



HOKKAIDO UNIVERSITY

Title	Hultenia
Author(s)	TATEWAKI, Misao
Citation	Journal of the Faculty of Agriculture, Hokkaido University, 53(2), 131-199
Issue Date	1963-09-30
Doc URL	https://hdl.handle.net/2115/12801
Type	departmental bulletin paper
File Information	53(2)_p131-199.pdf



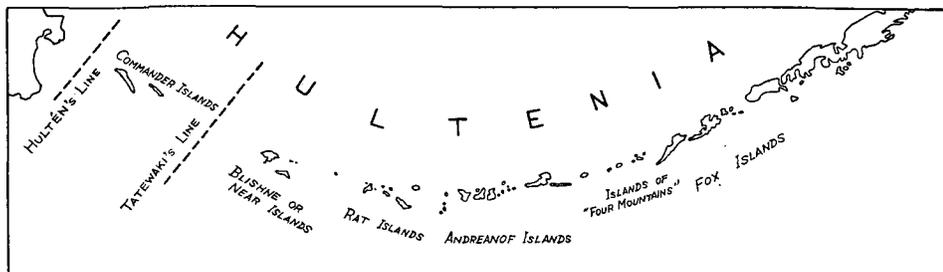
HULTENIA

By

Misao TATEWAKI

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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 hospitality during my stay at Stockholm, to Prof. Dr. SCHÖBER 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 Innsbruck 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.

* 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)

Polyodiaceae: *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; *Microstylis* 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
<i>Polypodiaceae</i>	8	15
<i>Ophioglossaceae</i>	2	6
<i>Equisetaceae</i>	1	6
<i>Lycopodiaceae</i>	1	6
<i>Selginellaceae</i>	1	2
<i>Isoetaceae</i>	1	1
PTERIDOPHYTA Fam. 6	14	36
PINACEAE	1	1
GYMNOSPERMAE Fam. 1	1	1
<i>Sparganiaceae</i>	1	3
<i>Potamogetonaceae</i>	3	8
<i>Scheuchzeriaceae</i>	1	1
<i>Gramineae</i>	21	51+8*
<i>Cyperaceae</i>	3	38
<i>Juncaceae</i>	2	16
<i>Liliaceae</i>	8	8
<i>Iridaceae</i>	2	2
<i>Orchidaceae</i>	8	16
MONOCOTYLEDONEAE Fam. 9	49	143+8*

* Number of the introduced plants.

