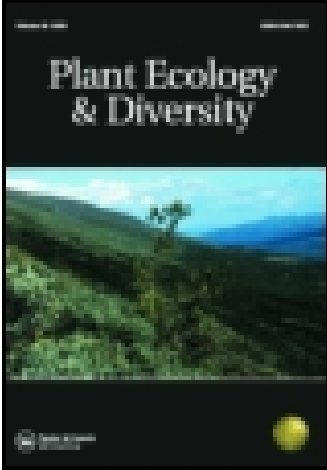


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The Flora of the Coasts of Lapland and of the Yugor Straits (N.-W. Siberia), as observed during the Voyage of the "Labrador" in 1888; with Summarised List of all the Species known from the Islands of Novaya Zemlya and Waigatz, and from the North Coast of Western Siberia

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The Flora of the Coasts of Lapland and of the Yugor Straits (N.-W. Siberia), as observed during the Voyage of the "Labrador" in 1888; with Summarised List of all the Species known from the Islands of Novaya Zemlya and Waigatz, and from the North Coast of Western Siberia.
By PHILIP SEWELL. (Plate VIII.)

(Read 13th June 1889.)

In presenting to the Society an account of the botanical collections made last summer during the voyage of the "Labrador," it is well to acknowledge at the very outset the valuable aid so kindly given by various botanists who have undertaken to name groups of plants submitted to them.

Next to my indebtedness to Professor Balfour, by whose liberal aid and encouragement I was enabled to make use of the offers of the Phoenix Company, I must acknowledge the kind help of Mr Arthur Bennett, who with Mr C. B. Clarke has not only named for me the species of *Carex*, but who has examined and named every critical species of Phanerogamæ, allowing me to submit to him the greater part of my collection. His work has been the more difficult, because of the extensive revision of the species of many Arctic genera, lately undertaken by Swedish botanists, and because also authentic specimens of certain of the species recently established have not reached this country.

To Mr J. G. Baker, Mr C. B. Clarke, and Dr Buchanan White (who has named the species of *Salix*); also to Mr William Mitten, and to Mr Geo. W. Traill, who have examined for me the *Musci* and such marine *Algæ* as I collected, my very sincere thanks are due.

A small collection of *Lichenes* has been kindly taken in hand by Mr W. H. Wilkinson. A report upon this, and upon certain fresh-water *Algæ*, also collected, must be left over for a future paper.

I take this opportunity also to express my thanks to Mr H. N. Sullivan, managing director of the Phoenix Company, and to Captain Wiggins, who gave me so many facilities for work on board their vessel.

NARRATIVE OF THE VOYAGE.

On the 19th of July 1888, we left Newcastle on board the Arctic steamer "Labrador," which, under the command of Captain Wiggins, had for her destination Goltschieka, an anchorage in the estuary of the river Yenisei. We rounded the North Cape on 1st August, and after sheltering for a day in the fiord of Kølle, arrived at the little fishing port of Vardø, a town of 1500 inhabitants, situated on an island in the extreme north-east of Lapland. On the very eve of departure from this port a telegram let us know that the river-steamer "Phoenix," which we were to meet at Goltschieka, was aground; in consequence we were delayed for five weeks until a substitute could be sent out to ascend the river in its stead. On 5th September we left Vardø in the company of this steamer, but next day we were separated in a storm, and so arrived alone on the 11th at the Yugor Straits, the southernmost entrance into the Kara Sea.

After waiting there some days for our companion steamer, Wiggins steered his vessel into the Kara Sea, he rounded the drifted pack-ice, which, in that exceptional year, was abundant, and on 27th September (delays having made it useless to proceed farther) he shaped his course back towards Vardø. There we found our companion, the "Seagull," laid up for the winter, the crew having feared to proceed alone when separated from the "Labrador." After a short stay we steamed homeward, calling in at Tromsø on 14th October, Wiggins having navigated his vessel among the magnificent fiords of the Loffodens. We arrived in the Tyne on the 23rd of October.

Despite this unfortunate miscarriage of all plans, I had the opportunity to see something of the flora of the north-west of Siberia, and also that of the north of Lapland.

When we were anchored in, or near to, the Yugor Straits (lat. $69^{\circ} 40'$ N., long. 60° E.), during a few days in the middle of September, I was able to pay longer or shorter visits to the mainland. These were not so satisfactory as could have been desired, for drift-ice was in the neighbourhood, our stay was every day uncertain, and, finally, during the latter part of the time, the ground was covered by a heavy fall of snow, the frosts of winter having just commenced.

At three stations in Lapland I had hurried opportunities in which to botanise; at Vardø alone had I ample time to collect and to observe.

The stations in Lapland were:—

Kølle, August 1st and 2nd, lat. $70^{\circ} 55'$, long. $27^{\circ} 20'$ E.

Vardø, August 3rd to Sept. 5th, lat. $70^{\circ} 22'$, long. $31^{\circ} 10'$ E.

Vadsø, August 15th, lat. $70^{\circ} 5'$, long. $29^{\circ} 50'$ E.

Tromsø, October 14th, lat. $68^{\circ} 39'$, long. 19° E.

It is very necessary, if comparison be made between the collections from each station, to bear in mind any difference in the time of the year, or in the length of time spent at such. Thus had not winter arrived, or had our stay been for a longer time at Tromsø, much richer results would there have been forthcoming.

PHYSICAL FEATURES IN RELATION TO THE FLORA.

The two regions of northern Siberia and Lapland offer almost opposite physical characters, whether comparison be made at first sight in each case, or after more detailed examination.

Northern Siberia extends as an immense plain, which in summer is a vast network of ponds and marshes, such as defy the efforts of the traveller to cross them. This, the "tundra" region, is, however, interrupted immediately to the south of the Yugor Straits, by the outlying northernmost spurs of the Ural range, which, as insignificantly low hills, forming cliffs not 200 feet in height at the eastern entrance to the Straits, extend northwards into Waigatz Island and Novaya Zemlya.

Lapland, on the contrary, is essentially mountainous. Tromsø, the southernmost of the stations visited, is situated on an island in the midst of a noble fiord, around which are peaks, snow-covered throughout the year, and reaching, it is said, to a height of 5600 feet.

It is true that in the vicinity of Kølle, Vardø, and Vadsø there is no land higher than 600 to 800 feet above sea-level (on the island of Vardø itself there is none that exceeds 200 feet), yet at no great distance from these stations are the heights of the Loffodens to the S.W., and to the S.E. the noble range along the Murman shore.

It has been pointed out by Sir Joseph Hooker that there

are in Lapland more than twice as many species of Phanerogamæ as there are in Arctic Siberia. Yet although this is the case, and although the flora of Lapland is richer in species than is that of any other region within the Arctic circle, the general appearance of the country is much more bleak and barren than is that of the land about the Yugor Straits. Once you land in the north of Siberia, the poverty of species and the scantiness of the vegetation is apparent, especially so to one who has observed the vegetation of Lapland along the same parallels of latitude. There are not, however, the rocky crags and bare mountain tops as in Lapland, so that, surprised because of the apparently continuous covering of turf as seen from the ship's deck, Wiggins actually compares the appearance of Waigatz Island to that of the Isle of Wight. Seebohm speaks of the richness and beauty of the "tundra" flora. Dr Warming, quoting from Kjellman, in his resumé of *Grønlands Vegetation*, records the phrase *les champs des fleurs*, descriptive of the flora in North Siberia, but, for the regions bordering on the north coast, all such descriptions are fallacious. They may be applicable to regions warmer by 10° C., bordering on the Yenisei, to which doubtless Kjellman and Seebohm refer; they are not applicable to the monotonous expanses of sedge and grass which only in more favourable places are associated with gayer plants, *e.g.*, *Saxifraga*, *Pedicularis*, and *Polemonium*.

If we consider with a little more detail the physical features of the two countries, we shall be able at once to make a fairer comparison as to the vegetation in each, and we shall find that the comparative wealth or poverty of species is thus reconcilable with the known facts as to the physical characters and the climate. Although the rocky character of Lapland gives it a more barren and desolate aspect, yet very slight observation suffices to show its superiority to northern Siberia in the number and variety of the commonest plants, just as it is found to have a richer flora when all its native species are considered.

We may describe as typical of Lapland the nature of the country about Kølle, the first place on the mainland off which we anchored. There were recognisable certain well-

defined *areas*, each of which has its fairly characteristic plants, whether at Kølle, Vadsø, or Vardø.

I. Most common were the *exposed slopes* of the hill-side, where was but a scanty covering of peat, which generally appeared almost dry by reason of the excessive drainage and the great exposure to winds and sun. Here typically grow *Diapensia*, *Betula*, *Vaccinium*.

II. Not by any means so characteristic of the country, but commonly enough met with, were the *level places*—

- (a) Along the sides of the fiords, where generally is a sandy and well-drained subsoil, carpeted with turf, or—
- (b) In the higher valleys, where the soil is of peat, and more retentive of water. Here are the bogs and pools, with their wealth of *Carex*, *Vaccinium*, *Andromeda*, *Pedicularis*, *Pyrola*, *Bartsia*, &c.

III. Distinct enough in physical character and in characteristic plants are the *essentially rocky places*, those either (a) of the hill-top, where drainage and exposure are excessive, and where *Lichenes* alone flourish; or (b) those situate at the bases of the hills, where there is always a continuous supply of moisture, where there is afforded protection from winds, and where soil readily collects. This last is the resort *par excellence* of the widely distributed mountain and arctic species.

Compared with the above, the coast-region of the Yugor Straits shows an almost complete absence of the *areas* we have considered under I. and III. *Level places* are everywhere; and most commonly the levels are peat-bogs; there is little sand covered with turf except in isolated places along the rivers or the sea-shore. It is probable that the land of the Yalmal peninsula is more fertile, this being due to the nature of its subsoil, which is essentially a fine sand, washed down ages ago by the river Obi. But Yalmal land is exceptional; the cold blue clays derived from the shales, which, with a few outcrops of limestone, form the rocks about the Yugor Straits, give place only to dreary extents of water-logged peat-bogs; it is very rarely that naturally better drained and turf-covered tracts are to be met with about the Yugor Straits.

The peat is clothed (not sparsely perhaps) with *Carex*, *Eriophorum*, and species of *Poa* and *Glyceria*, for the most

part arising from an almost continuous sheet of *Amblystegium uncinatum*, *Sphagnum*, *Jungermannia*, &c.

About the Yugor Straits such slight elevations as occurred were but poorly representative of the Lapland hill region (I.); scattered rocks covered with *Lichenes* were noticeable here and there, but the sole place characterised by the plants of the *rocky area* (III.) was the more or less continuous extent of gravel or sand which formed the beach. In the drier places upon the slopes of the low cliffs, and bordering the wide river-beds, wherever indeed the shales were not covered by a marsh or peat soil, the commonest plant was *Dryas octopetala*; among the rough network of this were many plants preferring a comparatively well-drained habitat.

The soils and subsoils are perhaps only of much importance, in so far as their mechanical structure allows of, or prevents, the rapid passage away of the great amount of surface water consequent upon the melting of the snows.

The following lists may serve to indicate roughly the common plants which inhabit more or less closely the different *areas*:—*Cochlearia*, *Arenaria peploides*, *Stellaria media*, *Saxifraga rivularis*, *Matricaria*, and *Mertensia maritima* were commonly noticed along the shore.

Upon the exposed hill slopes (I.) were oftenest—*Cerastium*, *Potentilla*, *Antennarium dioica*, *Gnaphalia*, *Vaccinium*, *Pyrola*, *Loiseleuria*, *Arctostaphylos*, *Diapensia*, *Betula nana*, *Empetrum*, *Salix* sps., *Luzula* sps., *Carex* sps., *Juniperus*, and often many *Lichens* growing among the shrubby prostrate stems.

Upon level turfy places [II. (a)]:—

Ranunculus <i>sps.</i>	Pinguicula.
Thalictrum.	Trientalis.
Cardamine.	Polygonum viviparum.
Viola biflora.	Veratrum.
Cerastium.	Juncus <i>sps.</i>
Geranium sylvaticum.	Eriophorum.
Alchemilla.	Carex <i>sps.</i>
Parnassia.	Alopecurus pratensis.
Epilobium.	Deschampsia, Festuca and
Angelica.	Poa <i>sps.</i> , &c.

In more boggy and peaty places [II. (b)]:—

Caltha palustris.
Viola palustris.
Cerastium trigynum.
Montia fontana.
Rubus Chamæmorus.
Potentilla Comarum.
Epilobium.
Cornus suecica.
Vaccinium uliginosum.

Oxycoccus palustris.
Andromeda polifolia.
Pyrola minor.
Bartsia alpina.
Pedicularis sps.
Salix sps.
Tofieldia palustris.
Habenaria viridis.
 &c.

