HULTENIA

By

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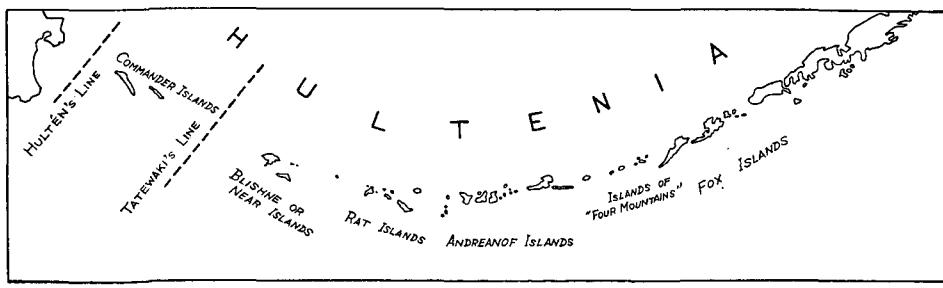

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Preface

During these 40 years, the writer has researched on Eastern Asiatic vegetation and botanized in the Kurile Islands, Sakhalin, Northern and Northeastern China, Mongolia and Maritime Province, and devoted especially to the phytogeographical study of the islands of the North Pacific Ocean. It is a very interesting and important problem for the geobotanist rendering the valuable and impressive character of the floristic composition and the synecological structure. In 1929, he explored botanically in the Aleutian Islands and was strongly struck by the flora and also the vegetation. Since then, special attention has been paid for the Aleutian Islands and also the Commander Islands. In 1934, he published his paper of the Aleutian flora with Dr. Y. KOBAYASHI. Just after, Prof. E. HULTÉN published his excellent flora of the Aleutian Islands by the precise study. The second edition of his flora was published from Germany in 1960.

In October 1954, and August 1962, the writer had the good chances to study on the problem under consideration in the National Science Museum at Stockholm. In 1961, after the Pacific Science Congress held at Honolulu, he had a botanical trip with Prof. E. HULTÉN for about a month in Japan. During the trip, they discussed often about the present problem each other. By the result of the present study mainly based on Prof. HULTÉN's work*, the writer wishes to dedicate this paper to Prof. E. HULTÉN who is still actively studying on the boreal flora and endeavouring to publish his magnificent work.

The writer expresses here his hearty thanks to Prof. ERIC HULTÉN for his kind direction, to Prof. B. LINDQUIST for his kind advice, also to Dr. STEN BERGMAN for his hospitability during my stay at Stockholm, to Prof. Dr. SCHOBER at Hann.-Münden and to Mr. NISHIHARA for his auspices of the writer's European trip. He wishes his cordial thanks to Dr. KOJI ITO for his assistance in the preparation of the present paper. Also he is indebted to Prof. Dr. G. TAYLOR and Prof. Dr. H. R. FLETCHER, the directors of the Royal Botanic Gardens at Kew and Edinburgh, Prof. Dr. R. TÜXEN at Stolzenau in Germany, Prof. Dr. H. GAMS at Insbruck and the directors of the botanic gardens and the botanical institutes of the universities at Brussel, Göttingen and München for kindly affording him the privilege of using their libraries.

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* HULTÉN, E.. Flora of the Aleutian Islands. 2. ed. 1960.

I. Statistical Study on Floristic Composition

Construction of the Flora

The families and the number of the genera and species growing in Hultenia are shown in the following table elements.

1. Species

According to the systematic arrangement of the families the number of species of the genera growing in Hultenia are shown as follows: (* the secondary element)

Polypodiaceae: *Cystopteris* 1; *Dryopteris* 4; *Polystichum* 4; *Athyrium* 2; *Blechnum* 1; *Cryptogramma* 1; *Adiantum* 1; *Polypodium* 1.
Ophioglossaceae: *Ophioglossum* 1; *Botrychium* 5.
Equisetaceae: *Equisetum* 6.
Lycopodiaceae: *Lycopodium* 6.
Selaginellaceae: *Selaginella* 2.
Isoetaceae: *Isoetes* 1.
Pinaceae: *Pinus* 1.
Sparganiaceae: *Sparganium* 3.
Potamogetonaceae: *Zostera* 1; *Potamogeton* 6; *Ruppia* 1.
Scheuchzeriaceae: *Triglochin* 1.
Gramineae: *Hierochloe* 2; *Phleum* 1+1*; *Alopeculus* 2; *Cinna* 1; *Arctagrostis* 1; *Agrostis* 5+1*; *Podagrostis* 2; *Calamagrostis* 6; *Deschampsia* 3; *Vahlodea* 1; *Trisetum* 2; *Melica* 1; *Dactylis* 1*; *Poa* 12+3*; *Puccinellia* 3; *Colpodium* 1; *Festuca* 3; *Bromus* 1+1*; *Hordeum* 1; *Anthoxanthum* 1*; *Elymus* 3.
Cyperaceae: *Eriophorum* 4; *Scirpus* 4; *Carex* 30.
Juncaceae: *Juncus* 9; *Luzula* 7.
Liliaceae: *Tofieldia* 1; *Veratrum* 1; *Allium* 1; *Fritillaria* 1; *Lloydia* 1; *Majanthemum* 1; *Streptopus* 1; *Trillium* 1.
Iridaceae: *Iris* 1; *Sisyrinchium* 1.
Orchidaceae: *Cypripedium* 2; *Orchis* 1; *Coeloglossum* 1; *Platanthera* 7; *Spiranthes* 1; *Listera* 2; *Corallorrhiza* 1; *Microstytis* 1.
Salicaceae: *Salix* 13.
Betulaceae: *Betula* 2; *Alnus* 1.
Urticaceae: *Urtica* 1.
Polygonaceae: *Koenigia* 1; *Rumex* 4+4*; *Oxyria* 1; *Polygonum* 1+1*.

Portulacaceae: *Claytonia* 3; *Montia* 1.
Caryophyllaceae: *Stellaria* 7+1*; *Cerastium* 4+1*; *Sagina* 4; *Minuartia* 4; *Honckenya* 1; *Moehringia* 1; *Silene* 1; *Melandryum* 1.
Nymphaeaceae: *Nuphar* 1.
Ranunculaceae: *Caltha* 1; *Trollius* 1; *Coptis* 1; *Aconitum* 2; *Delphinium* 1; *Anemone* 2; *Oxygraphis* 1; *Ranunculus* 9(+1)+2*; *Thalictrum* 1.
Papaveraceae: *Papaver* 1; *Corydalis* 1.
Cruciferae: *Subularia* 1; *Aphragmus* 1; *Thlaspi* 1*; *Cochlearia* 1; *Brassica* 3*; *Barbarea* 1; *Rorippa* 1*; *Cardamine* 4; *Capsella* 2*; *Draba* 7; *Sysimbrium* 1*; *Arabis* 3; *Parrya* 1.
Droseraceae: *Drosera* 1.
Crassulaceae: *Sedum* 1.
Saxifragaceae: *Leptarrhena* 1; *Tellima* 1; *Saxifraga* 13; *Chrysosplenium* 3; *Parnassia* 2.
Rosaceae: *Aruncus* 1; *Sorbus* 1; *Rubus* 3; *Potentilla* 7; *Sibbaldia* 1; *Alchemilla* 1*; *Geum* 5; *Dryas* 1; *Filipendula* 1; *Rosa* 1; *Fragaria* 1; *Sanguisorba* 1.
Leguminosae: *Medicago* 1*; *Trifolium* 2*; *Astragalus* 1; *Lupinus* 1; *Lathyrus* 2.
Geraniaceae: *Geranium* 1.
Callitrichaceae: *Callitriche* 3.
Empetraceae: *Empetrum* 1.
Violaceae: *Viola* 5.
Oenotheraceae: *Epilobium* 10; *Circaea* 1.
Hippuridaceae: *Hippuris* 3.
Halorrhagaceae: *Myriophyllum* 1.
Umbelliferae: *Osmorrhiza* 1; *Cicuta* 1; *Pachypleurum* 1; *Conioselinum* 1; *Cnidium* 1; *Ligusticum* 1; *Angelica* 2; *Pastinaca* 1*; *Heracleum* 1.
Cornaceae: *Cornus* 2.
Pyrolaceae: *Pyrola* 3.
Ericaceae: *Ledum* 1: *Rhododendron* 2; *Loiseleuria* 1; *Phyllodoce* 2; *Kalmia* 1; *Bryanthus* 1; *Cassiope* 2; *Andromeda* 1; *Arcterica* 1; *Gaultheria* 1; *Arctotaphylos* 2; *Vaccinium* 3; *Oxycoccus* 2.
Diapensiaceae: *Diapensia* 1.
Primulaceae: *Primula* 3; *Androsace* 1; *Lysimachia* 1; *Trientalis* 1.
Plumbaginaceae: *Armeria* 1.
Gentianaceae: *Gentiana* 6; *Swertia* 1; *Menyanthes* 1.
Polemoniaceae: *Polemonium* 2.
Hydrophyllaceae: *Romanzoffia* 1.

Borraginaceae: *Plagiobotrys* 1; *Amsinckia* 1; *Mertensia* 2.
Labiatae: *Prunella* 1.
Scrophulariaceae: *Mimulus* 1; *Limosella* 1; *Veronica* 5; *Lagotis* 1; *Castilleja* 1; *Euphrasia* 1; *Rhinanthus* 1; *Pedicularis* 8.
Lentibulariaceae: *Pinguicula* 2; *Utricularia* 1.
Plantaginaceae: *Plantago* 3+2*.
Rubiaceae: *Galium* 4.
Caprifoliaceae: *Sambucus* 1; *Linnaea* 1; *Lonicera* 1.
Valerianaceae: *Valeriana* 1.
Campanulaceae: *Campanula* 4.
Compositae: *Solidago* 3; *Berris* 1*; *Aster* 2; *Erigeron* 3; *Antennaria* 3; *Anaphalis* 1; *Achillea* 3; *Matricaria* 1*; *Chrysanthemum* 1+2*; *Artemisia* 7; *Petasites* 1; *Arnica* 3; *Cacalia* 1; *Senecio* 3+1*; *Saussurea* 2; *Cirsium* 1; *Picris* 1; *Taraxacum* 8+1*; *Prenanthes* 1; *Hieracium* 2.

TABLE 1. Number of genera and species

Name of families	Genera	Species
Polypodiaceae	8	15
Ophioglossaceae	2	6
Equisetaceae	1	6
Lycopodiaceae	1	6
Selginellaceae	1	2
Isoetaceae	1	1
PTERIDOPHYTA Fam. 6	14	36
PINACEAE	1	1
GYMNOSPERMAE Fam. 1	1	1
Sparganiaceae	1	3
Potamogetonaceae	3	8
Scheuchzeriaceae	1	1
Gramineae	21	51+8*
Cyperaceae	3	38
Juncaceae	2	16
Liliaceae	8	8
Iridaceae	2	2
Orchidaceae	8	16
MONOCOTYLEDONEAE Fam. 9	49	143+8*

* Number of the introduced plants.

Name of families	Genera	Species
Salicaceae	1	13
Betulaceae	2	3
Urticaceae	1	1
Polygonaceae	4	7+5*
Portulacaceae	2	4
Caryophyllaceae	8	23+2*
Nymphaeaceae	1	1
Ranunculaceae	9	19(+1)+2*
Papaveraceae	2	2
Cruciferae	13	19+8*
Droseraceae	1	1
Crassulaceae	1	1
Saxifragaceae	5	20
Rosaceae	12	23+1*
Leguminosae	5	4+3*
Geraniaceae	1	1
Callitrichaceae	1	3
Empetraceae	1	1
Violaceae	1	5
Oenotheraceae	2	11
Hippuridaceae	1	3
Halorrhagaceae	1	1
Umbelliferae	9	9+1*
Cornaceae	1	2
ARCHICHLAMYDEAE Fam. 24	85	177(+1)+22*
Pyrolaceae	1	3
Ericaceae	13	20
Diapensiaceae	1	1
Primulaceae	4	6
Plumbaginaceae	1	1
Gentianaceae	3	8
Polemoniaceae	1	2
Hydrophyllaceae	1	1
Borraginaceae	3	4
Labiatae	1	1
Scrophulariaceae	8	19

Name of families	Genera	Species
Lentibulariaceae	2	3
Plantaginaceae	1	3+2*
Rubiaceae	1	4
Caprifoliaceae	3	3
Valerianaceae	1	1
Campanulaceae	1	4
Compositae	20	46+6*
METACHLAMYDEAE Fam. 18	66	130+8*

Systematic Groups	Families	Genera	Species
Archichlamydeae	24	85	177(+1)+22*
Metachlamydeae	18	66	130+8*
Dicotyledoneae	42	151	307(+1)+30*
Monocotyledoneae	9	49	143+8*
Angiospermae	51	200	450(+1)+38*
Gymnospermae	1	1	1
Phanerogamae	52	201	451(+1)+38*
Pteridophyta	6	14	36
Total	58	215	487(+1)+38*

2. Number of Genera

The number of the genera in the families growing in Hultenia are shown as follows:

1 Genus: *Equisetaceae*; *Lycopodiaceae*; *Selaginellaceae*; *Isoetaceae*; *Pinaceae*; *Sparganiaceae*; *Scheuchzeriaceae*; *Salicaceae*; *Urticaceae*; *Nymphaeaceae*; *Droseraceae*; *Crassulaceae*; *Geraniaceae*; *Callitrichaceae*; *Empetraceae*; *Violaceae*; *Hippuridaceae*; *Halorrhagaceae*; *Cornaceae*; *Pyrolaceae*; *Diapensiaceae*; *Plumbaginaceae*; *Polemoniaceae*; *Hydrophyllaceae*; *Labiatae*; *Plantaginaceae*; *Rubiaceae*; *Valerianaceae*; *Campanulaceae.*

2 Genera: *Ophioglossaceae*; *Juncaceae*; *Iridaceae*; *Betulaceae*; *Portulacaceae*; *Papaveraceae*; *Oenotheraceae*; *Lentibulariaceae.*

3 Genera: *Potamogetonaceae*; *Cyperaceae*; *Gentianaceae*; *Borragi-*

naceae; *Caprifoliaceae.*

4 Genera: *Polygonaceae*; *Primulaceae.*

5 Genera: *Saxifragaceae*; *Leguminosae.*

8 Genera: *Polypodiaceae*; *Liliaceae*; *Orchidaceae*; *Caryophyllaceae*; *Scrophulariaceae.*

9 Genera: *Ranunculaceae*; *Umbelliferae.*

12 Genera: *Rosaceae.*

13 Genera: *Cruciferae*; *Ericaceae.*

20 Genera: *Compositae.*

21 Genera: *Gramineae.*

TABLE 2. Number of genera in the families

Number of genera	Number of families	Total number of genera
1	29	29
2	8	16
3	5	15
4	2	8
5	2	10
8	5	40
9	2	18
12	1	12
13	2	26
20	1	20
21	1	21
Total	58	215

3. Number of Species in Genera

The genera belonged to the groups of the species numbers in the genera are as follows:-

*Genera, including only the secondary elements

1 species: *Cystopteris, Blechnum, Cryptogramma, Adiantum, Polypodium, Ophioglossum, Isoetes, Pinus, Zostera, Ruppia, Triglochin, Cinna, Arctagrostis, Vahlodea, Melica, *Dactylis, Colpodium, Hordeum, *Anthoxanthum, Tofieldia, Veratrum, Allium, Fritillaria, Lloydia, Majanthemum, Streptopus, Trillium, Iris, Sisyrinchium, Orchis, Coeloglossum, Spiranthes, Corallorrhiza, Microstylis, Alnus, Urtica, Koenigia, Oxyria, Montia, Honkenya, Moehringia, Silene, Melandryum, Nuphar, Caltha, Trollius, Coptis,*

*Delphinium, Oxygraphis, Thalictrum, Papaver, Corydalis, Subularia, Aphragamus, *Thlaspi, Cochlearia, Barbarea, *Rorippa, *Sysimbrium, Parrya, Drosera, Sedum, Leptarrhena, Tellima, Aruncus, Sorbus, Sibbaldia, *Alchemilla, Dryas, Filipendula, Rosa, Fragaria, Sanguisorba, *Medicago, Astragalus, Lupinus, Geranium, Empetrum, Circaea, Myriophyllum, Osmorrhiza, Cicuta, Pachypleurum, Conioselinum, Cnidium, Ligusticum, *Pastinaca, Heracleum, Ledum, Loiseleuria, Kalmia, Bryanthus, Andromeda, Arcterica, Gaultheria, Diapensia, Androsace, Lysimachia, Trientalis, Armeria, Swertia, Menyanthes, Romanzoffia, Plagiobotrys, Amsinckia, Prunella, Mimulus, Limosella, Lagotis, Castilleja, Euphrasia, Rhinanthus, Utricularia, Sambucus, Linnaea, Lonicera, Valeriana, *Bellis, Anaphalis, *Matricaria, Petasites, Cacalia, Cirsium, Picris, Prenanthes.*