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

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

Systematic Groups	Families	Genera	Species
<i>Archichlamydeae</i>	24	85	177(+1)+22*
<i>Metachlamydeae</i>	18	66	130+8*
<i>Dicotyledoneae</i>	42	151	307(+1)+30*
<i>Monocotyledoneae</i>	9	49	143+8*
<i>Angiospermae</i>	51	200	450(+1)+38*
<i>Gymnospermae</i>	1	1	1
<i>Phanerogamae</i>	52	201	451(+1)+38*
<i>Pteridophyta</i>	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*, *Heraclium*, *Ledum*, *Loiseleuria*, *Kalmia*, *Bryanthus*, *Andromeda*, *Arctica*, *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*, *Hierochloa*, *Phleum*, *Alopecurus*, *Podagrostis*, *Trisetum*, *Bromus*, *Cypripedium*, *Listera*, *Betula*, *Polygonum*, *Aconitum*, *Anemone*, **Capsella*, *Parnassia*, **Trifolium*, *Lathyrus*, *Angelica*, *Cornus*, *Rhododendron*, *Phyllodoce*, *Cassiope*, *Arctostaphylos*, *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	1	2	3	4	5	6	7
Families							
<i>Polypodiaceae</i>	5	1	.	2	.	.	.
<i>Ophioglossaceae</i>	1	.	.	.	1	.	.
<i>Equisetaceae</i>	.	.	.	.	.	1	.
<i>Lycopodiaceae</i>	.	.	.	.	.	1	.
<i>Selaginellaceae</i>	.	1	.	.	.	.	.
<i>Isoetaceae</i>	1	.	.	.	.	.	.
<i>Pinaceae</i>	1	.	.	.	.	.	.
<i>Sparganiaceae</i>	.	.	1	.	.	.	.
<i>Potamogetonaceae</i>	2	.	.	.	.	1	.
<i>Scheuchzeriaceae</i>	1	.	.	.	.	.	.
<i>Gramineae</i>	6+(2)[2]	4+(2)[2]	4	.	.	1+(1)[1]	.
<i>Cyperaceae</i>	.	.	.	2	.	.	.
<i>Juncaceae</i>	.	.	.	.	.	.	1
<i>Liliaceae</i>	8	.	.	.	.	.	.
<i>Iridaceae</i>	2	.	.	.	.	.	.
<i>Orchidaceae</i>	5	2	.	.	.	.	1
<i>Salicaceae</i>	.	.	.	.	.	.	.
<i>Betulaceae</i>	1	1	.	.	.	.	.
<i>Urticaceae</i>	1	.	.	.	.	.	.
<i>Polygonaceae</i>	2	(1)[1]	.	.	.	.	.
<i>Portulacaceae</i>	1	.	1	.	.	.	.
<i>Caryophyllaceae</i>	4	.	.	2	(1)[1]	.	.
<i>Nymphaeaceae</i>	1	.	.	.	.	.	.
<i>Ranunculaceae</i>	6	2	.	.	.	.	.
<i>Papaveraceae</i>	2	.	.	.	.	.	.
<i>Cruciferae</i>	5+(3)[3]	(1)[2]	1+(1)[3]	1	.	.	1
<i>Droseraceae</i>	1	.	.	.	.	.	.
<i>Crassulaceae</i>	1	.	.	.	.	.	.
<i>Saxifragaceae</i>	2	1	1	.	.	.	.
<i>Rosaceae</i>	8+(1)[1]	.	1	.	1	.	1
<i>Leguminosae</i>	2+(1)[1]	1+(1)[2]	.	.	.	.	.
<i>Geraniaceae</i>	1	.	.	.	.	.	.
<i>Callitrichaceae</i>	.	.	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	13
.	.	.	.	1	.	.	.	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		1	2	3	4	5	6	7
Families								
	<i>Empetraceae</i>	1	.	.	.	.	.	.
	<i>Violaceae</i>	.	.	.	.	1	.	.
	<i>Oenotheraceae</i>	1	.	.	.	.	.	.
	<i>Hippuridaceae</i>	.	.	1	.	.	.	.
	<i>Halorrhagaceae</i>	1	.	.	.	.	.	.
	<i>Umbelliferae</i>	7+(1)[1]	1	.	.	.	.	.
	<i>Cornaceae</i>	.	1	.	.	.	.	.
	<i>Pyrolaceae</i>	.	.	1	.	.	.	.
	<i>Ericaceae</i>	7	5	1	.	.	.	.
	<i>Diapensiaceae</i>	1	.	.	.	.	.	.
	<i>Primulaceae</i>	3	.	1	.	.	.	.
	<i>Plumbaginaceae</i>	1	.	.	.	.	.	.
	<i>Gentianaceae</i>	2	.	.	.	.	1	.
	<i>Polemoniaceae</i>	.	1	.	.	.	.	.
	<i>Hydrophyllaceae</i>	1	.	.	.	.	.	.
	<i>Borraginaceae</i>	2	1	.	.	.	.	.
	<i>Labiatae</i>	1	.	.	.	.	.	.
	<i>Scrophulariaceae</i>	6	.	.	.	1	.	.
	<i>Lentibulariaceae</i>	1	1	.	.	.	.	.
	<i>Plantaginaceae</i>	.	.	.	.	(1)[2]	.	.
	<i>Rubiaceae</i>	.	.	.	1	.	.	.
	<i>Caprifoliaceae</i>	3	.	.	.	.	.	.
	<i>Valerianaceae</i>	1	.	.	.	.	.	.
	<i>Campanulaceae</i>	.	.	.	1	.	.	.
	<i>Compositae</i>	6+(2)[2]	3	5+(1)[2]	(1)[1]	.	.	1
Number		1	2	3	4	5	6	7
Systematic Groups								
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
<hr/>									
.	.	.	.	.	.	.	.	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]
<hr/>									
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]
<hr/>									
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]