In the richer rocky areas [III. (b)]:—*Ranunculus* sps., *Draba* sps., *Cerastium*, *Stellaria*, *Sagina*, *Vicia*, *Alchemilla*, *Potentilla procumbens*, *Saxifraga stellaris*, *S. cæspitosa*, *S. rivularis*, *Sedum Rhodiola*, *Epilobium*, *Linnaea*, *Cornus*, *Saussurea*, *Solidago*, *Gnaphalium*, *Hieracium*, *Euphrasia*, *Pyrola*, *Veronica alpina*, *Trientalis*, *Oxyria*, *Salix* sps., *Veratrum*, *Cystopteris*, *Polypodium*, &c.

In the driest and most exposed positions persisted most commonly *Rumex Acetosella*, *Rubus Chamæmorus*, *Luzula spicata* and *L. hyperborea*, *Festuca ovina* vars.

The *climate* of the two countries deserves attention, although in this case it has probably less influence upon distribution than results from the difference in physical character; we may note that although the dissimilarity of winter temperatures is considerable, yet owing to the heavy covering of snow it is not the extremes of winter, but the slighter variations during the short summers, which are likely to be effective. Summer-isotherms may be drawn approximately parallel to lines of latitude, yet where, as at the Yugor Straits, a large amount of drift ice may often accumulate, the temperature is undoubtedly lowered: thus it is probable that the summer mean for the Yugor Straits is a few degrees lower than it is in the same latitude both east and west. Seebohm judges that the mean for summer will be about 5° C., whereas the mean for regions due east on the Yenisei is nearly 15° C. Nordenskiöld recorded in 1876, in the middle of August, a maximum temperature of 20° C. at Goltschieka; but two weeks later, with winds from the ice-floes to the north, the temperature was only 1°·3 C.!

During September, when we were anchored in the Straits, 5° C. was recorded once, with southerly winds; the mean of the readings taken by us was 1°·5 C.; whilst -2° C. was

recorded when we were amongst the ice-floes. Berghause calculates the mean January temperature for the Yugor Straits to be -20° C.

It was very evident that, as we proceeded eastward from the North Cape, the temperature of the air (consequent upon that of the water) fell to a noticeable degree; the fall was rapid as we approached the coast of Novaya Zemlya and the shores of the Yugor Straits, about which was abundant drift ice. Signs of the (unusual) cold existed on shore, where *Armeria sibirica*, to mention but one instance, had generally its flower stalks nipped by the frost, instead of developing seed as we should assume would be normal to it even there.

Although at the time of our visit to the Yugor Straits there was only slight evidence of the flow so far to the north-east of the warm Atlantic current, yet the extreme west of Siberia and the islands of Novaya Zemlya clearly gain something from its influence.

But it is in Lapland that its effects are so remarkably evident in producing a mean winter temperature which is not lower than that of Chicago or of the south of Russia; from the same cause, whilst in identical latitudes along the shores of Greenland the summer temperature averages only a degree or two above the freezing point, the shores of Lapland enjoy an average of $+8^{\circ}$ C. to $+10^{\circ}$ C.

The average of temperatures recorded at Tromsø and at Vardø are as follows:—

Tromsø mean in winter	$-3^{\circ}6$ C.;	in summer	$+10^{\circ}2$ C.
Vardø	„	$-5^{\circ}5$ C.;	„ $+8^{\circ}0$ C.

Our stay at Vardø during the summer was of sufficient duration to show us that the temperature is a conspicuously even one. During five weeks the variation between the recorded maximum and minimum was only from 13° C. to 6° C.; the average for the last week in August, with predominantly southerly winds, was a little above 10° C.

That we may roughly be able to compare these conditions with those which obtain in our own neighbourhood, I annex the following statistics, from the official reports for 1886-7:—

Leith, mean for Nov. and Dec. 1886,	=	$+4^{\circ}3$ C.
„ Summer 1887,	=	$+14^{\circ}3$ C.

The apparent difference is slight, and indeed we only realise its full import when we observe that in Lapland and at the Yugor Straits the mean (in summer at least) is derived from slight extremes, in the British Isles often from very pronounced ones.

A very important condition is that consequent upon the high latitude of these regions, where assimilation and growth are possible for a period extending more or less continuously over three to five months, and where, in the winter, the plant lies inactive for a much longer time than is the case in lower latitudes.*

OBSERVATIONS UPON COLLECTIONS IN LAPLAND.

The commoner plants observed in Lapland were almost without exception present at each station except at Vardø, where the restricted area of the islands does not afford a suitable habitat for several of the species.

At Tromsø was the most extensive flora; due to its more southerly position, its neighbourhood to rich mountain areas, and its small belts of birch trees (among which are also *Salix* and *Pyrus Aucuparia*). Our stay was so short at this place, and the season was so far advanced that I was able to observe very inadequately. I noticed, however, the following commoner plants not met with at the more northerly stations:—

<i>Viola sylvatica.</i>	|	<i>Galium boreale</i> ?
<i>Lotus corniculatus.</i>	|	<i>Gnaphalium sylvaticum.</i>
<i>Saxifraga oppositifolia.</i>	|	<i>Calluna vulgaris.</i>
„ <i>aizoides.</i>	|	<i>Veronica officinalis.</i>
<i>Heracleum sibiricum.</i>	|	„ <i>serpyllifolia.</i>
<i>Ænanthe sp. ?</i>	|	<i>Plantago major.</i>

Many species, also found in the north of Lapland, were here much more luxuriant and vigorous. This was especially noticeable in the following:—*Thalictrum*, *Cochlearia*, *Capsella*, *Lychnis diurna*, *Vicia*, *Geum*, *Alchemilla vulgaris* (which also

* More detailed accounts of the conditions affecting the drift-ice in the Kara Sea, and also a record of temperatures observed during the voyage of the "Labrador," have been published in the Magazine of the *Scottish Royal Geographical Society*, April 1889; and in the *Proceedings of the Scottish Meteorological Society*, 1889.

was extremely abundant near to the houses), *Solidago*, *Matricaria*, *Achillea*, *Gentiana*, *Euphrasia*, *Urtica*.

It is more than probable that many plants have in my somewhat hurried excursions been overlooked, but those mentioned from Vardø, Kølle, and Vadsø may be not only sufficient evidence that the flora of northern Lapland is not by any means so extensive as is that to the south, but also when a plant has been noticed as occurring in each of these districts it is likely to be common throughout the northern part of the country.

At Kølle I was able to traverse more ground, and on that account see a more varied flora than elsewhere. Bushes of *Salix Myrsinites* and *S. lanata*, from 3 to 4 feet in height, were not uncommon in the warmer and less exposed places. Four plants growing near together of *Pyrus Aucuparia*, which, however, were not a foot in height, were the only other signs of "trees." A bush, which I have no doubt was *Sambucus nigra*, was growing to a height of 4 feet or so among the scattered rocks of a warm cliff facing south. It was in full flower, and easily recognised as an "Elder" by Mr Sulman, a non-botanical friend, who was with me. I was not aware as to the restricted distribution of this shrub, or I should certainly have secured specimens, and not have hurried past in answer to a summons from the whistle of the "Labrador."

There was a quite noticeable difference between the number and variety of plants to be found on slopes facing the south, which were so protected from the northerly winds, and the number of those growing in exposed places.

The plants frequenting the sheltered valleys were as opposed in character as in habitat to those frequenting the exposed slopes. The prostrate woody lichen-covered stems and the closely-set small persistent leaves of *Loiseleuria*, *Empetrum*, *Phyllodoce*, and *Diapensia*, of *Vaccinium*, *Betula*, and *Juniperus* contrast markedly with the more tender deciduous leaves of such plants as *Veratrum*, *Angelica*, *Alchemilla*, *Trollius*, *Caltha*, *Geranium sylvaticum*, &c. The leaves of the latter are produced immediately after the melting of the snows, and when autumn approaches the plant dies back into a small "crown" or resting state, in which form it may best withstand the winter. A large pro-

portion of the plants are those which are able thus to retreat into the smallest possible compass before the long winter sets in. It is, however, worth notice that it is not those plants which inhabit the valleys, and are therefore protected by the early snow, but those frequenting the exposed wind-swept slopes, that are characteristic of the country.

At Vadsø, on the northern shores of the Varanger Fiord, was a more extensive tract of marsh-land than at the other stations, which yielded distinctively *Viola palustris*, *Sedum palustre*, *Oxycoccus palustris*, *Pedicularis sceptrum-carolinum*, *Myosotis sylvatica*, *Salix lapponum*, *Tofieldia*, also *Pyrola secunda* and *Linnæa borealis*.

Lycopodia were more abundant than elsewhere. *Salix* sps. grew in considerable numbers in a sheltered valley, where also were *Spiræa Ulmaria*, *Geranium sylvaticum*, and *Trollius* in great profusion. There were no trees, except a few birch in one of the small gardens, *Pyrus Aucuparia* and (a sp. of *Pinus*?). We heard that they were plentiful on the south side of the Varanger Fiord, where the mountains of Russian Lapland afford a rich field for the botanist. *Polemonium cœruleum*, var. *grandiflorum*, and *Arenaria lateriflora*, were sent from this locality by Miss Clarke, an accomplished local botanist.

As is to be expected, there are several plants common to Lapland which were absent from the flora of the islands of Vardø, the reason for which may be seen, not so much in its separation from the mainland, as in its restricted area. The straits which cut it off from the mainland are not a couple of miles in width, and it would be easy for seeds to be blown or washed across; but the limited area of the islands does not allow of any extensive peat-bogs, nor are there the exposed slopes which were noticed at Kølle and Vadsø, as the home of *Diapensia*, *Betula*, &c.

The commonest of these plants absent from Vardø are enumerated below; they are perhaps absent mostly from lack of marsh-land or sheltered places:—

Trollius europæus.	Oxycoccus palustris.
Geum rivale.	Andromeda polifolia.
Rubus saxatilis.	Pyrola sps.
Alchemilla alpina.	Veronica alpina.
Hieracium sps.	Bartsia alpina.

Melampyrum.	|	Veratrum album.
Pedicularis <i>sps.</i>	|	Polypodium <i>sps.</i>
Salix lapponum.	|	Cystopteris.
Orchis maculata.	|	Equisetum <i>sps.</i>

Also (from lack of extensive drier slopes)—

Phyllodoce cærulea.	|	Betula tortuosa.
Arctostaphylos alpina.	|	Juniperus nana.
Diapensia lapponica.	|	Lycopodium.
Betula nana.	|	

The following have been noticed by Landmark or myself, but with the very rarest occurrence; nor were the last few species at all commonly distributed on the mainland:—

Vaccinium Vitis-Idæa.	|	Loiseleuria procumbens.
„ uliginosum.	|	Habenaria viridis.
Pyrola minor.	|	Allium sibiricum.
—		
Dryas octopetala.	|	Campanula rotundifolia.
Adoxa Moschatellina.	|	Myosotis <i>sps.</i>

On the other hand, there are to be found several plants, of which (doubtless only for lack of time) no trace was seen at the stations on the mainland, *e.g.*, *Primula stricta* and *Botrychium Lunaria*.

A species of *Carex*, found on the smallest island of the group, deserves more attention. This island is one especially kept by the Government for the breeding of Eider-ducks, and in consequence is the home of a large number of sea-fowl, from which cause its soil is exceptionally enriched. In all the more sheltered places on this island, the vegetation is extremely luxuriant, with masses especially of *Lychnis diurna*, *Rubus Chamæmorus*, *Caltha palustris* (specimens with leaves 7 inches in diameter), *Rumex Acetosa*, *Epilobium angustifolium*, *Spiræa*.

In a sheltered position at the base of a slight cliff in the centre of the island were several clumps of a comparatively large and graceful species of *Carex* growing in a loose turf; its habit appeared distinct from any I had previously collected in Lapland. Messrs C. B. Clarke and Arthur Bennett have seen sufficient reason to consider this a new species. As it is at least a matter for surprise that Swedish botanists should have overlooked a form so evidently distinct, I think it is quite probable that Pastor Landmark

(who has so carefully collected upon the Vardø islands) may have gathered this form and regarded it as *C. norvegica*; for this name appears in his list. It may possibly be that, from the very fact that access to the island is withheld by Government, the plant has been overlooked by botanists visiting Vardø, but I cannot think otherwise than that specimens in certain of the Swedish collections will be discovered approximately identical with mine. If this does not prove to be the case, the extreme rarity of Clarke and Bennett's species—which certainly as far as the islands of Vardø are concerned is restricted to this one alone—naturally attracts attention to the exceptional conditions of its habitat. The soil was unusually rich, the exact habitat of the few tufts was not only sheltered, but the near cliff probably affords an almost continuous shade in the months when the sun's altitude is greatest. Perhaps other instances of similar variation under such conditions may be forthcoming; at present there is no proof, only the suggestion, that the diagnostic features have any especial relationship to the habitat.*

Messrs Clarke and Bennett's description is as follows:—

Carex Sewellii, Arth. Bennett et C. B. Clarke. Sp. nova; spicis 3-6, in apice culmi approximatis, sessilibus, erectis, terminali basi mascula; glumis late ovatis, obtusis, nitidis, castaneis conspicue albo-marginatis; stylo 2-fido aut 3-fido; utriculo ellipsoideo acuminato rostrato. See Plate VIII.

