord: North side.
II. Matotchkin Shar: Pomorskaya.

Not too rare in the fjords of Novaya Zemlya proper, much looked after, but in vain, in Lütke Land.

It is generally more or less cespitose, as is the case with f. *borealis* in Norway. The ligule is variable, usually long up to 4 mm. The glumes are acute. I can find no difference, worthy of mention, between this plant and *Calamagrostis Holmii* LANGE.

Former investigations. Obtained only at Karmakuli (*Cal. stricta*, leg. EKSTAM), and at Pomorskaya (FEILDEN). HOLM states that *Cal. Holmii* is "frequentissime in paludibus ad Jugor Schar".

138. *Catabrosa algida* (SOL.) FR.

Pl. XVII, 5 (only my own stations); XXXVIII.

I. Bessimyannii Fjord. Gribovii Fjord: Veselago Island.
II. Matotchkin Shar: Pomorskaya and Belushii Bay.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Blomster Bay, and North side of Blaafjell Basin. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Lichutin Island, Eastern and Northern Krestovii Islands, Pankratyeff Peninsula.

Catabrosa algida is a very widespread and common species all over the districts investigated by us. Farthest north it was obtained at every

station visited, with the exception of the mainland east of Lichutin Island. We there chiefly investigated dry chalky *Dryas*-rocks, unfit for this species. — I did not obtain it so frequently on Novaya Zemlya proper; most probably I have overlooked it there.

When the expedition was planned it was not intended to devote much time to vascular plants, and I did not study these two species before we left Norway. I am, therefore, unable to say much on the relative frequency of them. But I have brought home a large series of either species. Together they are extremely frequent.

They are type plants of wet clayey ground, irrigated by water from melting ice and snow (Norw.: "sneleier"). But I also found them on sandy beaches, *Catabrosa algida* at Belushii Bay, and *C. concinna* at Krestovii Fjord, near the houses. As was to be expected plants from this warm substratum were large and well developed, *C. concinna* up to 20 cm. On cold wet clay they were often small, only a few cm. high.

Few if any grasses ripen their fruits so early as the two *Catabrosae*. At Belushii Bay I found entirely ripe fruits of *C. algida* on the 16th of July, together with flowers. The same was the case at the utterly desolate Pankratyeff Peninsula on the 19th of August. This sufficiently explains its distribution and frequency farthest north. It also ascends as high on the mountains as any other plant. At the pass between the two fjords Gribovii and Bessimyannii I found *C. algida* at the highest point of the pass, 350 m. s. m. Only a few other vascular plants were observed there, viz. *Cerastium Regelii*, *Draba alpina*, *Poa alpina*, *Saxifraga cernua* and *oppositifolia*, the commonest being *C. Regelii*, *C. algida* and *S. oppositifolia*.

In OSTENFELD Flora arctica GELERT refers *C. algida* to the genus *Phippsia* with one-flowered spikelets and *C. concinna* to the genus *Catabrosa* with two to many-flowered spikelets. I have seen *C. concinna* with two flowers, but I have seen no plant with more than one caryopsis in each spikelet.

HARRY SMITH studied the two species of *Catabrosa*[1]. He calls attention to the following characters:

Catabrosa algida: Colour light green, culms geniculate, panicle cylindrical with contracted branches. Much importance is attached to the pales which are described as obtuse and entirely glabrous, and to the caryopsis which is broadly ovate.

Catabrosa concinna: Colour darker, culms erect, more cespitose, lower branches of the panicle reflexed or divergent from the main axis after the anthesis, pales narrower and pubescent ("seidenhaarig"), caryopsis apiculate, narrower than in *C. algida*, and broadest at the base.

[1] SMITH, HARRY: *Catabrosa concinna* TH. FR. * *algidiformis* nov. sp. und ihre Nächstverwandte. Svensk Bot. Tidsskr. 1914, vol. VIII, p. 245—252, fig. 1—5.

He creates a new subspecies: *C. concinna* * *algidiformis:* . . . . panicula contracta . . . paleis ovatis . . . pilosis, caryopside angusto, medio vel infra medium latissimo.

I have found the characters derived from the pales and the caryopsis to be variable.

The latitude and the acuteness of the caryopsis is especially variable. Unquestionable *C. concinnae* (with reflexed panicle branches) often have caryopses that are much broader and more obtuse than in SMITH's figure. In general *C. algida* has broader and more obtuse caryopses, but the difference is not constant enough to be of specific value.

The pales of *C. algida* are described as entirely glabrous. But often they are ± scabrous, and some times directly hairy. SMITH would probably have referred many of these plants to his * *algidiformis* which is very common on Novaya Zemlya and Lütke Land. I have referred them to *C. algida*, for I think there is every intermediate stage between the glabrous pales of the typical *C. algida* and the silky hairs of *C. concinna*.

In his Svensk flora p. 85 LINDMAN mentions a valuable character: fruit protruding in *C. concinna*, and not protruding in *C. algida*. The broad pales are more appressed to the fruit in *C. algida* than in the other species.

The glumes of either species are small or very small and deciduous as soon as the anthesis is over. They are generally smaller in *C. concinna* than in *C. algida*.

Our Norwegian material of *Catabrosa* has been abroad on loan for several years, and it was impossible for me to get it back for comparison.

Former investigations. It is quite astonishing to see, how scarce the records of this common plant are the Novaya Zemlya literature. FEILDEN obtained a "large series" from Waigats, Novaya Zemlya, and Lütke Land, but he does not attribute specific value to the difference between *C. algida* and *concinna*.

139. *Catabrosa concinna* TH. FR.

PL. XVII, 6.

I. Bessimyannii Fjord. Gribovii Fjord: North side.
II. Matotchkin Shar: Pomorskaya. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Sol Bay, Strömsnes Bay, Blomster Bay. North and south side of Blaafjell Basin.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Mainland east of Lichutin Island, Pankratyeff Peninsula.

For particulars, see *Catabrosa algida*.

140. *Deschampsia alpina* ROEM. et SCHULT.

Pl. XVIII, 1.

I. Bessimyannii Fjord. Gribovii Fjord: North side.
II. Matotchkin Shar: Pomorskaya, West of Tretyakoff Glacier, At the foot of Mt. Syernaia, and Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, and Fram Bay.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Lichutin Island, Mainland east of Lichutin Island.

One of the commonest and most widespread grasses of Novaya Zemlya and Lütke Land. Its scattered tufts are seen almost everywhere on moist ground. It is, however, supposed to be somewhat scarcer northward.

Usually quite typical. Occasionally the spikelets are less distinctly viviparous, and if small such plants may approach to *Deschampsia caespitosa* (cfr. FRIES Herb. Norm. fasc. VIII, No. 91 (dext., in our copy), and *Deschampsia alpina* * *Wahlenbergii* NEUM. in NEUMAN Sveriges Flora (1901) p. 759. NEUMAN also refers the f. *arctica* (TRIN.) of *Deschampsia caespitosa* to *D. alpina*.

The best distinctive characters are the length of the glumes which are longer in *D. alpina* (5 mm. against 3—4 in *D. caespitosa*), the viviparous spikelets of *D. alpina*, and the awn which is attached nearer to the apex in *D. alpina* (it is not always present), nearer to the basis in *D. caespitosa*.

Former investigations. I was much astonished to find that there were only a few stations recorded in literature for this ubiquitous plant from Novaya Zemlya. The reason for this is that it has not always been distinguished from *D. caespitosa* (e. g. not by FEILDEN).

141. *Deschampsia caespitosa* P. B.

Pl. XVIII, 2.

I. Bessimyannii Fjord. At the head of Gribovii Fjord.
II. Matotchkin Shar: Pomorskaya, Mt. Lasareff (on the beach), Chalhonik Valley, Belushii Bay. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blaafjell Basin (south side), and Fram Bay.
VI. South of Arkhangel Bay, Lichutin Island, Eastern Krestovii Island.

A very common and widespread plant all over Novaya Zemlya and Lütke Land. Only farthest north it is supposed to be less common, at least I found no specimen of *Deschampsiae* at the poorest stations (Northern Krestovii Island and Pankratyeff Peninsula).

It affects moist, often clayey ground.

Nearly my entire material must be referred to var. *arctica* (TRIN.) SIMM. Vascular Plants of Ellesmereland p. 73. This variety has been well characterized by SIMMONS l. c. "small and short, coarsely built, with short, often somewhat involute leaves and coarse more or less inflated sheaths. The culm leaves, especially the uppermost ones, are very short, sometimes reduced nearly to the sheath alone. The panicle is generally densely contracted, almost spikelike".

The awn is usually affixed near the middle of the pale. Southward the panicle is often less contracted and occasionally plants are met with that approach more to Norwegian plants, with an open panicle, and the awn affixed nearer to the base of the pale.

It flowers late, in good accordance with its cold substratum. During the first three weeks of July the white withered tufts from the preceeding year were seen everywhere in Matotchkin Shar, with shorter green culms of the year, and flowers in bud. The first full-grown flowering plants were obtained in Serebryanka Fjord on the 23d of July. Farthest north the plants were generally not full-grown and the flowers were not yet expanded about the middle of August.

Former investigations. As was to be expected numerous stations have been recorded for this frequent plant. But it is not always clearly seen whether this plant is meant or *D. alpina*. The northernmost station mentioned is Pakhtusoff Island (FEILDEN).

142. *Dupontia Fisheri* R. BR.

PL. XVIII, 3.

I. Bessimyannii Fjord. Gribovii Fjord: North and south side, and Veselago Island.
II. Matotchkin Shar: Pomorskaya and Belushii Bay. Serebryanka Fjord.
IV. Mashigin Fjord: Rækvedbugten. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Eastern Krestovii Island.

Dupontia was not obtained at so many stations as several other plants, but it was common where I found it. It forms associations, often together with *Pleuropogon Sabinei*, on moist grass-moors and on

the borders of lakes and ponds. I found it more common on the plains on the coast and at the broad "Bays" than in Matotchkin Shar where suitable stations are scarce.

Former investigations. Recorded from several stations as far north as Krestovii Fjord (PALIBINE). FEILDEN writes that it is a widely distributed grass, common on . . . . Novaya Zemlya and Lütke Land, but he gives no special stations.

143. *Festuca ovina* L.
var. *brevifolia* R. BR.

Pl. XVIII, 4.

II. Matotchkin Shar: Pomorskaya and Belushii Bay (pluribi).
IV. North of the entrance to Mashigin Fjord.

Only obtained at a few places. It has possibly been overlooked, but it must be much less common than var. *vivipara*. The plants from Pomorskaya were well developed, up to 25 cm. high.

It affects dry gravelly hills.

Former investigations. Recorded from some scattered stations as far north as Ziwolka Fjord (FEILDEN).

var. *vivipara* L.

Pl. XVIII, 4.

I. Bessimyannii Fjord. Gribovii Fjord: North side and on the south side near the head of the fjord.
II. Matotchkin Shar: Pomorskaya. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Blomster Bay, South side of Blaafjell Basin, and Fram Bay.
V. Admiralty Peninsula.
VI. Mainland east of Lichutin Island.

A very wide-spread plant, common on dry hills at least as far north as Mashigin Fjord. Farthest north it is supposed to be less common (or overlooked?). Well developed plants were obtained in Blaafjell Basin not far from the large glaciers.

Former investigations. I was astonished to find only a few stations in literature for this common plant, as far north as Matotchkin Shar.

144. *Festuca rubra* L.
var. *arenaria* (OSB.) FR.

Pl. XVIII, 5; XXXIII.

I. Bessimyannii Fjord. Gribovii Fjord: North side, Veselago Island, and at the head of the fjord.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, At the foot of Mt. Syernaia, and on Albert Hill in Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strömsnes Bay, Blomster Bay, and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay, Berkh Island, Mainland east of Luchutin Island, Pankratyeff Peninsula.

One of the most wide-spread grasses on Novaya Zemlya and Lütke Land. It is also one of the commonest grasses, common and well developed even farthest north.

It affects well exposed, dry, sandy or gravelly hills (the "flower-hills"); at favourable stations it grows to a size of 30 cm.

It is so characteristic that it migth probably deserve the rank of a proper species.

Former investigations. The grasses of Novaya Zemlya have been poorly investigated. For this common species only a few stations have been recorded in literature, as far north as Krestovii Fjord (PALIBINE) on the west coast, and Pakhtusoff Island on the east coast (FEILDEN).

145. *Hierochloa alpina* (LILJEBL.) ROEM. et SCHULT.

Pl. XVIII, 6.

I. Goose Bay. Gribovii Fjord: North side.
II. Matotchkin Shar: Pomorskaya, Belushii Bay, and South side near the entrance to the Kara Sea. Serebryanka Fjord.
IV. Mashigin Fjord: Strömsnes Bay.
V. Admiralty Peninsula.

Common at suitable stations in Novaya Zemlya proper and in the Matotchkin Shar region. But north of this region I only obtained it twice. — Strömsnes Bay is supposed to be the best station in Mashigin Fjord.

It is well known that *Hierochloa alpina* affects dry and exposed places. I often found it on the top of the cliff and on prominent rocks where the gales could be so strong that I was obliged to use all my force to cling to the rock. It was there associated with *Oxytropis campestris* var. *sordida*.

It was in flower at Goose Bay as early as July 5th. We might have expected that a plant which flowers so early and which is able to subsist on such a poor substratum should be more common farther north. FEILDEN writes that it is common at Ziwolka Fjord on the east coast. I have perhaps overlooked it at my northern stations.

Former investigations. Recorded by many authors from many stations as far north as the Matotchkin Shar region, and from Ziwolka Fjord farther north (FEILDEN).

146. *Hierochloa pauciflora* R. BR.

Pl. XIX, 1.

II. Serebryanka Fjord, a few plants only.

Evidently a southern plant. To judge after literary records (e. g. HOLM) it must be quite as common in the southern parts of Novaya Zemlya as *Hierochloa alpina*.

147. *Pleuropogon Sabinei* R. BR.

Pl. XIX, 2.

I. Bessimyannii Fjord. Gribovii Fjord: North side and at the head of the fjord.
II. Matotchkin Shar: Pomorskaya and Belushii Bay.
IV. Mashigin Fjord: Blomster Bay and Trehörningen. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. South of Arkhangel Bay and Berkh Island.

This plant, generally recognized as the most beautiful of all Arctic grasses, is fairly common all over the area investigated by us, in suitable situations.

It grows in ponds, water-courses and other irrigated places, usually on clayey ground, on the borders of ponds and water courses often associated with *Dupontia Fisheri*. Its floating leaves are rare. I obtained them only once, in a quiet rivulet north of the entrance to Mashigin Fjord.

It was in full flower at Belushii Bay (18—19.7) and farthest north in the middle of August. At Gribovii Fjord the spikelets were deranged in the last days of August, and the fruits evidently ripe.

Former investigations. Recorded from many stations on Novaya Zemlya as well as in Lütke Land as far north as Ziwolka Fjord. FEILDEN writes that it is "abundant".

Poa.

By C. A. M. LINDMAN, Stockholm.

The species of this genus on Novaya Zemlya are only 4 in number, but the variation is considerable and the forms many. Dr. LYNGE has brought home very numerous *Poa*-specimens, and his collection contains many samples of the peculiar Arctic races and (doubtless hybrid) intermediate forms of *Poa*. Earlier authors on Arctic grasses have paid attention to them and tried to classify them, although not even as cross-breeds, and in some cases they have been doubtful as to the interpretation of these critical plants.

The rich material of *Poa* from Dr. LYNGE's journey deserves a careful examination. When classifying this rich and interesting collection I had for comparison in the first place the large herbarium of Arctic plants in the Natural History museum in Stockholm, collected during the many Swedish polar expeditions, and described in lists by A. J. MALMGREN, TH. M. FRIES, A. BERLIN, F. R. KJELLMAN, A. N. LUNDSTRØM, O. EKSTAM, E. ASPLUND, and others. This comparison, however, caused me a great deal of trouble, more than it helped me, I dare say, for in old collections there are always some misleading or meaningless names, so I first had to determine those numerous sets of an earlier date and get rid of some ambiguous names, e. g., "*Poa stricta*", and "*Poa colpodea*". Before all, I was obliged to learn exactly the true characteristics of the pure, unmixed species, in order to recognize them with greater certainty as components of a presumable cross-breed.

As has already been suggested, the polymorphismus of the Arctic *Poa*-species may, in part, depend on crossing, and partly on the Arctic habitat. The rudeness of the Arctic climate is able to reduce the size of a plant considerably, — even of so abundant and widely spread plants as *Poa alpina* and *arctica*, or at all events to retard its development to such a degree that it has not time to arrive at a perfect state of form and colour, the spikelets of a grass especially remaining undeveloped and indeterminable.

It is also well known from the Scandinavian mountains, that the scales (particularly the pales or valvulæ) get more or less changed in a viviparous (or proliferous) spikelet. Some of the pales at the top,

or at all events the uppermost one (the nearest one to the terminal bulbil or daughter plant) get deformed, they become a little elongated, more nervous or striated, and more greenish, not purely purple — in a few words, they become more vegetative by a retrograde metamorphosis.

In Novaya Zemlya the phenomenon of viviparous inflorescences is very common for the genus *Poa*. Although we do not know what reasons there are for such a revolution in the life of a species, we cannot omit to presume that it is specially provoked by the sterility, a debilitation in some way (or a destruction) of the sexual organs. There is a sufficient reason for this conclusion in the fact that a viviparous individual of an Arctic *Poa* generally differs from its species, becoming distinctly intermediate with regard to its floral organs, or often to its vegetative ones too, like a cross-breed between two certain species.

I therefore think it inevitable, on meeting with viviparous Arctic *Poae*, to regard them as cross-breeds; the classification, then, must be an attempt to determine their parents, i. e., the components of the hybrid combination.[1]

We need not ask, then, how it can be that hybrid forms arise, although the viviparous forms of this genus seem to be more numerous than the fertile ones, for there is no contradiction in this state of things. First, the Arctic *Poa*-species are not quite sterile, they sometimes produce perfectly good flowers (e. g., *Poa arctica* in the polar countries), so a crossing may be possible, even if not very common. Then if a hybrid individual has been generated (and is probably sterile), it has the most effective organ of propagation, if it becomes viviparous. In every spikelet it then produces one daughter plant, which, by its vegetative origin, is quite like the mother-plants, and the panicle will finally be able to sprinkle the ground with such little vital plants, ready to root immediately. If the severe climatic conditions could be injurious to a perfect development of a flowering individual, particularly the fructification, the ripeness, and the dissemination, the vegetative daughter plants or bulbils are likely to possess a more reliable power of resistance to the trying season of growing and ripening, and to the crushing cold of the long Arctic winter. By their hardier offspring the viviparous plants have, no doubt, a decided advantage over the sexual

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[1] It must be admitted, however, that an apparently unmixed plant, also a "homozygot", can appear as viviparous; probably *Poa alpina* belongs here, *Poa laxa* and *Poa arctica* too, the common *Deschampsia alpina* and the lowland-plants *Poa bulbosa* and *Dactylis glomerata*. But an examination may prove such specimens to be sterile from some external damage, e. g., parasitical animals.

In very few cases I have seen a hybrid *Poa*-form with non-viviparous panicle, e. g. a *Poa alpina* × *arctica*, collected at Karmakola in N. Z. 1. 9. 1895 by O. EKSTAM. It is like an *alpina*, 2—3 dm. high, but the glumes are quite narrow and rather distinctly cuspidate; the anthers 2 mm. long and sterile.

plants as to their perfection, propagation and distribution; the former consequently will increase in number much more than the latter.[1]

Whether sexual individuals of an Arctic *Poa* are able to produce ripe fruits in their own area, is as yet uncertain. Likewise, we do not know whether the offspring of a viviparous specimen are able to become sexual plants, or whether they will exclusively give rise to viviparous individuals again. — It does not occur very often that a spikelet of viviparous nature also gets normal flowers. In the Novaya Zemlya collection of Dr. LYNGE there are such specimens (⩧) of *Poa alpina* and of *P. arctica;* besides a flower with (partly) fertile anthers inside the lowermost pale, there is, as usual, a bulbil ("Brutpflanze") at the top of the spikelet.[2]

148. *Poa abbreviata* R. BR.

Pl. XX, 1; XLV, 1; XLVII, 9, 10.

II. Matotchkin Shar: Belushii Bay.
VI. South of Arkhangel Bay, Mainland east of Lichutin Island.

There are collections of this species from a few stations of Dr. LYNGE's journey. The general appearance is rather strange for a *Poa*. It is a plant of small size, forming a very dense tuft of numerous, narrow, rigid leaves, 2—9 cm. long; the base of a tuft consists of the large, firm, straw-coloured sheaths. The culms are short and very thin (in the tallest specimens about 15 cm.); the panicle is very small, ovate or roundish, 1—2 cm. long, containing but a few, 3—5(—8) crowded spikelets, which are relatively large. The spikelets are also rather aberrant from the common *Poa*-type: the glumes are very narrow and straight; the gluma I. is short, but the gluma II. reaches upto the top of the nearest valvula; all the glumes and pales are thin and membranaceous without prominent veins, and blackish-purple, but are provided with a very broad, hyaline edge. The flowers in a spikelet are usually 3.

The variations are evidently limited to the vegetative parts, some specimens being taller with erect leaves as much as 10 cm. in length, some

[1] Mrs. ELISABETH EKMAN, who visited Greenland in the summer of 1923, has told me that Dr. M. PORSILD, Director of the Arctic station of Disco, assured her that he had never met with viviparous specimens of *Poa alpina* in Greenland. I hardly think such plants are to be met with in any herbaria.

[2] Pl. XLVII, fig. 1, represents (on the left side, × 4) a little daughter-plant from a viviparous spikelet of *Poa alpina* (× ?). It is the continuation of the very top of the spikelet, and displaces the uppermost pale. The drawing shows it cut longitudinally, only two blades being developed. — The daughter-plant or bulbil is, thus, built up of the top of the rachis, which undergoes a metamorphosis; the bulbil is not a transformation of a flower, nor are the young blades transformed floral organs; all the flowers are lateral or axillary, but the bulbil terminal.

being quite low, only 2 cm. high, sometimes with culms and leaves all together incurved in one definite direction, pl. XLV, fig. 1, evidently depending on the habitat (as a vertical rock).

There may, thus, be distinguished two modifications: *erecta*, Flora Danica, t. 2884, and *arcuata*, pl. XLV, fig. 1. — There is also a f. *pallida*, pl. XLVII, fig. 10, collected at Belushii Bay, with pale greenish panicle.

This species is never viviparous and does not hybridize with the other species.

149. *Poa alpigena* (FR.) n.

Pl. XX, 1; XLV, 2, 3; XLVII, 11—13.

I. Gribovii Fjord: Veselago Island.
II. Matotchkin Shar: Belushii Bay at several stations. Sukhoi Noss.
IV. Mashigin Fjord: Sol Bay, Strømsnes Bay and North side of Blaafjell Basin.
VI. Rookery south of Arkhangel Bay, Berkh Island and the Pankratyeff Peninsula.