2 species: *Athyrium, Sellaginella, Hierochloe, Phleum, Alopeculus, Podagrostis, Trisetum, Bromus, Cypripedium, Listera, Betula, Polygonum, Aconitum, Anemone, *Capsella, Parnassia, *Trifolium, Lathyrus, Angelica, Cornus, Rhododendron, Phyllodoce, Cassiope, Arctostaphyllos, Oxycoccus, Polemonium, Mertensia, Pinguicula, Aster, Saussurea, Hieracium.*

3 species: *Sparganium, Deschampsia, Puccinellia, Festuca, Elymus, Claytonia, *Brassica, Arabis, Chrysosplenium, Rubus, Callitriche, Hippuris, Pyrola, Vaccinium, Primula, Solidago, Erigeron, Antennaria, Achillea, Chrysanthemum, Arnica.*

4 species: *Dryopteris, Polystichum, Eriophorum, Scirpus, Sagina, Minuartia, Cardamine, Galium, Campanula, Senecio.*

5 species: *Botrychium, Cerastium, Geum, Viola, Veronica, Plantago.*

6 species: *Equisetum, Lycopodium, Potamogeton, Agrostis, Calamagrostis, Gentiana.*

7 species: *Luzula, Platanthera, Draba, Potentilla, Artemisia.*

8 species: *Rumex, Stellaria, Pedicularis, Taraxacum.*

9 species: *Juncus.*

10 species: *Epilobium.*

11 species: *Ranunculus.*

13 species: *Salix, Saxifraga.*

15 species: *Poa.*

30 species: *Carex.*

The groups of the species number in the genera show the distinct character of the boreal flora, for the genera having more than 10 species are *Ranunculus, Salix, Saxifraga, Poa* and *Carex.*

TABLE 3. Number of

Number of species / Families	1	2	3	4	5	6	7
Polypodiaceae	5	1	·	2	·	·	·
Ophioglossaceae	1	·	·	·	1	·	·
Equisetaceae	·	·	·	·	·	1	·
Lycopodiaceae	·	·	·	·	·	1	·
Selaginellaceae	·	1	·	·	·	·	·
Isoetaceae	1	·	·	·	·	·	·
Pinaceae	1	·	·	·	·	·	·
Sparganiaceae	·	·	1	·	·	·	·
Potamogetonaceae	2	·	·	·	·	1	·
Scheuchzeriaceae	1	·	·	·	·	·	·
Gramineae	6+(2)[2]	4+(2)[2]	4	·	·	1+(1)[1]	·
Cyperaceae	·	·	·	2	·	·	·
Juncaceae	·	·	·	·	·	·	1
Liliaceae	8	·	·	·	·	·	·
Iridaceae	2	·	·	·	·	·	·
Orchidaceae	5	2	·	·	·	·	1
Salicaceae	·	·	·	·	·	·	·
Betulaceae	1	1	·	·	·	·	·
Urticaceae	1	·	·	·	·	·	·
Polygonaceae	2	(1)[1]	·	·	·	·	·
Portulacaceae	1	·	1	·	·	·	·
Caryophyllaceae	4	·	·	2	(1)[1]	·	·
Nymphaeaceae	1	·	·	·	·	·	·
Ranunculaceae	6	2	·	·	·	·	·
Papaveraceae	2	·	·	·	·	·	·
Cruciferae	5+(3)[3]	(1)[2]	1+(1)[3]	1	·	·	1
Droseraceae	1	·	·	·	·	·	·
Crassulaceae	1	·	·	·	·	·	·
Saxifragaceae	2	1	1	·	·	·	·
Rosaceae	8+(1)[1]	·	1	·	1	·	1
Leguminosae	2+(1)[1]	1+(1)[2]	·	·	·	·	·
Geraniaceae	1	·	·	·	·	·	·
Callitrichaceae	·	·	1	·	·	·	·

( ) shows the genus including the secondary elements. [ ] shows the number

Species in the Genera

8	9	10	11	13	14	15	30	Gen.	Sp.
.	.	.	.	.	.	.	.	8	15
.	.	.	.	.	.	.	.	2	6
.	.	.	.	.	.	.	.	1	6
.	.	.	.	.	.	.	.	1	6
.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	1	1
.	.	.	.	.	.	.	.	1	1
.	.	.	.	.	.	.	.	1	3
.	.	.	.	.	.	.	.	3	8
.	.	.	.	.	.	.	.	1	1
.	.	.	.	.	.	(1)[3]	.	15+(6)	51+[8]
.	.	.	.	.	.	.	1	3	38
.	1	.	.	.	.	.	.	2	16
.	.	.	.	.	.	.	.	8	8
.	.	.	.	.	.	.	.	2	2
.	.	.	.	.	.	.	.	8	16
.	.	.	.	1	.	.	.	1	13
.	.	.	.	.	.	.	.	2	3
.	.	.	.	.	.	.	.	1	1
(1)[4]	.	.	.	.	.	.	.	2+(2)	7+[5]
.	.	.	.	.	.	.	.	2	4
(1)[1]	.	.	.	.	.	.	.	6+(2)	23+[2]
.	.	.	.	.	.	.	.	1	1
.	.	.	(1(+1))[2]*	.	.	.	.	8+(1)	19(+1)+[2]
.	.	.	.	.	.	.	.	2	2
.	.	.	.	.	.	.	.	8+(5)	19+[8]
.	.	.	.	.	.	.	.	1	1
.	.	.	.	.	.	.	.	1	1
.	.	.	.	1	.	.	.	5	20
.	.	.	.	.	.	.	.	11+(1)	23+[1]
.	.	.	.	.	.	.	.	3+(2)	4+[3]
.	.	.	.	.	.	.	.	1	1
.	.	.	.	.	.	.	.	1	3

of the secondary elements.

Number of species / Families	1	2	3	4	5	6	7
Empetraceae	1	·	·	·	·	·	·
Violaceae	·	·	·	·	1	·	·
Oenotheraceae	1	·	·	·	·	·	·
Hippuridaceae	·	·	1	·	·	·	·
Halorrhagaceae	1	·	·	·	·	·	·
Umbelliferae	7+(1)[1]	1	·	·	·	·	·
Cornaceae	·	1	·	·	·	·	·
Pyrolaceae	·	·	1	·	·	·	·
Ericaceae	7	5	1	·	·	·	·
Diapensiaceae	1	·	·	·	·	·	·
Primulaceae	3	·	1	·	·	·	·
Plumbaginaceae	1	·	·	·	·	·	·
Gentianaceae	2	·	·	·	·	1	·
Polemoniaceae	·	1	·	·	·	·	·
Hydrophyllaceae	1	·	·	·	·	·	·
Borraginaceae	2	1	·	·	·	·	·
Labiatae	1	·	·	·	·	·	·
Scrophulariaceae	6	·	·	·	1	·	·
Lentibulariaceae	1	1	·	·	·	·	·
Plantaginaceae	·	·	·	·	(1)[2]	·	·
Rubiaceae	·	·	·	1	·	·	·
Caprifoliaceae	3	·	·	·	·	·	·
Valerianaceae	1	·	·	·	·	·	·
Campanulaceae	·	·	·	1	·	·	·
Compositae	6+(2)[2]	3	5+(1)[2]	(1)[1]	·	·	1

Systematic Groups / Number		1	2	3	4	5	6	7
METACHLAMYDEAE	Gen.	35+(2)	11	8+(1)	2+(1)	1+(1)	1	1
	Sp.	35+[2]	22	25+[2]	11+[1]	8+[2]	6	7
ARCHICHLAMYDEAE	Gen.	48+(6)	7+(3)	6+(1)	3	2+(1)	·	2
	Sp.	48+[6]	15+[5]	18+[3]	12	14+[1]	·	14
DICOTYLEDONEAE	Gen.	83+(8)	18+(3)	14+(2)	5+(1)	3+(2)	1	3
	Sp.	83+[8]	37+[5]	43+[5]	23+[1]	22+[3]	6	21
MONOCOTYLEDONEAE	Gen.	24+(2)	6+(2)	5	2	·	2+(1)	2
	Sp.	24+[2]	14+[2]	15	8	·	17+[1]	14

8	9	10	11	13	14	15	30	Gen.	Sp.
·	·	·	·	·	·	·	·	1	1
·	·	·	·	·	·	·	·	1	5
·	·	1	·	·	·	·	·	2	11
·	·	·	·	·	·	·	·	1	3
·	·	·	·	·	·	·	·	1	1
·	·	·	·	·	·	·	·	8+(1)	9+[1]
·	·	·	·	·	·	·	·	1	2
·	·	·	·	·	·	·	·	1	3
·	·	·	·	·	·	·	·	13	20
·	·	·	·	·	·	·	·	1	1
·	·	·	·	·	·	·	·	4	6
·	·	·	·	·	·	·	·	1	1
·	·	·	·	·	·	·	·	3	8
·	·	·	·	·	·	·	·	1	2
·	·	·	·	·	·	·	·	1	1
·	·	·	·	·	·	·	·	3	4
·	·	·	·	·	·	·	·	1	1
1	·	·	·	·	·	·	·	8	19
·	·	·	·	·	·	·	·	2	3
·	·	·	·	·	·	·	·	(1)	3+[2]
·	·	·	·	·	·	·	·	1	4
·	·	·	·	·	·	·	·	3	3
·	·	·	·	·	·	·	·	1	1
·	·	·	·	·	·	·	·	1	4
·	(1)[1]	·	·	·	·	·	·	15+(5)	46+[6]

8	9	10	11	13	14	15	30	Gen.	Sp.
1	(1)	·	·	·	·	·	·	60+(6)	
8	8+[1]	·	·	·	·	·	·		130+[8]
(2)	·	1	(1)	2	·	·	·	71+(14)	
11+[5]	·	10	9(+1)+[2]	26	·	·	·		177(+1)+[22]
1+(2)	(1)	1	(1)	2	·	·	·	131+(20)	
19+[5]	8+[1]	10	9(+1)+[2]	26	·	·	·		307(+1)+[30]
·	1	·	·	·	·	(1)	1	43+(6)	
·	9	·	·	·	·	12+[3]	30		143+[8]

Systematic Groups \ Number		1	2	3	4	5	6	7
ANGIOSPERMAE	Gen.	107+(10)	24+(5)	19+(2)	7+(1)	3+(2)	3+(1)	5
	Sp.	107+[10]	51+[7]	58+[5]	31+[1]	22+[3]	23+[1]	35
GYMNOSPERMAE	Gen.	1	·	·	·	·	·	·
	Sp.	1	·	·	·	·	·	·
PHANEROGAMAE	Gen.	108+(10)	24+(5)	19+(2)	7+(1)	3+(2)	3+(1)	5
	Sp.	108+[10]	51+[7]	58+[5]	31+[1]	22+[3]	23+[1]	35
PTERIDOPHYTA	Gen.	7	2	·	2	1	2	·
	Sp.	7	4	·	8	5	12	·
Total	Gen.	115+(10)	26+(5)	19+(2)	9+(1)	4+(2)	5+(1)	5
	Sp.	115+[10]	55+[7]	58+[5]	39+[1]	27+[3]	35+[1]	35

II. Botanical Districts in Hultenia

1. Hultenia

The botanical area, *Hultenia*, is composed of two islands, namely the Commander Islands and the Aleutian Islands, forming a beautiful arch between Kamtchatka and Alaska Peninsulae. The present area is named in the honor of Prof. ERIC HULTÉN who is the leading botanist of the phytogeography and the systematics of the boreal regions in the Northern Hemisphere. In 1961, the writer* already proposed it in the Pacific Science Congress held at Honolulu.

Hultenia, is situated between the Subarctic Zone of Far Eastern Asia and that of American Pacific Coast. But there is a quite characteristic vegetation characterized by devoid of the needle-leaved and broad-leaved forest nor the well-developed shrubby thicket. It is very important from the view point of the vegetation that the shrubby thickets represented by *Pinus pumila*, *Alnus crispa* subsp. *Maximowiczii* and *Betula Ermani* commonly found in the Kamtchatka Peninsula and the Northern Kuril Islands are absent. The tundra-like vegetation dominated by the dwarf shrubs accompanied with mosses and lichens is well developed. Tall herbaceous meadows often well developed in the low land of Kamtchatka are hardly found except the Commander Islands. From the view-point of the floristic composition, the number of the species, genera and families are fewer and the following facts apparently show these relations.

Four Districts in HULTENIA: Though the general aspect vegetation in

* TATEWAKI, M.: The phytogeography of the islands of the North Pacific Ocean. (1961).

8	9	10	11	13	14	15	30	Gen.	Sp.
1+(2)	1+(1)	1	(1)	2	·	(1)	1	174+(26)	
19+[5]	17+[1]	10	9(+1)+[2]	26	·	12+[3]	30		450(+1)+[38]
·	·	·	·	·	·	·	·	1	
·	·	·	·	·	·	·	·		1
1+(2)	1+(1)	1	(1)	2	·	(1)	1	175+(26)	
19+[5]	17+[1]	10	9(+1)+[2]	26	·	12+[3]	30		451(+1)+[38]
·	·	·	·	·	·	·	·	14	
·	·	·	·	·	·	·	·		36
1+(2)	1+(1)	1	(1)	2	·	(1)	1	189+(26)	
19+[5]	17+[1]	10	9(+1)+[2]	26	·	12+[3]	30		487(+1)+[38]

HULTENIA is similar to that of the Arctic Zone, but the composition of the floristic elements are different. HULTENIA is divided into four districts as follows:

I) Commander Islands; II) Near Islands; III) Rat Islands and ANDREANOF Islands; IV) Fox Islands and Mountains of Fox Islands.

2. Distribution of Species among Four Districts

The distribution of the species among these four districts are as follows, showing the interesting fact in the phytogeographical problem. (I, II, III, IV are respectively the botanical districts mentioned above).

I

*Equisetum limosum, Equisetum pratense, Equisetum silvaticum, Pinus pumila, Sparganium minimum, Potamogeton gramineus, Agrostis clavata, Calamagrostis bracteolata, Calamagrostis neglecta, Trisetum sibiricum, Poa penicillata, Colpodium fulvum, Scirpus palustris, Scirpus pauciflorus, Carex appendiculata, Carex subspathacea, Carex scita, Carex verna, Carex rariflora, Carex vaginata, Juncus beringensis, Luzula japonica, Trillium kamtschaticum, Platanthera oligantha, Salix cuneata, Betula Ermani, Urtica platyphylla, Rumex arcticus, Stellaria crassifolia, Stellaria radians, Cerastium maximum, Delphinium brachycentrum, Ranunculus auricomus, Corydalis ambigua, Arabis Stelleri, Chrysosplenium kamtschaticum, Potentilla fruticosa, Potentilla stolonifera, *Alchemilla subcrenata, Geum strictum, Filipendula kamtschatica, *Medicago denticulata, Viola avatschensis, Viola biflora, Hippuris*

tetraphylla, Cicuta virosa, Pachyplerum alpinum, Cnidium ajanense, Pyrola media, Rhododendron chrysanthum, Bryanthus Gmelini, Andromeda polifolia, Arcterica nana, Oxycoccus quadripetalus, Diapensia lapponica, Gentiana glauca, Polemonium humile, Pedicularis eriophora, Plantago camtschatica, Lonicera coerulea, Solidago Virgaurea, Erigeron acris, Achillea Ptarmica, Achillea sibirica, Artemisia borealis, Artemisia trifurcata, Saussurea Tilesii.

I~II

*Polystichum Braunii, Equisetum hiemale, Veratrum album, Cypripedium Yatabeanum, *Ranunculus repens, Sorbus sambucifolia, Viola epipsila, Phyllodoce coerulea, Gentiana auriculata, Mertensia asiatica, Limosella aquatica, Erigeron humilis, Senecio palmatus, Cirsium kamtschaticum, Picris hieracioides.*

I~II~III

Alopeculus alpinus, Carex gynocrates, Majanthemum dilatatum, Platanthera tipuloides, Draba aleutica, Rubus Chamaemorus, Potentilla emarginata, Myriophyllum spicatum, Veronica grandiflora, Antennaria dioica, Chrysanthemum arcticum, Cacalia auriculata.