C. lagopinae et *C. heleonasti* proxima, differt glumis magis obtusis, late scarioso-marginatis, spiculis erectis, utriculo rostrato. [C. B. Clarke, Jan. 1889.]

Specimens in herbaria of Edinburgh and Kew; also with Mr C. B. Clarke, Mr Arthur Bennett, and Professor Blytt.

By far the richest locality on the main island of Vardø is an extent of turf covering what is evidently a raised sea-beach. The pebbles and sandy soil underlying this turf have been protected by a considerable crag to the north-west, giving us a small illustration of "crag and tail"

* Professor Blytt, to whom I sent a specimen of this *Carex*, writes, August 21:—"It seems, however, to me to be only a luxuriant form of *C. lagopina*, caused by the exceptionally fertile locality in which it was found."

Mr Baker considers the differences insufficient to require a new species.

formation. It is upon this "tail," about the houses of the port and the whaling stations, that there have been enclosed small fields, which have evidently been manured and enriched by the sowing of grass seed. Towards the end of August we observed a small crop of hay cut from these few meadows, and spread out to dry on hurdles or "perches," after the manner common in many mountain regions.

This attempt at cultivation has from time to time introduced plants into the island, which have lasted, it may be, only for one year, and then succumbed under the influence of the long-continued winter.

The names of several such plants occurring in the MS. list of Pastor Landmark, kindly shown to me by the present Pastor Johanneson, are given below :—

Barbarea vulgaris, *R. Br.*

Erysimum hieracifolium, *L.* (1 specimen).

Brassica campestris, *L.*

Camelina sativa, *L.* (1 specimen).

Githago segetum, *Desf.* (only produced buds).

Linum sp.

Trifolium pratense, *L.* (1 specimen).

Potentilla norvegica (1 specimen).

Achillea Ptarmica, *L.*

Galeopsis Tetrahit, *L.*

„ *versicolor*, *Curt.* (These two species came up very plentifully in a meadow in 1858.)

Myosotis sylvatica (2 specimens).

Plantago major, *L.* (2 specimens).

Polygonum lapathifolium, *L.*

„ *Convolvulus*, *L.*

Euphorbia Helioscopia, *L.* (2 specimens).

Chenopodium album, *L.* (2 specimens in 1858).

Urtica urens, *L.* (1 specimen).

It is probable that several species at present found in the cultivated land or about the houses may have been artificially introduced. There are several which are not found in the more remote valleys, but only near to the Norwegian settlements. They, however, exist in sufficient quantity to warrant the supposition that they have become thoroughly naturalised.

It was with some surprise that we noticed in the windows of many of the houses in the various towns and hamlets quite a bright display of our common garden and green-

house flowers. The colour was rich, and the abundance of the flowers was not short of what is common in our own country. The low wooden houses, warmed by pipes and without gas, are doubtless very suitable for plants. The following list does not, by any means, include all the species observed. In one room alone there were as many as forty species growing in a healthy manner; in some rooms large festoons of ivy were noticed. The seeds of many are obtained from Archangel; in other cases the merchants' wives bring special favourites from Bergen and Christiania, where many spend the winter. We observed especially:—*Aralia*, *Begonia*, *Bellis*, *Cactus*, *Calla*, *Campanula*, "*Carnation*," *Convolvulus*, *Delphinium*, *Dianthus*, *Dracæna*, *Echeveria*, *Epiphyllum*, *Fuchsia*, *Geranium*, *Hedera*, *Helianthus*, *Hesperis*, *Iberis*, *Impatiens*, *Jasminum*, *Mesembryanthemum*, *Mimulus*, *Omphalodes*, "*Palm*," *Petunia*, "*Roses*," *Saxifraga*, *Sedum*, *Tradescantia*, *Vallotta*, *Veronica*, *Vinca*, *Viola*.

In the outside gardens were *Aconitum*, *Bellis*, *Beta*, *Delphinium*, *Lunaria*, *Tanacetum*, and some coarse species of *Umbelliferae*, also lettuce, turnip, and cabbage.

Ferns were noticeably luxuriant on the small island near the entrance to the harbour, where the soil is enriched by the droppings of countless sea-birds. *Aspidium spinulosum* var. *dilatatum*, and here and there *Athyrium alpestre* were the only species. *Botrychium Lunaria* of small habit was growing in the short turf on the main island.

Cystopteris, *Polypodium* *Dryopteris* and *P. Phegopteris* were not present on the island, although common on the mainland. Similarly, there was only a starved *Equisetum arvense* and *Selaginella selaginoides*.

Mosses were abundant enough, although not quite so characteristic as might have been anticipated. Mr William Mitten calls attention to *Oreoweisia serrulata*, Tunk., of which he has elsewhere seen no record from a locality so far north, although all the other species have previously been recorded. My collection of these is doubtless very imperfect. I would, however, direct attention to the predominance of *Amblystegia*, which in every small pond and damp place were sure to abound.

The following were observed:—

Dicranum scoparium, <i>Hedw.</i>	Stereodon patientiæ (<i>Lindb.</i>)
" fuscescens, <i>Turn.</i>	Hylocomium Schreberi (<i>Willd.</i>)
Oncophorus Wahlenbergii,	" splendens (<i>Dill.</i>)
<i>Brid.</i>	Leskea catenulata (<i>Brid.</i>)
" virens, <i>Brid.</i>	Amblystegium uncinatum
Ceratodon purpureus, <i>Brid.</i>	(<i>Hedw.</i>)
Oreoweisia serrulata (<i>Tunk.</i>)	" fluitans, <i>Dill.</i>
Rhacomitrium lanuginosum	" sarmentosum
(<i>Dill.</i>)	(<i>Wahl.</i>)
Syntrichia ruralis, <i>Brid.</i>	" cordifolium
Aulacomnion palustre, <i>Schw.</i>	(<i>Hedw.</i>)
Splachnum sphaericum, <i>Linn. f.</i>	" stramineum
Webera nutans, <i>Hedw.</i>	(<i>Dicks.</i>)
" albicans, <i>Schimp.</i>	Camptothecium nitens (<i>Schreb.</i>)
" cruda, <i>Schimp.</i>	Brachythecium reflexum, <i>W.</i>
" cucullata, <i>Schimp.</i>	<i>et M.</i>
Leptobryum pyriforme, <i>Schimp.</i>	Pogonatum alpinum, <i>Brid.</i>
Bryum pendulum (<i>Hsch.</i>)	Polytrichum juniperinum, <i>Hedw.</i>
" inclinatum (<i>Sw.</i>)	Sphagnum acutifolium, <i>Ehrh.</i>
" calophyllum, <i>Brown.</i>	" subsecundum, <i>Nees</i>
" purpurascens (<i>Brown.</i>)	<i>et Hsch.</i>
" turbinatum (<i>Hedw.</i>)	Jungermannia barbata, <i>Schreb.</i>
Mnium hornum, <i>Dill.</i>	Martinellia irrigua (<i>Nees.</i>)
" affine, <i>Bland.</i>	Chiloscyphus polyanthos (<i>L.</i>)
Timmia Megapolitana (<i>Hedw.</i>)	Cephalozia bicuspidata, <i>Dumort.</i>
Philonotis fontana (<i>L.</i>)	Kantia trichomanis, <i>Gray.</i>
Plagiothecium denticulatum	Blepharozia ciliaris, <i>Dumort.</i>
(<i>Dill.</i>)	Marchantia polymorpha, <i>L.</i>
" turfaceum, <i>Lindb.</i>	

In addition to some of the foregoing, *Mnium punctatum* (*L.*), *Hylocomium triquetrum* (*L.*), *H. squarrosus* (*L.*), and *Brachythecium rutabulum* (*L.*), were observed at Tromsø.

Such fresh-water *Algæ* as were obtained have not yet been carefully examined. There were on the island of Vardø and at Kjølle several species apparently not British, but *Spirogyra* sps. *Edogonium*, *Oscillatoria*, *Ulothrix*, *Lyngbia*, and *Cladophora* were not uncommon. A few Diatoms, as *Eunotia*, *Diatoma*, *Pinnularia*, and also *Closterium*, were obtained.

Fungi were apparently scarce. I observed a few species of *Agaricus*, also a *Uredo*-like parasite on *Salix* sps., and some others which I did not collect.

Lichenes, of course, were plentiful on rocks and upon stems of the prostrate shrubby plants in certain localities. They

were not so characteristic a feature as I had expected would be the case. W. H. Wilkinson, Esq. of Birmingham, has kindly taken in hand this difficult group.

Marine Algæ were doubtless numerous enough in the neighbourhood of Vardø, despite the steeply sloping shores, but for lack of experience in the collecting of these, I obtained but a poorly representative number of species. These Mr G. W. Traill of Joppa has very kindly named for me as follows:—

Bryopsis plumosa, <i>Lx.</i>	Fucus nodosus, <i>L.</i>
Chorda lomentaria, <i>Grev.</i>	" serratus, <i>L.</i>
" filum, <i>Lx.</i>	" vesiculosus, <i>L.</i>
Chordaria flagelliformis, <i>Ag.</i>	Halosaccion ramentaceum, <i>Ag.</i>
Chondrus crispus, <i>Lx.</i>	forma densa, <i>Kjellman.</i>
Cladophora rupestris, <i>Kutz.</i>	Laminaria digitata, <i>Lamx.</i>
Dictyosiphon fœniculaceus,	Polysiphonia arctica, <i>Ag.</i>
<i>Grev.</i>	" urceolata, <i>Grev.</i>
Desmarestia aculeata, <i>Lx.</i>	" fastigiata, <i>Grev.</i>
" viridis, <i>Lx.</i>	Porphyra laciniata, <i>Ag.</i>
Dumontia filiformis, <i>Grev.</i>	Ptilota plumosa, <i>Ag.</i>
Ectocarpus granulosus, <i>Ag.</i>	Rhodophyllis dichotoma, <i>Gobi.</i>
" littoralis, <i>Lyngh.</i>	Rhodymenia palmata, <i>Grev.</i>
Enteromorpha compressa, <i>Grev.</i>	Spongomorpha arcta (<i>f. typica</i>),
Euthora cristata, <i>Ag.</i>	<i>Kutz.</i>
Fucus canaliculatus, <i>L.</i>	Ulva latissima, <i>L.</i>

With the exception of *Rhodophyllis dichotoma* and *Polysiphonia arctica*, the above *Algæ*, Mr Traill remarks, are indigenous to the eastern coast of the United States of America, where they are generally of luxuriant growth. Their presence in such a high latitude as that of the North Cape is attributed to the influence of the Gulf Stream. The specimens examined are mostly identical in appearance with specimens of the same species found on our own coasts. The form of *Halosaccion ramentaceum* is, however, extremely robust and proliferous, and is so different in aspect from the typical plant, that one might almost be tempted to call it a distinct species. This genus, however, like our *Gelidium corneum*, assumes different forms according to the locality in which it occurs, and after a comparison of many specimens, there can be no doubt that they belong merely to a somewhat individualised form; Mr Foslie of Tromsø identifies them as plants of the second year belonging to the *forma densa* of Kjellman.

OBSERVATIONS UPON COLLECTONS AT THE YUGOR STRAITS.

At the Yugor Straits we were at first sight impressed with the widely different character of the vegetation. The plants were growing less closely together, there was less variety of species, the general habit of many that we had observed in Lapland was reduced or dwarfed. Thus *Salix* sps. did not exceed a foot in height, instead of forming bushes of 3 to 4 feet. *Caltha*, *Dryas*, *Ranunculus*, also *Vaccinium uliginosum* and *Rubus Chamæmorus* were noticeably different.

A little examination on shore showed quickly that many plants observed in Lapland were absent; it was a long time before we realised that the probable cause of this was to be found in the very distinct nature of the land. We would insist on this dependence upon physical features somewhat strongly, because (as may be seen by reference to the tables in the Summary) most of these plants, so noticeably absent from the shores of the Yugor Straits, are known to be distributed through Western Siberia.

Before giving more detailed attention to these absent forms, we may refer to the essential differences in physical features.

Exposed slopes (Area I. in Lapland) are wanting from the region immediately south of the Straits; the *Vaccinia*, *Arctostaphylos*, *Empetrum*, *Juniperus*, *Diapensia*, are therefore absent; *Betula nana* is certainly not at all common, though reported from that region in the account of the voyage of "Dijnpha;" *Lycopodia* similarly are absent, or, as is the case with *Lycopodium Selago*, uncommon.

Nor are *rocky places* (Area III. in Lapland) present. The sandy sea-beach is the only equivalent where alone most of the plants characterising this area were found. A few scattered boulders upon the "tundra" were covered with *Lichenes*, which, however, are more conspicuously absent than would be expected.