On an earlier occasion (in my Svensk fanerogamflora 1918, p. 89 and 91) I have tried to point out the specific marks, which seem essential enough to constitute *Poa alpigena* as a "species propria" sufficiently distinct from *Poa pratensis* (sensu strictiore) and its allies *P. angustifolia*, *P. irrigata* etc. In Scandinavia, *P. alpigena* is probably limited to northern Sweden (Norrland, Lappland) and the mountain-regions of Norway even farther south. The collective "*Poa pratensis*" (s. lat.) has not been fully dealt with in those parts of Scandinavia, but of its many forms, the *alpigena* must be considered the easiest to characterize. This opinion is confirmed by the rich collection of Dr. LYNGE.

In every list of grasses from polar countries there figures the name, "*Poa pratensis*". Dr. LYNGE's collection merely contains the true *alpigena* and its cross-breeds with *alpina* and *arctica*, but no other form of the large series of "*Poa pratensis*" (coll.).[1]

Regarding especially the specimens from Novaya Zemlya, which seem quite identical with typical Scandinavian ones, we can characterize *Poa alpigena* in the following manner:

1. The culms are detached and arise single, as the growth of this species is not cespitose, the branches being long subterraneous runners, much the same as in *Poa arctica*.
2. The panicle is slender, contracted, oblong or cylindrical, more than twice as long as broad; in comparison with *P. arctica* it is longer

[1] In his paper Beiträge zur Kenntnis der Flora des Eisfjordgebietes (Ark. f. Bot. 15:14, 1918, p. 16), ASPLUND reminds us that a form of *Poa pratensis*, perhaps introduced from Scandinavia, has been found in Spitzbergen.

and less open and the spikelets more numerous. The branchlets are smooth or rarely scabrous.

3. The spikelets are generally smaller than in *arctica*, and the gluma I. is distinctly shorter than gl. II., and usually narrow, acute and a little incurved.

Besides this, *Poa alpigena* is relatively taller than *alpina* and *arctica* in their common shape; the culm is less slender or gracile than in *arctica*; the uppermost culm-blade is longer than in the other species; the spikelets are paler rose-purplish than in the other Arctic *Poa*-species, and less glossy than in *arctica*. The colour of a spikelet is much less bright than in *arctica*, often partly greenish, and on the pales there is no golden zone between the white edge and the violet area. The ligule is rather long, nearly 2 mm., and, as in *pratensis*, firm, blunt, indistinctly denticulate.

It is probable that true, unmixed *alpigena* sometimes occurs more or less viviparous.

In Dr. LYNGE's collection several individuals are not taller than 12—15 cm. (some of them are perhaps not yet quite full-grown): modif. *humilis* n.; Pancratyeff Peninsula, Aug. 19th, only 12 cm. high, with very long and numerous subterraneous branches. A contrast to this is the modif. *robusta* n., valde robusta, ramis subterraneis crassioribus, foliis culmi infimis lamina usque ad 15 cm. longis, foliis summis lamina usque ad 10 cm. longa, panicula 6 cm. longa (glumis brevibus aut perlongis).

The typical form of *alpigena* is evidently f. *breviglumis* n.; pl. XLVII, fig. 11, 12. — Aberrant forms are:

f. *obtusata* n., glumis valvulisque perbrevibus, obtusatis, apice recto non arcuato. This form is rarer than the others, e. g. Veselago Island in Gribovii Fjord, Aug. 29th (upper glume only half as long as the spikelet); Berkh Island Aug. 18th (a part of that collection; these samples have unusually glossy, metallic glumes, a little yellowish).

f. *longiglumis* n., pl. XLVII, fig. 13, glumis longis, angustis, cuspidatis (strictis aut paulum incurvis); gl. II. 4—5 mm. long. Specimens from the mainland opposite Lichutin Island (seem entirely typical, except the narrow, cuspidate glumes; perhaps therefore rather a hybrid *alpigena* × *arctica*?); Albert Hill in Belushii Bay July 17th (a lower form with large panicle, 8 cm. long; uppermost culm leaf 4 cm. long; glumes distinctly unequal in length). — Of this form a modific. *luxurians* was gathered in Berkh Island Aug. 18th: panicula diffusa 16 cm. longa, 10 cm. lata. Its habit comes near to the modif. *robusta* (see above), and many shoots produce leaves 20 cm. long.[1]

[1] In Herb. Stockh. there is a large, very coarse (though undeveloped) viviparous form from Spitzbergen, Magdalena Bay, coll. by J. VAHL and labelled by him "*Poa alpina β vivipara*". L. L. LÆSTADIUS has labelled it *Poa pratensis-algida*. This, I think, can only be *P. alpigena* × *arctica*; its habit is nearest to *P. alpigena* f. *longiglumis* et modif. *robusta*.

150. *Poa alpina* L.

Pl. XX, 4; XLV, 4; XLVI, 1; XLVII, 1, 2.

I. Bessimyannii Fjord. Gribovii Fjord: North side, and south side near the head of the fjord.
II. Matotchkin Shar: Pomorskaya. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Strømsnes Bay, Blomster Bay and Fram Bay.
VI. Mainland east of Lichutin Island.

This well-known species, very common in the northern Scandinavian mountains, seems to be equally common in the polar countries, even in Novaya Zemlya, but it is evidently less variable there than on the European continent. Nevertheless, on a closer study of the material, it will at once prove somewhat heterogeneous, and even samples collected together and preserved on the same sheet are, as regards the panicle and the spikelets, too different to belong to one form, or to the pure, unmixed *P. alpina*. In such cases there must be a certain influence by means of crossing.

P. alpina is known as very variable in size from 5 cm. to nearly 5 dm., but in Novaya Zemlya the size is less variable, generally 5—12 cm., rarely 15 cm. or a little more.

In any form of whatever size of the pure *alpina*, there are several constant marks to ascertain. The most important ones are the following:

1. The base of the whole plant (or a tuft of this species) forms a rather thick, cylindrical or slightly swollen, pale yellowish-grey, vertical stem, containing the basis of the culm and lateral shoots, all of which are loosely wrapped in broad, pale, fibrous sheaths.
2. The glumes and pales are relatively broad, more so than in any other species of this genus; the side-view, in their natural state of convolution, is broadly ovate, or nearly semicircular; in more elongated specimens somewhat bigger and ovate-lanceolate, slightly tapering. They generally have a small very short apex.

There are also other important marks, peculiar to this species, e.g.:

3. The basal shoots have short, usually horizontal blades; the culm-leaves also have small blades, the uppermost is short, narrow, and erect, and its top bent to the culm like a little hook.
4. The ligules are long, 2,5—3 mm., at the top soft and membranaceous, irregularly denticulate; the uppermost vagina has a whitish hyaline edge below the ligule.
5. The spikelets are coarse and numerous, crowded to a dense panicle, which, when fully developed, is broad and spreading, the branches being more or less horizontal (pl. XLVI, fig. 1).

6. When young the glumes are reddish purple, rather dark on the exposed side, with a very narrow whitish edge (or without this), and inside this there is a broad margin of reddish purple colour, but a little more glossy or shining than the main part of the glume; the pales have the same colour (later on turning lighter purple), and a broad hyaline edge (whitish or nearly purple), more or less separated by a golden zone from the purple area.
7. The heavy panicle is supported by a very thin culm, which, generally, will at last be much exserted from the uppermost vagina.

Some of these marks are exposed to a certain variation, even those mentioned in the first instances. Such aberrant forms are very likely to be cross-breeds, which may be based on the fact, that in the same specimen there are simultaneously two or more variations in a certain direction. When, for instance, a specimen of *P. alpina* [which we should like to call "*P. alpina* f. *vivipara*"] is slightly aberrant towards *P. arctica* with respect to the subterraneous ramification as well as to the spikelets, it seems to me, that it is undoubtedly a form of the series *Poa alpina* × *arctica*.

A quite pure *P. alpina* seems to be extremely rare in Novaya Zemlya. In Dr. LYNGE's collection there are only 3 individuals with non-viviparous panicle (see pl. XLVI, fig. 1), such as this species is usually found in Scandinavia; they belong to the samples collected on the northern side of Gribovii Fjord. As the others from different stations are viviparous, I should prefer to classify all of them as more or less distinct cross-breeds, but I hesitate, when a specimen, in all its essential marks, seems fully to agree with an unmixed *P. alpina*, in spite of the viviparous spikelets (see pl. XLV, fig. 4).

Specimens gathered in July and August are nearly all of them undeveloped, the panicle being still contracted, the culm about 1 dm. in height. Only the specimens from Pomorskaya Aug. 27th, Bessimyannii Fjord Aug. 31th, and Gribovii Fjord Aug. 30th — Sept. 2d, are fully developed with spreading panicle and opened spikelets (see pl. XLVI, fig. 1). Besides them, there is only one individual equally developed, viz. from the Strømsnes Bay in Mashigin, gathered as early as Aug. 8th.

In other respects the variation of *P. alpina* in this collection is very unimportant. Noticeable is only f. *nana* n., pl. XLV, fig. 4, ex omnibus partibus minima, culmis 6 cm. alt., panicula 1—1,5 cm. longa.

?f. *retenta* (a checked, monstrous form?), humilis, robusta, altitudine ca. 1 dm. tantum, foliorum laminis majoribus quam in *alpina*, panicula (quamvis bene evoluta, multiflora) intra vaginam retenta, contracta, paullulum exserta. Probably a cross-breed (viviparous), although rhizome, ligule, glumes and pales have the characteristic form of *P. alpina*. Sukhoi Noss.

151. *Poa arctica* R. BR.

Pl. XX, 6; XLVI, 2; XLVII, 3—8, 14.

Syn. *P. flexuosa* WG, *P. cenisia* secundum auctores scandinavicos, non *cenisia* ALL.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North side and south side near the head of the fjord.
II. Matotchkin Shar: Pomorskaya and several places in Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Dal Bay, Strømsnes Bay, South side of Blaafjell Basin and Fram Bay. North of the entrance to Mashigin Fjord.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay.

This species seems to grow all over Novaya Zemlya, since it forms a predominant part of Dr. LYNGE'S *Poa*- collection. From many stations visited by him, there are numerous samples of it. In Novaya Zemlya it includes several forms, more than the other species of *Poa;* a good many flowering, non-viviparous specimens have been gathered, more than of *alpigena* and *alpina.*

On a careful examination, *P. arctica* is easily recognized in any form, depending on several small, constant details, which, together, give this plant its particular, striking appearance.

In the first place should be noticed:

1. The low, slender, but stiff and erect culm (only the very base arcuately ascending).
2. The long, thin yellowish (in an herbarum often orange-coloured) subterraneous runners.
3. The short, broad, pyramidal, never dense panicle of only a few more or less horizontal, quite smooth branchlets and only a few spikelets.

In the second place the following characteristics deserve our attention:

4. The culm-leaves are short, the uppermost blade often only 1 cm. long and very narrow.
5. The ligule is rather long, about 2 (—3) mm., with toothed top.
6. The spikelets are usually very dark-coloured, nearly blackish purple.

The shape of the spikelets is very characteristic and, together with the substance and colour of the surface, sufficient to distinguish *P. arctica* from the allied species.

In a spikelet, the flowers are very few, only 2 (or 3), very rarely 4—5. The glumes are relatively long and narrow, the lower one not much shorter than the upper; they are rather broad at the base, some-

what incurved, and taper into a thin point; they are usually quite smooth and glabrous, one-coloured and nearly without any hyaline edge. The pales are, as said above, dark, nearly blackish purple (either reddish or bluish), at the margin glossy, of a metallic or glassy, rose-purple lustre; the marginal vein is distinctly marked by a stripe of white silky hairs; the top of the pale is white, transparent, separated from the dark colour below by a golden or orange yellow zone. The base of the pale is generally minutely greyish woolly.

In Novaya Zemlya the common pure form of *arctica* is rather slender but very often taller than in the high Norwegian mountains, e. g., the well-known pretty typus *dovrensis* n., which does not reach much more than 15—20 cm. in height. The vagina surrounding the culm is only 1.5 mm. in diam. (in herbarium specimens) and the top of the culm itself 1 mm. thick.

There are specimens from Novaya Zemlya, which seem to be a true *P. arctica*, although viviparous. Such plants, however, are perhaps not so unmixed as we judge from their general appearance, but belonging to a series of cross-breeds, either towards *P. alpigena*, or towards *P. alpina*. The typical Scandinavian form (typus dovrensis, just mentioned) is not, or but rarely, viviparous and may be considered as a *P. arctica pura*. — In Novaya Zemlya, a *P. arctica*, unmixed though viviparous, is scanty, as it is in other countries of its area. A viviparous spike generally lacks sexual organs of normal structure; but sometimes full-grown anthers, and normally developed too, can be noticed. It seems to happen, that large individuals of a robust and vigorous growth become viviparous. Yet it appears to me to be very probable that a viviparous *P. arctica* is no longer a typical species, even if we are not very well able to discover any morphological difference in the vegetative organs. Such a plant is reproduced here pl. XLVI, fig. 3; I name it *P. alpina* × *arctica*, but it may be interpreted otherwise, because there is not much of *alpina* in it, and it reminds one of a stout, coarse *P. arctica*. (See also pl. XLVII, fig. 20, and p. 123).

It is a puzzling undertaking to arrange the forms of *P. arctica* in a definite manner. This species is evidently exposed to hybrid influence from several other species, even if this does not distinctly alter the general appearance of the plant. When, for instance, an indisputable specimen of *arctica* becomes relatively more cespitose than usual, or the branchlets of the panicle get a little scabridous, or the culm taller and coarser, or the panicle elongated to a more oblong or subcylindrical form — in all such cases the variation may probably be the effect of some crossing, not easy to point out with exactness.

Of the unmixed *P. arctica* individuals are seen of very different size. Independent of this are:

f. *breviglumis* n., pl. XLVII, fig. 3, glumis brevibus, ± latiusculis, gluma I. 2 mm., gl. II. 3 mm. longa.

f. *longiglumis* n., pl. XLVII, fig. 4, 5, glumis longis, angustis, evidenter cuspidatis, gluma I. 3 mm., gl. II. 4 mm. longa. — These names are given in relation to the length of the spikelet, the longest glumes reaching the top of the nearest pale. These two forms, although very striking, are not sharply distinct; a panicle sometimes containing more or less some intermediate spikelets.

f. *micrantha* n., pl. XLVII, fig. 14, spiculis minutis.

f. *macrantha* n., d : o, fig. 6, spiculis majoribus, gl. I. 4 mm., gl II. ad 5 mm. longa. — The spikelets, thus, are very big, as is often the whole plant (see below "f. *elongata*").

f. *mutilata* n., d : o, fig. 7, 8, glumis nunc mediocribus, nunc maximis, forma lata, subrecta neque incurva, apice vix aut non attenuata. This form may be caused by different conditions. Sometimes it belongs to a very big individual, e. g., a plant growing on a "Fugleberg" (Rookery) or at other manured places, and combined with a densely tufted or cespitose growth; sometimes the spikelets of this form have a sickly look, a pale, yellowish or brownish colour ("gilvescens"), with fewer and capillary branchlets. I think it very probable that this form is, in part, identical with *Poa filipes* LGE., Consp. Floræ groenlandicæ, p. 175 (olim *P. trichopoda* LGE., drawn in Flora Danica, 49, t. 2885), which I hardly think can be maintained as a distinct species (it is at all events ulterius investiganda in Greenland). The form in Dr. LYNGE's collection from Novaya Zemlya is not exactly the same as the drawing in Fl. Dan. l. c., for it is abundantly branched at the base, but rather loosely and not "dense cæspitose pulvinata", as said by LANGE of his "*P. filipes*".

"f. *elongata*" BLYTT, Norges Flora 1, p., 127 (1861).

Pl. XX, 4; XL, sin.; XLVII, 6.

II. Matotchkin Shar: Pomorskaya.

IV. Mashigin Fjord: Sol Bay.

VI. Rookery south of Arkhangel Bay.

This is meant by its author to include tall individuals (1 foot or more) with large panicle and somewhat scabridous branchlets. The plants quoted by him (FRIES, Herb. Norm., 3: 94 and 6: 84) make it evident, that his "f. *elongata*" is rather heterogeneous. The f. *elongata* in Dr. LYNGE's collection, indicated on the map Pl. XX, 4, is a genuine(?), 30—35 cm. high *arctica* f. *longiglumis*. Another very big form (40 cm. high, panicle 8 cm. long, 6 cm. broad) belongs to f. *macrantha* and f. *mutilata;* see pl. XLVII, fig. 7, 8.

"f. *cæspitans*" SIMMONS (in sched. Herb. Stockh.) is probably not different from the above mentioned "*P. filipes* LGE."

In Novaya Zemlya, a cespitose growth of *P. arctica* is more common than in Scandinavia.

Poa alpigena × *alpina*.

Pl. XX, 2; XLVII, 15—17.

I. Gribovii Fjord: North side.
II. Matotchkin Shar: Pomorskaya. Sukhoi Noss.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Sol Bay, Strømsnes Bay, Blomster Bay and Fram Bay. North of the Mashigin Fjord entrance.
V. Admiralty Peninsula.
VI. Lichutin Island, Mainland east of Lichutin Island and the Pankratyeff Peninsula.

These two species are in every respect so different, that a crossing between them would seem very unlikely. Nevertheless, a good many of Dr. LYNGE'S specimens cannot be interpreted otherwise. Their differences are:

alpigena:	*alpina:*
rhizome thin with long runners, its branches free all the way down;	rhizome short, thick, cylindrical, its branches hidden by broad sheaths;
culm tall, rather coarse and stiff;	culm low or middle sized, at the top relatively thin;
ligule nearly 2 mm., truncate;	ligule nearly 3 mm., pointed;
basal blades rather long, narrow, erect;	basal blades short, broad, mostly horizontal;
uppermost blade generally long;	uppermost blade small, about 1 cm. long;
panicle long, slender;	panicle short, thick;
spikelets and scales narrow;	spikelets and scales broad;
pales with prominent veins.	pales without distinct veins.

Possessing so many differences, the intermediate forms constitute a polymorphous series. The most peculiar species of the two is *P. alpina*, and its most striking characteristics are the broad glumes, and the apparently undivided, cylindrical, bulb-shaped rhizome. An influence from *P. alpina*, thus, may be different, but is easily recognized. The effect by means of a crossing may be a plant like *P. alpigena* but rather "latiglumis", or an *alpina*-like plant which is distinctly "angustiglumis"; or it may be an *alpigena*, with coarser and more crowded subterraneous branches, or an *alpina*, the rhizome of which has become resolved into a number of palissades, standing closely together, but discernible all the way down, released from any common sheaths

wrapping them up. It is not unusual to meet with a specimen of which the base is an *alpina* and the panicle an *alpigena*, or the contrary. All of these forms are viviparous.

Many of these cross-breeds represent the "*stricta*"-type, see below.

Poa alpigena × *arctica*.

Pl. XX, 3; XLVI, 4.

I. Bessimyannii Fjord. Gribovii Fjord: North side.
II. Matotchkin Shar: Pomorskaya and Belushii Bay. Serebryanka Fjord. Sukhoi Noss.
IV. Mashigin Fjord: Rækved Bay, Strømsnes Bay and South side of Blaafjell Basin.
VI. Berkh Island, Lichutin Island and Mainland east of Lichutin Island.

The two components of this cross-breed-series are not so different as *alpigena* and *alpina*, especially concerning the basal ramification and the form of the spikelets. On account of this near affinity there may exsist crossbreeds of them, difficult to distinguish from either of the parents, but yet — as shown by small marks — not unmixed. Such forms, always more or less viviparous, have often a general appearance of *alpigena*. As a pattern of a more *arctica*-shaped hybrid, I refer to XLVI, 4, the tall culm, the elongated panicle, and the viviparous, rather monstruous spikelets indicate the influence of *alpigena*; *P. arctica*, however, is predominant by the loose, poor panicle of spreading branchlets and blackish purple colour.

"*Poa stricta*" from the polar countries is often a form of the series *P. alpigena* × *arctica*. (See p. 123).

In his paper "Beiträge zur Kenntnis der Flora des Eisfjordgebietes" (Ark. f. Bot., 15: 14, p. 16, 1918), E. ASPLUND has made a very interesting contribution to this matter. He has observed the viviparous forms there of *P. arctica* and says:"Sie weichen indessen durch kräftigere Halme, breitere und steifere Blätter, weniger behaarte und deutlicher gerippte Deckspelze [valvula .or pale] vom Typus ab. Diese Abweichungen zeigen allerlei Abstufungen, so daß es eine ganze Serie von Formen gibt, die einerseits dertypischen *Poa arctica* sehr nahe kommen, andererseits von viviparen *Poa pratensis* Exemplaren [*P. alpigena* in this paper] kaum zu unterscheiden sind . . . (p. 17:) Bemerkenswert ist, daß besonders vivipare Formen sich nur schwierig unter die eine der Arten P. *arctica* und *P. pratensis* einordnen lassen; vielleicht stellen sie hybridogene Zwischenformen dar, die sich nur vegetativ (Viviparie und Stolonen) vermehren und dadurch konstant bleiben". This state-

ment by ASPLUND of viviparous, intermediate forms in Spitzbergen, the same as those collected in Novaya Zemlya by Dr. LYNGE, countenances the idea that the viviparous, Arctic *Poa*-forms must be examined and classified as cross-breeds, and that they become viviparous just as cross-breeds: this way of propagation is a consequence of the suppression of the sexual organs.

Poa alpina × *arctica*.

Pl. XX, 5; XLVI, 3; XLVII, 18—20.

I. Bessimyannii Fjord. South side of Gribovii Fjord near the head of the fjord.
II. Matotchkin Shar: Chalhonik Valley and Belushii Bay.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay, Blomster Bay, North side of Blaafjell Basin and Fram Bay.
V. Admiralty Peninsula.
VI. Rookery south of Arkhangel Bay, Berkh Island and Lichutin Island.

These two species are more different than even *alpigena* and *alpina*. *P. alpina* is compact and coarse, *arctica* is open and slender; the scales of *alpina* are short and broad, those of *arctica* (typus) narrow and cuspidate. In consequence, a cross of them, if fully intermediate, may be difficult of recognition, but, generally, the viviparous cross-breeds of this series are "mosaics", wherein some marks of *alpina* are seen side by side with equally distinct marks of *arctica*; there may even be seen a rhizome of *alpina* combined with a panicle of *arctica*, and so on. *P. alpina*, for instance, is able to make the hypogæous branches of *arctica* shorter, thicker and more crowded; *arctica*, on the contrary, to set free the culms tied together in the *alpina* rhizome, and to split this into sundered palissades, as also does *P. alpigena*. In pl. XLVI fig. 3 an *arctica*-shaped form is reproduced, as to form and colour much the same as a typical *arctica*, but manifestly stouter, and viviparous although yet in a young state; I therefore call it *P. alpina* × *arctica* f. *macrantha*, see also pl. XLVII, fig. 20, and suppose it is the same as *P. cenisia* [*arctica!*] var. *crassiculmis* of BLYTT, N. Fl., I, p. 127. From *P. alpigena* × *arctica* this hybrid may be distinguished by a shorter, broader panicle, a more slender culm, smaller culm-blades, longer ligule, brighter colours etc.