I~II~III~IV

*Dryopteris austriaca, Dryopteris Linnaeana, Dryopteris Oreopteris, Dryopteris Phegopteris, Athyrium Filix-femina, Botrychium Lunaria, Equisetum arvense, Lycopodium alpinum, Lycopodium annotinum, Lycopodium clavatum, Lycopodium sabinaefolium, Lycopodium Selago, Isoetes Brannii., Sparganium hyperboreum, Hierochloe odorata, Phleum alpinum, Agrostis borealis, Calamagrostis canadensis, Deschampsia beringensis, Trisetum spicatum, Vahlodea atropurpurea, *Poa annua, Poa arctica, Poa eminens, Poa hispidula, Poa Komarovii, Poa macrocalyx, Festuca brachyphylla, Festuca rubra, Bromus sitchensis, Hordeum boreale, Elymus arenarius, Scirpus caespitosa, Carex pribylovensis, Carex Hindsii, Carex Lyngbyei, Carex stylosa, Carex nesophila, Carex macrochaeta, Juncus balticus, Luzula arcuata, Luzula multiflora, Luzula parviflora, Luzuza Wahlenbergii, Tofieldia coccinea, Fritillaria camschatcensis, Streptopus amplexifolius, Iris setosa, Orchis aristata, Coeloglossum viride, Platanthera dilatata, Plathanthera convallariaefolia, Listera cordata, Salix crassijulis, Koenigia islandica, Oxyria digyna, Polygonum viviparum, Claytonia sibirica, Montia lamprosperma, Stellaria calycantha, *Stellaria media, Cerastium Beeringianum, Cerastium Fischerianum, Sagina*

*intermedia, Honckenya peploides, Moehringia lateriflora, Coptis trifolia, Aconitum maximum, Anemone narcissiflora, Anemone Richardsonii, Ranunculus Eschscholtzii, Ranunculus Nelsonii, Ranunculus reptans, Ranunculus sulphureus, Ranunculus trichophyllus, Cochlearia officinalis, Barbarea orthoceras, Cardamine umbellata, Draba borealis, Arabis lyrata, Saxifraga bracteata, Saxifraga bronchialis, Saxifraga unalaschkensis, Rubus stellulatus, Potentilla pacifica, Potentilla villosa, Sibbaldia procumbens, Geum calthifolium, Geum macrophyllum, Geum Rossii, *Trifolium repens, Lathyrus maritimus, Lathyrus palustris, Geranium erianthum, Empetrum nigrum, Viola Langsdorffii, Epilobium angustifolium, Epiobium Behringianum, Epilobium Hornemannii, Epilobium latifolium, Epilobium serturatum, Hippuris vulgaris, Conioselinum Benthami, Ligusticum scoticum, Angelica lucida, Heracleum lanatum, Cornus suecica, Pyrola minor, Rhododendron kamtschaticum, Loiseleuria procumbens, Phyllodoce aleutica, Cassiope lycopodioides, Vaccinium uliginosum, Vaccinium Vitis-idaea, Primula cuneifolia, Trientalis europaea, Veronica americana, Veronica tenella, Veronica Stelleri, Euphrassia mollis, Rhinanthus groenlandicus, Pedicularis Chamissonis, Plantago macrocarpa, Galium trifidum, Linnaea borealis, Campanula dasyantha, Campanula lasiocarpa, Erigeron peregrinus, Anapharis margaritacea, Artemisia unalaschkensis, Arnica unalaschkensis, Senecio Pseudo-Arnica, Taraxacum trigonolobum, Hieracium triste.*

I~II. IV

*Polystichum Lonchitis, Hierochloe alpina, Eriophorum Scheuchzeri, Carex Gmelini, Salix reticulata, *Rumex Acetosella, Stellaria humifusa, Minuartia macrocarpa, Minuartia rubella, *Ranunculus acris, *Capsella Bursa-pastoris, Drosera rotundifolia, Saxifraga oppositifolia, Parnassia palustris, Potentilla palustris, Callitriche verna, Angelica genuflexa, Pyrola asarifolia, Vaccinium ovalifolium, Oxycoccus microcarpus, Lagotis glauca, Artemisia arctica.*

I. III

Polystichum aleuticum, Salix pseudopolaris, Claytonia arctica, Trollius Riederianus.

I. III~IV

Equisetum variegatum, Potamogeton perfoliatus, Calamagrostis purpurascens, Poa Turneri, Eirophorum angustifolium, Carex nigricans, Juncus castaneus, Salix rotundifolia, Silene acaulis, Caltha palustris, Ranunculus hyperboreus, Ranunculus nivalis, Cardamine pratensis, Callitriche autumnalis, Epilobium

*glandulosum, Plagiobotrys orientalis, *Matricaria suaveolens, Petasites frigidus.*

I. IV

*Athyrium alpestre, Zostera marina, Ruppia spiralis, Triglochin palustre, *Dactylis glomerata, *Poa pratensis, Carex pyrenaica, Carex macloviana, Carex glareosa, Salix alasxensis, Salix arbutifolia, Salix Barclayi, Betula nana, *Polygonum Convolvulus, Melandryum apetalum, Thalictrum kemense, *Rorippa palustris, Saxifraga Hirculus, Chrysosplenium alternifolium, Cornus canadensis, Ledum palustre, Kalmia polifolia, Cassiope Stelleriana, Arctostaphylos alpina, Menyanthes trifoliata, Polemonium acutiflorum, Pedicularis sudetica, Aster sibiricus, *Chrysanthemum Leucanthemum, Saussurea nuda.*

II

*Polystichum Anederssonii, Lycopodium obscurum, Deschampsia flexuosa, *Bromus tectorum, Elymus hirsutus, Carex spectabilis, Carex livida, Allium Victorialis, Sisyrinchium littorale, Minuartia biflora, *Thlaspi arvense, *Brassica Napus, *Brassica juncea, Cardamine Regeliana, Draba fladnizensis, *Sisymbrium altissimum, Aruncus sylvester, Viola Selkirkii, *Pastinaca sativa, Lysimachia thyrsiflora, Amsinckia Menziesii, *Senecio vulgaris, Taraxacum oncophorum.*

II~III

Saxifraga aleutica.

II~III~IV

*Cystopteris fragilis, Polypodium vulgare, Selaginella selaginoides, Potamogeton filiformis, Agrostis alaskana, Agrostis exarata, Deschampsia caespitosa, *Poa trivialis, Puccinellia Langeana, Eriophorum medium, Eriophorum russeorum, Carex anthoxanthea, Carex circinata, Carex pluriflora, Carex physocarpa, Juncus Drummondii, Juncus ensifolius, Juncus falcatus, Juncus Mertensianus, Luzula nivalis, Platanthera Chorisiana, Listera convallarioides, Salix ovalifolia, Rumex fenestratus, Sagina crassicaulis, Cerastium aleuticum, Stellaria sitchana, Stellaria ruscifolia, Aphragmus Eschscholtzianus, Cardamine bellidifolia, Draba hyperborea, Leptarrhena pyrolifolia, Saxifraga punctata, Saxifraga rivularis, Chrysosplenium Wrightii, Lupinus nootakatensis, Primula tschuktschorum, Gentiana acuta, Gentiana aleutica, Mertensia maritima, Mimulus guttatus, Pinguicula vulgaris, Galium Aparine, Solidago multiradiata, Achillea borealis.*

II. IV

*Cryptogramma acrostichoides, Botrychium boreale, Botrychium lanceolatum, Sparganium angustifolium, Potamogeton alpinus, *Phleum pratense, Cypripedium guttatum, Microstylis monophyllos, Claytonia Chamissoi, Stellaria crispa, Nuphar polysepalum, Ranunculus Bongardii, Subularia aquatica, *Brassica campestris, Parrya nudicaulis, Saxifraga serpyllifolia, Callitriche anceps, Epilobium anagallidifolium, Hippuris montana, Prunella vulgaris, Castilleja unalaschcensis, Pedicularis verticillata, *Plantago major, Galium kamtschaticum, Aster foliaceus, Artemisia Tilesii.*

III

*Blechnum Spicant, Potamogeton praelongus, Potamogeton vaginatus, Puccinellia phryganodes, Poa brachyanthera, Elymus aleuticus, Carex Bigelovii, Salix phlebophylla, Potentilla pulchella, Geum pentapetalum, Gaultheria Miqueliana, *Chrysanthemum segetum, Artemisia aleutica.*

III~IV

Alopeculus aequalis, Calamagrostis nutkaensis, Poa stenantha, Puccinellia nutkaensis, Festuca altaica, Juncus triglumis, Lloydia serotina, Spiranthes Romanzoffiana, Oxygraphis glacilis, Papaver alaskanum, Draba nivalis, Arabis hirsuta, Parnassia Kotzebuei, Fragaria chiloensis, Veronica Wormskjoldii, Plantago maritima, Antennaria monocephala, Antennaria pallida.

IV

*Adiantum pedatum, Ophioglossum vulgatum, Botrychium multifidum, Botrychium virginianum, Selaginella sibirica, Cinna latifolia, Arctagrostis latifolia, Agrostis scabra, *Agrostis stolonifera, Podagrostis aequivalvis, Podagrostis Thurberiana, Calamagrostis inexpansa, Melica subulata, Poa lanata, Poa nemoralis, Poa palustris, *Anthoxanthum odoratum, Scirpus kamtschaticus, Carex canescens, Carex stellulata, Carex bicolor, Carex aquatilis, Carex Enanderi, Juncus alpinus, Luzula spicata, Platanthera stricta, Platanthera unalaschcensis, Corallorhiza triflora, Salix glacialis, Salix pulchra, Salix stolonifera, Alnus crispa, *Rumex Acetosa, *Rumex domesticus, Rumex graminifolius, *Rumex obtusifolius, Rumex transitorius, *Cerastium caespitosum, Sagina Linnaei, Sagina occidentalis, Minuartia arctica, Aconitum delphinifolium, *Capsella rubella, Draba lactea, Draba stenoloba, Sedum Rosea, Tellima grandifolia, Saxifraga caespitosa, Saxifraga foliosa, Saxifraga nivalis, Saxifraga nudicaulis, Rubus spectabilis, Dryas octopetala,*

*Rosa nutkana, Sanguisorba stipulata, *Trifolium pratense, Astragalus alpinus, Epilobium leptocarpum, Epilobium luteum, Epilobium Treleaseanum, Circaea alpina, Osmorrhiza chilensis, Arctostaphylos Uva-ursi, Primula egalikensis, Androsace Chamaejasme, Armeria maritima, Gentiana algida, Gentiana prostrata, Swertia perennis, Romanzoffia unalaschcensis, Pedicularis capitata, Pedicularis lanata, Pedicularis Langsdorffii, Pedicularis Oederi, Pinguicula villosa, Utricularia minor, *Plantago media, Galium triflorum, Sambucus racemosa, Valeriana capitata, Campanula latisepala (×), Campanula uniflora, Solidago lepida, *Bellis perennis, Artemisia globularia, Arnica Chamissonis, Arnica Lessingii, Senecio resedifolius, Taraxacum callorhinorum, Taraxacum chromocarpum, Taraxacum cinericolor, Taraxacum collinum, Taraxacum Eyerdamii, Taraxacum kamtschaticum, *Taraxacum vagans, Prenanthes alata, Hieracium gracile.*

The number of the species growing in the present area are summerized as follows :-

TABLE 4. Number of the species among the districts

Families \ District Groups	I	I|II	I|II|III	I|II|III|IV	I|II•IV	I•III	I•III|IV	I•IV	II	II|III	II|III|IV	II•IV	III	III|IV	IV	Total
Polypodiaceae	·	1	·	5	1	1	·	1	1	·	2	1	1	·	1	15
Ophioglossaceae	·	·	·	1	·	·	·	·	·	·	·	2	·	·	3	6
Equisetaceae	3	1	·	1	·	·	1	·	·	·	·	·	·	·	·	6
Lycopodiaceae	·	·	·	5	·	·	·	·	1	·	·	·	·	·	·	6
Selaginellaceae	·	·	·	·	·	·	·	·	·	·	1	·	·	·	1	2
Isoetaceae	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	1
PTERIDOPHYTA 6	3	2	·	13	1	1	1	1	2	·	3	3	1	·	5	36
Pinaceae	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
GYMNOSPERMAE	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Sparganiaceae	1	·	·	1	·	·	·	·	·	·	·	1	·	·	·	3
Potamogetonaceae	1	·	·	·	·	·	1	2	·	·	1	1	2	·	·	8
Scheuchzeriaceae	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	1
Gramineae	6	·	1	17 *1	1	·	2	*2	2 *1	·	4 *1	*1	3	5	10 *2	51 *8
Cyperaceae	8	·	1	7	2	·	2	3	2	·	6	·	1	·	6	38

Families \ District Groups	I	I | II	I | II | III	I | II | III | IV	I | II • IV	I • III	I • III | IV	I • IV	II	II | III	II | III | IV	II • IV	III	III | IV	IV	Total
Juncaceae	2	•	•	5	•	•	1	•	•	•	5	•	•	1	2	16
Liliaceae	1	1	1	3	•	•	•	•	1	•	•	•	•	1	•	8
Iridaceae	•	•	•	1	•	•	•	•	1	•	•	•	•	•	•	2
Orchidaceae	1	1	1	5	•	•	•	•	•	•	2	2	•	1	3	16
MONO-COTYLEDONEAE	20	2	4	39 *1	3	•	6	6 *2	6 *1	•	18 *1	4 *1	6	8	21 *2	143 *8
Salicaceae	1	•	•	1	1	1	1	3	•	•	1	•	1	•	3	13
Betulaceae	1	•	•	•	•	•	•	1	•	•	•	•	•	•	1	3
Urticaceae	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
Polygonaceae	1	•	•	3	*1	•	•	*1	•	•	1	•	•	•	2 *3	7 *5
Portulacaceae	•	•	•	2	•	1	•	•	•	•	•	1	•	•	•	4
Caryophyllaceae	3	•	•	6 *1	3	•	1	1	1	•	4	1	•	•	3 *1	23 *2
Nymphaeaceae	•	•	•	•	•	•	•	•	•	•	•	1	•	•	•	1
Ranunculaceae	2	*1	•	9	(+1) *1	1	3	1	•	•	•	1	•	1	1	19(+1) *2
Papaveraceae	1	•	•	•	•	•	•	•	•	•	•	•	•	1	•	2
Cruciferae	1	•	1	5	*1	•	1	*1	2 *4	•	3	2 *1	•	2	2 *1	19 *8
Droseraceae	•	•	•	•	1	•	•	•	•	•	•	•	•	•	•	1
Crassulaceae	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	1
Saxifragaceae	1	•	•	3	2	•	•	2	•	1	4	1	•	1	5	20
Rosaceae	4 *1	1	2	7	1	•	•	•	1	•	•	•	2	1	4	23 *1
Leguminosae	*1	•	•	2 *1	•	•	•	•	•	•	1	•	•	•	1 *1	4 *3
Geraniaceae	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	1
Callitrichaceae	•	•	•	•	1	•	1	•	•	•	•	1	•	•	•	3
Empetraceae	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	1
Violaceae	2	1	•	1	•	•	•	•	1	•	•	•	•	•	•	5
Oenotheraceae	•	•	•	5	•	•	1	•	•	•	•	1	•	•	4	11
Hippuridaceae	1	•	•	1	•	•	•	•	•	•	•	1	•	•	•	3
Halorrhagaceae	•	•	1	•	•	•	•	•	•	•	•	•	•	•	•	1
Umbelliferae	3	•	•	4	1	•	•	•	*1	•	•	•	•	•	1	9 *1
Cornaceae	•	•	•	1	•	•	•	1	•	•	•	•	•	•	•	2
ARCHICHLAMY-DEAE	22 *2	2 *1	4	52 *2	10(+1) *3	3	8	9 *2	5 *5	1	14	10 *1	3	6	28 *6	177(+1) *22

Families \ District Groups	I	I–II	I–II–III	I–II–III–IV	I–II·IV	I·III	I·III–IV	I·IV	II	II·III	II–III–IV	II·IV	III	III–IV	IV	Total
Pyrolaceae	1	·	·	1	1	·	·	·	·	·	·	·	·	·	·	3
Ericaceae	5	1	·	6	2	·	·	4	·	·	·	·	1	·	1	20
Diapensiaceae	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Primulaceae	·	·	·	2	·	·	·	·	1	·	1	·	·	·	2	6
Plumbaginaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	1
Gentianaceae	1	1	·	·	·	·	·	1	·	·	2	·	·	·	3	8
Polemoniaceae	1	·	·	·	·	·	·	1	·	·	·	·	·	·	·	2
Hydrophyllaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	1
Borraginaceae	·	1	·	·	·	·	1	·	1	·	1	·	·	·	·	4
Labiatae	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	1
Scrophulariaceae	1	1	1	6	1	·	·	1	·	·	1	2	·	1	4	19
Lentibulariaceae	·	·	·	·	·	·	·	·	·	·	1	·	·	·	2	3
Plantaginaceae	1	·	·	1	·	·	·	·	·	·	·	1*	·	1	1*	3 2*
Rubiaceae	·	·	·	1	·	·	·	·	·	·	1	1	·	·	1	4
Caprifoliaceae	1	·	·	1	·	·	·	·	·	·	·	·	·	·	1	3
Valerianaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	1
Campanulaceae	·	·	·	2	·	·	·	·	·	·	·	·	·	·	2	4
Compositae	7	4	3	7	1	·	1 1*	2 1*	1 1*	·	2	2	1 1*	2	13 2*	46 6*
METACHLAMYDEAE	19	8	4	27	5	·	2 1*	9 1*	3 1*	·	9	6 1*	2 1*	4	32 3*	130 8*
ARCHICHLAMYDEAE	23 2*	2 1*	4	52 2*	10 3*	2	8	9(+1) 2*	5 5*	1	14	10 1*	3	6	28 6*	177(+1) 22*
DICOTYLEDONEAE	42 2*	10 1*	8	79 2*	15 3*	2	10 1*	18 3*	8 6*	1	23	16 2*	5 1*	10	60 9*	307(+1) 30*
MONOCOTYLEDONEAE	20	2	4	39 1*	3	·	6	6 2*	6 1*	·	18 1*	4 1*	6	8	21 2*	143 8*
ANGIOSPERMAE	62 2*	12 1*	12	118 3*	18 3*	2	16 1*	24 5*	14 7*	1	41 1*	20 3*	11 1*	18	81 11*	450(+1) 38*
GYMNOSPERMAE	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
PHANEROGAMAE	63 2*	12 1*	12	118 3*	18 3*	2	16 1*	24 5*	14 7*	1	41 1*	20 3*	11 1*	18	81 11*	451(+1) 38*
PTERIDOPHYTA	3	2	·	13	1	1	1	1	2	·	3	3	1	·	5	36
Total	66 2*	14 1*	12	131 3*	19 3*	3	17 1*	25 5*	16 7*	1	44 1*	23 3*	12 1*	18	86 11*	487(+1) 38*

There are three goups having greater number of the species, namely I-II-III-IV, I and IV.