The characteristic feature is of course the "tundra,"—*level extents* (Area II. in Lapland), only very rarely exhibiting a turf over sandy tracts, and commonly consisting of peaty bogs and pools or ponds of large size. Here is to be found typically a monotonous vegetation, spread probably for thousands of miles over the northern part of the country.

Carex aquatilis, *C. rotundata* and other species, *Eriophorum*, and certain coarse grasses, grow in wearisome sameness out of the swamps, or from amongst carpets of *Amblystegium*, *Sphagnum*, and *Jungermannia*. These may be dotted over with *Caltha* and *Pedicularis*, whilst very commonly, where there is the slightest drainage afforded by sloping ground, *Polemonium*, *Saxifraga cernua*, *S. Hirculus*, *S. hieraciifolium*, *Chrysosplenium*, and often *Salix lanata*, or *S. glauca*, are to be met with.

In certain isolated places, as upon old river banks covered with peat and exposed to the south, were gayer plants, some of which were not observed in Lapland. Such were *Astragalus*, *Oxytropis*, *Senecio* (*Cineraria*), *Arnica*, *Myosotis*, *Draba* sps., and *Lloydia serotina*.

Marly places, along the edge of the low cliffs or about the river banks, were most characteristically clothed with *Dryas octopetala*, which spread in great tufts as one continuous network, in which were to be found *Saxifraga* sps., *Androsace*, *Draba* sps., *Papaver nudicaule*, and indeed almost every one of the plants requiring a drier habitat. These grew, not in the bare spaces between the network of *Dryas*, but out from amongst its prostrate stems, as if there alone could the young seedlings find protection sufficient to nurse them into maturity.

Very abundant on slopes of the low cliffs were *Saxifraga cernua*, *S. oppositifolia*, and *Draba* sps. (not met with in the north of Lapland); also *Cochlearia*, *Silene acaulis*, and *Sedum Rhodiola*. Often too, as on the drier beaches, several species of *Salix* grew in profusion, where also many of the plants not found by me in Lapland were observed; such, for instance, were *Lychnis apetala*, *L. affinis*, *Arenaria norvegica*, *Adoxa*, *Artemisia borealis*, *A. vulgaris*, *Armeria*, *Androsace*, *Polemonium pulchellum*, and *Lloydia serotina*.

A glance at the Summary will show what were the plants found at the Yugor Straits exclusively. Many of these are, however, native to Lapland.

Without making an exhaustive list of absentees, we may enumerate the following commoner plants which occurred in Lapland, but of which no signs were seen at the Yugor Straits:—*Trollius europæus*, *Viola biflora*, *V. palustris*, *Lychnis diurna*, *Sagina* sps., *Montia fontana*,

Geranium sylvaticum, *Empetrum nigrum*, *Trifolium repens*, *Vicia Cracca*, *V. hirsuta*, *Spiræa Ulmaria*, *Rubus saxatilis*, *Geum rivale*, *Potentilla procumbens*, *Alchemilla* sps., *Sedum acre*, *Epilobium* sps., *Anthriscus sylvestris*, *Ligusticum scoticum*, *Archangelica officinalis*, *Linnæa borealis*, *Cornus suecica*, *Valeriana sambucifolia*, *Carduus heterophyllus*, *Sonchus alpinus*, *Saussurea alpina*, *Solidago Virgaurea*, *Gnaphalium* sps., *Antennaria* sps., *Hieracium* sps., *Melampyrum*, *Rhinanthus*, *Campanula rotundifolia*, *Vaccinium Myrtillus*, *V. Oxycoccus*, *Andromeda polifolia*, *Arctostaphylos alpina*, *Calluna vulgaris*, *Phylloce cærulea*, *Loiseleuria procumbens*, *Sedum palustre*, *Pyrola* sps., *Diapensia lapponica*, *Menyanthes trifoliata*, *Mertensia maritima*, *Veronica* sps., *Bartsia alpina*, *Euphrasia officinalis*, *Plantago major*, *Pinguicula vulgaris*, *Trientalis europæa*, *Polygonum Aviculare*, *Rumex* sps., *Urtica dioica*, *Orchis maculata*, *Triglochin* sps., *Tofieldia palustris*, *Juniperus communis*, var. *nana*, *Lycopodium* sps., *Aspidium* sps., *Polypodium* sps., and *Cystopteris fragilis*. The species of *Salix* were different; many of the commonest species of *Carex* were absent.

To place these facts in another manner, we may say that out of 110 of the commonest species observed during the voyage of the "Labrador" in the extreme north of Lapland, or upon the coast of the Yugor Straits, only 25 were found in the two countries; 20 species were distinctive of Siberia, whilst 65 were absent from the shores of the Yugor Straits, though present in identically the same latitude in Lapland.

It is more than probable that some of the above-mentioned plants are prevented from reaching the northernmost shores of Siberia by reason of the greater cold; it is certain that a few are absent because no cultivation of land is attempted or possible, but a glance at the above list will show that rock-loving species (those of Area III.) are the ones most conspicuously wanting. Certain of these, as will be seen on comparison with the list given in the Summary of all species known from Novaya Zemlya, are found in the more rocky places along the coasts of that island, whilst the greater number are known from the Urals or from Siberia farther to the east and south. We may notice that some of them occur in the following list of plants collected near Turukansk, a town on the east bank of the Yenisei, within

the Arctic circle. The collection was brought to this country by Mr H. N. Sullivan: it is probably not by any means adequately representative of the country, but it suggests a richer flora by far than that found in the colder regions about the Yugor Straits:—

Ranunculus acris, *Trollius europæus*, *Aconitum Napellus*, *A. lycoctonum*, *Caltha palustris*, *Nasturtium terrestre*, *Erysimum cheiranthus*, *Cardamine pratensis*, *C. macrophylla*, *Geranium pratense*, *Epilobium angustifolium*, *Cerastium dahuricum*, *Stellaria radians*, *Silene graminifolia*, *Trifolium repens*, *T. lupinaster*, *Vicia Cracca*, *Lathyrus pratensis*, *Sanguisorba*, *Alchemilla vulgaris*, *Geum urbanum*, *Potentilla anserina*, *P. multifida*, *Rubus arcticus*, *R. Chamæmorus*, *Spiræa Ulmaria*, *Empetrum nigrum*, *Heracleum*, *Cenanthe crocata*, *Galium boreale*, *Valeriana officinalis*, *Saussurea*, *Carduus*, *Solidago Virgaurea*, *Anthemis tinctoria*, *Achillea Millefolium*, *Tanacetum vulgare*, *Artemisia vulgaris*, *Senecio sarracenicus*, *Ledum palustre*, *Vaccinium uliginosum*, *Polemonium cœruleum*, *P. pulchellum*, *Myosotis palustris*, *Veronica longifolia*, *Pedicularis compacta*, *Mentha arvensis*, *Lamium album*, *Polygonum Aviculare*, *P. viviparum*, *Rumex Acetosella*, *Chenopodium album*, *Veratrum album*, *Allium Schœnoprasum*, *Carex glauca*, *Eriophorum vaginatum*, *Alopecurus pratensis*, *Poa pratensis*, and *Bromus erectus*.

If we refer to the Summary, it is evident from the present collection and from those made by previous travellers, that whilst most of the Phanerogamæ collected in Lapland are known as common to Siberia, they do not push so far to the north in the latter country as in the former. Whilst many are present in Russian Lapland, the low-lying land from the Petchora to the White Sea affords no suitable foothold which would allow of their distribution eastward along the same line of latitude; the difference in the physical nature of the region of the Yugor Straits, and the greater cold thereabouts, are evidently the chief causes which restrict the distribution of these common Arctic plants, but it is not possible to say, without careful study of the distribution of each species, what prominence must be given to one or the other.

It is a subject of much interest to study as to the further distribution of many of the species enumerated in the various tables. We shall see that a very large proportion

are known from the mountain regions of our own country, and I have before me a list of plants collected by Mr Henry Tuke Mennell, F.L.S., during a single day spent (in a lower latitude) among the Rocky Mountains. Out of this list of about 170 species there are rather more than 70 genera, and between 60 and 70 species which are identical with those found in Lapland or about the Yugor Straits. Very complete knowledge as to the further distribution of the plants here enumerated may be obtained from Dr Warming's supplement to his *Grønlands Flora*, and from the older, yet more perfect, monograph by Sir Joseph Hooker.

The "Labrador" collections afford a very striking instance of the fact emphasised by Sir Joseph Hooker, that it may be exceedingly misleading to judge as to the distribution of Arctic plants from records of isolated floras, and it is only possible to treat the facts recorded in the accompanying Summary from the point of view of *local floras*.

The list of Musci, &c., from the shores south of the Yugor Straits which is here given must not be considered by any means as an exhaustive one. They were far from scarce, and it is not probable that I obtained other than a representative collection of the very commonest. The species here enumerated were almost without exception from marshy places:—

Swartzia capillacea, <i>Hedw.</i>	Amblystegium uncinatum, <i>Hedw.</i>
Dicranum scoparium, <i>Hedw.</i>	Campylium stellatum (<i>Schreb.</i>).
„ fuscescens, <i>Turn.</i>	Camptothecium nitens (<i>Schreb.</i>).
Aulacomnion palustre, <i>Schw.</i>	Brachythecium glareosum, <i>B.</i>
Paludella squarrosa (<i>L.</i>).	& <i>S.</i>
Meesia tristicha, <i>B. & S.</i>	Brachythecium cirrhosum (<i>Schw.</i>)
Tetraplodon urceolatus, <i>B. & S.</i>	Sphagnum acutifolium, <i>Ehrh.</i>
Webera nutans, <i>Hedw.</i>	Jungermannia minuta, <i>Crtz.</i>
Leptobryum pyriforme, <i>Schimp.</i>	Gymnocolia inflata, <i>Dumort.</i>
Mnium hymenophyllum, <i>B. & S.</i>	Blepharostoma trichophylla, <i>Dumort.</i>
Stereodon Bambergeri (<i>Schimp.</i>).	Blepharozia ciliaris, <i>Dumort.</i>
Hylocomium Schreberi (<i>Willd.</i>).	
Leskea atrovirens, <i>Hartm.</i>	

Lichenes, as before mentioned, were not so plentiful as might have been expected. I am unable at present to report upon these.

Fresh-water *Algæ* were not uncommon, *Vaucheria* and *Spirogyra* appearing plentifully in the various smaller pools

or over the *tundra*. Any report upon these must also be held over.

Mr George W. Traill has kindly named the few marine Algæ dredged in tow-nets suspended over the vessel's side, or picked up from among a considerable amount of drift on the beach. Probably there are very few Algæ in the immediate neighbourhood of the Straits. The water is shallow, and on that account during winter unusually cold, the Straits being frozen over for nearly half the year.

The species enumerated are common to our own shores, and also to the coasts of the United States, the exceptions being *Polysiphonia arctica*, *Porphyra abyssicola*, and *Cladostephus plumosus*. This last is a true Arctic species, found in Cumberland Sound and on the Labrador coasts. It would seem to be carried by the cold currents setting past Hudson's Bay as far south as to Prince Edward's Island, then probably it is carried by the Gulf Stream current to the British Islands, and eventually beyond the coast of Norway.

It may be worth remark that, of the small number collected, nearly one-half are different from those found at Vardø.

The remarks made by Mr Traill, as to the general habit of the species found near to the North Cape, refer also to these.

There were obtained—

Ahnfeldtia plicata, <i>Ag.</i>	Laminaria flexicaulis, <i>Le Jolis.</i>
Cladostephus plumosus, <i>Holmes.</i>	Polysiphonia nigrescens, <i>Grev.</i>
Delesseria sinuosa, <i>Lx.</i>	„ arctica, <i>Ag.</i>
Desmarestia aculeata, <i>Lx.</i>	„ urceolata, <i>Grev.</i>
Ectocarpus littoralis, <i>Lyngb.</i>	Porphyra abyssicola, <i>Kjell.</i>
Fucus <i>sp.</i>	Rhodomela lycopodioides, <i>Ag.</i>

Also *Rhizosolenia styliiformis* and *Chaetoceros armatus*, the former of which is not in our seas, were obtained in the tow-net when near to the ice off the south coast of Novaya Zemlya.

In conclusion, we may make certain more general comparisons between the vegetation of these places within the Arctic circle and that of our own country.