Poa stricta, P. jemtlandica, and P. colpodea.

In some records of *Poa*-species from the polar countries, there is mentioned a "*Poa stricta* LINDEBERG". By this name is meant a plant, described in Bot. Not. 1855 as a species intermediate between

"*P. cenisia* [*arctica!*] and *P. laxa*". In the next edition of HARTMAN'S Handb. i Skandinaviens Flora (1858), it was placed as a sub-species of "*P. cenisia*", but a few years later of *P. laxa*. The author, C. J. LINDEBERG, and others, have collected numerous specimens in the Norwegian mountain Dovre, now kept in the herbaria of Stockholm, Upsala, Christiania and many other places. On a sheet in Herb. Stockh. LINDEBERG has himself written: "I cannot understand why the *P. stricta* should be put together with *Poa laxa*, as it has much more resemblance to *P. cenisia*". The Danish botanist, J. LANGE, has in his Consp. Fl. groenl. expressed the opinion, that "*Poa stricta*" of LINDEBERG belongs to *P. arctica*. I have examined a number of Scandinavian samples, many of which are LINDEBERG'S own type-species, and find it evident that the main part of the Dovre-collection consists of the hybrid series *P. arctica* × *laxa;* in a few cases of *P. alpigena* × *laxa* or *P. alpina* × *arctica*.

Some of these hybrids have also been gathered in Novaya Zemlya: Jugor Shar 1870 by AAGAARD (Herb. Christian.), and Matotschkin Shar 1875 by KJELLMAN and LUNDSTRØM; both of these are *P. alpigena* × *arctica*. All the "*stricta*"-shaped specimens gathered by Dr. LYNGE belong to some of the 3 hybrids of the list above.

It is evident that these forms, called "*stricta*" on the labels, do not at all merit this name, the original "*stricta*" of Scandinavia chiefly containing hybrids of *Poa laxa*.

In his paper just quoted, p. 17, ASPLUND has mentioned the large collections of "*P. stricta*" from Spitzbergen. In his opinion, the greatest part of it contains on the one hand intermediate forms of *P. alpina* and on the other *pratensis* or *arctica*; he also quotes the following words of TH. M. FRIES (Till. till Spetsbergens Fanerogamflora, Öfvers. K. Vet. Ak.-s förh., 1869: "Die Unterscheidung . . . von *P. alpina*, ja sogar von *P. pratensis* ist bisweilen sehr schwierig . . . es gibt Formen, die nicht zu überwindende Schwierigkeiten darbieten", and he agrees with FRIES that these Arctic plants hardly can be placed together with the true "*stricta*" of LINDEBERG.

In the Scandinavian mountains a very similar plant is collected with the hybrid origin *Poa alpina* × *laxa*. This combination was recorded already in 1883, p. 114 in Bot. Not., from the Swedish province Jemtland by S. ALMQUIST, who observed its difference from "*Poa stricta*" and called it "*Poa jemtlandica*". Both plants may easily be confused with one another. *P. jemtlandica* is not rare in the northern part of Sweden, and I have also seen it from some places in Norway.

ASPLUND has (l. cit., p. 15) also discussed the occurrence of this hybrid, *P. alpina* × *laxa*, on Spitzbergen, where *P. laxa* is lacking, and his doubts are for the same reason quite applicable to Novaya Zemlya. A plant, very like the Scandinavian *jemtlandica*, which ASP-

LUND found at Sassenbay (Spitzbergen), may, according to him, rather be the combination *P. abbreviata* × *alpina*, because *P. abbreviata* is the substitute in Spitzbergen for *P. laxa*. For my part, I do not think this possible, judging from the very different habit and peculiar structure of *P. abbreviata*, and from the fact that there we never meet with the least traces of any viviparous and intermediate states in *P. abbreviata* itself. The specimens in Dr. LYNGE's collection, which look very like *P. jemtlandica*, are sufficiently explained as either *P. alpigena* × *alpina*, or *P. alpigena* × *arctica*.

"*Poa colpodea*" and "*P. stricta* **colpodea* TH. FR." is a name written on the labels of several, mostly viviparous plants in the Arctic *Poa* collections. It was published in TH. M. FRIES' Till. till Spetsbergens Fanerogamflora (quoted above), p. 138, and is evidently a viviparous, reduced form with very long runners. The author says that it is intermediate between "*P. stricta* and *P. pratensis*". The specimens I have seen labelled in TH. M. FRIES' hand are partly a reduced *P. alpigena*, partly cross-breeds of *alpigena* and *arctica*, the latter hybrid from Spitzbergen was by ASPLUND likewise labelled "**colpodea*". There is no systematical value in this heterogeneous name; from Novaya Zemlya, too, several specimens might easily be called "*colpodea*", but all of them belong to the various cross-breeds, enumerated above, or sometimes they are a badly developed *Poa alpigena*.[1]

152. *Puccinellia angustata* (R. BR.) ROND. et REDF.

Pl. XIX, 3.

Syn. *Glyceria angustata* (R. BR.) FR.

II. Matotchkin Shar: Belushii Bay. Serebryanka Fjord.
III. Krestovii Fjord.
IV. Mashigin Fjord: Rækved Bay.
VI. Lichutin Island and Eastern Krestovii Island.

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[1] As I have found it impossible to account the "former investigations" of the genus *Poa* in Novaya Zemlya, the former records being too summary, the maps of distribution (pl. XX), accordingly, only indicate the stations detected by this expedition. But I have been able to revise the determinations of a few earlier Novaya Zemlya *Poae* which I have personally seen, viz.:
Poa alpigena × *alpina:* Karmakuli Bay (EKST. 1895), and Matotchkin Shar (EKST. 1891).
Poa alpina: Karmakuli Bay (EKST. 1895).
Poa alpina × *arctica:* Karmakuli (EKST. 1895), and Matotchkin Shar (KJELLM. & LUNDSTR. 1875).
Poa arctica: Meidusharsky Isl. (HOLM), Rogatscheff Bay (KJELLM. & LUNDSTR. 1875) Karmakuli pluribi (EKST. 1891 and 1901); f. *macrantha:* Karmakuli (EKST. 1891).

Plentiful near the Samoyede colony in Krestovii Fjord. I do not venture to write much on the frequency of the very difficult species or *Puccinellia*. They were eagerly collected and the stations enumerated suggest something on their distribution and frequency.

Former investigations. According to OSTENFELD: Flora arctica p. 129 "*Glyceria angustata*" has been obtained on "Novaya Zemlya at 71°"; this statement is evidently based on HOLM s specimens of *Glyceria Vahliana* (OSTENFELD l. c. p. 126 and HOLM Novaya Zemlya Veget. p. 15).

var. *contracta* (LGE.) HOLMB.

II. Matotchkin Shar: Pomorskaya.

I am indebted to Dr. HOLMBERG for the determination of this plant.

153. *Puccinellia phryganodes* (TRIN.) SCRIBN. et MERZ.

Pl. XIX, 4.

Syn. *Glyceria reptans* (LÆST.) KROK.

I. Gribovii Fjord: Veselago Island, and on the north side of the fjord near the same island.
II. Matotchkin Shar: Pomorskaya, and Belushii Bay.
VI. On the beach at the foot of the great rookery south of Arkhangel Bay.

A scattered plant, but plentiful where I found it. Especially at Gribovii Fjord it was very abundant. It was the only plant on the muddy borders of a pond on a flat beach. The sea entered by a narrow canal through the gravelly strand-wall, and at high water the greater part of the plants must have been submerged by the sea. I only obtained a few flowering shoots, in Gribovii Fjord and at Pomorskaya.

Former investigations. I have only found two Novaya Zemlya stations in literature: Sachanicha Bay (HOLM), and Rogatcheff Bay (see Vega Expedition). The above enumeration extends its range by more than 4 degrees.

154. *Puccinellia Vahliana* (LIEBM.) SCRIBN. et MERZ.

Pl. XIX, 5.

Syn. *Glyceria Vahliana* (LIEBM.) TH. FR.

I. Gribovii Fjord, at the head of the fjord.
II. Serebryanka Fjord, pluribi.
IV. Mashigin Fjord: Blomster Bay and Fram Bay.
VI. South of Arkhangel Bay, Berkh Island, Pankratyeff Peninsula.

This is supposed to be the commonest and most widespread *Puccinellia* on Novaya Zemlya and Lütke Land. It must have been overseen by me in the southernmost regions, for it has been obtained in Matotchkin Shar by FEILDEN and in Bessimyannii Fjord, see the Vega Expedition.

Former investigations. Only 5 stations were formerly recorded in literature, the northernmost being Krestovii Fjord (PALIBINE). It is quite astonishing to what an extent the species of *Puccinellia* have escaped the attention of botanists in these countries.

155. *Trisetum spicatum* (L.) RICHTER.

Pl. XIX, 6; XXXIV.

I. Goose Bay. Bessimyannii Fjord. Gribovii Fjord: North side and south side near the head of the fjord.
II. Matotchkin Shar: Pomorskaya, Near Vasnetsoff Glacier, At the foot of Mt. Syernaia, Belushii Bay, and South side of the Shar near the entrance to the Kara Sea. Serebryanka Fjord.
IV. Mashigin Fjord: Sol Bay, Dal Bay, Strømsnes Bay, and Blomster Bay.
VI. Berkh Island.

Trisetum spicatum is more a southern plant, in spite of its great distribution. It was common on Novaya Zemlya proper and in Matotchkin Shar, and not rare in Mashigin Fjord (not obtained and not expected in Blaafjell Basin). But farthest north it was only seen once, at the uppermost part of a sunny slope of debris of chalky rocks, with *Myosotis alpestris*.

It is quite a type plant of the flower hills: it affects well exposed dry gravelly hills and slopes of debris (screes).

It is no early flowering plant. At Goose Bay its flowering shoots were not visible on the third of July. In Matotchkin Shar the plants were generally small (not full-grown) in the first 3 weeks of July. Full-grown plants were collected in Serebryanka Fjord (23. 7) and also in Mashigin 3 weeks later. The plants from Berkh Island were as fine as any other.

Former investigations. Recorded from some stations on Novaya Zemlya proper, as far north as Matotchkin Shar.

Summary.

Several authors on the vegetation of Novaya Zemlya have indicated the distribution of the species of plants between certain degrees of northern latitude. During our expedition I found these synoptic, though summary, enumerations extremely useful. I resolved to extract all the special stations, recorded in literature, and to enter them on maps. This method is supposed to give a better survey of the distribution of the species than the enumerations of former authors.

With few exceptions the species have been arranged in the same succession as in the book, and the maps have been cited in the book under the head of each species. A special index of the maps is, accordingly, unnecessary.

It was impossible to make the maps as exhaustive as desireable. Several authors do not enumerate special stations for all the species. A station "Novaya Zemlya" or "Matotchkin Shar" cannot be entered on a map. And the maps give no adequate idea of the distribution of plants which are only described as "common", "abundant", or the like.

The rich collections, made by EKSTAM about Karmakuli and in Matotchkin Shar were only in part available for me, for he has not yet published the full account of his observations.

For some species only my own stations have been entered on the maps. The reason for this generally was that the species in question is critical and that it was impossible to decide from literature alone which species was meant by other authors.

The name Walkowa Bay (VON BAER) for *Ranunculus nivalis*, *R. sulphureus* and *Luzula confusa* was not found on any map accessible to me. During the reading of the proofs I detected (SPØRER 1867 p. 50) that Walkowa Bay is situated at the north end of Meshdusharsky Island.

When my plates of the geographical distribution were prepared and printed, two works on Novaya Zemlya were not accessible to me, and one had escaped my attention[1]. Thanks to the help from some libraries and botanical friends I have now been able to consult them. They contain several stations not entered on my maps, viz:

[1] TRAUTVETTER (1879), OLIVER in MARKHAM (1881) and DANGUY (1910).

Alopecurus alpinus: Schubert Bay (OLIV.).
Alopecurus pratensis: Karmakuli (TRAUTV.).
Arabis alpina: River Puchowaja (TRAUTV.).
Arabis petraea: Karmakuli and R. Puchowaja (TRAUTV.).
Arctagrostis latifolia: Karmakuli (TRAUTV.).
Artemisia borealis: R. Puchowaja (TRAUTV.); Schubert Bay and Feodora Isl. (OLIV.).
Artemisia Tilesii: Lütke Bay (OLIV.).
Astragalus alpinus: Schubert Bay (OLIV.); Chaîne Fallières (DANG.).
Braya purpurascens: Lütke Bay (OLIV.).
Caltha palustris: Rogatscheff Bay (DANG.), Belushii Bay of Goose Land (DANG.); Karmakuli (TRAUTV.).
Cardamine pratensis: Karmakuli (TRAUTV.), Cape Galla (OLIV.).
Carex rigida: Karmakuli (TRAUTV.).
Deschampsia caespitosa: Chaîne Fallières (DANG.); Karmakuli (TRAUTV.).
Draba alpina: Karmakuli and R. Puchowaja (TRAUTV.).
Draba nivalis: Karmakuli and R. Puchowaja (TRAUTV.).
Draba Wahlenbergii (v. *D. fladnizensis* s. n. *D. lactea*): Karmakuli (TRAUTV.).
Dryas octopetala: Chaîne Fallières (DANG.); Karmakuli (TRAUTV.), Cairn Island (OLIV.).
Dupontia Fisheri: Schubert Bay (OLIV.).
Epilobium latifolium: Chaîne Fallières (DANG.); Karmakuli (TRAUTV.).
Eriophorum polystachyum: Karmakuli (TRAUTV.).
Eriophorum Scheuchzeri: Karmakuli (TRAUTV.); Schubert Bay and Cape Hessen (OLIV.).
Eritrichium villosum: R. Puchowaja (TRAUTV.); Feodora Island and Cape Hessen (OLIV.).
Festuca ovina (violacea): Karmakuli (TRAUTV.); Feodora Island (OLIV.).
Festuca rubra var. *arenaria:* Karmakuli (TRAUTV.).
Hedysarum obscurum: Karmakuli (TRAUTV.).
Hierochloa alpina: R. Puchowaja (TRAUTV.).
Hippuris vulgaris: Karmakuli (TRAUTV.).
Luzula confusa: Walkowa Bay (v. BAER).
Luzula nivalis (s. n. *L. hyperborea*): Karmakuli and R. Puchowaja (TRAUTV.); Cape Hessen (OLIV.).
Lycopodium Selago: Chaîne Fallières (DANG.).
Matricaria inodora: Brenta Bay and Schubert Bay (OLIV.).
Melandrium apetalum: Karmakuli (TRAUTV.).
Minuartia rubella: Belushii Bay of Goose Land (DANG.).
Myosotis alpestris: R. Puchowaja (TRAUTV.); Chaîne Fallères (DANG.); Brenta Bay, Lütke Bay and Cape Hessen (OLIV.).

Oxyria digyna: Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.); Tern Island (perhaps one of the Krestovii Islands) (OLIV.).

Oxytropis campestris var. *sordida:* Karmakuli (TRAUTV.); Lichutin Island and Feodora Island (OLIV.).

Pachypleurum alpinum: Karmakuli (TRAUTV.).

Papaver radicatum: R. Puchowaja (TRAUTV.); Tern Island, Brenta Bay and Schubert Bay (OLIV.).

Parrya nudicaulis: Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.); Feodora Island and Schubert Bay (OLIV.).

Pedicularis hirsuta: R. Puchowaja (TRAUTV.).

Pedicularis sudetica: Chaîne Fallières (DANG.); Schubert Bay (OLIV.).

Petasites frigida: Belushii Bay of Goose Land and Chaîne Fallières (DANG.); Karmakuli (TRAUTV.); Schubert Bay (OLIV.).

Phaca frigida: Karmakuli (TRAUTV.); Schubert Bay (OLIV.).

Polemonium boreale: Chaîne Fallières (DANG.); Schubert Bay and Lütke Bay (OLIV.).

Polemonium campanulatum: Cape Galla (OLIV.).

Polygonum viviparum: Belushii Bay of Goose Land and Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.); Cape Galla (OLIV.).

Potentilla emarginata: Schubert Bay (OLIV.).

Ranunculis acer f. *borealis:* Karmakuli (TRAUTV.); Feodora Island (OLIV.).

Ranunculus nivalis: Walkowa Bay (v. BAER); Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.); Lichutin Island (OLIV.). — *R. sulphureus* was common so far north, but I never obtained *R. nivalis*.

Ranunculus sulphureus: Walkowa Bay (v. BAER), Karmakuli and R. Puchowaja (TRAUTV.).

Rumex Acetosa: Chaîne Fallières (DANG.); Karmakuli (TRAUTV.).

Saxifraga caespitosa: Belushii Bay of Goose Land (DANG.); R. Puchowaja (TRAUTV.); Feodora Island and Schubert Bay (OLIV.).

Saxifraga cernua: Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.); Feodora Island (OLIV.).

Saxifraga flagellaris: Tern Island and Cape Hessen (OLIV.).

Saxifraga hieraciifolia: R. Puchowaja (TRAUTV.).

Saxifraga Hirculus: Belushii Bay of Goose Land and Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.); Schubert Bay (OLIV.).

Saxifraga rivularis: Chaîne Fallières (DANG.); Karmakuli and R. Puchowaja (TRAUTV.).

Saxifraga stellaris: Chaîne Fallières (DANG.); Karmakuli (TRAUTV.).

Sedum roseum: Chaîne Fallières (DANG.); Feodora Island (OLIV.).

Silene acaulis: R. Puchowaja (TRAUTV.); Schubert Bay and Lütke Bay (OLIV.).

Stellaria longipes: Karmakuli (TRAUTV.).

Taraxacum arcticum: R. Puchowaja (TRAUTV.).

Thalictrum alpinum: Karmakuli (TRAUTV.).

Trisetum spicatum: R. Puchowaja (TRAUTV.).

Valeriana capitata: Chaîne Fallières (DANG.); R. Puchowaja (TRAUTV.); Cape Galla and Schubert Bay (OLIV.).

The tables of distribution published by EKSTAM and FEILDEN were so useful to me during my field work that I resolved to publish a similar table also including the plants of our expedition.

But I presume that the table would be more valuable if the stations were referred to some natural geographical provinces, instead of to the degrees of northern latitude. And to make it comparable to the data of distribution formerly given in this work I have arranged the stations north of North Gusini Noss in the same 6 provinces and designated them as I—VI. All stations south of this cape are placed in a column, called O.

The few stations known from the east coast are easily referred to the corresponding stations on the west coast.

An asterisc (*) before the name in this table indicates that I did not find that species. Such plants are only cited after literature.

Hybrids are entered under the head of the supposed parents.

It should be understood that this enumeration does not include the rich flora of Waigats; that island is too distant from our field of investigation.

O: Stations south of North Gusini Noss (i. e. the south coast, Kostin Shar, Goose Land; about 70½—72°).
I: N. Gusini Noss to Matotchin Shar (72—73°).
II: Matotchkin Shar, Serebryanka Fjord and Sukhoi Noss (73—74°).
III: Krestovii Fjord
IV: Mashigin Fjord } (74—75°).
V: Admiralty Peninsula (75°).
VI: Arkhangel Bay to Oranie Islands (75½—77°).

	O	I	II	III	IV	V	VI
Cryptogamae Vasculares.							
1. *Cystopteris fragilis*	+	+	+	—	+	—	—
2. *Equisetum arvense*	+	+	+	—	+	—	—
3. — *variegatum* f. *anceps*	—	+	+	—	+	—	+
4. — *scirpoides*	—	+	+	—	+	—	—
5. *Lycopodium Selago*	+	+	+	—	—	—	—
Betulaceae.							
6. *Betula nana*	+	+	+	—	—	—	—
Salicaceae.							
7. *Salix arctica*	+	+	+	+	+	+	+
8. — *glauca*	+	+	+	+	+	—	—
9. — *lanata*	+	+	+	—	—	—	—
*10. — *myrsinites*	+	—	—	—	—	—	—
*11. — *ovalifolia*	+	—	—	—	—	—	—
12. — *polaris*	+	+	+	+	+	+	+
13. — *reptans*	+	+	+	+	+	—	—
14. — *reticulata*	+	+	+	—	—	—	—
15. — *rotundifolia*	+	+	+	—	—	—	—
16. — *taimyrensis*	+	+	+	—	+	—	—
Polygonaceae.							
17. *Koenigia islandica*	—	+	+	—	+	+	—
18. *Oxyria digyna*	+	+	+	+	+	+	+
19. *Polygonum viviparum*	+	+	+	+	+	—	+
20. *Rumex Acetosa* (**arifolius*)	+	+	+	—	—	—	—
21. — *Acetocella* var. *integrifolia*	—	—	+	—	—	—	—
*22. — *domesticus* var. *nana*	—	+	—	—	—	—	—
Caryophyllaceae.							
*23. *Arenaria ciliata*	+	+	—	—	—	—	—
24. *Cerastium alpinum*[1]	?	+	+	?	?	?	+
25. — *Regelii*	+	+	+	+	+	+	+
*26. *Halianthus peploides*	+	—	—	—	—	—	—
27. *Melandrium affine*	+	—	+	—	+	—	—
28. — *apetalum*	+	+	+	+	+	+	+
29. *Minuartia biflora*	+	—	+	—	—	—	—
30. — *macrocarpa*	—	—	+	—	—	—	—
31. — *stricta*	—	—	+	—	—	—	—
32. — *verna* var. *rubella*	+	+	+	+	+	+	+
33. *Sagina intermedia*	+	+	+	+	+	—	+
34. *Silene acaulis*	+	+	+	+	+	—	+
*35. *Stellaria humifusa*	+	+	+	—	—	—	—
36. — *longipes* γ *humilis*	+	+	+	+	+	+	+
— — β *pedunculatis*	—	+	+	—	—	—	—