TABLE 5. Greater number of the species

Districts / Groups	I	I-II-III-IV	IV
PTERIDOPHYTA	3	13	5
GYMNOSPERMAE	1	·	·
MONOCOTYLEDONEAE	20	39+1*	21+2*
ARCHICHLAMYDEAE	23+2*	52+2*	28+6*
METACHLAMYDEAE	19	27	32+3*
Total	66+2*	131+3*	86+11*

* Secondary element.

The common species to the four districts (I-II-III-IV group) has the largest number. It is very natural that it shows the general character of the flora of Hultenia which forms a botanical area. The next important groups are I and IV, showing respectively the special character of the plant distribution in the flora. In the I and IV groups, there are the different two ways of the migration namely the Eastern Asiatic way and the Alaskan one; it will be explained in the later chapter.

In the II district, the influence from the Eastern Asiatic side is mainly considered by the number of species of the I-II-III and the I-II groups, while that of the Alaskan side by those of the II-III-IV and the II-IV groups. The comparsion of them is 12 and 14: 44 and 23.

In the III district, influence from the American side is mainly considered by the number of species of the II-III-IV and the III-IV groups, while that of the Eastern Asiatic side by the I-II-III and the I-III ones. The comparison of them is 44 and 18: 12 and 3. It is clear that the III district is floristically more influenced by the eastern side. It is very natural that the comparison number of the plants indegenous to the districts influenced from the eastern and the western sides is parallel to the geographical position showing the transitional feature in plant distribution. The number of species of the II-III group is only endemic species.

TABLE 6. Number of species of the four districts

I	District Groups	I	I | II	I | II | III	I | II | III | IV	I | II · IV	I · III	I · III | IV	I · IV	Total
	Number of Species	66 + 2*	14 + 1*	12	131 + 3*	19 + 3*	3	17 + 1*	25 + 5*	287 + 15*
II	District Groups	I | II	I | II | III	I | II | III | IV	I | II · IV	II	II | III	II | III | IV	II · IV	
	Number of Species	14 + 1*	12	131 + 3*	19 + 3*	16 + 7*	1	44 + 1*	23 + 3*	260 + 18*
III	District Groups	I | II | III	I | II | III | IV	I · III	I · III | IV	II | III	II | III | IV	III	III | IV	
	Number of Species	12	131 + 3*	3	17 + 1*	1	44 + 1*	12 + 1*	18	238 + 6*
IV	District Groups	I | II | III | IV	I | II · IV	I · III | IV	I · IV	II | III | IV	II · IV	III | IV	IV	
	Number of Species	131 + 3*	19 + 3*	17 + 1*	25 + 5*	44 + 1*	23 + 3*	18	86 + 11*	363 + 27*

The above table shows the richer species are found in the IV and the I districts.

III. Floristic Relationship in Hultenia, Kamtchatka and Alaska.

Hultenia is situated between the Kamtchatka Peninsula and Alaska, so the floristic relationships to those regions must be studied at first.

1. Kamtchatka

a. Families

Except only one family, *Hydrophyllaceae* not found in Kamtchatka, the other families indigenous to Hultenia are all found in Kamtchatka. But the following families indigenous to Kamtchatka are not found in Hultenia.

Typhaceae, Alismataceae, Araceae, Lemnaceae, Myricaceae, Chenopodiaceae, Oxalidaceae, Balsaminaceae, Guttiferae, Elatinaceae, Thymelaeaceae, Orobanchaceae.

b. Grenera

The following genera are found in Kamtchatka, but not in Hultenia. (* secondary element)

Polypodiaceae: *Woodsia, Struthiopteris, Asplenium.*
Pinaceae: *Larix, Picea, Abies, Juniperus.*
Typhaceae: *Typha.*
Potamogetonaceae: *Zanichellia.*
Scheuchzeriaceae: *Scheuchzeria.*
Alismataceae: *Alisma, Sagittaria.*
Gramineae: *Phalaris. Millium, Avena, Danthonia, Beckmannia, Phragmites, Koeleria, Glyceria, *Dupontia, Lolium, Agropyron.*
Cyperaceae: *Kyllingia, Fimbristylis, Rhynchospora.*
Araceae: *Lysichitum, Calla.*
Commelinaceae: **Commelina.*
Lemnaceae: *Spirodela, Lemna.*
Liliaceae: *Lilium.*
Orchidaceae: *Gymnadenia, Epipactis, Epipogum, Neottia, Goodyera, Oreorchis.*
Salicaceae: *Populus.*
Myricaceae: *Myrica.*
Chenopodiaceae: *Chenopodium, Atriplex, *Axyris.*
Caryophyllaceae: *Malachium, Arenaria, Merckia, *Spergularia, Dianthus.*
Nymphaeaceae: *Nymphaea.*
Ranunculaceae: *Actaea, Cimicifuga, Pulsatilla, Clematis.*
Papaveraceae: *Dicentra.*
Cruciferae: *Eutrema, *Sinapis, *Descurainia, Erysimum, Hesperis.*
Saxifragaceae: *Ribes.*

Rosaceae: *Spiraea, Sorbaria, Crataegus.*
Leguminosae: *Thermopsis, Oxyrtopis, Hedysarum, Vicia.*
Oxalidaceae: *Oxalis.*
Balsaminaceae: *Impatiens.*
Guttiferae: *Hypericum.*
Elatinaceae: *Elatine.*
Thymelaeaceae: *Daphne.*
Umbelliferae: *Anthriscus, Pleurospermum, Bupleurum, Sium, Carum.*
Ericaceae: *Chamaedaphne.*
Gentianaceae: *Lomatogonium, Halenia.*
Borraginaceae: *Lappula, Eritrichium, Myosotis.*
Labiatae: *Scutellaria, *Galeopsis, Lamium, Stachys, Thymus, Lycopus, Mentha.*
Scrophulariaceae: *Pentestemon.*
Orobanchaceae: *Boschniakia.*
Campanulaceae: *Peracarpa, Lobelia.*
Compositae: *Gnaphalium, Inula, Bidens, Tanacetum, Mulgedlium, Lactuca, Crepis.*

c. Species

The following species are found in Hultenia and Kamtchatka, but not in Alaska. They are shown in the next table accompanied with their distributions in the four districts of Hultenia.

TABLE 7. Spesies not found in Alaska

Species \ Districts	I	II	III	IV
Pinus pumila	+	·	·	·
Agrostis clavata	+	·	·	·
Deschampsia flexuosa	+	·	·	·
Trisetum sibiricum	+	·	·	·
Carex appendiculata	+	·	·	·
Carex subspathacea	+	·	·	·
Carex scita	+	·	·	·
Carex beringensis	+	·	·	·
Luzula japonica	+	·	·	·
Veratrum album	+	+	·	·
Allium Victorialis	+	·	·	·
Trillium kamtschaticum	+	·	·	·

Species \ Districts	I	II	III	IV
Cypripedium Yatabeanum	+	+	•	•
Platanthera oligantha	+	•	•	•
Platanthera tipuloides	+	+	+	•
Salix cuneata	+	•	•	•
Betula Ermani	+	•	•	•
Urtia platyphylla	+	•	•	•
Claytonia arctica	+	+	+	•
Stellaria radians	+	•	•	•
Cerastium maximum	+	•	•	•
Trollius Riederianus	+	•	+	•
Delphinium brachycentrum	+	•	•	•
Ranunculus auricomus	+	•	•	•
Corydalis ambigua	+	•	•	•
Cardamine Regeliana	•	+	•	•
Arabis Stelleri	+	•	•	•
Saxifraga nudicaulis	•	•	•	+
Chrysosplenium kamtschaticum	+	•	•	•
Sorbus sambucifolia	+	+	•	•
Potentilla stolonifera	+	•	•	•
Geum pentapetalum	•	•	+	•
Filipendula kamtschatica	+	•	•	•
Viola avatschensis	+	•	•	•
Cicuta virosa	+	•	•	•
Pachypleurum alpinum	+	•	•	•
Cnidium ajanense	+	•	•	•
Pyrola media	+	•	•	•
Rhododendron chrysanthum	+	•	•	•
Bryanthus Gmelini	+	•	•	•
Arcterica nana	+	•	•	•
Gaultheria Miqueliana	•	•	+	•
Oxycoccus quadripetalus	+	•	•	•
Gentiana auriculata	+	+	•	•
Polemonium humile	+	•	•	•
Mertensia asiatica	+	+	•	•
Veronica grandiflora	+	+	+	•
Pedicularis eriophora	+	•	•	•
Plantago camtschatica	+	•	•	•

Species \ Districts	I	II	III	IV
Lonicera caerulea	+	·	·	·
Solidago Virgaurea	+	·	·	·
Erigeron acris	+	·	·	·
Antennaria dioica	+	+	+	·
Achillea Ptarmica	+	·	·	·
Artemisia unalaschkensis	+	+	+	+
Cacalia auriculata	+	+	+	·
Senecio palmatus	+	+	·	·
Saussurea Tilesii	+	·	·	·
Cirsium kamtschaticum	+	+	·	·
Picris hieracioides	+	+	·	·

The following species are found in Hultenia and Eastern Asia, but not in Kamtchatka. They are shown in the next table accompanied with their distribution in the four districts of Hultenia.

TABLE 8. Species found in Eastern Asia

Species \ Districts	I	II	III	IV
Blechnum Spicant	·	+	·	·
Adiantum pedatum	·	·	·	+
**Poa trivialis*	+	+	+	·
Puccinella Langeana	·	+	+	+
Salix alaxensis	+	·	·	+
Salix ovalifolia	·	+	+	+
Salix phlebophylla	·	·	+	·
Salix rotundifolia	+	·	+	+
**Rumex obtusifolius*	+	·	·	+
Potentilla pulchella	·	·	+	·
Potentilla villosa	+	+	+	+
Sanguisorba stipulata	·	·	·	+
Pachypleurum alpinum	+	·	·	·
Gaultheria Miqueliana	·	·	+	·
Arctostaphylos Uva-ursi	·	·	·	+
Vaccinium ovalifolium	+	+	·	+
Gentiana acuta	·	+	+	+

* secondary element.

Species \ Districts	I	II	III	IV
Sweria perennis	·	·	·	+
Mertensia maritima	+	+	+	·
Pedicularis Langsdorffii	·	·	·	+
Galium Aparine	·	+	+	+
Campanula uniflora	·	·	·	+
**Chrysanthemum segetum*	·	·	+	·
Saussurea nuda	+	·	·	+
Taraxacum collinum	·	·	·	+
**Taraxacum vagans*	·	·	·	+

2. Alaska

a. Families

All families indigenous to Hultenia are found in Alsaka. But the following families indigenous to Alaska are not found in Hultenia.

Araceae, Lemnaceae, Loranthaceae, Santalaceae, Linaceae, Aceraceae, Balsaminaceae, Elaeagnaceae, Araliaceae, Apochynaceae, Orobanchaceae, Adoxaceae.

b. Genera

The following genera are found in Alaska, but not in Hultenia.

Polypodiaceae: *Woodsia, Asplenium, Pteridium.*
Pinaceae: *Picea, Tsuga, Abies, Thuja, Chamaecyparis, Juniperus.*
Potamogetonaceae: *Phyllospadix.*
Scheuchzeriaceae: *Schuechzeria.*
Gramineae: *Stipa, Phippsia, Podagrostis, Danthonia, Bechmannia, Spherropholis, Koeleria, Schizachne, Arctophila, Dupontia, Glyceria, Agropyron.*
Cyperaceae: *Rhynchospora, Kobresia.*
Araceae: *Lysichtum, Calla.*
Lemnaceae: *Lemna.*
Liliaceae: *Zygadenus, Clintonia, Smilacina.*
Orchidaceae: *Goodyera, Calypso.*
Salicaceae: *Populus.*
Myricaceae: *Myrica.*
Loranthaceae: *Arceutobium.*

Santalaceae: *Geocaulon, Camandra.*
Chenopodiaceae: *Chenopodium, Monolepis, Atriplex, Corispermum, Salicornia, Suaeda.*
Caryophyllaceae: *Arenaria, Merckia, Spergula, Dianthus.*
Nymphaeaceae: *Brasenia.*
Ranunculaceae: *Actaea, Aquilegia.*
Cruciferae: *Eutrema, Descurainia, Cakile, Lesquerella, Smelowskia, Arabidopsis, Ermania, Alyssum, Braya, Torularia.*
Saxifragaceae: *Therofora, Tiarella, Heuchera, Leptaxis, Mitella, Ribes.*
Rosaceae: *Physocarpus, Spiraea, Luetkea, Amelanchier, Crataegus, Sanguisorba.*
Leguminosae: *Oxytropis, Hedysarum, Vicia.*
Linaceae: *Linum.*
Aceraceae: *Acer.*
Balsaminaceae: *Impatiens.*
Elaeagnaceae: *Shepherdia, Elaeagnus.*
Araliaceae: *Oplopanax.*
Umbelliferae: *Bupleurum, Oenanthe, Glehnia.*
Pyrolaceae: *Chimaphila, Moneses, Monotropa, Cladothamnus.*
Ericaceae: *Menziesia, Chamaedaphne.*
Primulaceae: *Douglasia, Dodecatheon.*
Borraginaceae: *Lomatogonium.*
Apochynaceae: *Apochynum.*
Polemoniaceae: *Phlox.*
Hydrophyllaceae: *Phacela.*
Borraginaceae: *Lappula, Hackelia, Eritrichium, Myosotis.*
Labiatae: *Scutellaria, Dracocephalum, Stachys, Lycopus, Mentha.*
Scrophulariaceae: *Collinsia, Synthyris.*
Orobanchaceae: *Orobanche, Boschniakia.*
Caprifoliaceae: *Viburnum, Symphoricarpus.*
Adoxaceae: *Adoxa.*
Compositae: *Haplopappus, Lactuca, Apargidium, Agoseris, Crepis.*

c. Species

The following species indigenous to Hultenia are found in Alaska, but not in Kamtchatka. They are shown in the next table accompanied with their distribution in the four districts of Hultenia.