Bearing in mind that on no part of the earth, within the

Arctic regions, is there a more poverty-stricken flora than exists in Siberia, it is yet quite possible there to find tracts, of greater or less extent (*e.g.*, over a well-drained, sandy soil), which show an almost luxuriant turf. The country about the Straits presented generally a green appearance, contrasting with the barren, because more rocky, slopes of Lapland, and affording a contrast also with the barren rocky summits of our own mountains, which are, often enough with justice, compared as to their vegetation with these Arctic regions. Thus we may select the following plants, found in greater or less abundance in one or other of these localities, which are among the greatest rarities of our own mountain flora, and are regarded as the relics of an Arctic vegetation which in the glacial epoch covered the whole of Great Britain:—*Astragalus alpinus*, *Oxytropis campestris*, *Saxifraga rivularis*, *S. cernua*, *S. cæspitosa*, *Gnaphalium norvegicum*, *Phyllodoce*, *Gentiana nivalis*, *Polemonium cæruleum*, *Myosotis alpestris*, *Veronica alpina*, *Salix lanata*, *Allium sibiricum*, *Lloydia serotina*, *Juncus filiformis*, *J. castaneus*, *J. biglumis*, *Luzula arcuata*, *Carex rupestris*, *C. alpina*, *C. rariflora*, *C. frigida*, *C. pulla*, *Hierochloa borealis*, *Alopecurus alpinus*, *Phleum alpinum*, *Deyeuxia strigosa* and *D. neglecta*. Yet these are not in any sense characteristic of our bare mountain summits; rather are the following (at least on the tops of the Ross-shire mountains), common at an elevation of 3000 to 3500 feet:—*Silene acaulis*, *Sibbaldia procumbens*, *Alchemilla alpina*, *Saxifraga stellaris*, *Empetrum nigrum*, *Galium saxatile*, *Gnaphalium supinum*, *Antennaria dioica*, *Solidago Virgaurea*, *Hieracium alpinum*, *Achillea Millefolium*, *Vaccinium Myrtillus*, *Armeria maritima*, *Thymus serpyllum*, *Polygonum viviparum*, *Oxyria reniformis*, *Juncus trifidus*, *Luzula spicata*, *Carex rigida*, *Deschampsia flexuosa*, and *Festuca vivipara*. At such elevations these are mostly reduced in habit. In the more sheltered places, or lower down the sides of the mountains, occur *Rumex Acetosa*, *Cerastium alpinum*, *Geum rivale*, *Chrysosplenium oppositifolium*, *Caltha palustris*, *Viola palustris*, *Anthoxanthum odoratum*; whilst there are found, on the mountains to which I have referred, at a still lower elevation, *Calluna vulgaris*, *Pyrola minor*, *Parnassia palustris*, *Arctostaphylos Uva-Ursi*, *A. alpina*, *Vaccinium Vitis-Idæa*, and even *Loiseleuria procumbens*.

These few last-mentioned are (*Calluna* excepted) characteristic of a great part of Lapland, but nowhere in the north of Lapland were the slopes covered with *Calluna*, *Eleocharis*, and *Pteris*, which characterise the Highlands.

Nowhere also were the tangled growths of the plants common to our waysides, and which, on our return in October, gave the impression of a really luxuriant vegetation, in comparison with that to which we had become accustomed. Here and there in favourable positions, as on the sheltered slopes of the naturally manured island at Vardø, before mentioned, was a rich growth of certain deciduous plants, but this was quite the exception; none of the plants commonly seen as masses of bright colour in the Lowlands of our own country occurred as other than isolated plants. Perhaps we should except *Ranunculus acris* in the meadows about the small hamlets, *Matricaria inodora*, also about the houses, and in one place, *Lychnis diurna*.

Nowhere were such masses of *Campanula rotundifolia*, *Solidago Virgaurea*, *Saxifraga aizoides*, &c., as may be seen so commonly in the Highlands.

On the island of Vardø, where the characteristic *Ericaceæ* and *Vaccinia* were wanting, there were, however, masses of white colour, from the abundance of *Cerastium*, *Cornus*, *Trientalis*, *Cochlearia*; also in one place, from exceedingly large flowers of *Rubus Chamæmorus*.

I saw very few insects fertilising these flowers. There were certain small *Diptera*, and about Vardø, other larger ones, attracted perhaps by the amount of animal refuse from the whaling and fishing industries. *Musca vomitoria*, L., var. *mortuum*, Fabr., and *Scatophaga merdaria*, Fabr. (?), were not uncommon. Twice only did I observe moths; one species of which, *Larentia cæsiata*, is common enough on our own moors; the other was a species of *Cidaria*, not known in this country.

Whilst *white* flowers were most abundant on the island of Vardø, where the reddish colours of the *Ericaceæ* characterising the mainland were absent, *yellow* was perhaps the colour most widely dispersed about the Yugor Straits. This was due to the abundance of *Senecio* and other *Compositæ*, *Saxifraga Hirculus*, *Chrysosplenium*, *Draba*, &c. There also *Saxifraga cernua* brought the *Saxifragæ* forward

as perhaps the most widespread of any of the more decorative plants. *Cruciferae* appeared more plentiful than was the case in Lapland—*Caryophyllaceae* not being quite so prominent.

It is useless, however, to dwell upon the predominance of any one colour, so dependent did such appear to be upon the nature of the locality, whether it favoured the spread of one class of plants or another. A mere comparison as to the relative numbers of plants with flowers of one colour or another would be quite or almost useless; such would show to us that a large proportion of the collected species were those with highly coloured flowers, which individually appeared to be quite as brightly coloured as with us; but, as before mentioned, usually they are but sparsely distributed.

It is very difficult to indicate with any precision as to the relative frequency or scarcity of the plants common to these regions. I have endeavoured to indicate the commonest in the notes attached to the Summary.

It is hoped that the present paper may be followed by one dealing especially with the distribution and the remarkable variation of some of the species herein mentioned.

My collections have been presented to the Herbarium of the Royal Botanical Garden, Edinburgh.

SUMMARISED LIST OF SPECIES NOW KNOWN FROM THE
ISLANDS OF NOVAYA ZEMLYA AND WAIGATZ AND
FROM THE NORTH COAST OF WESTERN SIBERIA.

That the distribution of plants in these Arctic regions to the North-East may be more accurately recorded, I have incorporated the names of all species mentioned by the following authors:—

Kjellman (1882), *Växtligheten på Sibiriens Nordkust, Sibiriska Nordkustens Phanerogamflora; Phanerogamflora på Novaja Semlja och Wajgatsch.*

Holm (1887), *Djymphna-Togets; Zoolog-Botaniske Udbytte.*

Warming (1888), *Tabellarisk oversigt over Grønlands, Islands og Farøernes Flora.*

In *Västligheten på Sibliens Nordkust* will be found full references to the literature of previous expeditions.

None of our countrymen except Wiggins (who, however, engaged in no scientific work) have, since the time of the early Merchant Adventurers, explored these Arctic regions lying to the south and east of Novaya Zemlya. It has been left to the enterprise of the Swedes, and especially are we indebted to the voyages of the "Vega" and of the "Dijmphna" for information as to the botany of these regions.

There had, however, been overland journeys to the northern shores of Asia, and thence to Novaya Zemlya, the results of which have been incorporated in Sir Joseph Hooker's *Outlines of the Distribution of Arctic Plants* (see *Trans. Linn. Soc.*, vol. xxiii.), and in the works above cited.

The following abbreviations have been made use of:—

- × = observed during the voyage of the "Labrador."
- D = observed during the voyage of the "Dijmphna" from shores of the Yugor Straits.
- V = observed during the voyage of the "Vega," or recorded in Dr Kjellman's summary of plants known from the northern coast of Asia as far as to Cape Tcheluschin.
- T = other records from the Taimyr peninsula given in Dr Warming's Summary.
- Z = recorded from Novaya Zemlya.
- L = observed on the Island of Vardo by Pastor Landmark.
- = known from West Siberia, but more to the south.

Plants marked with the asterisk (*) are British species; those in brackets were not observed by me. Those marked as "indigenous" were collected at the Yugor Straits, and are also native to Lapland, though not observed there by me.

Flora of North Coast of West Siberia and of adjoining Regions.	Siberia.		Lapland.				Yugor Straits and Siberia.	Lapland.	
	Yugor Straits and West Siberia.	North Coast of Siberia.	Novaya Zemlya.	Island of Vardø.	Vadsø.	Kølle.			Tromsø.
*Thalictrum alpinum, L.	x	v	Z	x	.	.	x	Frequent.	Frequent.
Ranunculus—									
Pallasii, Schl.	x	.	Z	.	.	.	.	...	Indigenous.
*repens, L.	.	.	Z	x	x	x	x	Frequent.	Frequent; often in masses.
*acris, L. vars.	x	v	Z	x	x	x	x	Frequent.	Frequent; often in masses.
„ sub sp. borealis, Trautv.	.	v	Z	.	.	.	.	...	Near houses.
*auricomus, L.]	.	v	Z	.	.	.	.	...	...
affinis, R. Br.	.	v	Z	.	.	.	.	...	...
[sulphureus, Soland.]	D	v	Z	.	.	.	.	=altaicus, Laxm.	...
nivalis, L.	x	v	Z	.	.	.	.	In peaty bed of river.	Indigenous.
pygmæus, Wahl.	.	v	Z	x	x	x	x	...	Common.
hyperboreus, Rottb.	.	v	Z	x	x	x	x	...	...
[japonicus, L.]	.	v	Z	.	.	.	.	...	...
*Caltha palustris, L.	x	v	Z	x	x	x	x	A reduced form, common; probably var. minor.	Both type and var. minor.
*Trollius europæus, L.	.	.	.	.	x	x	x	Frequent along shore.	Indigenous.
Papaver nudicaule, L.	x	v	Z	.	.	.	.	...	...
[Corydalis pauciflora, Pers.]	.	v	Z	.	.	.	.	...	...
Matthiola nudicaulis, L.	x	v	Z	.	.	.	.	...	...
[Parrya macrocarpa, R. Br.]	?	v	Z	.	.	.	.	...	...
Arabis—									
*alpina, L.	x	.	Z	x	.	.	.	Frequent.	...
*[petraea, L.]	.	v	Z	.	.	.	.	...	...
Cardamine—									
*pratensis, L.	x	v	Z	x	.	x	.	...	...
bellidifolia, L.	?	v	Z	.	.	.	.	...	...
[Shivereckia podolica, And.]	.	.	Z	.	.	.	.	...	...
Draba—									
alpina, L., et vars.	x	v	Z	.	.	.	.	...	...
[Wahlenbergii, Htn.]	D	v	Z	.	.	.	.	...	...
[oblongata, R. Br.]	.	v	Z	.	.	.	.	...	...
repens, Bieb.	.	x	Z	.	.	.	.	...	...
[arctica, J. Vahl]	.	.	Z	.	.	.	.	...	...
hirta, L., et rupestris, Htn.	x	v	Z	.	.	.	.	...	...
[altaica, Bunge.]	.	v	Z	.	.	.	.	...	...
[lactea, Adams]	.	.	Z	.	.	.	.	...	...
nivalis, Lilj.	.	.	Z	.	.	.	.	...	...
[corymbosa, R. Br.]	.	v	Z	.	.	.	.	...	...
*incana, L.	x	.	.	x	x	.	x	Doubtful.	...
Cochlearia—									
*officinalis, L.	.	.	.	x	.	.	?	...	...
*alpina, Bab.	.	.	.	x	.	.	.	...	...
*anglica, L.	.	.	.	x	.	x	x	...	Common at Vardø.
„ sub sp. arctica, Schl.	x	v	.	x	.	.	.	...	...
fenestrata, R. Br.	x	v	Z	.	.	.	.	Common.	...
[Sisymbrium—									
*Sophia, L.]	.	v	.	.	.	.	.	...	...
[pygmæum, Trautv.]	.	.	Z	.	.	.	.	...	...
Eutrema Edwardsii, R. Br.	x	v	Z	.	.	.	.	...	...
[Erysimum hieracifolium, L.]	.	.	.	L	.	.	.	...	...
Braya—									
alpina (Koch), L.	x	.	Z	.	.	.	.	East Siberia.	Indigenous.
[glabella, Richards]	.	.	Z	.	.	.	.	...	...
*[Camelina sativa, L.]	.	.	.	L	.	.	.	...	...
*[Brassica campestris, L.]	.	.	.	L	.	.	.	...	...
*Capsella bursa-pastoris, L.	.	.	.	x	x	x	x	...	...
*Thlaspi arvense, L.]	.	.	.	L	.	.	.	...	...
Viola—									
*sylvatica, Fr.	.	.	.	.	.	.	x	...	...
*palustris, L.	.	.	.	?	x	Common at Vadsø: V. suecica, recorded from Vardø by Landmark, Common.
biflora, L.	.	.	Z	x	x