[1] ? probably *C. Regelii.*

	O	I	II	III	IV	V	VI
Ranunculaceae.							
37. *Caltha palustris*	+	+	+	+	+	+	+
38. *Ranunculus acer* f. *borealis*	+	+	+	+	+	—	—
39. — *affinis*	—	?	+	—	—	—	—
40. — *auricomus* var. *glabrata*	+	+	+	—	—	—	—
41. — *hyperboreus*	+	+	+	—	+	+	+
42. — *lapponicus*	+	+	+	—	—	—	—
43. — *nivalis*	+	+	+	+	+	—	?
*44. — *Pallasii*	+	+	+	—	—	—	—
45. — *pygmaeus*	+	+	+	—	+	+	+
46. — *reptans*	—	+	—	—	—	—	—
47. — *sulphureus*	+	+	+	+	+	+	+
48. *Thalictrum alpinum*	+	+	+	—	—	—	—
Papaveraceae.							
49. *Papaver radicatum*	+	+	+	+	+	+	+
Cruciferae.							
50. *Arabis alpina*	+	+	+	—	+	—	—
51. — *petraea*	+	+	+	—	—	—	—
52. *Braya purpurascens*	+	+	+	+	+	—	+
53. *Cardamine bellidifolia*	+	+	+	—	+	+	+
54. — *pratensis* var. *dentata*	+	+	+	—	+	+	+
*55. *Cheiranthus pygmaeus*	—	—	+	—	—	—	—
56. *Cochlearia officinalis* var. *arctica*	+	+	+	—	—	—	—
— — var. *groenlandica*	+	+	+	+	+	+	+
57. *Draba alpina*	+	+	+	+	+	+	+
— — var. *glacialis*	—	+	+	—	+	+	+
— — var. *oblongata*	—	+	+	—	—	+	—
*58. *Draba arctica*	+	—	+	—	—	—	—
59. — *magellanica* subsp. *borea*	?	+	+	?	+	—	—
60. — *nivalis*	+	+	+	—	+	—	—
*61. — *repens*	+	—	—	—	—	—	—
62. — *rupestris*	?	+	+	?	+	—	—
63. — *subcapitata*	+	+	+	+	+	—	—
64. — *Wahlenbergii* (incl. *fladnizensis*)	+	+	+	+	+	+	+
65. *Eutrema Edwardsii*	+	+	+	+	+	+	+
66. *Parrya nudicaulis*	+	+	+	+	+	—	—
*67. *Schievereckia podolica*	+	—	—	—	—	—	—
Crassulaceae.							
68. *Sedum roseum*	+	+	+	+	+	—	+
Saxifragaceae.							
69. *Chrysosplenium alternifolium* var. *tetrandrum*	+	+	+	—	+	—	+
70. *Saxifraga aizoides*	+	+	+	+	+	—	—
71. — *caespitosa* var. *eucaespitosa*	+	+	+	+	+	+	+

	O	I	II	III	IV	V	VI
72. *Saxifraga cernua*	+	+	+	+	+	+	+
73. — *flagellaris*	+	+	+	+	+	+	+
74. — *hieraciifolia*	+	+	+	+	+	+	+
75. — *Hirculus* f. *propinqua*	+	+	+	+	+	+	+
76. — *nivalis*	+	+	+	+	+	+	+
77. — *oppositifolia*	+	+	+	+	+	+	+
78. — *rivularis*	+	+	+	—	+	+	+
79. — *stellaris* comosa*	+	+	+	+	+	+	+
80. — *tenuis*	?	+	+	+	+	+	+
Rosaceae.							
81. *Dryas octopetala* var. *minor*	+	+	+	+	+	+	+
82. *Potentilla alpestris* (= *P. maculata, P. verna*)	+	+	—	—	+	—	—
83. *Potentilla emarginata*	+	+	+	+	+	+	+
84. — *nivea* (var. *pinnatifida*)	—	+	+	—	—	—	—
85. — *palustris*	—	+	+	—	—	—	—
86. — *pulchella*	+	—	+	—	+	—	+
87. — *sericea* var. *dasyphylla*	+	—	+	—	+	—	—
88. *Rubus Chamaemorus*	+	+	+	—	—	—	—
Papilionaceae.							
89. *Astragalus alpinus*	+	+	+	+	+	—	+
90. *Hedysarum obscurum*	+	+	+	—	+	—	—
91. *Oxytropis campestris* var. *sordida*	+	+	+	+	+	+	+
92. *Phaca frigida*	+	+	+	—	+	—	—
Oenotheraceae.							
93. *Epilobium arcticum* (incl. „*E. alpinum*“)	+	+	+	—	—	—	—
94. — *latifolium*	+	+	+	—	+	—	—
Hippuridaceae.							
95. *Hippuris vulgaris*	—	+	—	—	—	—	—
Umbelliferae.							
96. *Pachypleurum alpinum*	+	+	+	—	—	—	—
Pyrolaceae.							
97. *Pyrola grandiflora*	+	+	+	—	—	—	—
Ericaceae.							
98. *Arctostaphylos alpina*	—	+	+	—	—	—	—
99. *Vaccinium uliginosum* f. *microphylla*	—	+	+	—	—	—	—
100. — *Vitis idaea* f. *pumila*	+	+	—	—	—	—	—
Plumbaginaceae.							
*101. *Armeria sibirica*	+	—	+	—	—	—	—

		O	I	II	III	IV	V	VI
	Primulaceae.							
*102.	*Androsace septentrionalis (= A. triflora?)*	+	—	—	—	—	—	—
103.	*Androsace triflora*	+	+	+	—	—	—	—
*104.	*Primula farinosa*	+	—	—	—	—	—	—
*105.	— *stricta*	+	+	—	—	—	—	—
	Polemoniaceae.							
106.	*Polemonium boreale*	+	+	+	—	+	—	+
107.	— *campanulatum*	+	+	+	—	—	—	—
	Boraginaceae.							
108.	*Eritrichium villosum*	+	+	+	+	+	+	—
109.	*Myosotis alpestris*	+	+	+	+	+	—	+
	Scrophulariaceae.							
*110.	*Lagotis glauca*	—	—	+	—	—	—	—
111.	*Pedicularis hirsuta*	+	+	+	+	+	+	+
112.	— *lanata* var. *dasyantha*	+	+	+	—	+	—	—
113.	— *lapponica*	—	—	+	—	—	—	—
*114.	— *Oederi*	+	+	?	—	—	—	—
115.	— *sudetica*	+	+	+	+	—	—	—
	Gentianaceae.							
*116.	*Gentiana chrysoneura*	—	+	—	—	—	—	—
117.	— *tenella*	—	+	—	—	+	—	—
	Valerianaceae.							
118.	*Valeriana capitata*	+	+	+	—	—	—	—
	Campanulaceae.							
*119.	*Campanula rotundifolia*	+	+	+	—	—	—	—
120.	— *uniflora*	+	+	+	—	+	—	—
	Compositae.							
121.	*Antennaria carpathica*	+	+	+	—	+	—	—
122.	*Arnica alpina*	+	+	+	—	+	—	—
123.	*Artemisia borealis*	+	+	+	+	+	+	—
124.	— *Tilesii*	+	+	+	+	+	—	—
125.	*Erigeron uniflorus* var. *eriocephalus*	+	+	+	—	+	—	—
126.	*Matricaria inodora* var. *grandiflora*	+	+	+	—	—	—	—
127.	*Petasites frigidus*	+	+	+	+	+	—	—
*128.	*Senecio frigidus*	+	—	—	—	—	—	—
*129.	— *integrifolius*	+	—	—	—	—	—	—
130.	— *palustris* f. *congesta*	—	+	—	—	—	—	—
*131.	— *resedifolius*	+	—	—	—	—	—	—
132.	*Taraxacum arcticum*	+	+	+	+	+	—	+
133.	— *brevicorne*	—	+	+	—	+	—	—
134.	— *glabrum*	+	+	+	—	—	—	—

		O	I	II	III	IV	V	VI
135.	*Taraxacum Novae Zemliae*	—	—	+	—	—	—	—
136.	— *platylepium*	+	+	+	+	+	—	+
	Juncaceae.							
137.	*Juncus biglumis*	+	+	+	+	+	+	+
*138.	— *castaneus*	+	—	—	—	—	—	—
139.	*Luzula confusa*	+	+	+	+	+	+	+
140.	— *nivalis*	+	+	+	+	+	+	+
141.	— *Wahlenbergii*[1]	+	+	+	—	—	—	—
	Cyperaceae.							
*142.	*Carex acuta*	+	—	—	—	—	—	—
143.	— *aquatilis*	+	+	+	—	+	+	+
144.	— *glareosa*	+	+	+	—	—	—	—
145.	— *incurva*	+	+	—	—	—	—	—
146.	— *lagopina*	+	+	+	—	—	—	—
147.	— *misandra*	+	+	+	—	+	—	+
148.	— *parallela*	+	+	+	—	+	—	—
149.	— *pulla*	+	+	+	—	+	—	—
150.	— *rariflora*	+	+	+	—	—	—	—
151.	— *rigida*	+	+	+	+	+	+	+
152.	— *rupestris*	+	+	+	—	+	—	—
153.	— *salina* var. *subspathacea*	+	+	+	—	—	—	—
*154.	— *ursina*	+	+	—	—	—	—	—
*155.	*Eriophorum Callithrix*	—	—	+	—	—	—	—
156.	— *Chamissonis*	—	+	+	—	—	—	—
157.	— *intercedens*	—	+	+	—	—	—	—
158.	— *polystachyum* f. *triste*	+	+	+	+	+	+	—
159.	— *Scheuchzeri*	+	+	+	+	+	+	—
160.	— *vaginatum*	+	+	+	—	—	—	—
	Gramineae.							
161.	*Alopecurus alpinus*	—	+	+	+	+	+	+
162.	— *pratensis* f. *alpestris*	+	+	+	—	—	—	—
*163.	— *ventricosus*	—	+	—	—	—	—	—
*164.	*Arctagrostis humilis*	+	—	—	—	—	—	—
165.	— *latifolia*	+	+	+	+	+	+	+
166.	*Arctophila fulva*	—	+	+	—	+	—	—
167.	*Calamagrostis neglecta* (= *C. Holmii*, et *C. stricta*)	—	+	+	—	—	—	—
*168.	— *strigosa*	—	+	—	—	—	—	—
169.	*Catabrosa algida*	+	+	+	—	+	+	+
170.	— *concinna*	?	+	+	+	+	+	+
171.	*Deschampsia alpina*	—	+	+	+	+	+	+
172.	— *caespitosa*	+	+	+	+	+	—	+
173.	*Dupontia Fisheri*	+	+	+	+	+	+	+
174.	*Festuca ovina* var. *brevifolia*	+	+	+	—	+	—	—

[1] *Luzula spicata* from Matotchkin Shar (det. A. BLYTT) is *L. confusa*.

		O	I	II	III	IV	V	VI
	Festuca ovina var. *vivipara*	—	+	+	—	+	+	+
175.	— *rubra* var. *arenaria*	+	+	+	+	+	+	+
176.	*Hierochloa alpina*	+	+	+	—	+	+	—
*177.	— *pauciflora*	+	+	+	+	—	—	—
178.	*Phleum pratense*	—	+	—	—	—	—	—
179.	*Pleuropogon Sabinei*	+	+	+	—	+	+	+
180.	*Poa abbreviata*	—	—	+	—	—	—	+
181.	— *alpigena* (incl. *pratensis*)	+	+	+	+	+	+	+
182.	— *alpina*	—	+	+	+	+	+	+
183.	— *arctica* (et f. "*elongata*)"	+	+	+	+	+	+	+
184.	*Puccinellia angustata* (et f. *contracta*)	—	—	+	+	+	—	+
*185.	— *Kjellmannii*	—	—	+	—	—	—	—
186.	— *phryganodes*	+	+	+	—	—	—	+
*187.	— *tenella*	+	—	—	—	—	—	—
188.	— *Vahliana*	+	+	+	+	+	—	+
189.	*Trisetum spicatum*	+	+	+	—	+	—	+
	Summary:							
	Number of species, total 189	148	157	159	67	107	55	70
	Found by our expedition 155	0	127	138	47	105	55	70

It is evident from this enumeration that on the west coast the districts between Sukhoi Noss and Mashigin Fjord and between Admiralty Peninsula and Arkhangel Bay are in a botanical sense poorly investigated. The same is the case north of Pankratyeff Peninsula.

Corrections.

Pag. 14: V, should be VI.
„ 18: *Salix reticulata:* All the plants collected were female, but without catkins, should be: All the plants were female.
„ 19: II. Gribovii Fjord, should be: I. Gribovii Fjord.
IV. South of &c., should be: VI. South of
„ 24: IV. Rookery &c., should be: VI. Rookery
„ 31: VI. Mashigin: should be: IV. Mashigin:
„ 52: alternfolium, should be: alternifolium.
„ 49, first line: *fladnizensis*, should be: *Wahlenbergii.*
„ 66: I, should be: II.
„ 93, line 19 f. a.: *Carex glauca*, should be: *Carex rigida.*

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II. Index of plates.

Plates I—XX represent the distribution of the species, collected by our expedition. The species have been arranged in accordance with the text.

Plate XXI.

Ranunculus affinis R. BR.

Plate XXII.

Ranunculus auricomus var. *glabrata* nov. var.

Plate XXIII—XXIV.

Dryas octopetala var. *minor* HOOK.

Plate XXV.

Potentilla sericea var. *dasyphylla* LEDEB.

Plate XXVI.

1. *Stellaria longipes β peduncularis* (BUNGE) LEDEB.
2. *Dryas octopetala* var. *minor* HOOK.
3. *Dryas octopetala* L. typica, from Norway.
4—5. *Epilobium arcticum* SAM. basal leaves.

Plate XXVII.

Epilobium arcticum SAM.

Plate XXVIII.

Erigeron uniflorus var. *eriocephalus* (VAHL) VIERH.

Plate XXIX.

Taraxacum Novae Zemliae HOLMBOE nov. sp. ($^4/_5$ nat. size). 1. and 2. Exterior and interior involucral scale ($^4/_3$ nat. size). 3. ripe fruit ($^4/_1$ nat. size). 4. Ripe fruit of *T. platylepium* DAHLST. ($^4/_1$ nat. size).

Plate XXX.

1—2. *Epilobium arcticum* SAM.
3. *Erigeron uniflorus* var. *eriocephalus* (VAHL) VIERH.
4—5. *Stellaria longipes β. peduncularis* (BUNGE) LEDEB.

Plate XXXI.

Sin. Flower hill in Mashigin Fjord (Blomster Bay), August 4th; *Erigeron uniflorus* var. *eriocephalus*, *Myosotis alpestris*, *Polygonum viviparum*, *Taraxacum* sp. a. o. Sun clouded, 12.5, 1/5."

Dext. Rookery south of Arkhangel Bay (*Uria lomvia*) Aug. 12th, good light, 12.5, 1/50".

Plate XXXII.

Sin. *Braya purpurascens*. Serebryanka Fjord, July 25th, diffuse light, fog in the mountains, 25, 1/2".

Dext. *Valeriana capitata*. Serebryanka Fjord, July 26th, fog, 12.5, 1/5".

Plate XXXIII.

Serebryanka Fjord, July 26th. Flowers on a gravelly plain near the beach. *Valeriana capitata*, *Festuca rubra* var. *arenaria*, *Astragalus alpinus Cerastium Regelii*, *Myosotis alpestris*, and *Polygonum viviparum*. Fog, 9, 1/5".

Artemisia Tilesii. Flower hill in Blomster Bay (Flower Bay) in Mashigin Fjord, Aug. 3 d., diffuse light, 6, 1/10".

Plate XXXIV.

Sin. *Cerastium Regelii*, *Trisetum spicatum*, and *Myosotis alpestris*. Flower hill in Blomster (Flower) Bay, Mashigin Fjord, Aug. 4th; sun clouded, good diffuse light, 18, 1/5".

Dext. *Papaver radicatum*, *Myosotis alpestris*, *Cerastium Regelii*, *Polygonum viviparum*. Same date and station, sun clouded, 9, 1/15".

Plate XXXV.

Flower hill (ALBERT HILL) in Belushii Bay, Matotchkin Shar, July 17th. *Parrya nudicaulis*, *Myosotis alpestris*, *Melandrium apetalum*, *Potentilla sericea*, *Erigeron uniflorus* var. *eriocephalus*, *Luzula nivalis*, a. o. Good diffuse light, full opening, 1/10".

Same date and station: *Silene acaulis*, *Myosotis alpestris*, *Polygonum viviparum*, *Astragalus alpinus*, *Papaver radicatum*. 36, 1".

Plate XXXVI.

Salix reptans RUPR. North of the entrance to Mashigin Fjord, Aug. 23d., sunshine, 18, 1/25".

Flower hill (ALBERT HILL) in Belushii Bay, Matotchkin Shar, July 17th: *Polemonium boreale*, *Myosotis alpestris*, *Silene acaulis*, *Erigeron uniflorus* var. *eriocephalus*, *Polygonum viviparum*, *Saxifraga oppositifolia*, *Astragalus alpinus*, *Luzula* sp. Good diffuse light, 12.5, 1/5".

Plate XXXVII.

Astragalus alpinus. Serebryanka Fjord, July 26th. Fog, 12.5, 1/2".

Hedysarum obscurum and *Polygonum viviparum*. Serebryanka Fjord, July 26th. Fog, less dense, 18, 1/5.

Plate XXXVIII.

Salix arctica × *polaris* × *reptans*. Matotchkin Shar, 8 km. west of the entrance to Belushii Bay, July 14th, sun clouded, good diffuse light, 36, 1/2".

Sedum roseum, *Catabrosa algida*, *Cerastium Regelii*, *Cochlearia officinalis* var. *groenlandica*, lichens and mosses on the stones. Rock near the strand in front of a large rookery south of Arkhangel Bay. July 12th, clouded weather, 25, 5" (yellow filter).

Plate XXXIX.

Rock in front of a large rookery south of Arkhangel Bay. Nitrophilous vegetation: The black figures on the rock are *Alopecurus alpinus*, forming continuous "grass-land". On the left was *Puccinellia phryganodes*, on the right *Chrysosplenium tetrandrum* and a rich vegetation of almost all the *Saxifragae* (except *S. aizoides*). August 12th, sun clouded, 9, 1/5".

Saxifraga cernua, in the large rookery south of Arkhangel Bay, Aug. 13th, rain, 18, 2" (yellow filter).

Plate XL.

Sin. *Poa arctica* f. *elongata;* large rookery south of Arkhangel Bay, Aug. 13th, mist and rain, 12.5, 1".

Alopecurus alpinus, the same rookery, Aug. 13th, 18, 2" (yellow filter).

Dext. Rookery on Veselago Island, Gribovii Fjord (at the foot of the cliff: *Rissa tridactyla*, at the upper part of the vertical cliff: *Uria lomvia*). The whole surface of the cliff covered with *Matricaria inodora*, the white spots are its flowers.

Plate XLI.

Broad and flat valley north of the entrance to Mashigin Fjord. Quiet rivulet with *Pleuropogon Sabinei*, *Dupontia Fisheri*, *Arctophila fulva*, and *Carex aquatilis*. Aug. 23d, sunshine, 25, 1/2".

Arctophila fulva in this rivulet, 18, 1/5".

Plate XLII.

Saxifraga rivularis and *Cochlearia officinalis* var. *groenlandica* in the large rookery south of Arkhangel Bay, Aug. 12th, sun clouded, 22.5, 1/5".

Saxifraga flagellaris on stony ground, underground clay. Belushii Bay, July 17th, good diffuse light, 9, 1/10".

Plate XLIII.

Sin. *Artemisia borealis*. North of the entrance to Mashigin Fjord, Aug. 23d, bright sunshine, 6, 1/5". (This plant as well as *Papaver radicatum* and *Pleuropogon Sabinei* are difficult objects. Their long flower stalks are never at rest in this windy country. Several attempts were made with *Pleuropogon*, all of them in vain, its spikelets are always oscillating.)

Cochlearia officinalis var. *groenlandica* immersed in mosses, appressed shoots. Far north: Eastern Krestovii Island, Aug. 15th, clouded weather, 36, 6" (yellow filter).

Dext. *Oxytropis campestris* var. *sordida*, appressed shoots with pods. North of the entrance to Mashigin Fjord, Aug. 23d, bright sunshine, 18, 1/2".

Saxifraga Hirculus in the large rookery south of Arkhangel Bay, Aug. 13th, mist and rain, 12.5, 1".

Plate XLIV.

Arctic desert on Pankratyeff Peninsula. The black spots are *Papaver radicatum*, no other plant was obtained for miles.

Narrow isthmus, connecting Pankratyeff Peninsula. with the mainland. Much drift wood.

Plate XLV.

Fig 1. *Poa abbreviata* R. BR. f. *arcuata* n. (natural size) South of Arkhangel Bay.

Fig. 2. *Poa alpigena* (FR.) f. *longiglumis* n. Natural size. Berkh Island.

Fig. 3. *Poa alpigena*, a probably not quite unmixed form, panicle greenish, a few spikelets in a beginning viviparous state, blades very broad. (natural size) Rookery south of Arkhangel Bay.

Fig. 4. *Poa alpina* L. f. *nana* n. viviparous, but otherwise apparently unmixed. (natural zize). North of Gribovii Bay.

Plate XLVI.

Fig. 1. *Poa alpina* L., pura, non vivipara (natural size). North of Gribovii Bay.

Fig. 2. *Poa arctica* R. BR. f. *mutilata* n. (natural size). Perhaps identical with "*Poa filipes*" LGE. Spikelet pale brownish, with blunt scales. Sol Bay in Mashigin.

Fig. 3. *Poa (alpina* × *?) arctica*, not yet fullgrown. A coarse nearly viviparous form, spikelets intensively blachish-purple. (natural size). South of Arkhangel Bay, on a rookery.

Fig. 4. *Poa alpigena* × *arctica* (see pl. XL, sin.), a tall plant, like *P. arctica*, except its large size and elongated panicle. Natural size. Sol Bay in Mashigin.

Plate XLVII.

The figures are × 5, only a detail of fig. 1 is × 4.

Fig. 1. *Poa alpina* L. spikelets of an apparently unmixed though viviparous form, on the leff a young bulbil, longitudinally cut (× 4). Strömsnes Bay in Mashigin.

Fig. 2. *Poa alpina* L. a form like fig. 1, spikelets very large, quite open when flowering, with anther and a vegetative daughter plant together. North of Gribovii Fjord (see pl. XLVI, fig. 1).

Fig. 3. *Poa arctica*, R. BR. typus, f. *breviglumis* n., a tall specimen 33 cm. high. Pomorskaya.

Fig. 4. The same, but f. *longiglumis*. Serebryanka Fjord.

Fig. 5. The same as fig. 4, Pomorskaya, in a *Sphagnum* moor.

Fig. 6. *Poa arctica* R. BR. f. *elongata* BLYTT and *macrantha* n., spikelets pale purplish. North of Gribovii Fjord.

Fig. 7 and 8. *Poa arctica* R. BR. f. *macrantha* n. and also f. *mutilata* n., of a plant with brownish spiketets (cfr. pl. XLVI, fig. 2, and perhaps "*Poa filipes*" LGE.). Sol Bay in Mashigin.

Fig. 9. *Poa abbreviata* R. BR. typus. Mainland east of Lichutin Island.

Fig. 10. The same, f. pallida n. Belushii Bay in Matotchkin Shar.

Fig. 11 and 12. *Poa alpigena* (FR.) f. *breviglumis* n. Fig. 11: Mainland east of Lichutin Island, fig. 12: Veselago Island in Gribovii Fjord.