TABLE 9. Species found in Alaska

Species \ Districts	IV	III	II	I
Polystichum Andersonii	·	·	+	·
Agrostis alaskana	+	+	+	·
Podagrostis aequivalvis	+	·	·	·
Podagrostis Thurberiana	+	·	·	·
Calamagrostis inexpansa	+	·	·	·
Calamagrostis nutkaensis	+	+	·	·
Melica subulata	+	·	·	·
Poa brachyanthera	·	+	·	·
Poa hispidula	+	+	+	+
Poa stenantha	+	+	·	·
**Poa trivialis*	+	+	+	·
Poa Turneri	+	+	·	+
Puccinellia nutkaensis	+	+	·	·
Puccinellia phryganodes	·	+	·	·
Bromus sitchensis	+	+	+	+
Elymus hirsutus	·	·	+	·
Carex anthoxanthea	+	+	+	·
Carex circinata	+	+	+	·
Carex nigricans	+	+	·	+
Carex pribylovensis	+	+	+	+
Carex bicolor	+	·	·	·
Carex Hindsii	+	+	+	+
Carex Enanderi	+	·	·	·
Carex pluriflora	+	+	+	·
Carex physocarpa	+	+	+	·
Juncus Drummondii	+	+	+	·
Juncus ensifolius	+	+	+	·
Juncus Mertensianus	+	+	+	·
Luzula spicata	+	·	·	·
Sisyrinchium littorale	·	·	+	·
Platanthera stricta	+	·	·	·
Platanthera unalaschcensis	+	·	·	·
Spiranthes Romanzoffiana	+	+	·	·
Salix alaxensis	+	·	·	+
Salix Barclayi	+	·	·	+

Species \ Districts	IV	III	II	I
Salix glacialis	+	·	·	·
Salix stolonifera	+	·	·	·
Rumex fenestratus	+	+	+	·
**Rumex obtusifolius*	+	·	·	·
Rumex transitorius	+	·	·	·
Claytonia Chamissoii	+	·	+	·
Claytonia sibirica	+	+	+	+
Stellaria crispa	+	·	+	·
Sagina occidentalis	+	·	·	·
Minuartia rubella	+	·	+	+
Nuphar polysepalaum	+	·	+	·
Ranunculus Bongardii	+	·	+	·
Ranunculus Nelsonii	+	+	+	+
Papaver alaskanum	+	+	·	·
Aphragmus Eschscholtzianus	+	+	+	·
Draba fladnizensis	·	·	+	·
Draba hyperborea	+	+	+	·
Draba nivalis	+	+	·	·
Draba stenoloba	+	·	·	·
Arabis hirsuta	+	+	·	·
Leptarrhena pyrolifolia	+	+	+	·
Tellima grandifolia	+	·	·	·
Saxifraga caespitosa	+	·	·	·
Saxifraga nudicaulis	+	·	·	·
Rubus spestabilis	+	·	·	·
Potentilla emarginata	·	+	+	+
**Alchemilla subcrenata*	·	·	·	+
Rosa nutkana	+	·	·	·
Fragaria chiloensis	+	+	·	·
**Medicago denticulata*	·	·	·	+
Lupinus nootkatensis	+	+	+	·
Callitriche anceps	+	·	+	·
Epilobium leptocarpum	+	·	·	·
Epilobium luteum	+	·	·	·
Epilobium Treleaseanum	+	·	·	·
Hippuris montana	+	·	+	·
Osmorhiza chilensis	+	·	·	·
**Pastinaca sativa*	+	·	·	·

Species \ Districts	IV	III	II	I
Kalmia polifolia	+	·	·	+
Primula egalikensis	+	·	·	·
Gentiana acuta	+	+	+	·
Gentiana aleutica	+	+	+	·
Romanzoffia unalaschcensis	+	·	·	·
Amsinckia Menziesii	·	·	+	·
Mertensia maritima	·	+	+	+
Mimulus guttatus	+	+	+	·
Veronica Wormskjoldii	+	+	·	·
Castilleja unalaschkensis	+	·	+	·
Rhinanthus groenlandicus	+	+	+	+
Plantago macrocarpa	+	+	+	+
Plantago maritima	+	+	·	·
Galium Aparine	+	+	+	·
Campanula latisepala (×)	+	·	·	·
Solidago lepida	+	·	·	·
Solidago multiradiata	+	+	+	·
**Bellis perennis*	+	·	·	·
Aster foliaceus	+	·	+	·
Erigeron peregrinus	+	+	+	+
Antennaria pallida	+	+	·	·
Achillea borealis	+	+	+	·
**Chrysanthemum Leucanthemum*	+	·	·	·
**Chrysanthemum segetum*	·	+	·	·
Artemisia globularia	+	·	·	·
Arnica Chamissonis	+	·	·	·
Saussurea nuda	+	·	·	+
Taraxacum callorhinorum	+	·	·	·
Taraxacum cinericolor	+	·	·	·
**Taraxacum vagans*	+	·	·	·
Prenanthes alata	+	·	·	·
Hieracium gracile	+	·	·	·

The total number of the species in the tables 7 and 9 are as follows :-

TABLE 10. Total number of species in the 7 and 9 tables

Tables	7				9			
Districts	I	II	III	IV	IV	III	II	I
Number	56	15	9	2	87+6*	44+2*	44+1*	18+2*

The above table shows the important difference of the floristic charcter between the I and the IV districts.

IV. Analysis of Distribution Types

Though at the present day, the distribution types do not be expected the absolute accuracy, the analysis of it will be given to get the general idea of the transitional way of the plant migration. The materials here treated are mainly followed by HULTEN's concept. It is convenient that the secondery elements are usually excluded from the treatment of such a problem.

1. Secondary Elements

In Hultenia, the secondary elements are there 38 species. They include the escaped species from the garden, farm and meadow, the introduced weed and also the unexpected adventive plants brough by the transportation. So such plants have been mostly found near villages. The abundant number found at Unalaska is a good example. The following list shows the distribution in the four districts in Hultenia where they are usually found in such villages as Chichagof in the Attu Island, Nazan in the Atka Island and Unalaska in the Unalaska Island. As well known, these plants are all wide ranging species in the distribution belonging mostly to the circumpolar species or even to the cosmopolite species.

TABLE 11. Secondary elements

Families	Species \ Districts	I	II	III	IV
Gramineae	*Phleum pratense*	·	+	·	+
	Agrostis stolonifera	·	·	·	+
	Dactylis glomerata	+	·	·	+
	Poa annua	+	+	+	+
	Poa pratensis	+	·	·	+
	Poa trivialis	·	+	+	+
	Bromus tectorum	·	+	·	·
	Anthoxanthum odoratum	·	·	·	+
Polygonaceae	*Rumex Acetosa*	·	·	·	+
	Rumex Acetosella	+	+	·	·
	Rumex domesticus	·	·	·	+
	Rumex obtusifolius	·	·	·	+
	Polygonum Convolvulus	+	·	·	+

Families	Districts / Species	I	II	III	IV
Caryophyllaceae	*Stellaria media*	+	+	+	+
	Cerastium caespitosum	·	·	·	+
Ranunculaceae	*Ranunculus acris*	+	·	·	+
	Ranunculus repens	+	+	·	·
Cruciferae	*Thlaspi arvense*	·	+	·	·
	Brassica campestris	·	+	·	+
	Brassica Napus	·	+	·	·
	Brassica juncea	·	+	·	·
	Rorippa palustris	+	·	·	+
	Capsella Bursa-pastoris	+	+	·	+
	Capsella rubella	·	·	·	+
	Sisymbrium altissimum	·	+	·	·
Rosaceae	*Alchemilla subcrenata*	+	·	·	·
Leguminosae	*Medicago denticulata*	+	·	·	·
	Trifolium pratense	·	·	·	+
	Trifolium repens	+	+	+	+
Umbelliferae	*Pastinaca sativa*	·	+	·	·
Plantaginaceae	*Plantago major*	·	+	·	+
	Plantago media	·	·	·	+
Compositae	*Bellis perennis*	·	·	·	+
	Matricaria suaveolens	+	·	+	+
	Chrysanthemum Leucanthemum	+	·	·	+
	Chrysanthemum segetum	·	·	+	·
	Senecio vulgaris	·	+	·	·
	Taraxacum vagans	·	·	·	+
Total Families 10; Genera 26; Species 38		15	17	6	26

2. Distribution Types

a. Distribution Types

In the present paper, the distribution types are divided into the following categories.

[A] Widely ranging elements: a. Cosmopolite; b. Circumpolar.

[B] Pacific elements: c. Northern Pacific; d. North American Pacific; e. Northern Asiatic Pacific; f. American Pacific.

[C] Endemic elements: g. Endemic.

[D] North American elements: h. North American; (North American, Western North American, Alaskan, 'North American Pacific', 'Endemic'); i. American; j. North American transgressing into Europe; k. North American-Eastern Asiatic-European; l. North American transgressing into Western Europe and Eastern Asia; m. North American transgressing into Eastern Asia; n. Western North American transgressing into Eastern Asia.

[E] Asiatic elements: o. Asiatic-North American; p. Asiatic-Western North American; q. Asiatic transgressing into Western North America; r. Eastern Asiatic; s. Eastern Asiatic-Western North American.

[F] Eurasiatic elements: t. Eurasiatic; u. Eurasiatic-Western North American; v. Eurasiatic transgressing into Western North America, w. Eurasiatic transgressing into Western North America and Eastern North America.

[G] European elements: x. European-North American; y. European-Western North American-Eastern Asiatic.

[H] Bicentric elements: z. Bicentric.

[A] Wide Ranging Elements

[A. a] Cosmopolite

Cystopteris fragilis, Botrychium Lunaria, Equisetum arvense, Lycopodium clavatum, Lycopodium Selago, Potamogeton perfoliatus, Ruppia spiralis, Trisetum spicatum, Scirpus palustris, Carex pyrenaica, Carex canescens, Carex stellulata, Myriophyllum spicatum, Limosella aquatica.

[A. b] Circumpolar

Dryopteris austriaca, Dryopteris Linnaeana, Dryopteris Oreopteris, Dryopteris Phegopteris, Polystichum Braunii, Polystichum Lonchitis, Athyrium alpestre, Athyrium Filix-femina, Ophioglossum vulgatum, Botrychium lanceolatum, Botrychium multifidum, Botrychium virginianum, Equisetum hiemale, Equisetum limosum, Equisetum pratense, Equisetum silvaticum, Equisetum variegatum, Lycopodium alpinum, Lycopodium annotinum, Selaginella selaginoides, Sparganium angustifolium, Sparganium hyperboreum, Sparganium minimum, Zostera marina, Potamogeton alpinus, Potamogeton filiformis, Potamogeton gramineus, Potamogeton praelongus, Potamogeton vaginatus, Triglochin palustre, Hierochloe alpina, Hierochloe odorata, Phleum alpinum, Alopeculus aequalis, Alopeculus alpinus, Cinna latifolia,

Arctagrostis latifolia, Agrostis borealis, Calamagrostis canadensis, Calamagrostis neglecta, Deschampsia caespitosa, Deschampsia flexuosa, Poa arctica, Poa nemoralis, Poa palustris, Colopodium fulvum, Festuca rubra, Elymus arenarius, Eriophorum angustifolium, Eriophorum medium, Eriophorum russeolum, Eriophorum Scheuchzerii, Scirpus caespitosus, Scirpus pauciflorus, Carex glareosa, Carex bicolor, Carex Bigelovii, Carex aquatilis, Carex subspathacea, Carex rariflora, Carex variegata, Juncus alpinus, Juncus castaneus, Juncus triglumis, Luzula arcata, Luzula multiflora, Luzula parviflora, Luzula spicata, Veratrum album, Coeloglossum viride, Listera cordata, Corallorrhiza trifida, Platanthera oligantha, Salix crassifolia, Salix reticulata, Betula nana, Koenigia islandica, Oxyria digyna, Polygonum viviparum, Montia lamprosperma, Stellaria crassifolia, Stellaria crispa, Stellaria humifusa, Sagina intermedia, Sagina Linnaei, Minuartia biflora, Minuartia rubella, Honckenya peploides, Moehringia lateriflora, Melandryum apetalum, Caltha palustris, Ranunculus acris, Ranunculus hyperboreus, Ranunculus nivalis, Ranunculus reptans, Ranunculus sulphreus, Ranunculus trichophyllus, Subularia aquatica, Cochlearia officinalis, Cardamine bellidifolia, Cardamine pratensis, Draba fladnizensis, Draba lactea, Draba nivalis, Drosera rotundifolia, Saxifraga caespitasa, Saxifraga foliolosa, Saxifraga Hirculus, Saxifraga nivalis, Saxifraga oppositifolia, Saxifraga rivularis, Parnassia palustris, Aruncus sylvester, Rubus Chamaemorus, Potentilla fruticosa, Potentilla palustris, Sibbaldia procumbens, Geum strictum, Dryas octopetala, Astragalus alpinus, Lathyrus maritimus, Callitriche autumnalis, Callitriche verna, Empetrum nigrum, Viola Selkirkii, Epilobium anagallidifolium Epilobium angustifolium, Epilobium Hornemannii, Epilobium latifolium, Circaea alpina, Hippuris tetraphylla, Hippuris vulgaris, Pyrola minor, Ledum palustre, Phyllodoce coerulea, Andromeda polifolia, Arctostaphylos alpina, Arctostaphylos Uva-ursi, Vaccinium uliginosum, Vaccinium Vitisidaea, Oxycoccus microcarpus, Oxycoccus quadripetalus, Diapensia lapponica, Androsace Chamaejasme, Lysimachia thrysiflora, Armeria maritima, Menyanthes trifoliata, Prunella vulgaris, Veronica tenella, Pedicularis lanata, Pinguicula villosa, Pinguicula vulgaris, Utricutaria minor, Plantago maritima, Galium Aparine, Galium trifidum, Sambucus racemosa, Linnaea borealis, Erigeron acris, Erigeron humilis, Artemisia borealis, Artemisia Tilesii.*

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* HULTÉN, F.: Vår sällsyntalste orchidé och des amerikanska släkting. Fauna o. Flora. 166~174 (1943).

[B] Pacific Elements

[B. c] Northern Pacific

Selaginella sibirica, Deschampsia beringensis, Poa Komarovii, Poa lanata, Poa macrocalyx, Puccinellia Langeana, Scirpus kamtschaticus, Carex Gmelinii, Carex spectabilis, Juncus ensifolius, Juncus falcatus, Juncus Mertensianus, Fritillaria camschatcensis, Majanthemum dilatatum, Orchis aristata, Platanthera Chorisiana, Platanthera convallariaefolia, Salix pseudopolaris, Stellaria ruscifolia, Stellaria sitchana, Cerasticum Fischerianum, Sagina crassicaulis, Delphinium brachycentrum, Aconitum maximum, Ranunculus Eschscholtzii, Draba borealis, Draba hyperborea, Saxifraga bracteata, Saxifraga nudicaulis, Saxifraga unalschkensis, Chrysosplenium Wrightii, Rubus stellulatus, Potentilla villosa, Geum calthifolium, Geum pentapetalum, Geum Rossii, Viola Langsdorffii, Epilobium Behringianum, Epilobium serrutulatum, Conioselinum Benthami, Angelica genuflexa, Phyllodoce aleutica, Cassiope lycopodioides, Cassiope Stelleriana, Primula cuneifolia, Primula Tschuktschorum, Plagiobotrys orientalis, Veronica grandiflora, Veronica Stelleri, Lagotis glauca, Euphrasia mollis, Pedicularis Chamissonis, Pedicularis Langsdorffii, Campanula dasyantha, Campanula lasiocarpa, Antennaria monocephala, Artemisia globularia, Artemisia unalaskensis, Arnica unalaschcensis, Saussurea nuda, Taraxacum kamtschaticum, Taraxacum trigonolobum, Hieracium triste.

[B. d] North American Pacific

Polystichum Anderssonii, Agrostis alaskana, Podagrostis aequivalvis, Podagrostis Thunberiana, Calamagrostis nutkaensis, Melica subulata, Poa brachyanthera, Poa hispidula, Poa stenantha, Poa Turneir, Puccinellia nutkaensis, Bromus sitchensis, Elymus hirsutus, Carex anthoxanthea, Carex circinata, Carex nigricans, Carex pribylovensis, Carex Hindsii, Carex Enanderi, Carex nesophila, Carex pluriflora, Juncus Drummondi, Sisyrinchium littorale, Platanthera stricta, Salix stolonifera, Rumex fenestratus, Rumex transitorius, Sagina occidentalis, Nuphar polysepalum, Ranunculus Bongardii, Ranunculus Nelsonii, Papaver alaskanum, Aphragmus Eschscholtzianus, Draba stenoloba, Arabis hirsuta, Leptarrhena pyrolifolia, Tellima grandifolia, Rubus spectabilis, Rosa nutkana, Lupinus nootkatensis, Epilobium luteum, Hippuris montana, Kalmia polifolia, Romanzoffia unalaschcensis, Mimulus guttatus, Castilleja unalaschkensis, Plantago macrocarpa, Erigeron peregrinus, Arnica Chamissonis, Taraxacum callorhinorum, Taraxacum cinericolor, Prenanthes alata.

[B. e] Northern Asiatic Pacific

Poa penicillata, Carex scita, Juncus beringensis, Luzula japonica, Trillium kamtschaticum Cypripedium Yatabeanum, Platanthera tipuloides, Urtica platyphylla, Corydalis ambigua, Cardamine Regeliana, Chrysosplenium kamschaticum, Sorbus sambucifolia, Potentilla stolonifera, Filipendula kamtschatica, Viola avatschensis, Cnidium ajanense, Bryanthus Gmelini, Arcterica nana, Gaultheria Miqueliana, Gentiana auriculata, Polemonium humile, Mertensia asiatica, Plantago camtschatica, Saussurea Tilesii, Cirsium kamtschaticum.

[B. f] American Pacific

Fragaria chiloensis.

[C] Endemic Element

[C. g] Endemic

Polystichum aleuticum, Calamagrostis bracteolata, Elymus aleuticus, Cerastium aleuticum, Draba aleutica, Saxifraga aleutica, Artemisia aleutica, Taraxacum chromocarpum, Taraxacum Eyerdamii, Taraxacum oncophorum.