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<i>Viola</i> [sp.]	D		
* <i>Silene acaulis</i> , L.	x	.	Z	x	.	.	x	Frequent.	
<i>Lychnis</i> —									
* <i>[Githago, Lam.]</i>	-	.	.	L	
* <i>diurna</i> , Sibth.	-	.	.	x	x	x	x	...	
(<i>Wahlbergella</i>) <i>apetala</i> , Fr.	x	V	Z	.	.	.	.	= <i>L. apetala</i> , L.
" <i>affinis</i> (<i>J. Vahl</i>) Fr.	x	V	Z	.	.	.	.	...
<i>Cerastium</i> —									
* <i>alpinum</i> , L., et vars.	x	V	Z	x	x	x	x	Scarce.	
* <i>triviale</i> , Link.	-	.	.	x	x	x	x	...	
" <i>alpestre</i> , Lindb.	-	.	.	.	x	.	x		
* <i>[glomeratum, Thuill.]</i>	-	.	.	.	L	.	.		
* <i>tetrandrum</i> , Curtis	-	.	.	.	x	x	.		
* <i>trigynum</i> , Vill.	-	.	Z	x	x	x	.	East Siberia.	
<i>Stellaria</i> —									
* <i>nemorum</i> , L. . . . .	.	.	.	?	.	x	.	...
* <i>media</i> , Cyr., et vars.	-	.	.	.	x	x	x	Scarce.	
* <i>uliginosa</i> , Murr.	-	.	.	.	x	.	.		
[<i>crassifolia</i> , Ehrh.]	-	.	Z	L	.	.	.		
[<i>longipes</i> , Goldie]	x	V	Z	.	.	.	.	...
<i>humifusa</i> , Rottb.	x	V	Z	x	.	.	.	Indigenous.	
<i>Arenaria</i> —									
* <i>ciliata</i> , L. var. <i>frigida</i> , Koch	.	.	Z	.	.	.	.
" <i>norvegica</i> , Vill.	x	.	.	.	.	.	.	...
* <i>peploides</i> , L.	-	.	Z	x	.	.	x	Scarce.	
" <i>diffusa</i> , Hornem.	x	.	.	.	.	.	.	...
* (<i>Alsine</i>) [<i>biflora</i> , Wahl.]	-	.	Z	.	.	.	.	...
" [<i>arctica</i> , Fz.]	-	V	.	.	.	.	.
" [<i>macrocarpa</i> , Fz.]	-	V	.	.	.	.	.	<i>Arenaria</i> of Pursh not Horn.
" <i>verna</i> , Bart. . . . .	.	.	.	.	.	.	.
" " <i>glacialis</i> , Fz.	.	.	Z	.	.	.	.
" " <i>*rubella</i> , Hk.	x	V	Z	.	.	.	.	...
<i>Sagina</i> —									
* <i>nodosa</i> , L.	-	.	.	.	x	.	.		
* <i>subulata</i> , Wm. . . . .	-	.	.	.	.	.	x	
* <i>nivalis</i> , Fr.	-	V	Z	.	.	.	.
* <i>Linnaei</i> , Presl	-	.	Z	x	.	x	.		
* <i>apetala</i> , L.	-	.	.	.	x	.	x		
* <i>maritima</i> , Don	-	.	.	.	x	.	x		
* <i>procumbens</i> , L.	-	.	.	.	x	.	x		
* <i>Montia fontana</i> , L.	-	.	.	.	x	.	x	Known from East Siberia.	
* <i>Geranium sylvaticum</i> , L.	-	.	.	.	x	x	x	...	
* <i>Empetrum nigrum</i> , L.	-	T	.	.	x	x	x	...	
* <i>Trifolium repens</i> , L.	-	.	.	.	x	.	x	Common.	
* <i>Lotus corniculatus</i> , L. . . . .	-	.	.	.	.	.	x	From Altai Mts.
<i>Astragalus</i> —									
* <i>[alpinus, L.]</i> . . . . .	.	V	Z	.	.	.	.	...
(<i>Phaca</i>) <i>frigida</i> , L.	x	.	Z	.	.	.	.	A stunted form. See var. <i>littoralis</i> .
[<i>Hedysarum obscurum</i> , L.] . . . . .	.	.	Z	.	.	.	.
<i>Oxytropis</i> —									
* <i>campestris</i> , L., var.	x	V	Z	.	.	.	.
[<i>Mertensiana</i> , Turcz.] . . . . .	.	V	.	.	.	.	.
<i>Vicia</i> —									
* <i>hirsuta</i> , L.	-	.	.	.	x	.	x		
* <i>Cracca</i> , L.	-	.	.	.	x	.	x	...	
* <i>Spiraea Ulmaria</i> , L.	-	.	.	.	x	.	x		
<i>Rubus</i> —									
* <i>saxatilis</i> , L.	-	.	.	.	x	.	x		
* <i>Chamæmorus</i> , L.	x	T	Z	x	x	x	x	Scarce: a very reduced form.	

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				Vadsø.	Kølle.	Tromsø.			
* <i>Dryas octopetala</i> , L.	×	V	Z	L	×	×	×	A form with very small leaves; the predominant plant in most of the drier places.	Frequent.
[<i>Sieversia glacialis</i> , R. Br.]	.	V	.	.	.	.	.
* <i>Geum rivale</i> , L.	×	×	×		
Potentilla—									
* <i>Comarum, Nestl.</i>	×	T	Z	×	×	×	×	Common	Common.
* <i>procumbens, Clairv.</i>	.	.	.	×	×	×	×		"
* <i>anserina</i> , L.	.	.	.	×	.	.	×		
[<i>norvegica</i> , L.]	.	.	.	T	.	.	.		
* <i>Salisburgensis, Haenke</i> ,	×	.	Z	×	×	.	×	= <i>maculata</i> , Pourr.	= <i>verna</i> , L., of Landmark's list; frequent. Indigenous.
* <i>reptans</i> , L.	×	...	
[<i>fragiformis</i> , Willd., var. <i>parviflora</i> , Trautv.]	.	V	Z	.	.	.	.
[<i>sericea</i> , L., var.]	.	.	Z	.	.	.	.
[<i>emarginata</i> , Pursh]	.	D	V	Z	.	.	.		
[<i>nivea</i> , L., et var.]	.	.	V	.	.	.	.
Alchemilla—									
* <i>vulgaris</i> , L.	.	.	.	×	×	×	×	...	Very abundant on island of Tromsø. Common.
* <i>alpina</i> , L.	×	×	×	...	At Vadsø—a tree 5 feet high in a garden; at Kølle, four specimens growing together, not a foot high; at Tromsø 10-20 feet.
* <i>Pyrus Aucuparia, Gaertn.</i>	.	T	.	.	×	×	×	...	
Saxifraga—									
* <i>aizoides</i> , L.	×	.	Z	.	.	.	×		
* <i>oppositifolia</i> , L.	×	V	Z	.	.	.	×	Probably both the older species of <i>Linnaeus</i> and <i>decipiens</i> , Ehrh., which varies but little from it, occur: these names are, however, very differently used by different authors.	
<i>decipiens</i> , Ehrh., et } * <i>caespitosa</i> , L. }	×	V	Z	×	.	×	×		
* <i>cernua</i> , L.	×	V	Z	.	.	.	.	Very abundant.	Indigenous.
* <i>rivularis</i> , L.	?	V	Z	×	×	×	×	A doubtful specimen from sea shore; is probably the sub. sp.	
<i>sub. sp. hyperborea</i> , Br.	×	Common.	"
<i>hieraciifolia</i> , Waldst. et Kit.	×	V	Z	.	.	.	.
[<i>punctata</i> , L.]	.	V	.	.	.	.	.
* <i>nivalis</i> , L.	×	V	Z	.	.	.	×		
[<i>tenuis</i> , Wahl.]	.	V	.	.	.	.	.
* <i>Hirculus</i> , L.	×	V	Z	.	.	.	.	Common.	"
[<i>flagellaris</i> , Willd., vars.]	.	V	Z	.	.	.	.
[<i>serpyllifolia</i> , Pursh]	.	V	.	.	.	.	.
[<i>bronchialis</i> , L.]	.	V	.	.	.	.	.
* <i>stellaris</i> , L.	×	V	Z	×	×	×	×	Common: probably the variety <i>comosa</i> , Poir.	Common.
* <i>Chrysosplenium alternifolium</i> , L.	×	V	Z	×	×	×	×	Common.	The form found at Vardø was named by Landmark, the var. <i>tetrandrum</i> , Fr.

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	Yugor Straits and West Siberia.	North Coast of Siberia.	Novaya Zemlya.	Island of Vardø.	Vadsø.	Kølle.			Tromsø.
*Parnassia palustris, L.	×	T	Z	×	×	×	×	Probably vars. as well as type. Common along shore	Frequent.
Sedum—									
*Rhodiola, DC.	×	V	Z	×	×	×	×	...	A much drawn out form.
*acre, L.	×	.	.	×	.	.	×	...	Frequent.
*Hippuris vulgaris, L.	×	.	Z	×	.	.	.	...	Common.
*Callitriche verna, L.	1	.	.	×	.	.	.	...	Common.
Epilobium—									
*angustifolium, L.	1	T	.	×	×	×	×	East Siberia.	Common.
[latifolium, L.]	1	.	Z	.	.	.	.	East Siberia.	Common.
*alsinifolium, Vill. . . . .	.	.	.	?	.	×	×	"et var." (Warming).	
*alpinum, L. . . . .	.	T	Z	×	×	×	×		
*palustre, L.	?	T	Z	×	×	.	×		
*Carum carui, L.	1	.	.	×	.	.	.	East Siberia.	
*Anthriscus sylvestris, Hfm.	?	.	.	×	.	.	.	East Siberia.	
*Archangelica officinalis, Hfm. . . . .	.	.	.	×	.	×	×	East Siberia.	
Heracleum sibiricum, L.	1	.	.	.	.	.	×	East Siberia.	
*Ligusticum scoticum, L. . . . .	.	.	.	?	.	.	.	East Siberia.	
(Conioselenium) Fischeri, Wm. (Pachyleurum) alpinum, Ledeb.	×	.	Z	.	.	.	.
*Adoxa Moschatellina, L.	×	.	.	L	.	.	.	...	See note, p. 452.
*Sambucus nigra, L.	1	.	.	.	.	?	.	East Siberia.	
*Linnea borealis, Gronov. . . . .	.	.	.	.	×	.	.	East Siberia.	
*Cornus suecica, L. . . . .	.	.	.	×	×	×	×
*Galium boreale, L. . . . .	.	.	.	.	.	.	×
Valeriana—									
*officinalis, L.	1	.	.	×	×	×	.	On drier banks; Scarce.	A dwarfed form.
*var. sambucifolia } capitata, Pall.	×	.	Z	.	.	.	.	...	Common.
*Solidago Virgaurea, L. . . . .	.	.	.	×	×	×	×	...	Common.
*Erigeron uniflorus, L.	?	T	Z	.	?	.	.	...	Common.
Antennaria—									
*dioica, R. Br.	1	.	.	×	×	×	×	...	Common.
alpina, Rechb. ?	1	.	.	.	.	.	.	...	Common.
carpathica, Bl. F. ?	1	.	Z	.	.	×	.	...	Common.
Gnaphalium—									
*sylvaticum, L.	1	.	.	.	.	.	×	Asia Minor only.	
*norvegicum, Hook.	1	.	.	.	×	×	×	...	An alien.
*supinum, L.	1	.	.	.	×	×	.	...	In meadows.
Achillea—									
*[Ptarmica, L.]	1	.	.	L	.	.	.	A few plants on beach near village.	Indigenous.
*Millefolium, L.	×	.	.	×	.	×	×	Scarce about village.	Very abundant about village of Vardø.
Pyrethrum bipinnatum, Willd.	×	.	Z	.	.	.	.	Probably also var. Purshii, Bess., on sandy beach.	Indigenous.
*Matricaria inodora, L. et var. phaeocephala, Rupr.	×	V	Z	×	×	×	×	Probably var. Tilesii, Ledeb.	Indigenous.
Artemisia—									
borealis, Pall.	×	T	Z	.	.	.	.	Leaves only; not common.	
*vulgaris, L.	×	V	Z	.	.	.	.	...	Indigenous.
Petasites frigida, Fr.	×	.	Z	.	.	.	.	...	Indigenous.
*Carduus heterophyllus, L. . . . .	.	.	.	×	.	×	.	Common.	
Arnica alpina, Murr.	×	.	Z	= var. of C. campestris; many forms of this exceedingly variable plant; common.	
Senecio—									
resedafolius, Less.	×	.	Z		
(Cineraria) integrifolia, L.	×	V	Z		