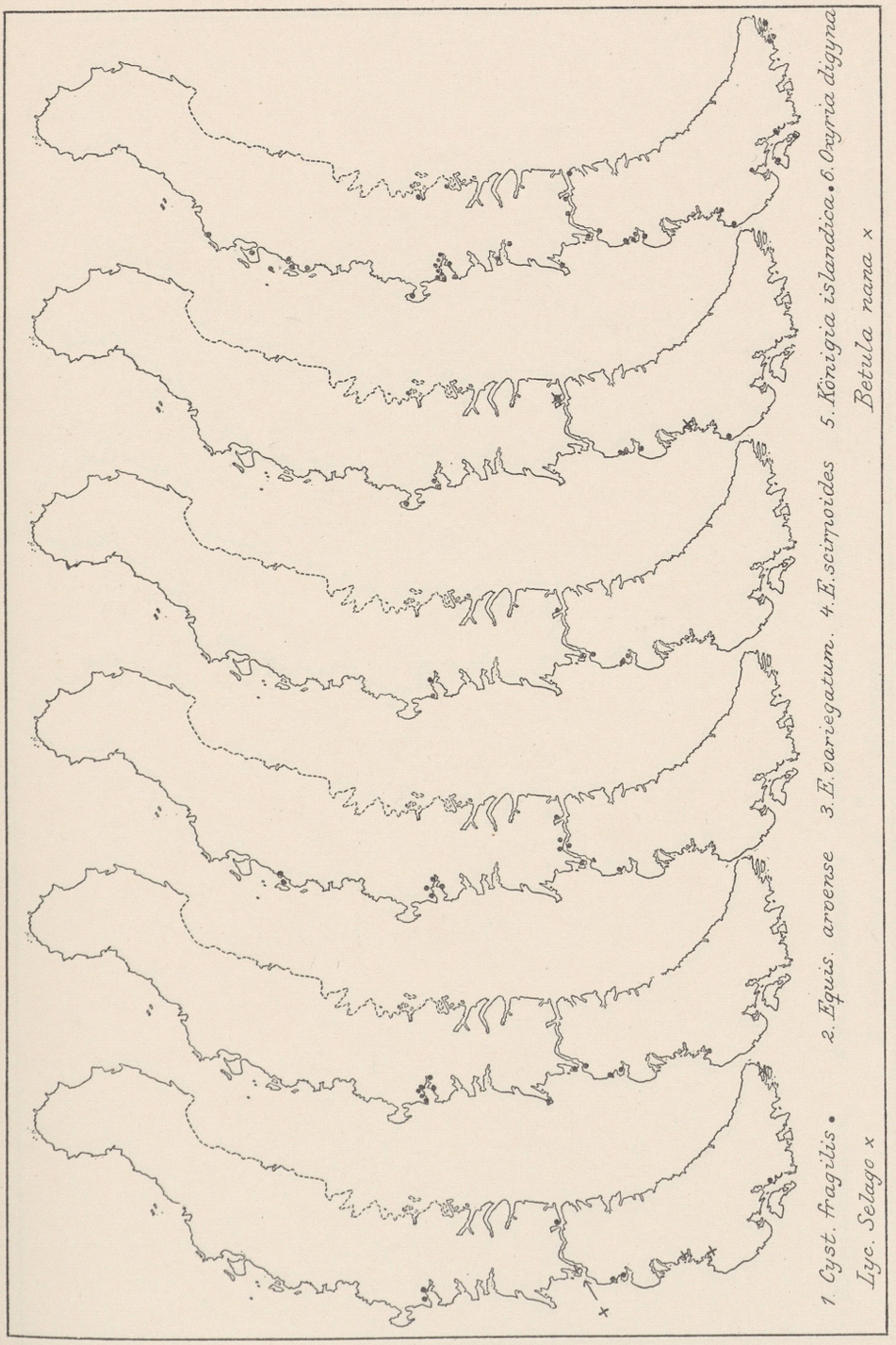
Fig. 13. The same, f. *longiglumis* n. (see pl. XLV, fig. 2). Berkh Island.

Fig. 14. *Poa alpina* × *arctica* R. BR. f. *micrantha* n. North side of Gribovii Fjord.

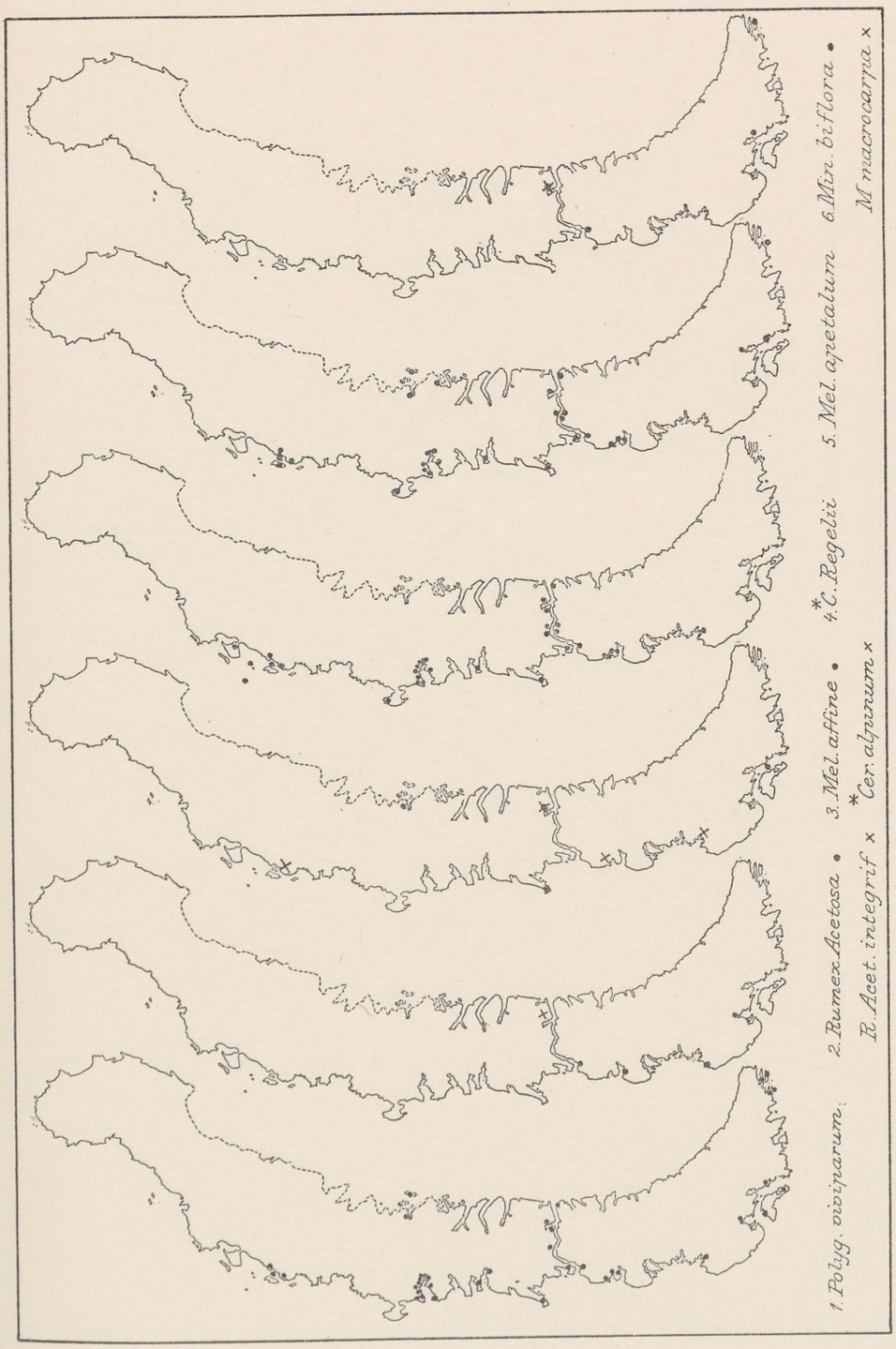
Fig. 15. *Poa alpigena* (FR.) × *alpina* L. Strömsnes Bay in Mashigin Fjord.
Fig. 16. The same, Lichutin Island.
Fig. 17. The same, Admiralty Peninsula.
Fig. 18. *Poa alpina* L. × *arctica* R. BR. Berkh Island.
Fig. 19. The same. Lichutin Island.
Fig. 20. *Poa arctica* R. BR. f. *macrantha*. Arkhangel Bay, see pl. XLVI, fig. 3.

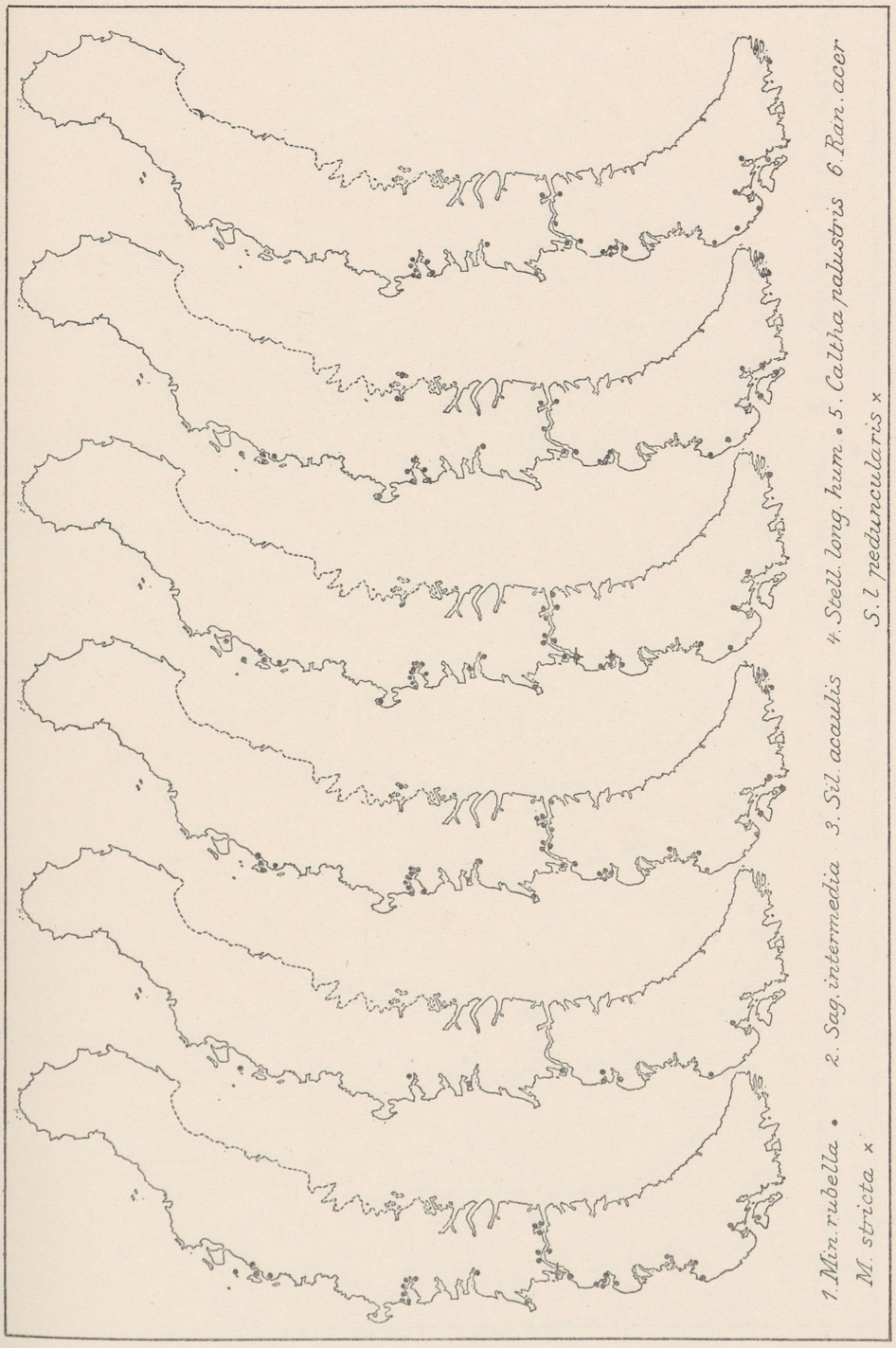
Plates XX—XXVIII and XXX have been drawn by SIGFRID BERGH, Kristiania, pl. XXIX by H. BUCHER, Bergen, and pl. XLVII by professor LINDMAN, Stockholm.

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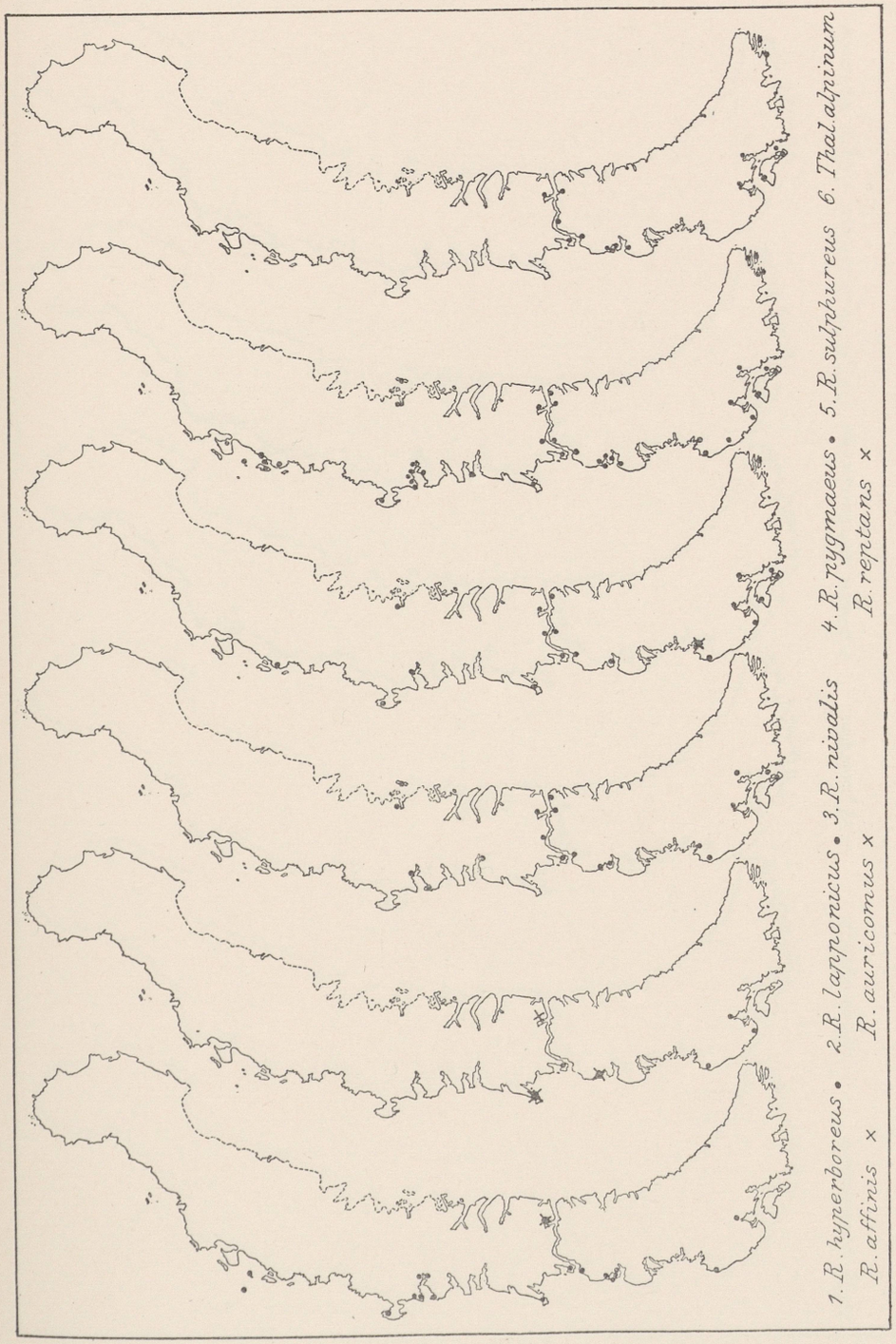


1. Cyst. fragilis • 2. Equis. arvense 3. E. variegatum. 4. E. scirpoides 5. Königia islandica. 6. Oxyria digyna
Lyc. Selago × Betula nana ×

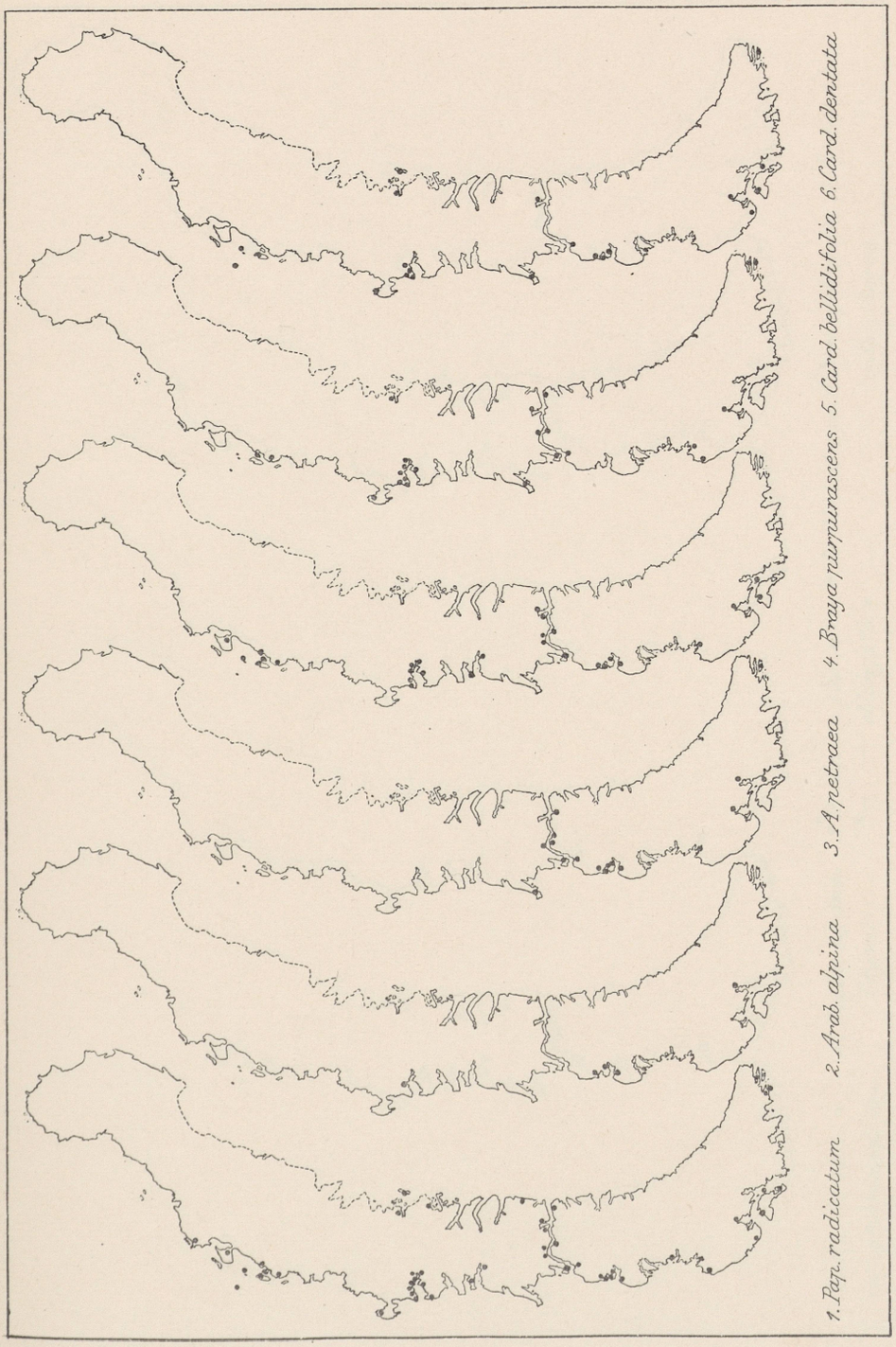

1. Polyg. vivipara. 2. Rumex Acetosa • 3. Mel. affine • *4. C. Regelii 5. Mel. apetalum 6. Min. biflora •
R. Acet. integrif × *Cer. alpinum × M. macrocarpa ×



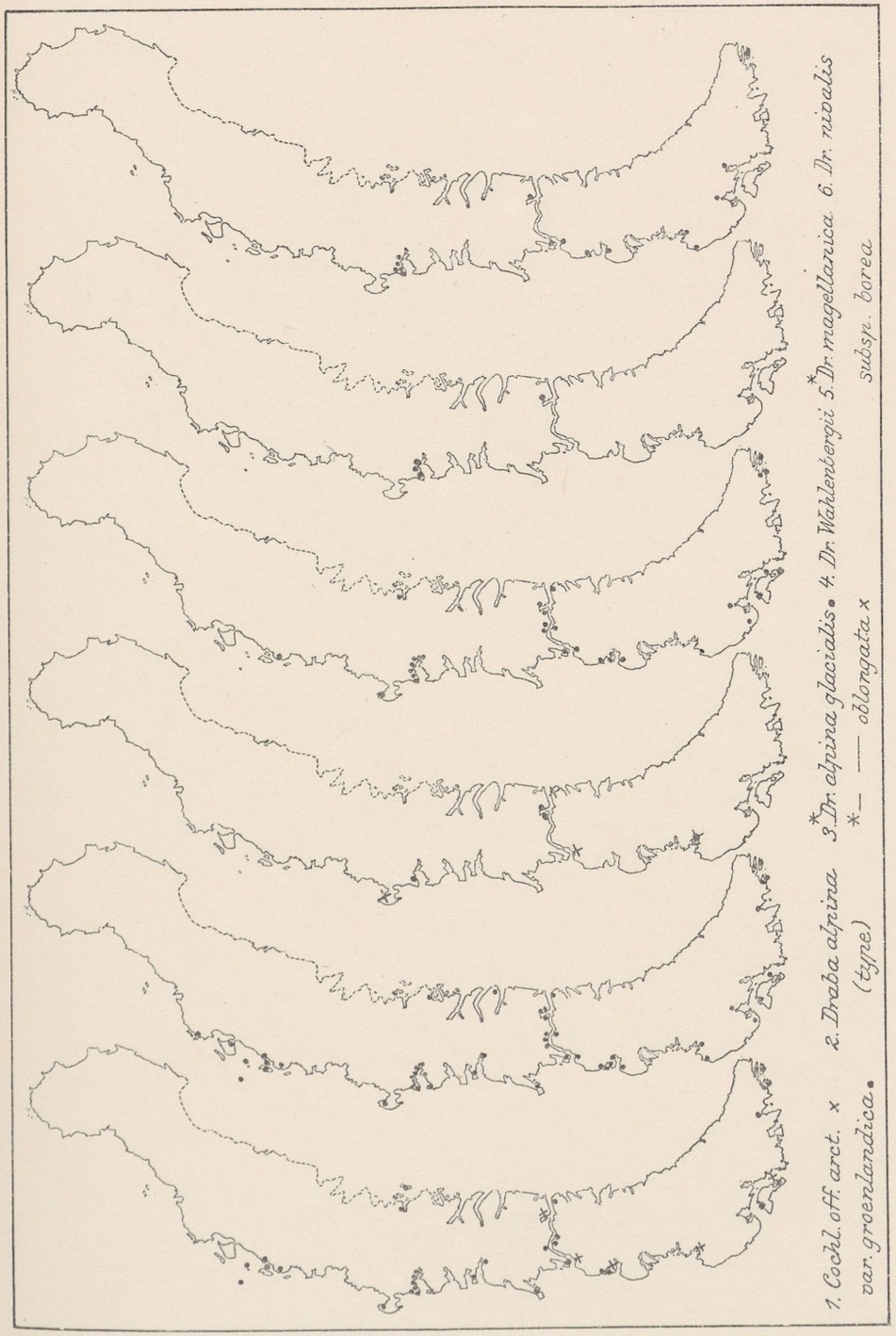
1. Min. rubella • 2. Sag. intermedia 3. Sil. acaulis 4. Stell. long. hum • 5. Caltha palustris 6. Ran. acer
S. l. pedunculoris ×
M. stricta ×