[D] North American Elements

The North American elements are divided into the North American and the Western North American ones. The latter includes the Western North American, the Alaskan, the Northern American Pacific and the endemic elements. But the last two were already mentioned above.

[D. h] North American

*Isoetes Braunii, Calamagrostis inexpansa, Carex physocarpa, Platanthera unalaschcensis, Listera convallarioides, *Salix Barclayi, *Salix glacialis, Claytonia Chamissoi, *Claytonia sibirica, Potentilla emarginata, Calltriche anceps, *Epilobium leptocarpum, *Epilobium Treleaseanum, Primula egalikensis, *Gentiana aleutica, Amsinckia Menziesii, Campanula latisepala* (×), *Solidago lepida, Solidago multiradiata, *Antennaria pallida, Aster foliaceus, Achillea borealis.* (* Western American including Alaskan)

[D. i] American

Osmorrhiza chilensis, Hieracium gracile.

[D. j] North American transgressing into Europe

Festuca brachyphylla, Spiranthes Romanzoffiana, Potentilla pulchella,

Rhinanthus groenlandicus.

[D. k] North American-Eastern Asiatic-European

Carex Lyngbyei.

[D. l] North American transgressing into Western Europe and Eastern Asia

Vahlodea atropurpurea, Puccinellia phryganodes, Carex macloviana, Carex stylosa, Carex livida, Juncus balticus, Streptopus amplexifolius, Stellaria calycantha, Silene acaulis, Loiseleuria procumbens, Mertensia maritima, Galium triflorum, Chrysanthemum arcticum.

[D. m] North American transgressing into Eastern Asia

*Cryptogramma achrostichoides, *Adiantum pedatum, *Lycopodium obscurum, *Lycopodium sabinaefolium, *Agrostis exarata, *Agrostis scabra, *Calamagrostis purpurascens, Poa eminens, Hordeum branchyantherum, Carex gynocrates, Platanthera dilatata, Salix alaxensis, Coptis trifolia, Anemone Richardsonii, Barbarea orthoceras, Arabis lyrata, Parnassia Kotzebuei, Potentilla pacifica, Geum macrophyllum, *Sanguisorba stipulata, Epilobium glandulosum, Angelica lucida, Heracleum lanatum, Cornus canadensis, Vaccinium ovalifolium, Veronica americana, Anapharis margaritacea.*
(* Far East)

[D. n] Western North American transgressing into Eastern Asia

Cardamine umbellata.

[E] Asiatic Elements

[E. o] Asiatic-North American

Pyrola asarifolia, Gentiana acuta, Pedicularis capitata.

[E. p] Asiatic-Western North American

Salix pulchra, Cerastium maximum, Minuartia arctica, Minuartia macrocarpa, Oxygraphis glacialis, Parrya nudicaulis, Saxifraga punctata, Saxifraga serpyllifolia.

[E. q] Asatic transgressing into Western North America

Saxifraga bronchialis, Gentiana algida.

[E. r] Eastern Asiatic

Pinus pumila, Carex appendiculata, Salix cuneta, Betula Ermani, Claytonia arctica, Stellaria radians, Trollius Riederianus, Arabis Stelleri, Rhododendron aureum, Pedicularis eriophora, Cacalia auriculata, Senecio palmatus.

[E. s] Eastern Asiatic-Western North American

Festuca altaica, Carex macrochaeta, Tofieldia coccinea, Iris setosa, Salix arbutifolia, Salix ovalifolia, Salix phlebophylla, Salix rotundifolia, Cerastium Beeringianum, Aconitum delphinifolium, Geranium erianthum, Rhododendron camtschaticum, Gentiana glauca, Artemisia arctica, Artemisia trifurcata, Arnica Lessingii, Taraxacum collinum.

[F] Eurasiatic Elements

[F. t] Eurasiatic

Agrostis clavata, Trisetum sibiricum, Carex verna, Allium Victorialis, Rumex graminifolius, Ranunculus auricomus, Cicuta virosa, Pachypleurum alpinum, Pyrola media, Lonicera coerulea, Solidago Virgaurea, Antennaria dioica, Achillea Ptarmica, Picris hieracioides.

[F. u] Eurasiatic-Western North American

Alnus crispa, Trientalis europaea, Polemonium acutiflorum.

[F. v] Eurasiatic transgressing into Western North America

Polypodium vulgare, Botrychium boreale, Luzula nivalis, Luzula Wahlenbergii, Lloydia serotina, Cypripedium guttatum, Microstylis monophyllos, Rumex arcticus, Anemone narcissiflora, Thalictrum kemense, Chrysosplenium alternifolium, Viola biflora, Viola epipsila, Gentiana prostrata, Swertia perennis, Pedicularis Oederi, Pedicularis sudetica, Pedicularis verticillata, Valeriana capitata, Aster sibiricus, Petasites frigidus.

[F. w] Eurasiatic transgressing into E. N. America and W. N. America

Sedum Rosea, Lathyrus palustris.

[G] European Elements

[G. x] European-North American

Veronica Wormskjoldii, Campanula uniflora.

[G. y] Western North American-European-Eastern Asiatic (Japanese)

Blechnum Spicant.

[H] Bicentric Elements

[H. z] Bicentric

Ligusticum scoticum, Cornus suecica, Galium kamtschaticum, Achillea sibirica, Senecio Pseudo-Arnica, Senecio resedifolius.

b. Distribution Types of the Species among the Four Districts

The distribution types of the species among these four districts are as follows :-(I, II, III, IV are respectively the botanical districts)

[A] Widely ranging elements

[A. a] Cosmopolite

I : *Scirpus palustris.*
I-II : *Limosella aquatica.*
I-II-III : *Myriophyllum spicatum.*
I-II-III-IV : *Botrychium Lunaria, Equisetum arvense, Lycopodium clavatum, Lycopodium Selago, Trisetum spicatum.*
I-III-IV : *Potamogeton perfoliatus.*
I-IV : *Ruppia spiralis, Carex pyrenaica.*
II-III-IV : *Cystopteris fragilis.*
IV : *Carex canescens, Carex stellulata.*

[A. b] Circumpolar

I : *Equisetum variegatum, Equisetum silvaticum, Sparganium minimum, Potamogeton gramineus, Calamagrostis neglecta, Colopodium fulvum, Scirpus pauciflorus, Carex rariflora, Carex vaginata, Platanthera oligantha, Stellaria crassifolia, Potentilla fruticosa, Geum strictum, Hippuris tetraphylla, Andromeda polifolia, Oxycoccus quadripetalus, Diapensia lapponica, Erigeron acris, Artemisia borealis.*
I-II : *Polystichum Braunii, Equisetum hiemale, Veratrum album, Phyllodoce caerulea, Erigeron humilis.*

I-II-III: *Alopeculus alpinus, Rubus Chamaemorus.*

I-II-III-IV: *Dryopteris austriaca, Dryopteris Linnaeana, Dryopteris Oreopteris, Dryopteris Phegopteris, Athyrium Filix-femina, Lycopodium alpinum, Lycopodium annotinum, Sparganium angustifolium, Hierochloe odorata, Phleum alpinum, Agrostis borealis, Calamagrostis canadensis, Poa arctica, Festuca rubra, Elymus arenarius, Scirpus caespitosus, Carex glareosa, Luzula arcuata, Luzula multiflora, Luzula parviflora, Coeloglossum viride, Listera cordata, Salix crassijulis, Koenigia islandica, Oxyria digyna, Polygonum viviparum, Montia lamprosperma, Sagina intermedia, Honckenya peploides, Moehringia lateriflora, Ranunculus reptans, Ranunculus sulphureus, Ranunculus trichophyllus, Cochlearia officinalis, Sibbaldia procumbens, Lathyrus maritimus, Empetrum nigrum, Epilobium angustifolium, Epilobium Hornemannii, Epilobium latifolium, Hippuris vulgaris, Pyrola minor, Vaccinium uliginosum, Vaccinium Vitis-idaea, Veronica tenella, Galium trifidum, Linnaea borealis.*

I-II-IV: *Eriophorum Scheuchzeri, Hierochloe alpina, Salix reticulata, Stellaria humifusa, Minuartia rubella, Ranunculus acris, Drosera rotundifolia, Saxifraga oppositifolia, Parnassia palustris, Potentilla palustris, Callitriche verna, Oxycoccus microcarpus.*

I-III: *Polystichum Lonchitis.*

I-III-IV: *Equisetum variegatum, Eriophorum angustifolium, Juncus castaneus, Caltha palustris, Ranunculus hyperboreus, Ranunculus nivalis, Cardamine pratensis, Callitriche autumnalis.*

I-IV: *Athyrium alpestre, Zostera marina, Triglochin palustre, Carex subspathacea, Betula nana, Melandryum apetalum, Saxifraga Hirculus, Ledum palustre, Arctostaphylos alpina, Menyanthes trifoliata.*

II: *Deschampsia flexuosa, Minuartia biflora, Draba fladnizensis, Aruncus sylvester, Viola Selkirkii, Lysimachia thyrsiflora.*

II-III-IV: *Selaginella selaginoides, Potamogeton filiformis, Deschampsia caespitosa, Eriophorum medium, Eriophorum russeolum, Cardamine bellidifolia, Saxifraga rivularis, Pinguicula vulgaris, Galium Aparine.*

II-IV: *Sparganium angustifolium, Potamogeton alpinus, Stellaria crispa, Subularia aquatica, Epilobium anagallidifolium, Prunella vulgaris, Artemisia Tilesii.*

III: *Potamogeton vaginatus, Potamogeton praelongus, Carex Bigelovii.*

III-IV: *Alopeculus aequalis, Juncus triglumis, Draba nivalis, Plantago maritima.*

IV: *Ophioglossum vulgatum, Botrychium lanceolatum, Botrychium multifidum, Botrychium virginianum, Cinna latifolia, Arctagrostis latifolia,*

Agrostis stolonifera, Poa nemoralis, Poa palustris, Carex bicolor, Carex aquatilis, Juncus alpinus, Luzula spicata, Corallorrhiza trifida, Sagina Linnaei, Draba lactea, Saxifraga caespitosa, Saxifraga foliolosa, Saxifraga nivalis, Dryas octopetala, Astragalus alpinus, Circaea alpina, Arctostaphylos Uva-ursi, Androsace Chamaejasme, Armeria maritima, Pedicularis lanata, Pinguicula villosa, Utricularia minor, Sambucus racemosa.

[B] Pacific elements

[B. c] Northern Pacific

I. *Delphinium brachycentrum.*

I-II-III: *Majanthemum dilatatum, Veronica grandiflora.*

I-II-III-IV: *Deschampsia beringensis, Poa Komarovii, Poa macrocalyx, Fritillaria camschatcensis, Orchis aristata, Platanthera convallariaefolia, Cerastium Fischerianum, Aconitum maximum, Ranunculus Eschscholtzii, Draba borealis, Saxifraga bracteata, Saxifraga unalaschkensis, Rubus stellulatus, Potentilla villosa, Geum calthifolium, Geum Rossii, Viola Langsdorfii, Epilobium Behringianum, Epilobium sertulatum, Conioselinum Benthami, Phyllodoce aleutica, Cassiope lycopodioides, Primula cuneifolia, Veronica Stelleri, Euphrasia mollis, Pedicularis Chamissonis, Campanula dasyantha, Campanula lasiocarpa, Artemisia unalaskensis, Arnica unalaschcensis, Taraxacum trigonolobum, Hieracium triste.*

I-II-IV: *Carex Gmelinii, Angelica genuflexa, Lagotis glauca.*

I-III-IV: *Plagiobotrys orientalis.*

I-III: *Salix pseudopolaris.*

I-IV: *Saussurea nuda.*

II: *Carex spectabilis.*

II-III-IV: *Puccinellia Langeana, Juncus ensifolius, Juncus falcatus, Juncus Mertensianus, Platanthera Chorisiana, Stellaria ruscifolia, Stellaria sitchana, Sagina crassicaulis, Draba hyperborea, Chrysosplenium Wrightii, Primula tschuktschorum.*

III: *Geum pentapetalum.*

III-IV: *Antennaria monocephala.*

IV: *Selaginella sibirica, Poa lanata, Scirpus kamtschaticus, Saxifraga nudicaulis, Cassiope Stelleriana, Pedicularis Langsdorffii, Artemisia globularis, Taraxacum kamtschaticum.*

[B. d] North American Pacific

I: *Carex nesophila.*

I-II-III-IV : *Poa hispidula, Bromus sitchensis, Carex pribylovensis, Carex Hindsii, Ranunculus Nelsonii, Plantago macrocarpa, Erigeron peregrinus.*

I-III-IV : *Poa Turneri, Carex nigricans.*

I-IV : *Kalmia polifolia.*

II : *Polystichum Anderssonii, Elymus hirsutus, Sisyrinchium littorale.*

II-III-IV : *Agrostis alaskana, Carex anthoxanthea, Carex circinata, Carex pluriflora, Juncus Drummondii, Rumex fenestratus, Aphragmus Eschscholtzianus, Leptarrhena pyrolifolia, Lupinus nootkatensis, Mimulus guttatus.*

II-IV : *Nuphar polysepalnm, Ranunculus Bongardii, Hippuris montana, Castilleja unalaschkensis.*

III : *Poa brachyanthera.*

III-IV : *Calamagrostis nutkaensis, Poa stenantha, Puccinella nutkaensis, Papaver alaskanum, Arabis hirsuta.*

IV : *Podagrostis aequivalvis, Podagrostis Thurberiana, Melica subulata, Carex Enanderi, Platanthera stricta, Salix stolonifera, Rumex transitorius, Sagina occidentalis, Draba stenoloba, Tellima grandifolia, Rosa nutkana, Rubus spectabilis, Epilobium luteum, Romanzoffia unalaschcensis, Arnica Chamissonis, Taraxacum callorhinorum, Taraxacum cinericolor, Prenanthes alata.*

[B. e] Northern Asiatic Pacific

I : *Poa penicillata, Carex scita, Juncus beringensis, Luzula japonica, Trillium kamtschaticum Urtica platyphylla, Corydalis ambigua, Chrysosplenium kamtschaticum, Potentilla stolonifera, Filipendula kamtschatica, Viola avatschensis, Cnidium ajanense, Bryanthus Gmelini, Arcterica nana, Polemonium humile, Plantago camtschatica, Saussurea Tilesii.*

I-II : *Cypripedium Yatabeanum, Sorbus sambucifolia, Gentiana auriculata, Mertensia asiatica, Cirsium kamtschaticum.*

I-II-III : *Platanthera tipuloides.*

II : *Cardamine Regeliana.*

III : *Gaultheria Miqueliana.*

[C] Endemic element

[C. g] Endemic species

I : *Calamagrostis bracteosa.*

I-II-III : *Draba aleutica.*

I-III : *Polystichum aleuticum.*

II : *Taraxacum oncophorum.*

II-III : *Saxifraga aleutica.*
II-III-IV : *Cerastium aleuticum.*
III : *Elymus aleuticus, Artemisia aleutica.*
IV : *Taraxacem chromocarpum, Taraxacum Eyerdamii.*

[D] North American elements

[D. h] North American

I-II-III-IV : *Isoetes Braunii, Calamagrostis inexpansa, Carex pribylovensis, Claytonia sibrica.*
I-II-III : *Potentilla emarginata.*
I-IV : *Salix Barclayi.*
II : *Amsinckia Menziesii.*
II-III-IV : *Carex physocarpa, Listera convallarioides, Gentiana aleutica, Solidago multiradiata, Achillea borealis.*
II-IV : *Claytonia Chamissoi, Callitriche anceps, Aster foliaceus.*
III-IV : *Antennaria pallida.*
IV : *Platanthera unalaschcensis, Salix glacialis, Epilobium leptocarpum, Epilobium Treleaseanum, Primula egalikensis, Campanula latisepala* (×), *Solidago lepida.*

[D. i] American

IV : *Osmorrhiza chilensis, Hieracium gracile.*

[D. j] American-Europe

I-II-III-IV : *Festuca brachyphylla, Rhinanthus groenlandicus.*
III : *Potentilla pulchella.*
III-IV : *Spiranthes Romanzoffiana.*

[D. k] North American-Eastern Asiatic-European

I-II-III-IV : *Carex Lyngbyei.*

[D. l] North American transgressing into Europe and Eastern Asia

I-II-III : *Chrysanthemum arcticum.*
I-II-III-IV : *Vahlodea atropurpurea, Carex stylosa, Juncus balticus, Streptopus amplexifolius, Stellaria calycantha, Loiseleuria procumbens.*
I-III-IV : *Silene acaulis.*
I-IV : *Carex macloviana.*

II: *Carex livida.*
II-III-IV: *Mertensia maritima.*
III: *Puccinellia phryganodes.*
IV: *Galium triflorum.*