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	Yugor Straits and West Siberia.	North Coast of Siberia.	Novaya Zemlya.	Island of Vardø.	Vadsø.	Kølle.		
(Cineraria) [frigida, Richd.]	D	V	Z	.	.	.	.
„ [palustris, L., var. congesta, Hook.]	.	.	Z	.	.	.	.
*Saussurea alpina, L.	-	V	.	×	×	×	×	...
*Hieracium—								Very variable.
*lingulatum, Bach.	.	.	.	.	.	×	.	...
*Chrysanthum, Ledeb.	.	V	.	.	.	×	.	A variety.
*alpinum	.	.	.	.	.	.	.	? Nigrescens, at Kølle.
„ *melanocephalum, Tausch.	.	.	.	.	.	×	×
„ sps?	.	.	.	.	×	×	×
Leontodon sp.?	.	.	.	.	.	.	×
Taraxacum—								
*officinale, Wiggers.	?	T	Z	×	×	×	×	Of Weber, later.
*palustre, DC.	-	.	×	.	.	.	.
phymatocarpum, Vahl	×	V	Z	.	.	.	.	Once found: not distinguishable from <i>T. ceratophorum</i> .
nivale, Lange	.	.	.	.	.	.	×	...
*Sonchus alpinus, L.	-	.	.	.	.	×	.	Probably this species. See <i>Medd. Soc. Fauna et Flora Fennica</i> , xvi.
Campanula—								
*rotundifolia, L., et vars.	-	.	Z	×	×	×	×	...
[uniflora, L.]	-	.	Z	.	.	.	.	Indigenous.
Vaccinium—								
*uliginosum, L., et vars.	×	V	Z	×	×	×	×	The single specimen obtained in very poor condition, is probably the var. <i>microphyllum</i> , Lge. See <i>Dijmphna Togtets</i> .
*Myrtillus, L.	-	.	.	×	×	×	×	
*Vitis-Idæa, L.	?	T	Z	×	×	×	×	Var. <i>pumila</i> , Horn, recorded in <i>Dijmphna Togtets</i> .
*Oxycoccus palustris, Pers.	-	.	.	×	?	.	.	Scarce.
*Arctostaphylos alpina, Spreng.	.	.	.	.	×	×	×	Not abundant. Common.
[Cassiope—								
hypnoides, Don.]	-	.	.	.	.	.	.	Indigenous.
[tetragona, L.]	-	.	.	.	.	.	.	...
*Andromeda polifolia, L.	-	T	.	.	×	×	×	Common.
*Calluna vulgaris, Salisb.	-	.	.	.	.	.	×	Mr Bennett remarks that this is very near what Dr Seeman describes (<i>Jour. Bot.</i> , t. liii. p. 305) as <i>C. atlantica</i> ; his specimens were from Newfoundland.
*Loiseleuria procumbens, Desv.	.	.	.	×	×	×	×	East Siberia. Common.
*Phyllocoæ cærulea, Bab.	.	.	.	.	×	×	×	Frequent in less boggy places. Abundant at Vadsø.
Ledum palustre, L.	-	T	.	.	×	.	.	...
Pyrola—								
*rotundifolia, L.	-	T	.	×	.	.	×	Abundant.
„ grandiflora, Raddi.	.	T	.	.	×	.	×	...
*minor, L.	-	.	Z	L	×	×	×	...
*secunda, L., et var.	-	T	.	.	×	×	×	...
[sp. sine flore]	D	A small form at Vadsø.

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<i>Diapensia lapponica</i> , L.	-	.	.	.	×	×	.	Found, according to Kjellman, to the east of Cape Tscheluskin.	Common on exposed slopes.
<i>Armeria sibirica</i> , Turcz.	×	.	Z	.	.	.	.
<i>Primula</i> — * <i>farinosa</i> , L.	.	.	Z	.	.	.	.
<i>stricta</i> , Horn.	×	.	Z	×	.	.	.	One place on cliffs west of village.	
<i>Androsace</i> — <i>septentrionalis</i> , L.	×	.	Z	.	.	.	.	On beach. Beside true forms, two plants are regarded by Mr Baker as probably "a non-umbellate var."	Indigenous.
[<i>villosa</i> , L.]	.	V	.	.	.	.	.
<i>chamaejasme</i> , Willd.	×	.	Z	.	.	.	.	Frequent among tufts of <i>Dryas</i> .	
[<i>triflora</i> , Adams, var. <i>villosa</i> , Kjell.]	.	.	Z	.	.	.	.
[<i>Cortusa Matthioli</i> , L.]	.	.	Z	.	.	.	.
* <i>Trientalis europæa</i> , L.	-	.	Z	×	×	×	×	...	Common.
<i>Gentiana</i> — * <i>nivalis</i> , L.	.	.	.	×	.	.	.		
<i>tenella</i> , Rottb.	×	T	.	×	.	.	.	Only once found. East Siberia.	= <i>involutata</i> , Rottb.
<i>aurea</i> , L.	.	.	.	×	.	.	×		
* <i>Menyanthes trifoliata</i> , L.	-	T	Z	×	×	×	.	See Dr Warming's Summary.	
[<i>Lagotis glauca</i> , Gaertn.]	.	V	Z	.	.	.	.
<i>Polemonium</i> — * <i>cæruleum</i> , L., var. <i>acutiflora</i> , Willd.	×	.	Z	.	.	.	.	Common.	
<i>grandiflorum</i> ,	×	A form between <i>cæruleum</i> and <i>pulchellum</i> ; sent from south of Varanger Fiord.
<i>pulchellum</i> , Bunge.	×	V	Z	.	.	.	.	= <i>humile</i> , Wild., not so common as <i>P. cæruleum</i> . Common among <i>Dryas</i> .	Indigenous.
<i>Eritrichium villosum</i> , Bunge.	×	V	Z	.	.	.	.	Common among <i>Dryas</i> .	
* <i>Mertensia maritima</i> , Don	-	.	.	×	.	.	.		
<i>Myosotis</i> — [<i>lappula</i> , L.]	.	.	.	L	.	.	.	...	= <i>Echinosperrum</i> , Lehm.; not in Berlin Dist. Scand. from Lapland.
* <i>sylvatica</i> , Hoffm.	.	.	.	L	×	.	×		
* <i>alpestris</i> , Koch	×	V	Z	-	.	.	.	...	Indigenous.
(<i>Mimulus luteus</i> , L.)	×	...	An escape.
<i>Veronica</i> — * <i>officinalis</i> , L.	-	×		
* <i>alpina</i> , L.	-	×		
* <i>serpyllifolia</i> , L.	-	×		
* <i>Euphrasia officinalis</i> , L., vars.	-	.	.	×	×	×	×	...	A very considerable difference noticeable between the Vardø and Tromsø specimens.

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				Vadsög.	Kølle.	Tromsög.		
* <i>Bartsia alpina</i> , L.	×	×	×	Asia?
Pedicularis— sceptrum-carolinum, L.	× Common in extensive marshes.
[<i>sudetica</i> , Willd., et vars.]	.	V	Z	.	.	.	.	A very common and variable plant.
[<i>lanata</i> , Cham.]	D	V	Z	.	.	.	.
[<i>hirsuta</i> , L.] . . . . .	.	V	Z	.	.	.	.
<i>Oederi</i> , Vahl	×	V	Z	.	.	.	.
[<i>capitata</i> , Adams]	.	T	.	.	.	.	.	... Common.
[<i>euphrasioides</i> , Steph.]	.	T	.	.	.	.	.
[<i>villosa</i> , Ledeb.] . . . . .	.	V	.	.	.	.	.
<i>lapponica</i> , L. . . . .	.	T	.	.	×	×	×	... Meadows. Frequent.
* <i>palustris</i> ? . . . . .	.	.	.	.	.	.	×
* <i>Rhinanthus minor</i> , Ehrh. . . . .	.	.	.	.	.	.	×	...
* <i>Melampyrum pratense</i> , L. var. . . . .	.	.	.	×	×	×	.	...
* <i>Pinguicula vulgaris</i> , L. . . . .	.	.	.	×	×	×	×	... "
Plantago— * <i>major</i> , L. . . . .	.	.	.	L	.	.	×	... Sparingly.
* <i>maritima</i> , L.	?	.	Z	.	.	.	.	Var <i>pumila</i> , Kjell., recorded in <i>Djmphna Togetts</i> . Indigenous.
*[<i>Galeopsis Tetrahit</i> , L.] . . . . .	.	.	.	L	.	.	.	... An alien; plentiful in 1858 in cultivated field with <i>G. versicolor</i> .
*[<i>Chenopodium album</i> , L.] . . . . .	.	.	.	L	.	.	.	... Indigenous. Very common; often, as at Vardög, luxuriant.
* <i>Atriplex Babingtonii</i> , Woods.	.	.	.	.	.	.	×
<i>Koenigia islandica</i> , L. . . . .	.	.	Z	×	×	.	.	
Polygonum— * <i>Bistorta</i> , L.	×	V	Z	.	.	.	.	... A dwarf form.
* <i>viviparum</i> , L.	×	V	Z	×	×	×	×	
*[<i>amphibium</i> , L. . . . .	.	T	.	.	.	.	.	... Indigenous.
*[<i>lapathifolium</i> , L.] . . . . .	.	.	.	L	.	.	.	Common. Common.
* <i>Aviculare</i> , L. . . . .	.	.	.	L	×	.	.	
* <i>Oxyria reniformis</i> , Hook.	×	V	Z	×	×	×	×	...
Rumex— <i>arcticus</i> , Trautv. . . . .	.	V	Z	?	.	.	.	... = <i>R. domesticus</i> , Hart.; probably specimens were this plant.
* <i>Acetosa</i> , L.	?	T	Z	×	×	×	×	... The most persistent with <i>Luzula</i> and <i>Festuca</i> .
* <i>Acetosella</i> , L. . . . .	.	T	.	×	×	×	×	
Urtica— *[<i>urens</i> , L.] . . . . .	.	.	.	L	?	.	.	...
* <i>dioica</i> , L. . . . .	.	.	.	×	×	×	×
Salix— * <i>pentandra</i> , L. . . . .	.	.	.	.	.	.	×	non L. = <i>S. helvetica</i> , Vill.
* <i>Caprea</i> , L. . . . .	.	.	.	.	.	.	×
* <i>nigricans</i> , Sm. . . . .	.	.	.	.	×	×	×
* <i>phylicifolia</i> , L.	×	×	×	
<i>hastata</i> , L.	T	?	
* <i>lanata</i> , L.	×	T	Z	×	×	×	×	
* <i>lapponum</i> , L.	×	×	×	
*var. <i>glauca</i> , Sm.	×	.	.	.	×	×	×	
[var. <i>glauca</i> , L.]	V	Z	

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Salix— *Wichura, <i>And.</i>	?	.	.	= <i>phylicifolia</i> × <i>glauca</i> . According to Dr White, "very probably;" an imperfect specimen. Lund, later.	
[<i>ovalifolia</i> , <i>Trautv.</i>] . . . . .	.	.	Z	.	.	.	.
<i>norvegica</i> (<i>Fr.</i>) <i>And.</i> , var. <i>alpestris</i> , <i>And.</i>	?	.	.	.	.	.	.	"Possibly;" specimen without catkins: = <i>glauca</i> × <i>herbacea</i> ;	
[<i>reptans</i> , <i>Lundst.</i>] . . . . .	.	.	Z	.	.	.	.
[<i>arctica</i> , <i>Pall.</i>] . . . . .	.	T	Z	.	.	.	.
[" <i>polaris</i> , <i>Lundst.</i>] . . . . .	.	.	Z	.	.	.	.
<i>Myrsinitis</i> , <i>L.</i>	×	.	Z	I	×	.	.		
<i>polaris</i> , <i>Wahl.</i>	×	V	Z	.	.	.	.	...	Indigenous.
" var. <i>herbaceoides</i> , <i>And.</i>	×	.	Z	.	.	.	.
[<i>rotundifolia</i> , <i>Trautv.</i>]	D	V	Z	.	.	.	.
* <i>herbacea</i> , <i>L.</i> , et var.	-	.	Z	×	.	×	×		
[<i>sarmentacea</i> , <i>Fr.</i>] . . . . .	.	.	.	L	.	.	.	= <i>hastata</i> × <i>herbacea</i> .	
<i>onychophylla</i> , <i>And.</i>? . . . .	×	.	.	.	.	.	.	"Very probably;" only a poor specimen: = <i>herbacea</i> × <i>reticulata</i> .	
* <i>reticulata</i> , <i>L.</i>	?	V	Z	×	.	×	×	At the Yugor Straits the species were found chiefly along the gravelly and sandy slopes above the beach. The species are almost all of wide range.	
[<i>subarctica</i> and <i>Brownei</i> , <i>Lundst.</i> , are also recorded from <i>Novaya Zemlya</i>]									
<i>Betula</i> — <i>tortuosa</i> , <i>Led.</i>	-	.	.	.	×	×	×	...	Probably this species.
* <i>nana</i> , <i>L.</i>	×	T	Z	.	×	×	×	Scarce; doubtful if seen.	
* <i>Orchis maculata</i> , <i>L.</i> . . . . .	-	.	.	.	×	×	.	...	Probably a variety ? <i>O. lapponica</i> , <i>Læst.</i>
* <i>Habenaria viridis</i> , <i>R.Br.</i>	-	.	.	L	×	×	.	...	Indigenous.
[<i>Corallorhiza innata</i> , <i>R.Br.</i>]	-	T	.	.	.	.	.	...
<i>Triglochin</i> — * <i>palustre</i> , <i>L.</i>	-	.	.	.	×	×	×		
* <i>maritimum</i> , <i>L.</i>	-	.	.	.	×	.	×		
* <i>Allium Schoenoprasum</i> , <i>L.</i> var. <i>sibiricum</i> ,	×	.	Z	×	.	×	.	Only three plants seen.	Scarce on island of Vardø.
* <i>Lloydia serotina</i> , <i>Reich.</i>	×	V	Z	.	.	.	.	Very abundant in drier places.	
* <i>Tofieldia palustris</i> , <i>Huds.</i>	-	.	.	.	×	.	.	Seen with <i>Allium</i> in one place only.	Abundant at Kølle.
<i>Veratrum album</i> ,	×	.	.	.	×	×	.		
<i>Juncus</i> — * <i>filiformis</i> , <i>L.</i>]	-	.	.	L	.	.	.		
* <i>alpinus</i> , <i>Vill.</i> . . . . .	-	.	.	.	.	.	×
* <i>castaneus</i> , <i>Sm.</i>]	D	.	.	.	.	.	.	...	Indigenous.
* <i>stygius</i> , <i>L.</i>	-	.	.	.	×	×	×		
* <i>triglumis</i> , <i>L.</i>	-	.	.	.	×	×	×		
* <i>biglumis</i> , <i>L.</i>	-	.	V	Z	.	?	×		
* <i>trifidus</i> , <i>L.</i>	-	×	×		
<i>Luzula</i> — <i>parviflora</i> , <i>Desv.</i>	×	T	.	×	×	= <i>spadicea</i> , <i>DC.</i>