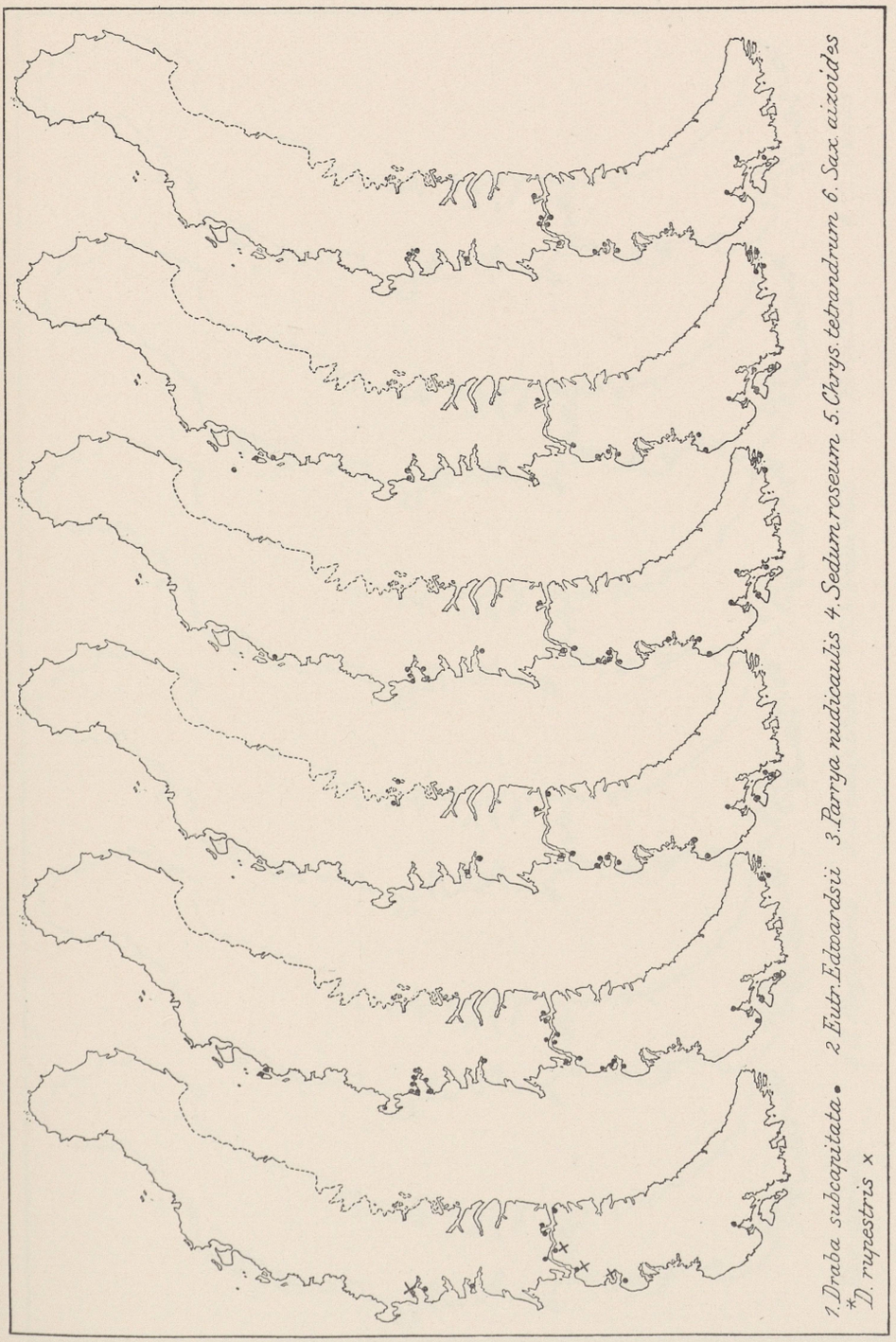
1. R. hyperboreus • 2. R. lapponicus • 3. R. nivalis 4. R. pygmaeus • 5. R. sulphureus 6. Thal. alpinum
R. affinis × R. auricomus × R. reptans ×



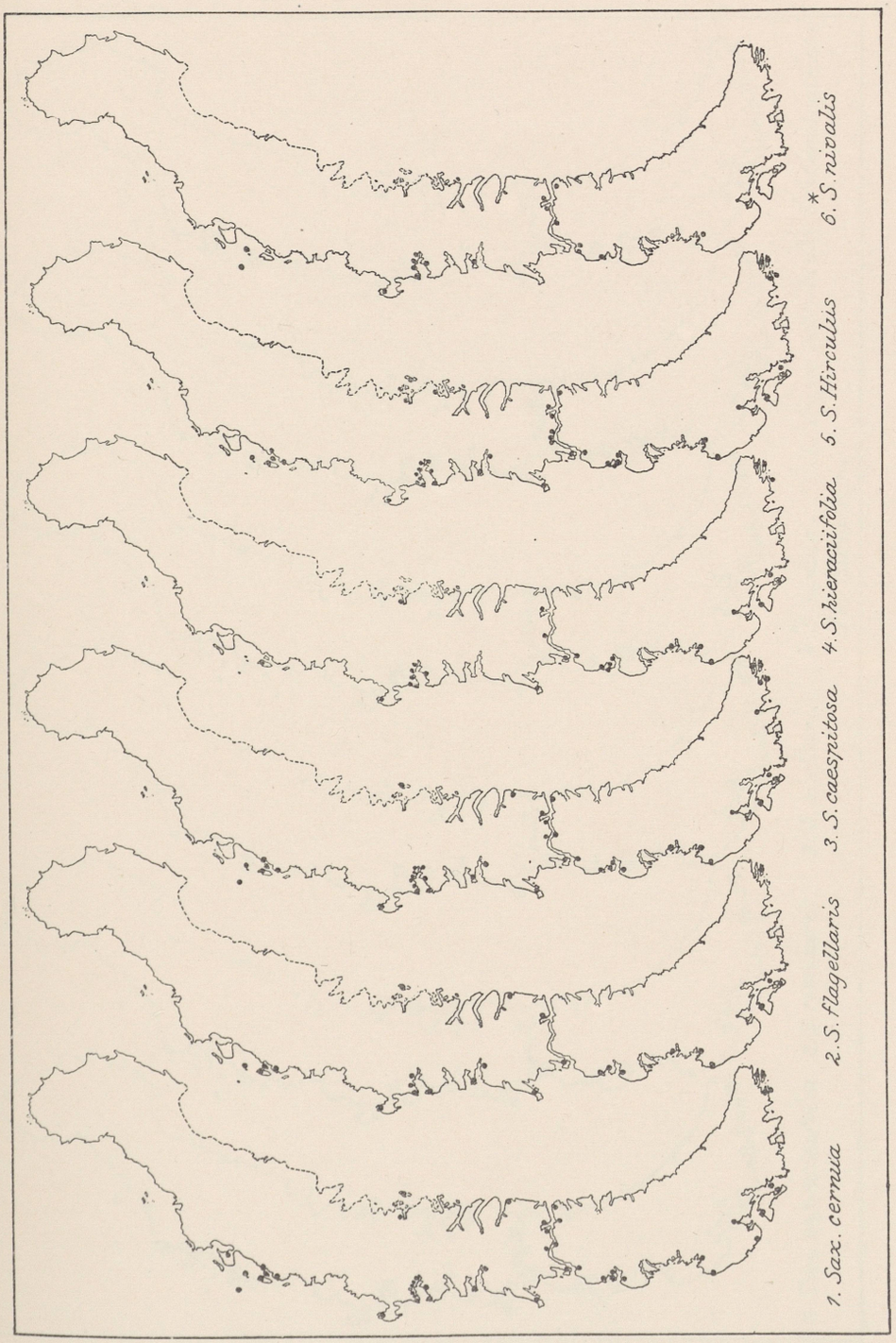
1. Pap. radicatum 2. Arab. alpina 3. A. petraea 4. Braya purpurascens 5. Card. bellidifolia 6. Card. dentata

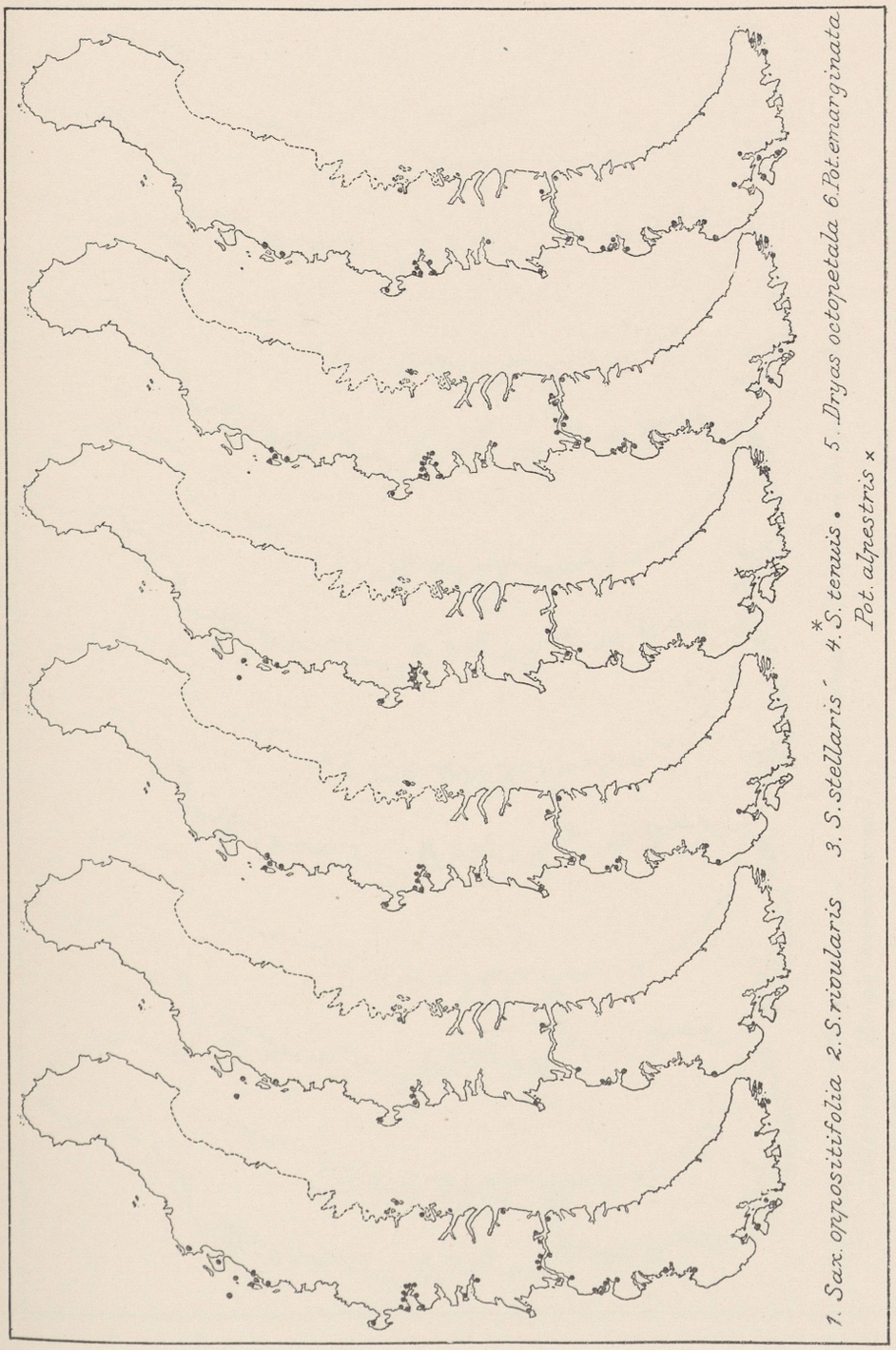


1. Cochl. off. arct. × 2. Draba alpina 3.*Dr. alpina glacialis● 4. Dr. Wahlenbergii 5.*Dr. magellanica 6. Dr. nivalis
var. groenlandica●. (type) *— —— oblongata × subsp. borea

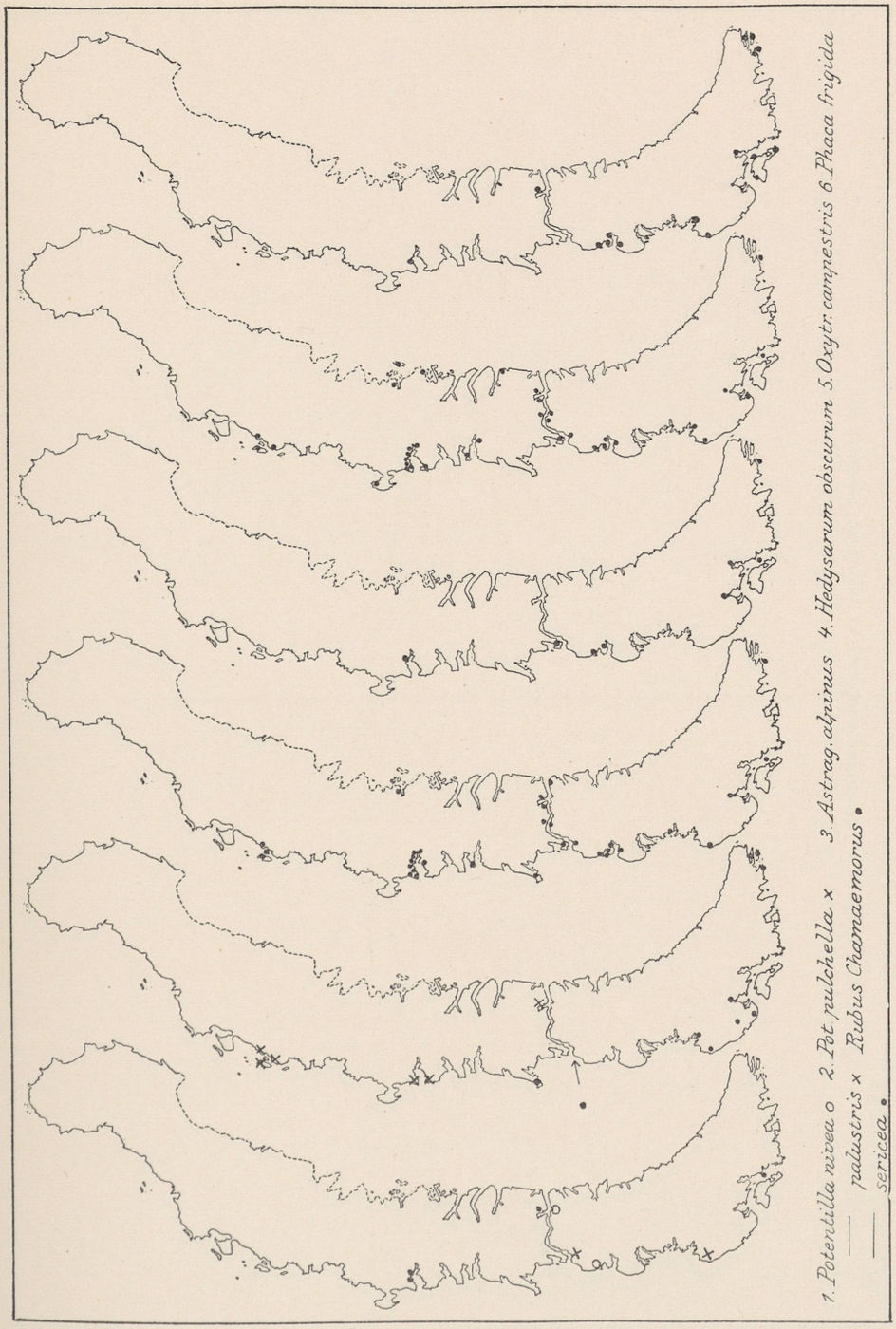


1. Draba subcapitata • 2 Eutr. Edwardsii 3. Parrya nudicaulis 4. Sedum roseum 5. Chrys. tetrandrum 6. Sax. aizoides
*D. rupestris ×

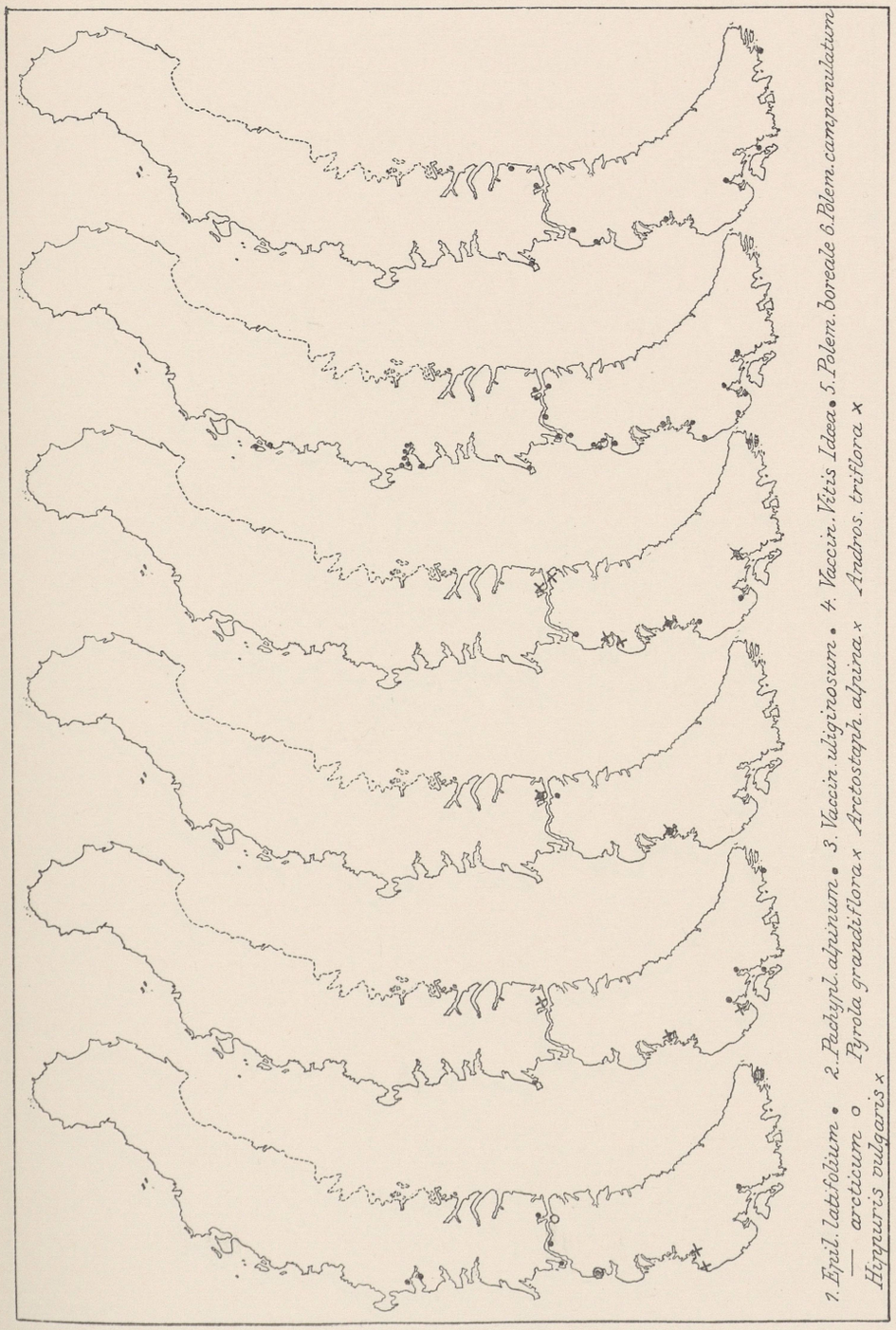

1. Sax. cernua
2. S. flagellaris
3. S. caespitosa
4. S. hieraciifolia
5. S. Hirculus
6.* S. nivalis



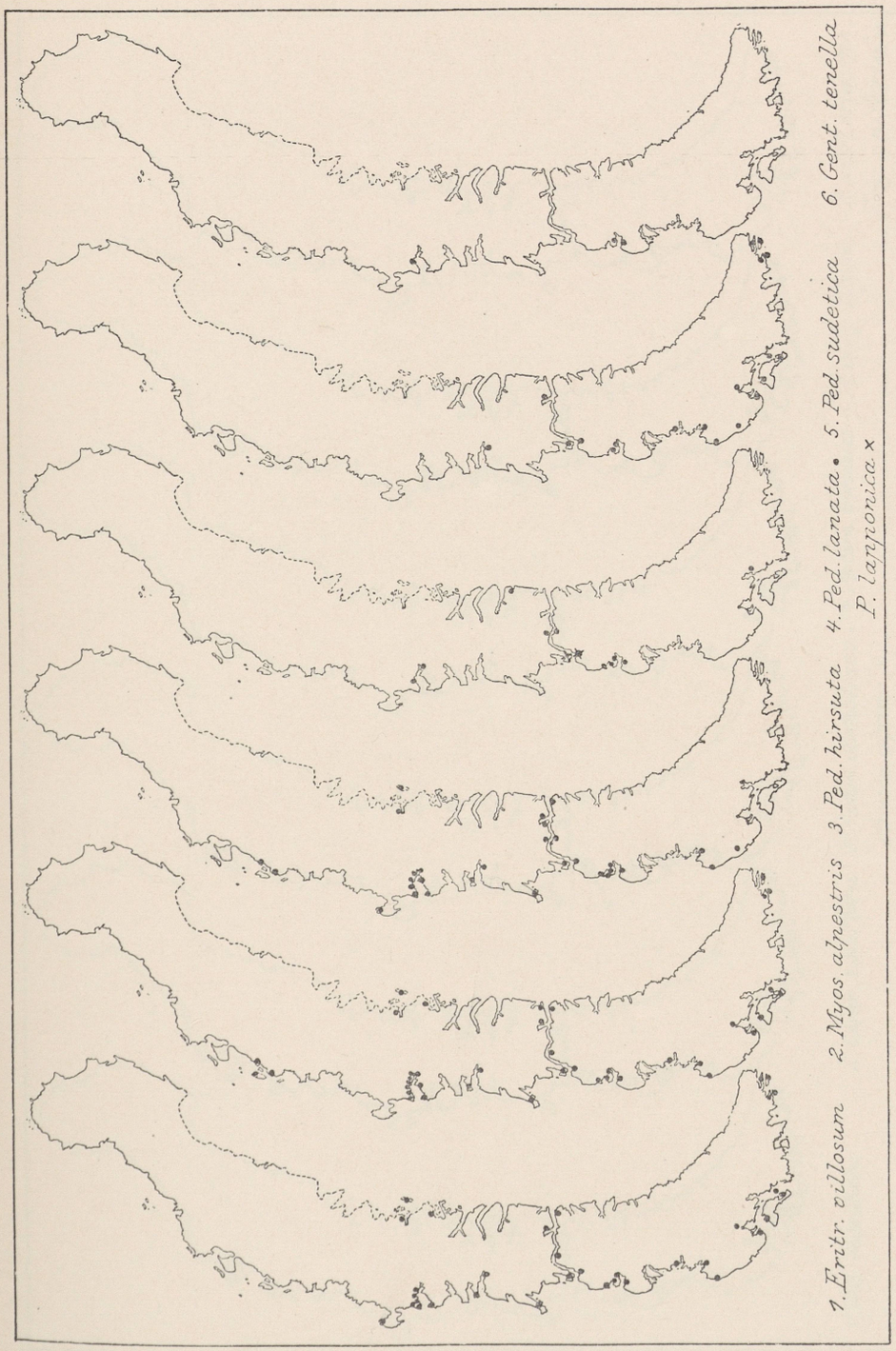
1. Sax. oppositifolia 2. S. rivularis 3. S. stellaris * 4. S. tenuis • 5. Dryas octopetala 6. Pot. emarginata Pot. alpestris ×