[D. m] North American transgressing into Eastern Asia

I-II-III-IV: **Lycopodium sabinaefolium, Poa eminens, Hordium brachyantherum, Platanthera dilatata, Coptis trifolia, Anemone Richardsonii, Barbarea orthoceras, Arabis lyrata, Potentilla pacifica, Geum macrophyllum, Angelica lucida, Heracleum lanatum, Veronica americana, Anapharis margaritacea.*
I-II-III: *Carex gynocrates.*
I-II-IV: *Vaccinium ovalifolium.*
I-III-IV: **Calamagrostis purpurascens, *Epilobium glandulosum.*
I-IV: *Salix alaxensis, Cornus canadensis.*
II: **Lycopodium obscurum.*
II-III-IV: **Agrostis exarata, *Agrostis scabra.*
II, IV: *Cryptogramma acrostichoides.*
III-IV: *Parnassia Kotzebuei.*
IV: **Adiantum pedatum, *Sanguisorba stipulata.*

[D. n] Western North American trangressing into Eastern Asia

I-II-III-IV: *Cardamine umbellata.*

[E] Asiatic elements

[E. o] Asiatic-North American

I-II-IV: *Pyrola asarifolia.*
II-III-IV: *Gentiana acuta.*
IV: *Pedicularis capitata.*

[E. p] Asiatic-Western American

I: *Cerastium maximum.*
I-II-IV: *Minuartia macrocarpa.*
II-III-IV: *Saxifraga punctata.*
II-IV: *Parrya nudicaulis, Saxifraga serpyllifolia.*
III-IV: *Oxygraphis glacialis.*
IV: *Salix pulchra, Minuartia arctica.*

[E. q] Asiatic transgressing into Western North America

I-II-III-IV : *Saxifraga bronchialis.*
IV : *Gentiana algida.*

[E. r] Eastern Asiatic

I : *Pinus pumila, Carex appendiculata, Salix cuneata, Betula Ermani, Stellaria radians, Arabis Stelleri, Rhododendron aureum, Pedicularis eriophora.*
I-II : *Senecio palmatus.*
I-II-III : *Cacalia auriculata.*
I-III : *Claytonia arctica, Trollius Riederianus.*

[E. s] Eastern Asiatic-Western North American

I : *Gentiana glauca, Artemisia trifurcata.*
I-II-III-IV : *Carex macrochaeta, Tofieldia coccinea, Iris setosa, Cerastium Beeringianum, Geranium erianthum, Rhododendron kamtschaticum.*
I-II-IV : *Artemisia arctica.*
I-III-IV : *Salix rotundifolia.*
I-IV : *Salix arbutifolia.*
II-III-IV : *Salix ovalifolia.*
III : *Salix phlebophylla.*
III-IV : *Festuca altaica.*
IV : *Aconitum delphinifolium, Arnica Lessingii, Taraxacum collinum.*

[F] Eurasiatic elements

[F. t] Eurasiatic

I : *Agrostis clavata, Trisetum sibiricum, Carex verna, Ranunculus auricomus, Cicuta virosa, Pachypleurum alpinum, Pyrola media, Lonicera coerulea, Solidago Virgaurea, Achillea Ptarmica.*
I-II : *Picris hieracioides.*
I-II-III : *Antennaria dioica.*
II : *Allium Victorialis.*
IV : *Rumex graminifolius.*

[F. u] Eurasiatic-Western American

I-II-III-IV : *Trientalis europaea.*
I-IV : *Polemonium acutiflorum.*
IV : *Alnus crispa.*

[F. v] Eurasiatic-Western North America

I: *Rumex arcticus, Viola biflora.*

I-II: *Viola epipsila.*

I-II-III-IV: *Luzula Walhlenbergii, Anemone narcissiflora.*

I-III-IV: *Petasites frigidus.*

I-IV: *Thalictrum kemense, Chrysosplenium alternifolium, Pedicularis sudetica, Aster sibiricus.*

II-III-IV: *Polypodium vulgare, Luzula nivalis.*

II-IV: *Botrychium boreale, Microstylis monophyllos, Cypripedium guttatum, Pedicularis verticillata.*

III-IV: *Lloydia serotina.*

IV: *Gentiana prostrata, Swertia perennis, Pedicularis Oederi, Valeriana capitata.*

[F. w] Eurasiatic transgressing into Eastern North America and Western North America

I-II-III-IV: *Lathyrus palustris.*

IV: *Sedum Rosea.*

[G] European elements

[G. x] European-North American

III-IV: *Veronica Wormskjoldii.*

IV: *Campanula uniflora.*

[G. y] European-Western north American-Eastern Asiatic (Japanese)

III: *Blechnum Spicant.*

[H] Bicentric elements

[H. z] Bicentric

I: *Achillea sibirica.*

I-II-III-IV: *Ligusticum scoticum, Cornus suecica, Senecio Pseudo-Arnica.*

II-IV: *Galium kamtschaticum.*

IV: *Senecio resedifolius.*

TABLE 12. Distribution type

Families \ Distribution Types	Cosmopolite	Circumpolar	N. Pacific	N. American Pacific	N. Asiatic Pacific	American Pacific	Endemic	N. American	American	N. American–Europe	N. American–E. Asiatic –Europe	N. American–E. Asia & Europe	N. American–E. Asia	W. N. American–E. Asia	Asiatic–N. American	Asiatic–W. N. American	Asiatic–W. N. America	E. Asiatic	E. Asiatic–W. N. American	Eurasiatic	Eurasiatic–W. N. American	Eurasiatic–W. N. America	Eurasiatic–E. N. America & W. N. America	European–N. American	W. N. American–Eurasiatic –E. Asiatic	Bicentric	Total
	A		B				C	D							E					F				G		H	
Polypodiaceae	1	8	·	1	·	·	1	·	·	·	·	·	2	·	·	·	·	·	·	·	·	1	·	·	1	·	15
Ophioglossaceae	1	4	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	6
Equisetaceae	1	5	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	6
Lycopodiaceae	2	2	·	·	·	·	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	6
Selaginellaceae	·	1	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2
Isoetaceae	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
PTERIDOPHYTA	5	20	1	1	·	·	1	1	·	·	·	·	4	·	·	·	·	·	·	·	·	2	·	·	1	·	36
Pinaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	1
GYMNOSPERMAE	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	1
Sparganiaceae	·	3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3
Potamogetonaceae	2	6	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	8
Scheuchzeriaceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1

Gramineae	1	18	5	12	1	·	2	1	·	1	·	2	5	·	·	·	·	·	1	2	·	·	·	·	·	·	51
Cyperaceae	4	13	3	8	1	·	·	1	·	·	1	3	1	·	·	·	·	1	1	1	·	·	·	·	·	·	38
Juncaceae	·	7	3	1	2	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	2	·	·	·	·	16
Liliaceae	·	1	2	·	1	·	·	·	·	·	·	1	·	·	·	·	·	·	1	1	·	1	·	·	·	·	8
Iridaceae	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	2
Orchidaceae	·	4	3	1	2	·	·	2	·	1	·	·	1	·	·	·	·	·	·	·	·	2	·	·	·	·	16
MONOCOTYLEDONEAE	7	53	16	23	7	·	2	4	·	2	1	7	7	·	·	·	·	1	4	4	·	5	·	·	·	·	143
Salicaceae	·	2	1	1	·	·	·	2	·	·	·	·	1	·	·	1	·	1	4	·	·	·	·	·	·	·	13
Betulaceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	1	·	·	·	·	·	3
Urticaceae	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Polygonaceae	·	3	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	1	·	·	·	·	7
Portulacaceae	·	1	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	4
Caryophyllaceae	·	10	4	1	·	·	1	·	·	·	·	2	·	·	·	3	·	1	1	·	·	·	·	·	·	·	23
Nympheaceae	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Ranunculaceae	·	6 (+1)	3	2	·	·	·	·	·	·	·	·	2	·	·	1	·	1	1	1	·	2	·	·	·	·	19 (+1)
Papaveraceae	·	·	·	1	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2
Cruciferae	·	7	2	3	1	·	1	·	·	·	·	·	2	1	·	1	·	1	·	·	·	·	·	·	·	·	19
Droseraceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Crassulaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	1
Saxifragaceae	·	7	4	2	1	·	1	·	·	·	·	·	1	·	·	2	1	·	·	·	·	1	·	·	·	·	20
Rosaceae	·	7	5	2	3	1	·	1	·	1	·	·	3	·	·	·	·	·	·	·	·	·	·	·	·	·	23
Leguminosae	·	2	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	4
Geraniaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	1
Callitrichaceae	·	2	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3

Families \ Distribution Type	Cosmopolite	Circumpolar	N. Pacific	N. American Pacific	N. Asiatic Pacific	American Pacific	Endemic	N. American	American	N. American–Europe	N. American–E. Asiatic –Europe	N. American–E. Asia & Europe	N. American–E. Asia	W. N. American–E. Asia	Asiatic–N. American	Asiatic–W. N. American	Asiatic–W. N. America	E. Asiatic	E. Asiatic–W. N. American	Eurasiatic	Eurasiatic–W. N. American	Eurasiatic–W. N. America	Eurasiatic–E. N. American & W. N. American	European–N. American	W. N. American–Eurasiatic –E. Asiatic	Bicentric	Total
	A		B				C	D							E					F				G		H	
Empetraceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Violaceae	·	1	1	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·	·	5
Oenotheraceae	·	5	2	1	·	·	·	2	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	11
Hippuridaceae	·	2	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3
Halorrhagaceae	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Umbelliferae	·	·	2	·	1	·	·	·	1	·	·	·	2	·	·	·	·	·	·	2	·	·	·	·	·	1	9
Cornaceae	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	1	2
ARCHICHLAMYDEAE	1	58+ (1)	24	18	9	1	3	8	1	1	·	2	13	1	·	8	1	6	7	4	1	6	2	·	·	2	177 (+1)
Pyrolaceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	1	·	·	·	·	·	·	3
Ericaceae	·	9	3	1	3	·	·	·	·	·	·	1	1	·	·	·	·	1	1	·	·	·	·	·	·	·	20
Diapenciaceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Primulaceae	·	2	2	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	6
Plumbaginaceae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Gentianaceae	·	1	·	·	1	·	·	1	·	·	·	·	·	·	1	·	1	·	1	·	·	2	·	·	·	·	8
Polemoniaceae	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	2

Hydrophyllaceae	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Borraginaceae	·	·	1	·	1	·	·	1	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	4
Labiatae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Scrophulariaceae	1	2	6	2	·	·	·	·	·	1	·	·	1	·	1	·	·	1	·	·	·	3	·	1	·	·	·	·	19
Lentibulariaceae	·	3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3
Plantaginaceae	·	1	·	1	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3
Rubiaceae	·	2	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	4
Caprifoliaceae	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	3
Valerianaceae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	1
Campanulaceae	·	·	2	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	4
Compositae	·	4	8	5	2	·	4	5	1	·	·	1	1	·	·	·	·	2	4	4	·	2	·	·	·	3	·	6	46
METACHLAMYDEAE	1	30	22	10	9	·	4	9	1	1	·	4	3	·	3	·	1	4	6	6	2	8	·	2	·	4	·	6	130
ARCHICHLAMYDEAE	1	58 (+1)	24	18	9	1	3	8	1	1	·	2	13	1	·	8	1	6	7	4	1	6	2	·	·	2	·	6	177 (+1)
DICOTYLEDONEAE	2	88 (+1)	46	28	18	1	7	17	2	2	·	6	16	1	3	8	2	10	13	10	3	14	2	2	·	6	307 (+1)		
MONOCOTYLEDONEAE	7	53	16	23	7	·	2	4	·	2	1	7	7	·	·	·	·	1	4	4	·	5	·	·	·	·	143		
ANGIOSPERMAE	9	141 (+1)	62	51	25	1	9	21	2	4	1	13	23	1	3	8	2	11	17	4	3	19	2	2	·	6	450 (+1)		
GYMNOSPERMAE	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	1		
PHANEROGAMAE	9	141 (+1)	62	51	25	1	9	21	2	4	1	13	23	1	3	8	2	12	17	14	3	19	2	2	·	6	451 (+1)		
PTERIDOPHYTA	5	20	1	1	·	·	1	1	·	·	·	·	4	·	·	·	·	·	·	·	·	2	·	·	1	·	36		
Total	14	16	63	52	25	1	10	22	2	4	1	13	27	1	3	8	2	12	17	14	3	21	2	2	1	6	487 (+1)		
	175	161+(1)	141				10	70							42					40				3		6			

3. Endemic Element

TABLE 13. Endemic element

Species \ Districts	I	II	III	IV
Polystichum aleuticum	+	·	+	·
Calamagrostis bracteolata	+	·	·	·
Elymus aleuticus	·	·	+	·
Cerastium aleuticum	·	+	+	+
Draba aleutica	+	+	+	·
Saxifraga aleutica	·	+	+	·
Artemisia aleutica	·	·	+	·
Taraxacum chromocarpum	·	·	·	+
Taraxacum Eyerdamii	·	·	·	+
Taraxacum oncophorum	·	+	·	·
Total Genera 8; Species 10	3	4	6	3

As shown in the above table, the endemic species comparatively few. It is the general aspect of the boreal flora of the volcanic chain. Among them, the endemic species of the Aleutian Islands are 7 species. If 3 species of *Taraxacum* are excluded from them, only 4 species are endemic of it.

4. Disjunctive Distribution

The disjunctive distribution often gives the sensitive problem for the phytogeography. If the floristic distributions are researched, the special group of the distributional limit will be found in the disjunctive islands. For an example, the Commander Islands is the good one where there are found the eastern limits of the plant distribution. It will be seen in the next list of the eastern limit (Table 15). The following table shows the disjunctive species, in Hultenia.

TABLE 14. Disjunctive species

Species \ Districts	I	II	III	IV	Distribution Types
Polystichum Anderssonii	·	+	·	·	N. American Pacific
Polystichum Braunii	+	+	·	·	Circumpolar
Polystichum Lonchitis	·	+	·	+	Circumpolar
Blechnum Spicant	·	·	+	·	European–W. N. American

Species \ Districts	I	II	III	IV	Distribution Types
Cryptogramma crispa	·	+	·	+	N. American–E. Asia
Adianthum pedatum	·	·	·	+	N. American–E. Asia
Ophioglossum vulgatum	·	·	·	+	Circumpolar
Botrychium boreale	·	+	·	+	Eurasiatic–W. N. America
Botrychium multifidum	·	·	·	+	Circumpolar
Bortychium virginianum	·	·	·	+	Circumpolar
Equisetum pratense	+	·	·	·	Circumpolar
Equisetum silvaticum	+	·	·	·	Circumpolar
Lycopodium obscurum	·	+	·	·	N. American–E. Asia
Selaginella sibirica	·	·	·	+	N. Pacific
Sparganium minimum	+	·	·	·	Circumpolar
Potamogeton gramineus	+	·	·	·	Circumpolar
Potamogeton praelongus	·	·	+	·	Circumpolar
Potamogeton vaginatus	·	·	+	·	Circumpolar
Podagrostis Thurberiana	·	·	·	+	N. American Pacific
Calamagrostis neglecta	+	·	·	·	Circumpolar
Melica subulata	·	·	·	+	N. American Pacific
Poa brachyanthera	·	·	+	·	N. American Pacific
Poa lanata	·	·	·	+	N. Pacific
Poa palustris	·	·	·	+	Circumpolar
Puccinellia phryganodes	·	·	+	·	N. American–Europe and E. Asia
Elymus hirsutus	·	+	·	·	N. American Pacific
Colopodium fulvum	+	·	·	·	Circumpolar
Scirpus kamtschaticus	·	·	·	+	N. Pacific
Scirpus palustris	+	·	·	·	Cosmopolite
Scirpus pauciflorus	+	·	·	·	Circumpolar
Carex stellulata	·	·	·	+	Cosmopolite
Carex bicolor	·	·	·	+	Circumpolar
Carex Enanderi	·	·	·	+	N. American Pacific
Carex Bigelovii	·	·	+	·	Circumpolar
Carex subspathacea	+	·	·	·	Circumpolar
Carex spestabilis	·	+	·	·	N. Pacific
Carex rariflora	+	·	·	·	Circumpolar
Carex livida	·	+	·	·	N. American–Europe and E. Asia
Carex vaginata	+	·	·	·	Circumpolar
Allium Victorialis	·	+	·	·	Eurasiatic
Sisyrinchium littorale	·	+	·	·	N. Amercan Pacific

Species \ Districts	I	II	III	IV	Distribution Types
Platanthera oligantha	+	·	·	·	Circumpolar
Platanthera stricta	·	·	·	+	N. American Pacific
Platanthera unalascensis	·	·	·	+	N. American
Corallorrhiga trifida	·	·	·	+	Circumpolar
Salix phlebophylla	·	·	+	·	E. Asiatic–W. N. American
Rumex arcticus	+	·	·	·	Eurasiatic–W. N. America
Rumex graminifolius	·	·	·	+	Eurasiatic
Stellaria crassifolia	+	·	·	·	Circumpolar
Cerastium maximum	+	·	·	·	Asiatic–W. N. American
Sagina occidentalis	·	·	·	+	N. American Pacific
Minuartia biflora	·	+	·	·	Circumpolar
Nuphar polysepalum	·	+	·	·	N. American Pacific
Cardamine Regeliana	·	+	·	·	N. Asiatic Pacific
Draba fladnizensis	·	+	·	·	Circumpolar
Draba lactea	·	·	·	+	Circumpolar
Saxifraga nivalis	·	·	+	+	Circumpolar
Saxifraga nudicaulis	·	·	·	+	N. Pacific
Geum pentapetalum	·	·	+	·	E. Asiatic
Geum strictum	+	·	·	·	Circumpolar
Potentilla pulchella	·.	·	+	·	N. American–Europe
Viola Selkirkii	·	+	·	·	Circumpolar
Hippuris tetraphylla	+	·	·	·	Circumpolar
Andromeda polifolia	+	·	·	·	Circumpolar
Gaultheria Miqueliana	·	·	+	·	N. Asiatic Pacific
Oxycoccus quadripetalus	+	·	·	·	Circumpolar
Diapensia lapponica	+	·	·	·	Circumpolar
Lysimachia thyrsiflora	·	+	·	·	Circumpolar
Polemonium humile	+	·	·	·	N. Pacific
Amsinckia Menziensii	·	+	·	·	N. American
Total 70	22	18	11	24	

TABLE 15. Number of species of the disjunctive distribution in the four districts

Distribution \ Districts	I	II	III	IV	Total
Circumploar	18	6	4	9	34
N. American Pacific	·	4	1	5	10
N. Pacific	1	1	·	4	6
N. American-E. Asia	·	2	·	2	3
Cosmopolite	1	·	·	1	2
N. Asiatic Pacific	·	1	1	·	2
N. American	·	1	·	1	2
N. American-Europe and E. Asia	·	1	1	·	2
Eurasiatic	·	1	·	1	2
Eurasiatic-W. N. America	1	1	·	1	2
N. American-Europe	·	·	1	·	1
Asiatic-W. N. American	1	·	·	·	1
E. Asiatic	·	·	1	·	1
E. Asiatic-W. N. American	·	·	1	·	1
European-W. N. American	·	·	1	·	1
Total Species 70	22	18	11	24	

The disjunctive element in the plant distribution includes 15 categories of the distribution types. The total number of each category in the four districts are in the Table 15.