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Luzula—									
Wahlenbergii, Rupr.	D	.	Z	x	x	.	.		
*sudetica, DC.	.	.	.	x	x	=nigricans, Desv.
*pilosa, Willd.	x	.	.	x	
*campestris, Willd., et var. congesta.	x	T	.	x	x	x	x		
hyperborea, R. Br.	.	V	Z	x	x	.	.	x	
*arcuata, Hook.	?	V	Z	x	x	x	x	...	Described as <i>Juncus arcuatus</i> by Wahlenberg.
arcuata confusa, Lindb.	.	V	Z	?	x	.	.		
*spicata, DC.	x	.	Z	x	x	.	x		
Eriophorum—									
*angustifolium, Roth	D	V	Z	x	x	x	x	...	Probably var. <i>elatius</i> , Koch.
*vaginatum, L.	x	V	Z	x	x	.	.		
capitatum, Host	.	T	.	.	x	x	.		
[callithrix, Cham.]	.	.	Z	.	.	.	.
[russeolum, Fr.]	.	V	Z	.	.	.	.
Scheuchzeri, Hoppe.	x	V	Z	.	.	.	.	...	Indigenous.
*alpinum, L.	.	.	.	?	.	x	.		
*Carex—									
dioca, L., var. subtriangularis.	.	.	Z	x	x	.	.	=C. parallela, Læst.	
obtusata, Lilj. ?	.	.	.	.	x	.	.	...	Very doubtful. In Scandinavia the true plant is only known from Oland.
*[rupestris, All.]	.	.	Z	.	.	.	.	...	Indigenous.
[ursina, Desv.]	.	V	Z	.	.	.	.	...
incurva, Lightf.	x	.	Z	x	.	.	.	See Dr Warming's Summary.	
[pratensis, Drej.]	.	.	Z	.	.	.	.	...
*lagopina, Wahl.	.	.	Z	x	x	.	.	...	Common in most exposed places.
glareosa, Wahl.	x	.	Z	x	.	x	.	...
[norvegica, Willd.]	.	.	.	L	.	.	.	...	Common.
*canescens, L.	.	.	.	.	x	x	.	...
„ vitalis, Fr.	.	.	.	.	x	x	.	...
Sewellii, Arth. Bennett et C. B. Clarke.	.	.	.	.	x	.	.	...	New species; see note, page 456.
*atrata, L.	.	.	.	.	x	.	.	...	Indigenous.
[misandra, R. Br.]	?	.	Z	.	.	.	.	...
*alpina, Swartz	.	.	.	L	.	x	.	...
*[salina, Wahl., et var.]	.	V	Z	.	.	x	.	...
*vulgaris, Fr.	.	.	.	.	x	x	.	...
[hyperborea, Drej.]	.	.	Z	.	.	.	.	See Dr Warming's Summary.	
*[acuta, L.]	.	.	Z	.	.	.	.	...
*rigida, Good.	x	V	Z	.	.	.	.	Var. <i>longipes</i> , in Vega records.	Common.
„ infuscata.	x	.	.	.	.	.	.	Commonest var.	
„ inferalpina, Læst.	.	V	.	.	x	.	.	There was also a form less than <i>frigida</i> , scarcely <i>C. Fyllae</i> , Holm (see Lange <i>Meddelelser Grøent.</i> , p. 291).	
*aquatilis, Wahl.	x	V	Z	.	x	x	.	Common.	
epigeios, Læst.	.	T	Z	.	.	.	.	...
*pulla, Good.	x	.	Z	.	x	x	.	Common.	Apparently common.
rotundata, Wahl.	x	.	Z	x	x	Indigenous.
fuliginosa, Sch.	x	
*rariflora, Sm.	D	.	Z	x	.	x	

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					Vadsö.	Kølle.	Tromsø.		
Carex—									
<i>caespitosa</i> (L.) Fr.	= <i>magellanica</i> , Lam. (fide Boeck).
<i>*irrigua</i> , Sm.	-	.	.	.	x	x	Indigenous.
<i>*capillaris</i> , L.	.	.	.	x	.	.	x	...	
<i>*[vaginata, Tausch.]</i>	.	T	.	.	.	.	.	...
<i>*panicea</i> , L.	.	.	.	.	.	.	.	...
<i>*Scirpus caespitosus</i> , L.	.	.	.	.	.	.	.	...
<i>*Anthoxanthum odoratum</i> , L.	.	.	.	x	.	.	.	...
<i>Hierochloa—</i>									
<i>borealis</i> , R. and S.	.	.	.	.	.	.	x	...	
<i>[pauciflora, R. Br.]</i>	.	V	Z	.	.	.	.	...
<i>[alpina, R. and S.]</i>	.	V	.	.	.	.	.	...	"
<i>Alopecurus—</i>									
<i>*pratensis</i> , L., et var.	.	.	.	Z	x	.	x	...	
<i>ruthenicus</i> , Wein.	.	.	.	Z	.	.	.	...
<i>*alpinus</i> , Sm.	x	V	Z	.	.	.	.	...
<i>Phleum—</i>									
<i>*pratense</i> , L.	.	.	.	Z	.	.	.	...
<i>*alpinum</i> , L.	.	.	.	.	x	.	x	...	
<i>*[Agrostis alba, L.]</i>	.	.	.	L	.	.	.	...	Probably an alien.
<i>Calamagrostis—</i>									
<i>Hartmaniana</i> , Fr.	.	.	.	.	.	.	?	...	= sp. q. Wahl.
<i>[lapponica, Trin.]</i>	.	V	.	L	.	.	.	...
<i>*lancoolata</i> , Roth	.	.	.	L	.	.	x	...	
<i>[Holmii, Lge.]</i>	.	D	.	.	.	.	.	...
<i>*[Apera spica-venti, Beauv.]</i>	.	.	.	L	.	.	.	...	Probably an alien.
<i>Deyeuxia—</i>									
<i>*neglecta</i> , Kunth	.	.	.	x	.	.	x	Altai Mts.	= <i>Calamagrostis stricta</i> , Nutt.
<i>*strigosa</i> , Kunth	-	.	Z	.	x	.	.	...	= <i>C. strigosa</i> , Bunge.
<i>[Aira alpina, L.]</i>	.	.	Z	.	.	.	.	...	Indigenous.
<i>Deschampsia—</i>									
<i>*caespitosa</i> , Beauv., et vars.	-	V	Z	x	x	x	x	...	
<i>*flexuosa</i> , Beauv.	-	.	.	x	.	.	.	...
<i>[Koeleria hirsuta, Gaud.]</i>	.	V	.	.	.	.	.	...
<i>Trisetum—</i>									
<i>*flavescens</i> , P. B.	.	V	.	.	.	.	.	...
<i>borealis</i> , Trautv.	.	.	Z	.	.	.	.	...
<i>sub-spicatum</i> , Trin.	.	.	Z	.	.	.	.	...	"
<i>*Flumina arundinacea</i> , Fr.	x	.	.	.	.	.	.	...	"
<i>[Dupontia Fischeri, R. Br.]</i>	.	V	Z	.	.	.	.	...
<i>Colpodium—</i>									
<i>[latifolium, R. Br.]</i>	D	V	Z	.	.	.	.	...	"
<i>[humile, Lge.]</i>	.	.	Z	.	.	.	.	...
<i>[Pleuropogon Sabinii, R. Br.]</i>	.	V	Z	.	.	.	.	...
<i>Catabrosa—</i>									
<i>*aquatica</i> , Beauv.	-	.	.	x	.	.	x	...	
" <i>subtilis</i>.	.	.	.	x	.	.	.	...
<i>[concinna, Th. Fr.]</i>	.	V	Z	.	.	.	.	...
<i>[algida, Fr.]</i>	.	V	Z	.	.	.	.	...
<i>Poa—</i>									
<i>*pratensis</i> , L., et vars.	x	V	Z	x	x	x	x	Var. <i>paupera</i> , Lge., in Vega records.	Probably an alien.
<i>*[palustris, Roth]</i>	.	.	.	L	.	.	.	...	Probably <i>glauca</i>
<i>*nemoralis</i> , L., et vars.	-	.	.	x	x	x	.	...	Probably <i>glauca</i> and <i>Parneii</i> amongst the varieties.
<i>*laxa</i> .	x	.	.	.	x	.	.	...
<i>*alpina</i> , L., et var.	x	.	Z	x	.	x	.	...
<i>[cenisia, All.]</i>	.	V	
<i>arctica</i> , R. Br.	x	V	Z	<i>Poa arctica</i> and <i>P. laxa</i> were commonest in tundra swamps.	

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Poa— *annua, L.	×	.	.	×	.	×	.	
sp.?	×	.	×	.	
Glyceria— [Vahliana, Th. Fr.]	Z	
[angustata, R. Br.]	V	
[vaginata, Lge.]	Z	Var. <i>contracta</i> .
*maritima, Wahl.	×	.	.	×	.	.	×	...
vilfoidea, Th. Fr. . . . .	.	V	Z	.	.	.	.
Kjellmanni, Lge. . . . .	.	V	Z	.	.	.	.
tenella, Lge. . . . .	.	.	Z	.	.	.	.	Var. <i>pumila</i> .
Arctophila— effusa, Lge.	D	V	Z	.	.	.	.
pendulina, Ands. . . . .	.	V	.	.	.	.	.
fulva, . . . . .	.	V	.	.	.	.	.
Festuca— ovina, L., et vars.	×	V	Z	×	×	×	×	Vars. <i>violacea</i> and <i>vivipara</i> , from Novaya Zemlya, and on north coast Asia. = <i>ovina</i> , sub. sp. <i>bo-realis</i> , Lange.
brevifolia, R. Br. . . . .	.	.	Z	.	.	.	.	Vars. <i>vivipara sylvatica</i> and <i>villosa</i> .
*rubra, L.	×	V	Z	.	.	.	.
sp.? . . . .	.	.	.	.	×	×	.
*[Agropyrum caninum, Beauv.] . . . . .	.	.	.	L	.	.	.	...
*Elymus arenarius, L.	×	.	Z	×	.	.	×	Var. <i>villosus</i> , also at Tromsø.
*Juniperus communis, L., *var. nana. . . . .	.	T	.	.	×	×	×	
*Athyrum alpestre, Nyl. * Filix-fœmina, Bernh. . . . .	.	.	.	×	×	×	.
Aspidium— *dilatatum, Sw. . . . .	.	.	.	×	×	×	×	...
*Felix-mas, . . . . .	.	.	.	.	.	.	×	Luxuriant on one island of group at Vardø.
*Cystopteris fragilis, Bernh. . . . .	.	.	N	.	×	×	×	
Polypodium— *Phegopteris, L. . . . .	.	.	.	.	×	×	×
*Dryopteris, L. . . . .	.	.	.	.	×	×	×
*Woodsia ilvensis] . . . . .	.	.	?	.	.	.	.	...
*Botrychium Lunaria, Sw. . . . .	.	.	.	×	.	.	.	Indigenous. A very starved form.
Equisetum— *arvense, L.	×	.	Z	×	×	×	×	Scarce; reduced. A peculiar form.
*sylvaticum, L. . . . .	.	.	.	.	×	×	×
*limosum, L. . . . .	.	.	.	.	.	×	.
*variegatum, Schl. . . . .	×	.	.	.	.	.	.	Only a single poor specimen obtained.
scirpoides, Michx. . . . .	.	.	N	.	.	.	.
Lycopodium— *clavatum, L. . . . .	.	.	.	.	×	.	.
*annotinum, L. . . . .	.	.	.	.	×	.	.
*alpinum, L.	×	.	.	
*Selago, L.	D	.	Z	.	×	×	×	
*Selaginella selaginoides, Gray.	×	×	×	×	
*Isoetes lacustris, L.	×	.	

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A.M. Traill del.

F. Huth, Lith^r Edin^r.

CAREX SEWELLII, Benn. et C.B. Clarke.