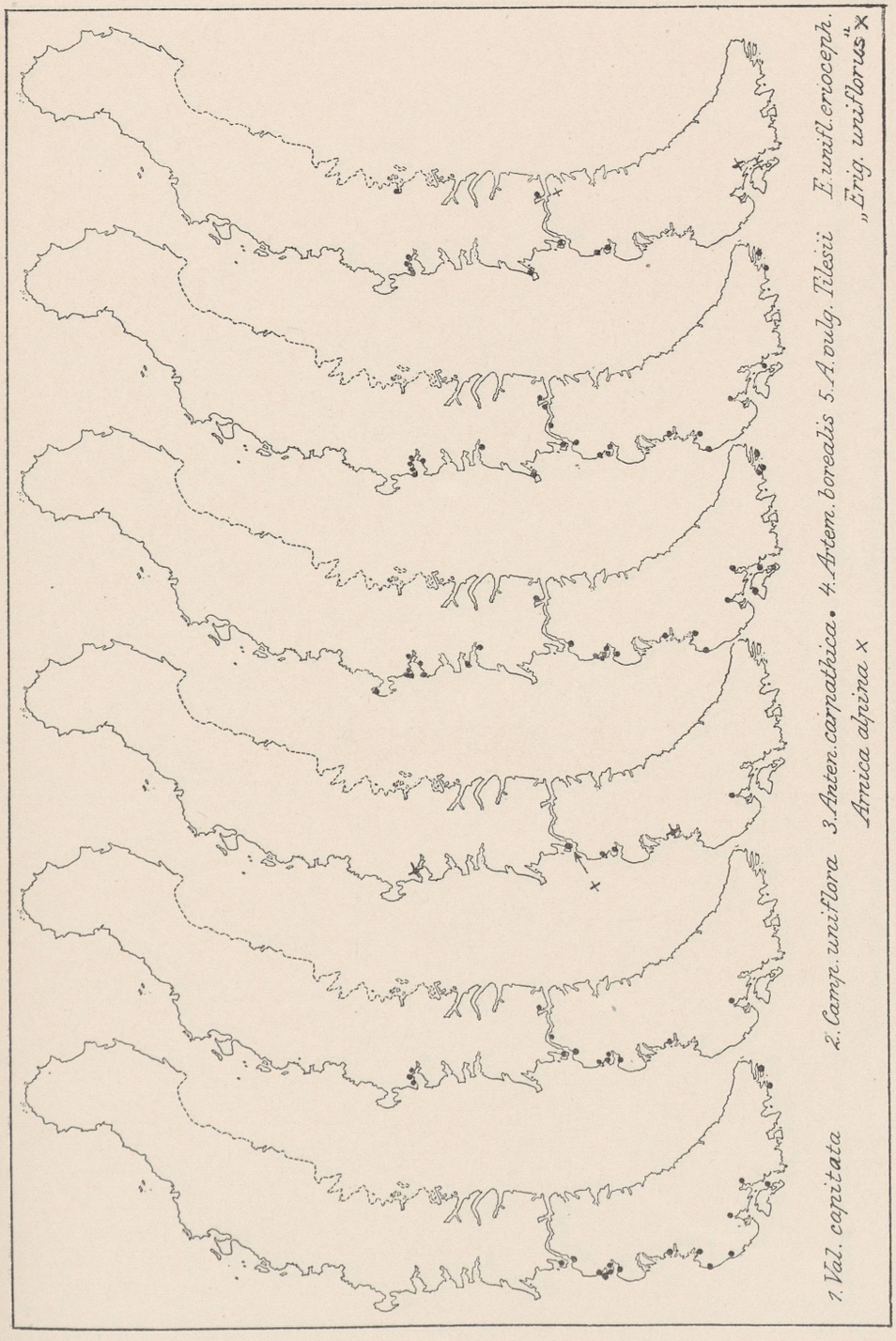


1. Potentilla nivea o 2. Pot. pulchella × 3. Astrag. alpinus 4. Hedysarum obscurum 5. Oxytr. campestris 6. Phaca frigida
—— palustris × Rubus Chamaemorus •
—— sericea •

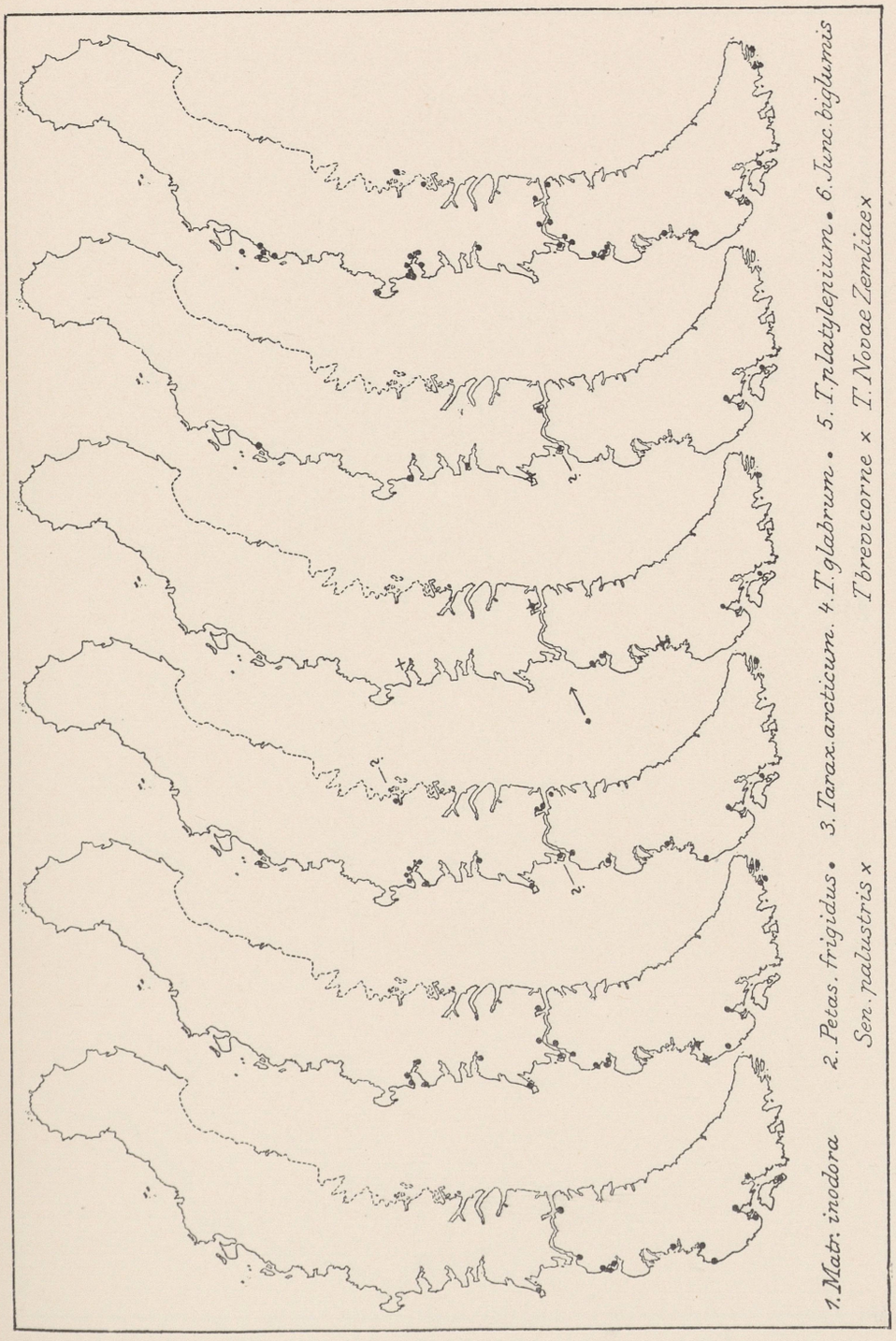


1. Eril. latifolium • 2. Pachyl. alpinum • 3. Vaccin. uliginosum • 4. Vaccin. Vitis Idaea • 5. Polem. boreale 6. Polem. campanulatum
— arcticum ○ Pyrola grandiflora × Arctostaph. alpina × Andros. triflora ×
Hippuris vulgaris ×

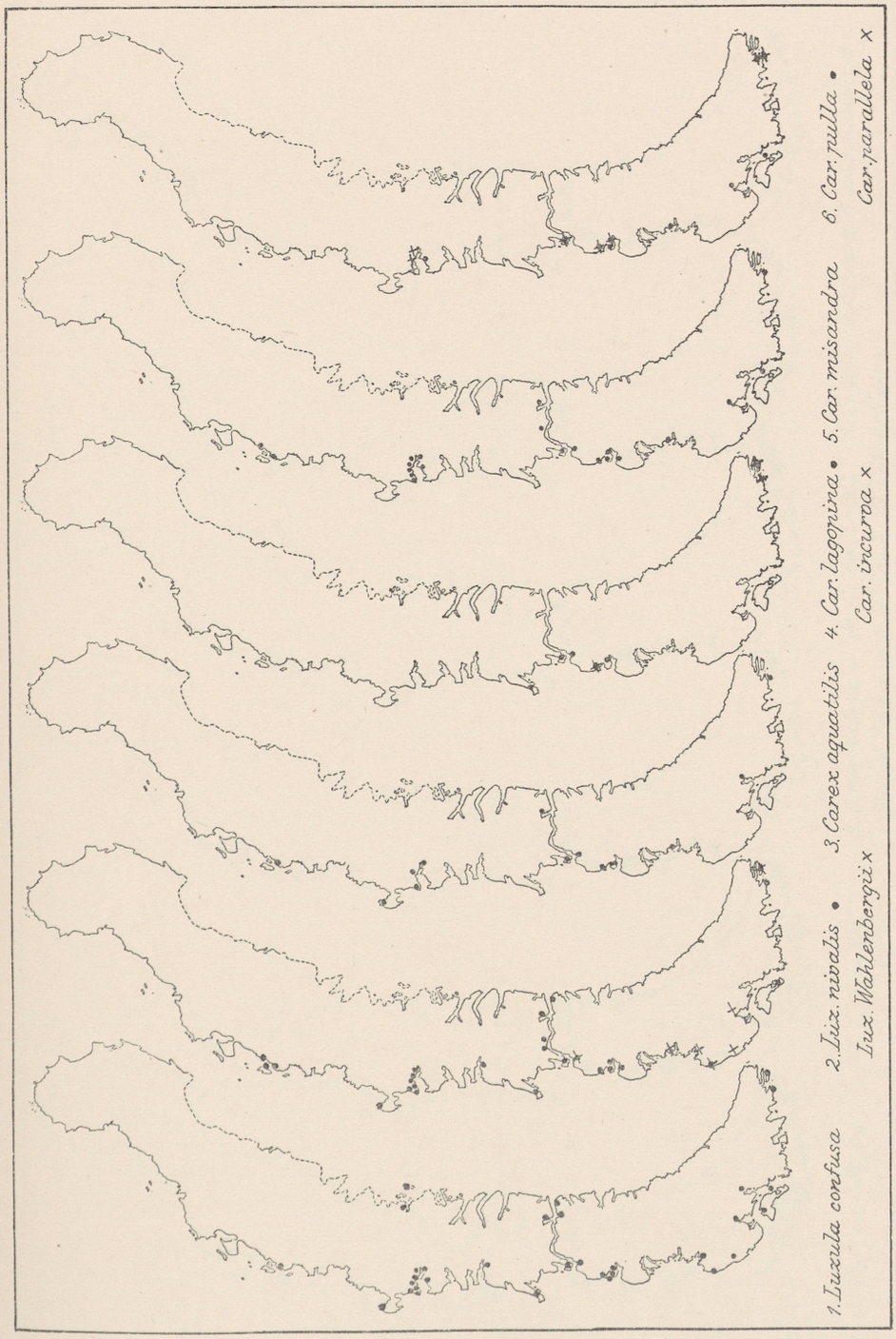

1. Eritr. villosum 2. Myos. alpestris 3. Ped. hirsuta 4. Ped. lanata • 5. Ped. sudetica 6. Gent. tenella
P. lapponica ×



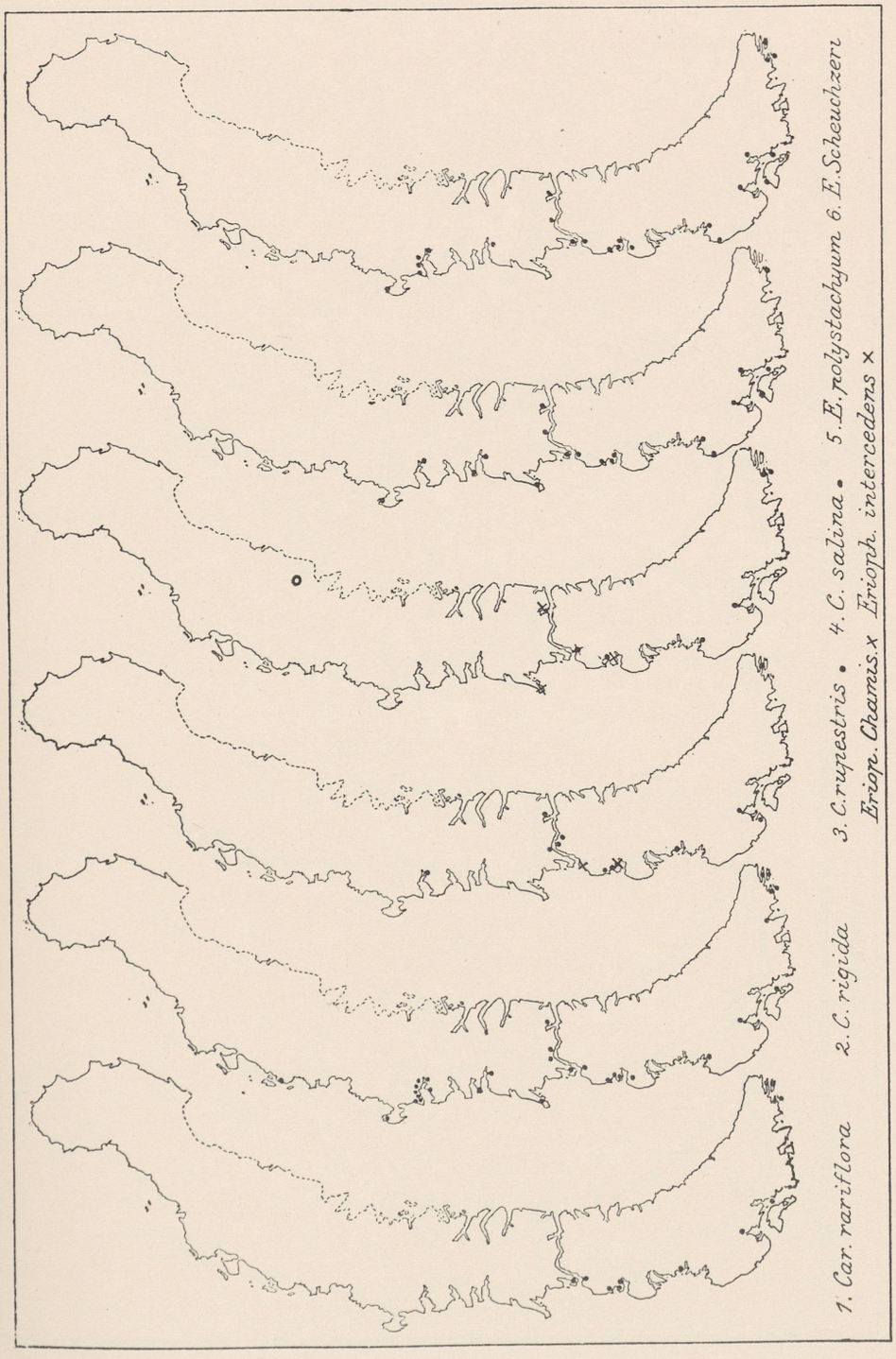
1. Val. capitata 2. Camp. uniflora 3. Arten. carpathica • 4. Artem. borealis 5. A. vulg. Tilesii E. unifl. eriocenh.
Arnica alpina × „Erig. uniflorus" ✳



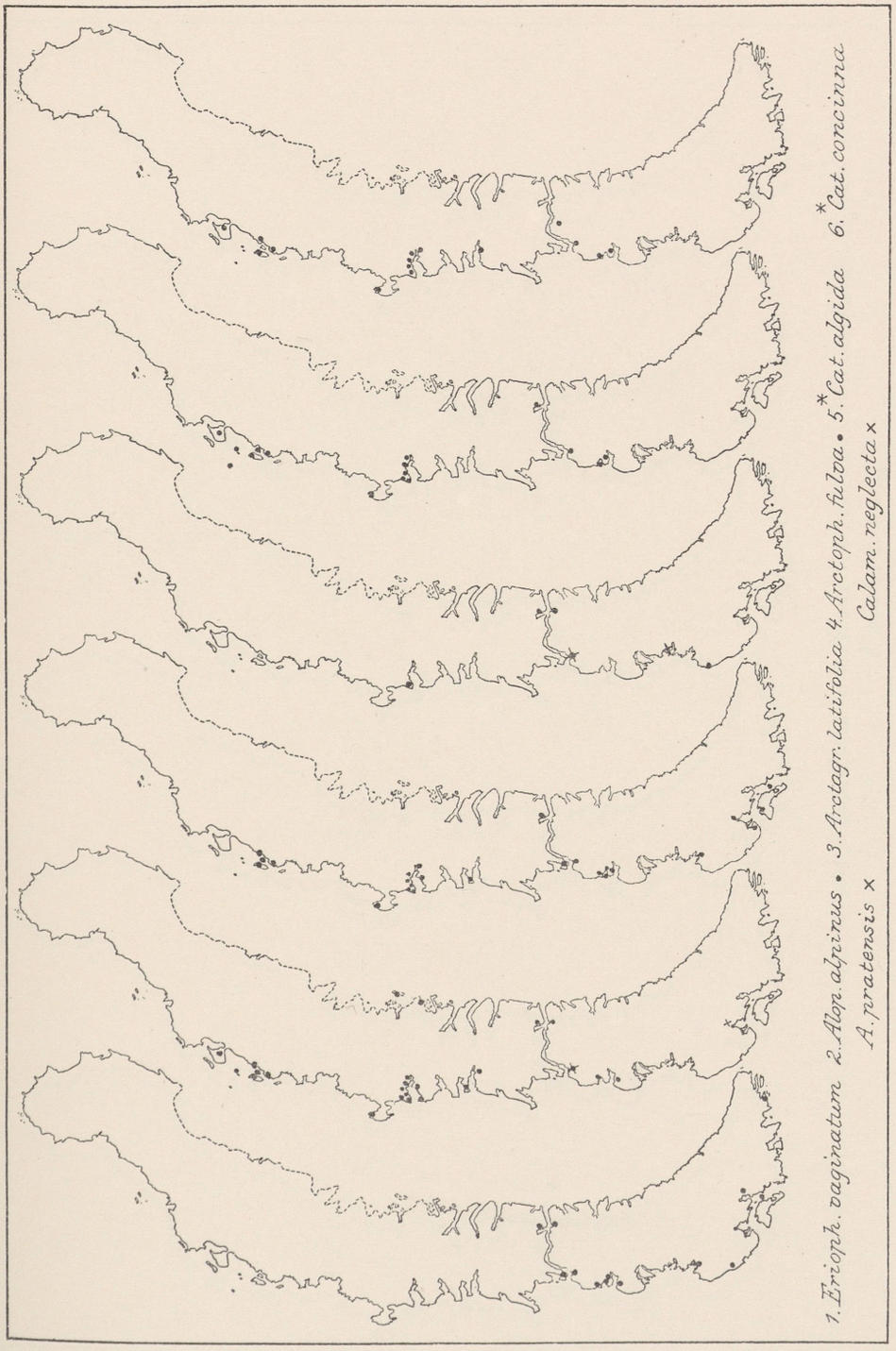
1. Matr. inodora 2. Petas. frigidus • 3. Tarax. arcticum. 4. T. glabrum • 5. T. platylepium • 6. Junc. biglumis
Ser. palustris × T. brevicorne × T. Novae Zemliae ×