Greater number is found in the circumpolar elements and succeeded by the Northern Pacific elements in wide sense.

5. Limits of Distribution

The limits of distribution of species has an important character of the phytogeography, especially when the waterfall of the flora exists. Owing to the geographical position and the insular chain ranging from east to west, there are the distinct eastern and western limits of the plant distribution.

a. Eastern Limit

The next table shows the plants having the eastern limit in the floristic dictricts of the Aleutian Islands.

TABLE 16. Species of eastern limit (*)

Species \ Districts	I	II	III	IV	Distribution Types
Pinus pumila	*	·	·	·	Eastern Asiatic
Agrostis clavata	*	·	·	·	Eurasiatic
Trisetum sibiricum	*	·	·	·	Eurasiatic
Poa penicillata	*	·	·	·	N. Asiatic Pacific
Carex appendiculata	*	·	·	·	E. Asiatic Pacific
Carex scita	*	·	·	·	N. Asiatic Pacific
Carex verna	*	·	·	·	Eurasiatic
Juncus beringensis	*	·	·	·	N. Asiatic Pacific
Luzula japonica	*	·	·	·	N. Asiatic Pacific
Allium Victorialis	·	*	·	·	Eurasiatic
Trillium kamtschaticum	*	·	·	·	N. Asiatic Pacific
Cypripedium Yatabeanum	+	*	·	·	N. Asiatic Pacific
Platanthera tipuloides	+	+	*	·	N. Asiatic Pacific
Salix cuneata	*	·	·	·	Eastern Asiatic
Betula Ermani	*	·	·	·	Eastern Asiatic
Urtica platyphylla	*	·	·	·	N. Asiatic Pacific
Claytonia arctica	+	·	*	·	Eastern Asiatic
Stellaria radians	*	·	·	·	Eastern Asiatic
Trollius Riederianus	·	*	·	·	Eastern Asiatic
Ranunculus auricomus	*	·	·	·	Eurasiatic
Thalictrum kemense	+	·	·	*	Eurasiatic–W. N. America
Corydalis ambigua	*	·	·	·	N. Asiatic Pacific
Arabis Stelleri	*	·	·	·	Eastern Asiatic
Cardamine Regeliana	·	*	·	·	N. Asiatic Pacific
Chrysosplenium kamtschaticum	*	·	·	·	N. Asiatic Pacific
Geum pentapetalum	·	·	*	·	Northern Pacific
Filipendula kamtschatica	*	·	·	·	N. Asiatic Pacific
Sorbus sambucifolia	+	*	·	·	N. Asiatic Pacific
Potentilla stolonifera	*	·	·	·	N. Asiatic Pacific
Viola avatschensis	*	·	·	·	N. Asiatic Pacific
Cicuta virosa	*	·	·	·	Eurasiatic
Pachypleurum alpinum	*	·	·	·	Eurasiatic
Cnidium ajanense	*	·	·	·	N. Asiatic Pacific
Pyrola media	*	·	·	·	Eurasiatic
Rhododendron aureum	*	·	·	·	Eurasiatic

Species \ Districts	I	II	III	IV	Distribution Types
Bryanthus Gmelini	✻	·	·	·	N. Asiatic Pacific
Arcterica nana	✻	·	·	·	N. Asiatic Pacific
Gaultheria Miqueliana	·	·	✻	·	N. Asiatic Pacific
Gentiana auriculata	+	✻	·	·	N. Asiatic Pacific
Polemonium humile	✻	·	·	·	N. Asiatic Pacific
Mertensia asiatica	+	✻	·	·	N. Asiatic Pacific
Veronica grandiflora	+	+	✻	·	Northern Pacific
Pedicularis eriophora	✻	·	·	·	Eastern Asiatic
Plantago camtschatica	✻	·	·	·	N. Asiatic Pacific
Lonicera coerulea	✻	·	·	·	Eurasiatic
Solidago Virgaurea	✻	·	·	·	Eurasiatic
Antennaria dioica	+	+	✻	·	Eurasiatic
Achillea Ptarmica	✻	·	·	·	Eurasiatic
Artemisia unalaskensis	+	+	+	✻	Northern Pacific
Cacalia auriculata	+	+	✻	·	Eastern Asiatic
Senecio palmatus	+	✻	·	·	Eastern Asiatic
Saussurea Tilesii	✻	·	·	·	N. Asiatic Pacific
Cirsium kamtschaticum	+	✻	·	·	N. Asiatic Pacific
Picris hieracioides	+	✻	·	·	Eurasiatic

The eastern limit includes five categories of the distribution types, namely the Eastern Asiatic, the Pacific, the Eurasiatic, the Eurasiatic W. N. America, the Eastern Asiatic and the Northern Pacific. The total number of each category are asfollows :-

Eastern Asiatic Pacific	26	Eurasiatic	14
Eurasiatic W. N. America	1	Eastern Asiatic	10
Northern Pacific	3		

The Northern Pacific element here used is only the extension of the Eastern Asiatic Pacific and the Eurasiatic transgressing into W. N. America elements except *Artemisia unalaskensis*. The number of the species of the eastern limit found in the four districts are as follows (Table 17).

There is the greatest number in the I district. This fact shows the important floristic position of the Commander Islands where is the outermost floristic district of Eastern Asia. A depression of the floristic phytogeography exists between the Commander Islands and the Near Islands.

TABLE 17. Number of species of the eastern limit in the four districts

Distr. Types \ Districts	I	II	III	IV	Total
Northern Asiatic Pacific	18	6	2		26
Eurasiatic	12	2			14
Eurasiatic-W. N. America				1	1
Eastern Asiatic	6	2	2		10
Northern Pacific			2	1	3
Total	36	10	6	2	54

b. Western Limit

The next table shows the plants having the wertern limit in the floristic districts of the Aleutian lslands.

TABLE 18. Species of western limit (*)

Species \ Districts	I	II	III	IV	Distribution Types
Polystichum Andersonii	·	*	·	·	N. American Pacific
Agrostis alaskana	·	*	+	+	N. American Pacific
Podagrostis aequivalvis	·	·	·	*	N. American Pacific
Podagrostis Thurberiana	·	·	·	*	N. American Pacific
Calamagrostis inexpansa	·	·	·	*	N. American
Calamagrostis nutkaensis	·	·	*	+	N. American Pacific
Melica subulata	·	·	·	*	N. American Pacific
Poa brachyanthera	·	·	*	·	N. American Pacific
Poa hispidula	*	+	+	+	N. American Pacific
Poa stenantha	·	·	*	+	N. American Pacific
Poa Turneir	*	·	+	+	N. American Pacific
Puccinellia nutkaensis	·	·	*	+	N. American Pacific
Bromus sitchensis	*	+	+	+	N. American Pacific
Elymus hirsutus	·	*	·	·	N. American Pacific
Carex anthoxanthera	·	*	+	+	N. American Pacific
Carex circinata	·	*	+	+	N. American Pacific
Carex nigricans	*	·	+	+	N. American Pacific
Carex pribilovensis	*	+	+	+	N. American Pacific
Carex Hindsii	*	+	+	+	N. American Pacific

Species \ Districts	I	II	III	IV	Distribution Types
Carex pluriflora	·	·	·	*	N. American Pacific
Carex physocarpa	·	*	+	+	N. American Pacific
Carex Enanderi	·	*	+	+	W. N. American
Juncus Drummondii	·	*	·	·	N. American Pacific
Sisyrinchium littorale	·	*	·	·	N. American Pacific
Platanthera stricta	·	·	·	*	N. American Pacific
Platanthera unalaschcensis	·	·	·	*	N. American
Spiranthes Romanzoffiana	·	·	*	+	N. American
Salix Barclayi	*	·	·	+	N. American
Salix glacilis	·	·	·	*	N. American
Salix stolonifera	·	·	·	*	N. American Pacific
Rumex fenestratus	·	*	+	+	N. American Pacific
Rumex transitorius	·	·	·	*	N. American Pacific
Claytonia Chamissoi	·	*	·	+	W. N. American
Claytonia sibirica	*	+	+	+	W. N. American
Sagina occidentalis	·	·	·	*	N. American Pacific
Nuphar polysepalum	·	*	·	+	N. American Pacific
Runnunculus Bongardii	·	*	·	+	N. American Pacific
Ranunculus Nelsonii	*	+	+	+	N. American Pacific
Papaver alaskanum	·	·	*	+	N. American Pacific
Aphragmus Eschscholtzianus	·	*	+	+	N. American Pacific
Draba stenoloba	·	·	·	*	N. American Pacific
Arabis hirsuta	·	·	*	+	N. American Pacific
Leptarrhena pyrolifolia	·	*	+	+	N. American Pacific
Tellima grandifolia	·	·	·	*	N. American Pacific
Rubus spectabilis	·	·	·	*	N. American Pacific
Potentilla emarginata	*	+	+	·	N. American
Rosa nutkana	·	·	·	*	N. American
Fragaria chiloensis	·	·	*	+	American Pacific
Lupinus nootkatensis	·	*	+	+	N. American Pacific
Callitriche anceps	·	*	·	+	N. American
Epilobium leptocarpum	·	·	·	*	N. American
Epilobium luteum	·	·	·	*	N. American Pacific
Epilobium Treleaseanum	·	·	·	*	N. American
Hippuris montana	·	*	·	+	N. American Pacific
Osmorrhiza chilensis	·	·	·	*	American
Kalmia polifolia	*	·	·	+	N. American Pacific

Species \ Districts	I	II	III	IV	Distribution Types
Primula egalikensis	·	·	·	*	N. American
Gentiana aleutica	·	*	+	+	N. American
Romanzoffia unalaschcensis	·	·	·	*	N. American Pacific
Amsinckia Menziesii	·	*	·	·	N. American
Mimulus guttatus	·	*	+	+	N. American Pacific
Veronica Wormskjoldii	·	·	*	+	European-American
Castilleja unalaschkensis	·	*	·	+	N. American
Rhinanthus groenlandicus	*	+	+	+	American-W. Europe
Plantago macrocarpa	*	+	+	+	N. American Pacific
Campanula latisepala (×)	·	·	·	*	N. American
Solidago lepida	·	·	·	*	N. American
Solidago multiradiata	·	*	+	+	N. American
Aster foliaceus	·	*	·	+	N. American
Erigeron peregrinus	*	+	+	+	N. American Pacific
Antennaria pallida	·	·	*	+	N. American
Achillea borealis	·	*	+	+	N. American
Arnica Chamissonis	·	·	·	*	N. American Pacific
Taraxacum cinericolor	·	·	·	*	N. American Pacific
Prenanthes alata	·	·	·	*	N. American Pacific
Hieracium gracile	·	·	·	*	American

The western limit includes 7 categories of the distribution types, namely the North American Pacific, the North American, the Western North American, the American, the American Pacific, the European-America, the American-western Europe elements. The total number of each categories in the four districts are as follows ;-

TABLE 19. Number of species of the western limit in the four districts

Distr. Types \ Districts	I	II	III	IV	Total
N. American Pacific	10	17	6	15	48
N. American	2	7	2	9	20
W. N. American	1	2			3
American			1	1	2
American Pacific			1		1
European-American			1		1
American-W. Europe	1				1
Total	14	26	11	25	76

There is the greater number in the IV and the I districts. Some depressions of the phytogeography may be expected among the I and the II, and the II and the III, the III and the IV districts. The total number of the species of the western limit in the Aleutian Islands and Commander Islands are 62 : 14. Therefore, the remarkable difference exists between these two islands.

Résumé

1. Hultenia including the Commander Islands and the Aleutian Islands, is a distinct area from the view point of the vegetation, having no forest and even no well-developed shrubby thicket, represented by *Pinus pumila*, *Alnus crispa subsp. Maximowiczii* and *Betula Ermani*, though it belongs to the Subarctic Zone between the Eastern Asiratic and the North American Pacific needle-leaved forest ones.

2. The flora of the higher plants in Hultenia is composed of 487 indigenous species and 38 secondary ones, belonging to 215 genera and 58 families. The larger number of species in the genera are found in *Carex* (30), *Poa* (15), *Salix* 13, *Saxifraga* (13), *and Epilobium* (10). The greater number of genera in the families are found in *Gramineae* (21), *Compositae* (20), *Cruciferae* (13), *Ericaceae* (13) and *Rosaceae* (12). They show apparaently the general character of the boreal floristic composition.

3. Hultenia is divided floristically into four districts, viz., I (the Commander Islands), II (the Near Islands), III (the Rat Islands, and the Andreanof Islands) and IV (the Fox Islands and the Islands of Four Mountains). Each district is well represented respectively by the Islands of Bering, Attu, Ataka and Unalaska. The total number of the species in each dtstrict are 285 + 15*; 260+18*; 238+6* and 363+27*. (* secondary elemnet)

4. Among these groups in the four districts, the I-II-III-IV groups is predominant in the species, attaining to total number 131 (26.9%). The species limited to the Fox and the Commander Islands respectively maintain the subordinate rank in the number of the species. It is very natural when the migration from the eastern and the western sides are considered.

5. The ways of migration are clearly shown in the floristic relationships in Hultenia, the Alaska and the Kamtchatka Peninsulae, each other.

6. In the analysis of the distribution type, the secondary elements were excluded. They are 38 species. (7.2% of the total number), most of which are widely ranging species. Their distribution in the present area is limited to around the village, especially older ones.

7. The present flora of Hultenia is made up largely by the Circumpolar

and the Northern Pacific elements (in wide sense). The numbers of species of these two types are 161 (33.2%) ane 141 (29.5%).

8. In general, Hultenia is at the present considered to be a flora bridge, which is mainly serving to transport the eastern elements to the west, and the western ones to the east. From the various points, this is proved by the analysis of the flora.

9. There are found interesting disjunctive elements amounted to 71 species (14.6% of the total number). The species with eastern limit amounts to 54 (11.3%) and those with western limit to 76 (15.6%). This is a rather high percentage showing the important character for the plant distribution.

10. During the research of the present study, the writer pointed out the distinct difference between the Commander Islands and the Aleutian Islands. There is a decided floristic depression between the first and the second districts. The former belongs to the Eastern Asiatic Region, while the second, the third and the fourth districts to the North American Region; though there is a clear transitional trend. The tall herbaceous meadows well developed along the Northern Asiatic Pacific Ocean is only found in the Commander Islands. Therefore, the writer wishes to propose here the floristic phytogeographical depression, namely "TATEWAKI's LINE" between the I and the II districts, viz., the Copper Islands and the Attu Islands.

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