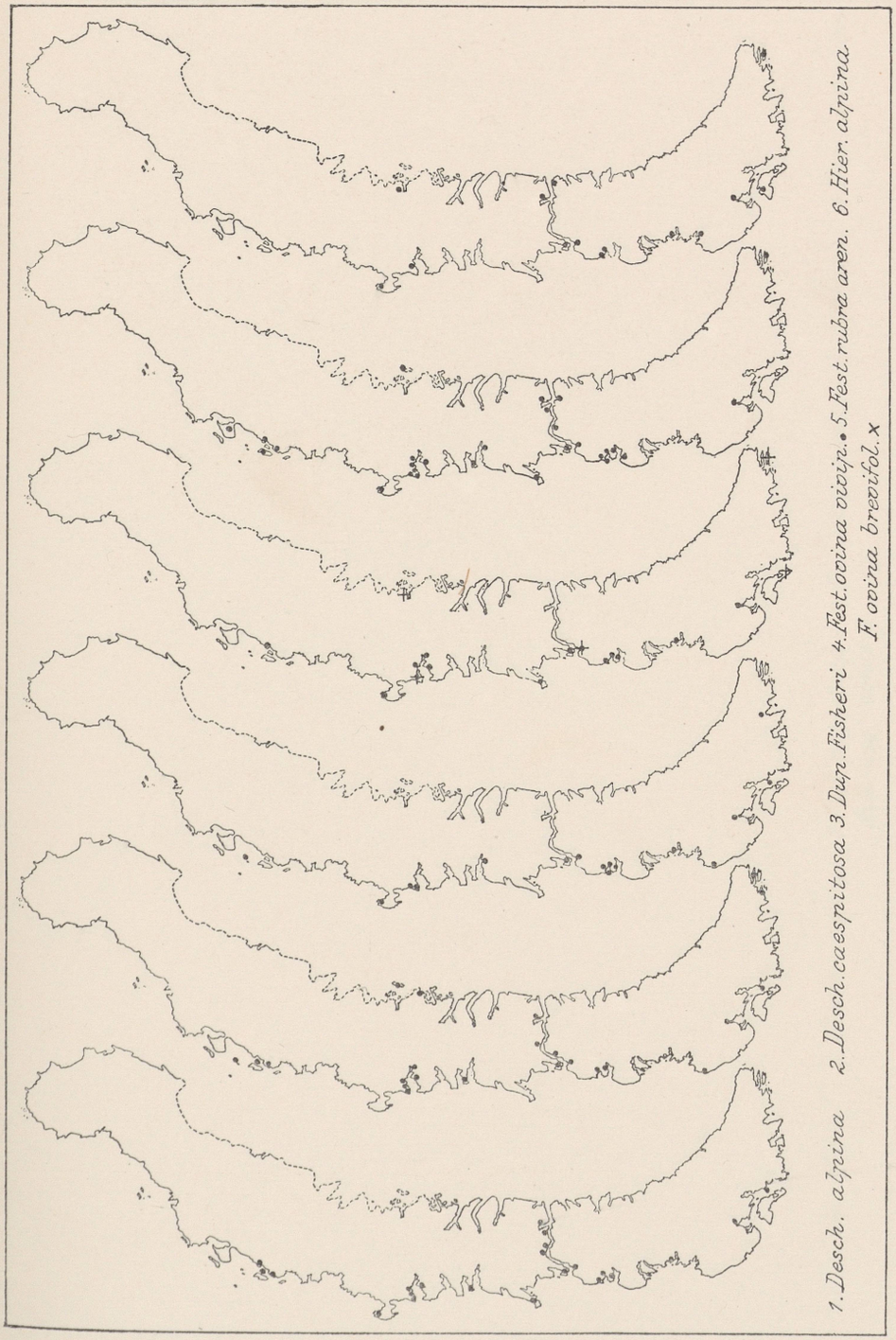
1. Juncula confusa 2. Juc. nivalis • 3. Carex aquatilis 4. Car. lagopina • 5. Car. misandra 6. Car. pulla •
Juc. Wahlenbergii × Car. incurva × Car. parallela ×



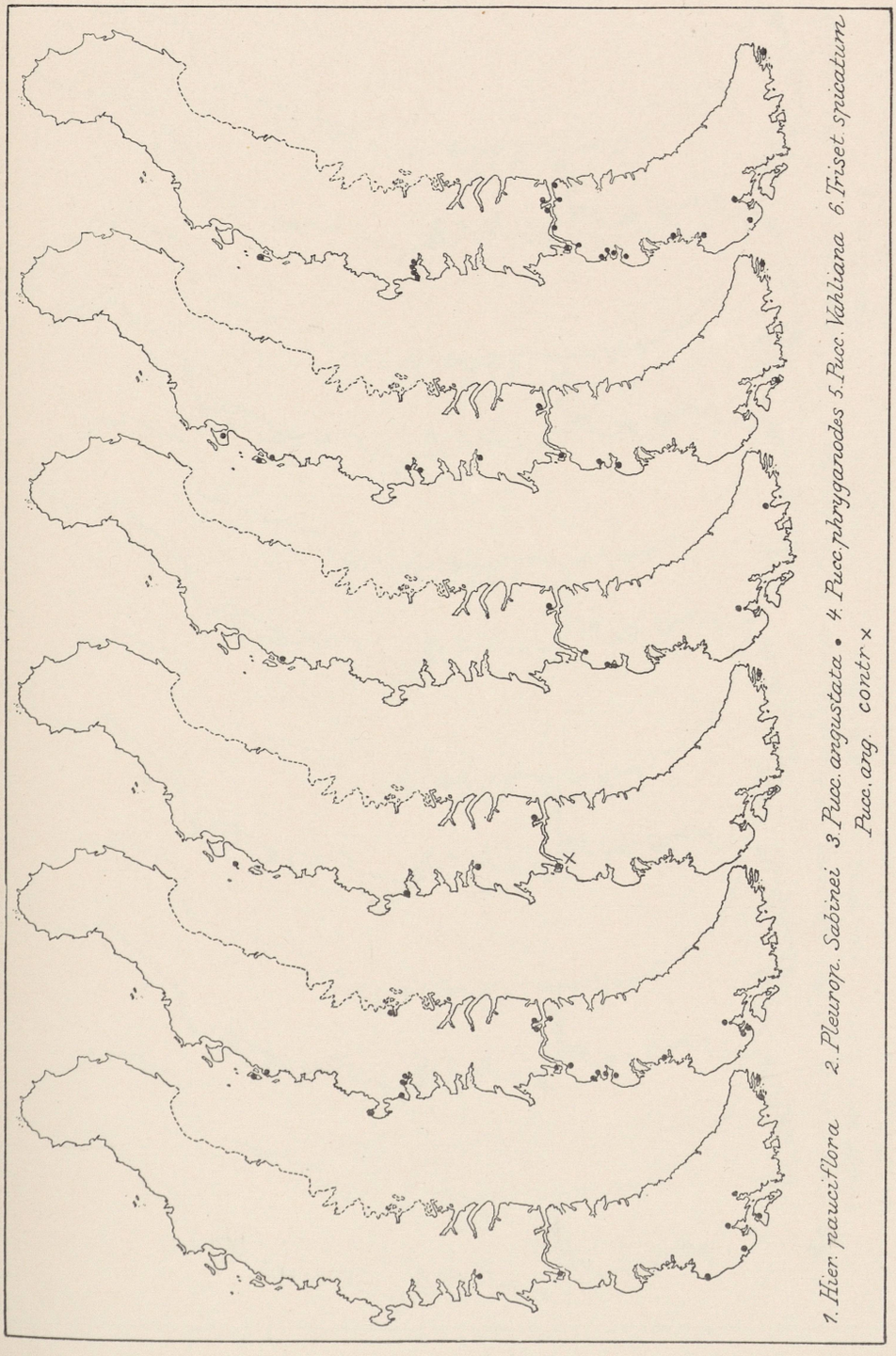
1. Car. rariflora 2. C. rigida 3. C. rupestris • 4. C. salina • 5. E. polystachyum 6. E. Scheuchzeri
Erion. Chamis. × Erioph. intercedens ×



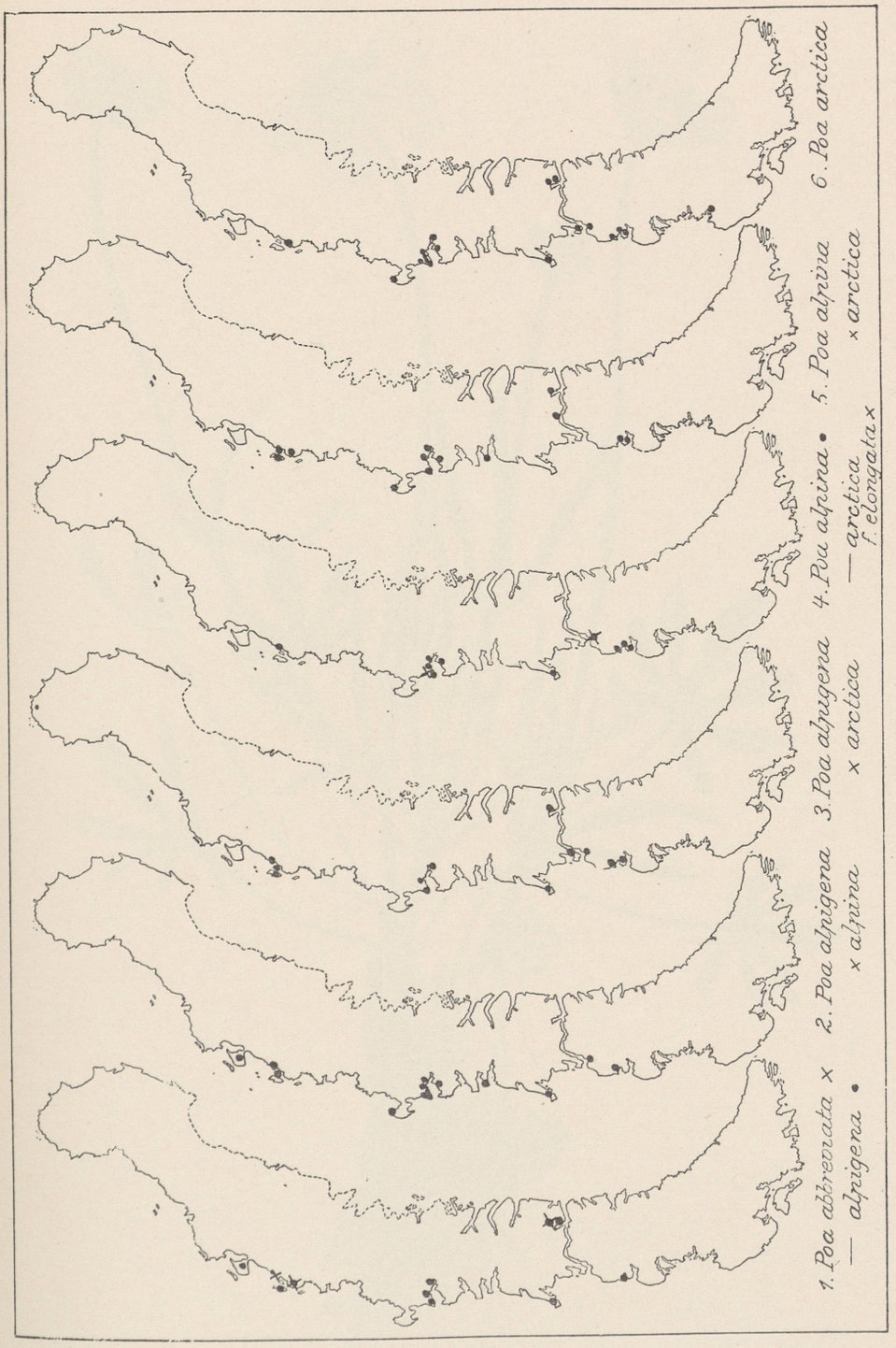
1. Eriopk. vaginatum 2. Alop. alpinus • 3. Aretogr. latifolia 4. Arctoph. fulva • 5.* Cat. algida 6.* Cat. concinna
A. ratensis × Calam. neglecta ×



1. Desch. alpina 2. Desch. caespitosa 3. Dup. Fisheri 4. Fest. ovina vivip. 5. Fest. rubra aren. 6. Hier. alpina
F. ovina brevifol. x



1. Hier. pauciflora. 2. Pleurop. Sabinei 3. Puc. angustata • 4. Puc. rhryganodes 5. Puc. Vahliana 6. Triset. spicatum
Puc. arg. contr ×


1. Poa abbreviata ×
— alpigena •
2. Poa alpigena
× alpina
3. Poa alpigena
× arctica
4. Poa alpina •
— arctica
f. elongata ×
5. Poa alpina
× arctica
6. Poa arctica













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H.B.

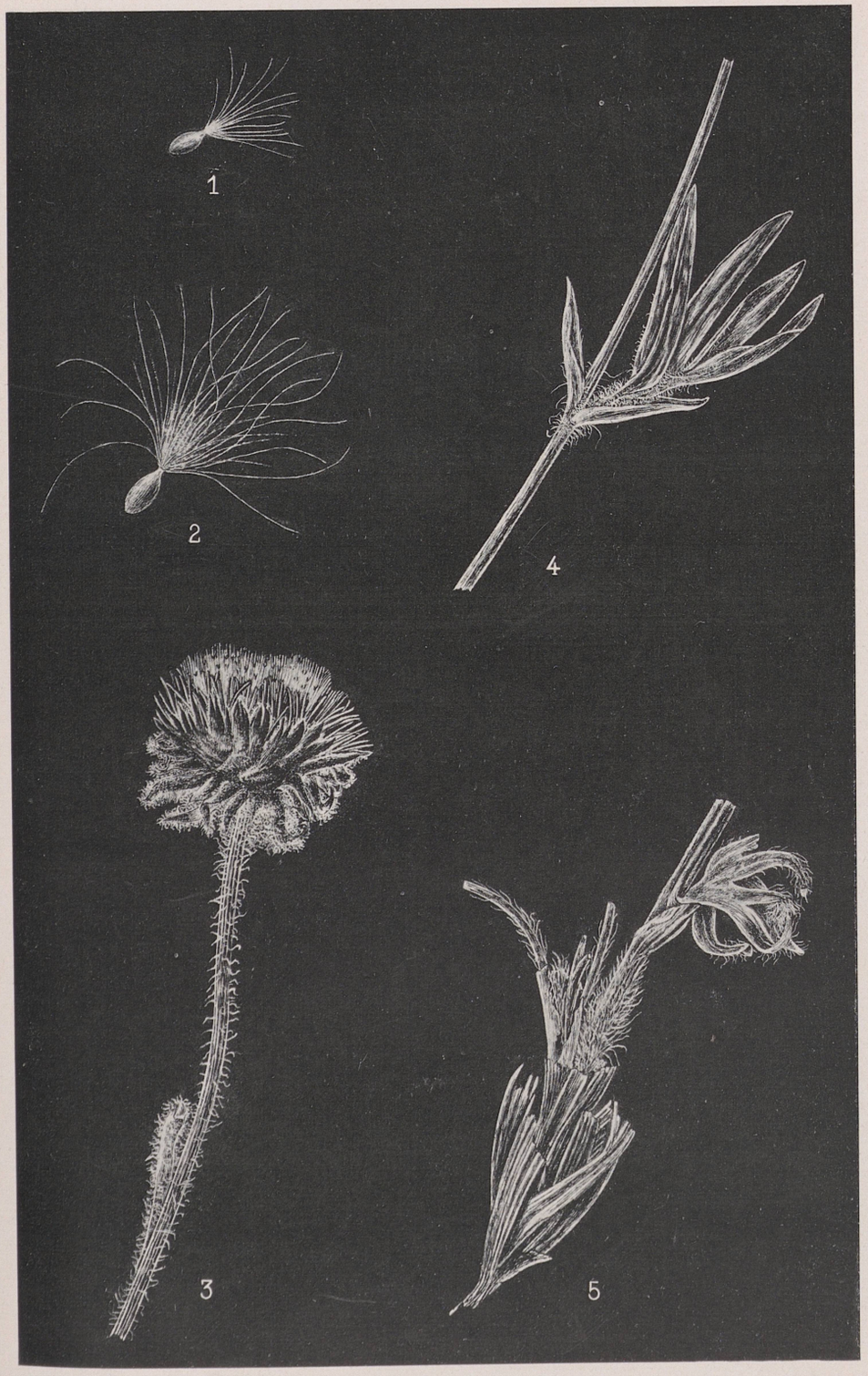

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Fig. 2.

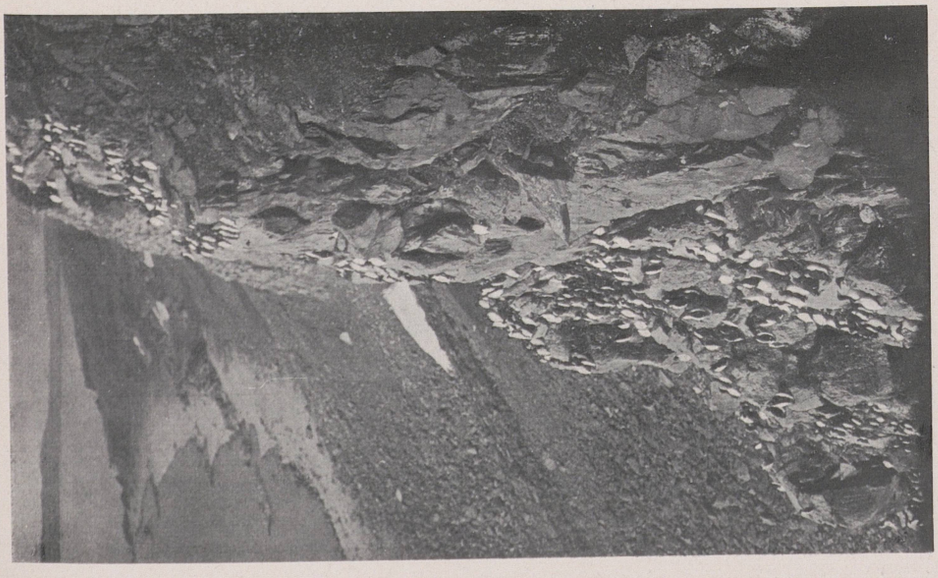


Fig. 1.

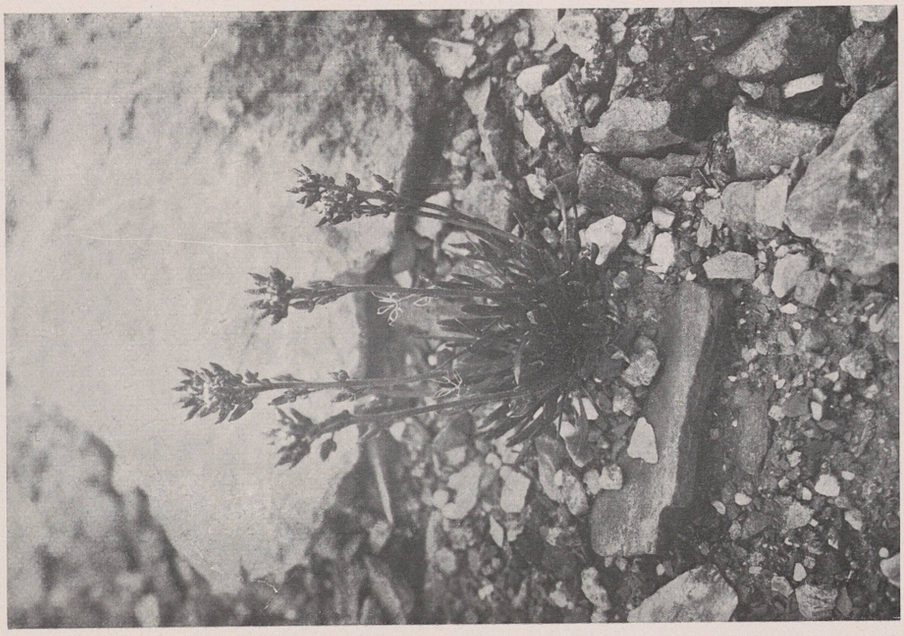


Fig. 2.



Fig. 1.



Fig. 1.



Fig. 2.



Fig. 2.

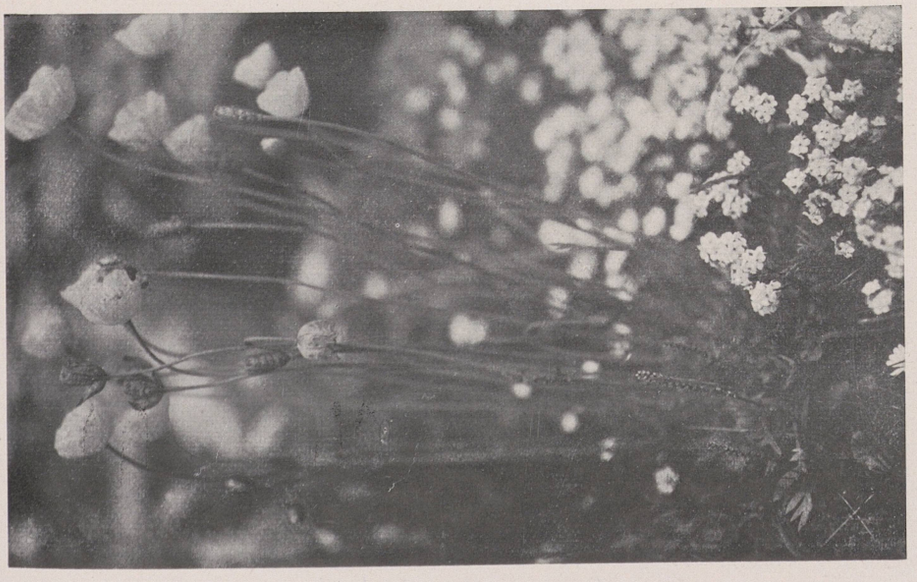


Fig. 1



Fig. 1.



Fig. 2.



Fig. 1.



Fig. 2.



Fig. 1.



Fig. 2.



Fig. 1.



Fig. 2.



Fig. 1.



Fig. 2.

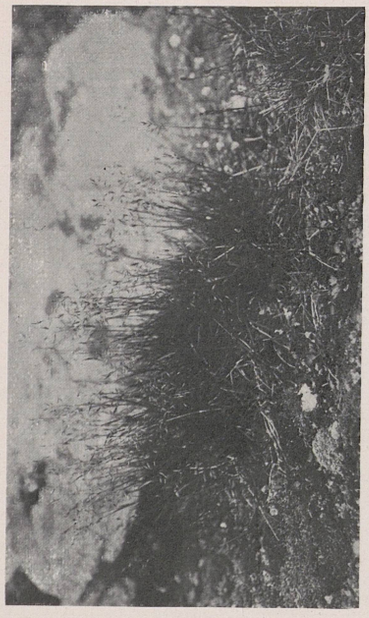


Fig. 2.



Fig. 3.



Fig. 1.



Fig. 1.



Fig. 2.



Fig. 1.



Fig. 2.

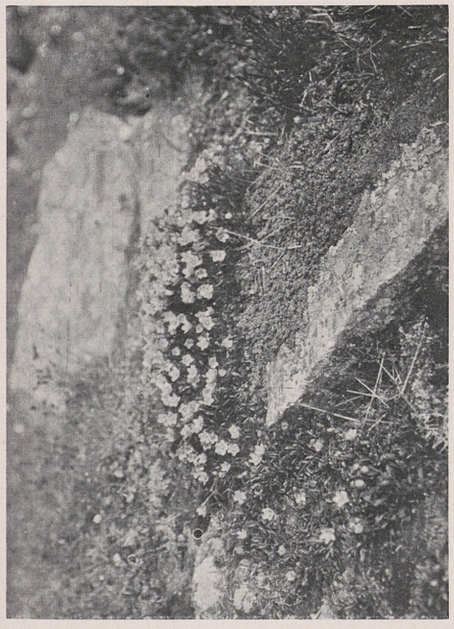


Fig. 2.



Fig. 4.



Fig. 1.



Fig. 3.



Fig. 1.



Fig. 2.


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