		Number						
Systematic Groups		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 Peninsulæ. 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)	450(+1)+ [38]
19+ [5]	17+ [1]	10	9(+1)+ [2]	26	.	12+ [3]	30	1	
.	.	.	.	.	.	.	.		1
.		
1+ (2)	1+ (1)	1	(1)	2	.	(1)	1	175+(26)	451(+1)+ [38]
19+ [5]	17+ [1]	10	9(+1)+ [2]	26	.	12+ [3]	30	14	
.	.	.	.	.	.	.	.		36
.		
1+ (2)	1+ (1)	1	(1)	2	.	(1)	1	189+(26)	487(+1)+ [38]
19+ [5]	17+ [1]	10	9(+1)+ [2]	26	.	12+ [3]	30		

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*, *Arctica 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

Alopecurus 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*, *Hierochloa 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*, *Luzula Wahlenbergii*, *Tofieldia coccinea*, *Fritillaria camtschaticensis*, *Streptopus amplexifolius*, *Iris setosa*, *Orchis aristata*, *Coeloglossum viride*, *Platanthera dilatata*, *Platanthera convallariaefolia*, *Listera cordata*, *Salix crassijulis*, *Koenigia islandica*, *Oxyria digyna*, *Polygonum viviparum*, *Claytonia sibirica*, *Montia lamprosperma*, *Stellaria calycantha*, **Stellaria media*, *Cerastium Beringianum*, *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*, *Epilobium 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*, *Euphrasia 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*, *Eriophorum 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 alaxensis*, *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 Aneiderssonii, *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 thyrsoflora*, *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 nootakensis*, *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

Alopecurus aequalis, *Calamagrostis nutkaensis*, *Poa stenantha*, *Puccinellia nutkaensis*, *Festuca altaica*, *Juncus triglumis*, *Lloydia serotina*, *Spiranthes Romanzoffiana*, *Oxygraphis glacialis*, *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 latisejala* (×), *Campanula uniflora*, *Solidago lepidia*, **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 summarized as follows :-

TABLE 4. Number of the species among the districts

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

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

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

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

TABLE 5. Greater number of the species

Groups	Districts		
	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*
METACHLAMIDEAE	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 comparison 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 indigenous 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 +	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. Genera

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*, *Oxyrtopsis*, *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: *Pentstemon*.
Orobanchaceae: *Boschniakia*.
Campanulaceae: *Peracarpa*, *Lobelia*.
Compositae: *Gnaphalium*, *Inula*, *Bidens*, *Tanacetum*, *Mulgedium*,
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. Species not found in Alaska

Species	Districts			
	I	II	III	IV
<i>Pinus pumila</i>	+	.	.	.
<i>Agrostis clavata</i>	+	.	.	.
<i>Deschampsia flexuosa</i>	+	.	.	.
<i>Trisetum sibiricum</i>	+	.	.	.
<i>Carex appendiculata</i>	+	.	.	.
<i>Carex subspathacea</i>	+	.	.	.
<i>Carex scita</i>	+	.	.	.
<i>Carex beringensis</i>	+	.	.	.
<i>Luzula japonica</i>	+	.	.	.
<i>Veratrum album</i>	+	+	.	.
<i>Allium Victorialis</i>	+	.	.	.
<i>Trillium kamschaticum</i>	+	.	.	.

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

Species	Districts			
	I	II	III	IV
<i>Lonicera caerulea</i>	+	.	.	.
<i>Solidago Virgaurea</i>	+	.	.	.
<i>Erigeron acris</i>	+	.	.	.
<i>Antennaria dioica</i>	+	+	+	.
<i>Achillea Ptarmica</i>	+	.	.	.
<i>Artemisia unalaschkensis</i>	+	+	+	+
<i>Cacalia auriculata</i>	+	+	+	.
<i>Senecio palmatus</i>	+	+	.	.
<i>Saussurea Tilesii</i>	+	.	.	.
<i>Cirsium kamschaticum</i>	+	+	.	.
<i>Picris hieracioides</i>	+	+	.	.

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
<i>Blechnum Spicant</i>	.	+	.	.
<i>Adiantum pedatum</i>	.	.	.	+
* <i>Poa trivialis</i>	+	+	+	.
<i>Puccinella Langeana</i>	.	+	+	+
<i>Salix alaxensis</i>	+	.	.	+
<i>Salix ovalifolia</i>	.	+	+	+
<i>Salix phlebophylla</i>	.	.	+	.
<i>Salix rotundifolia</i>	+	.	+	+
* <i>Rumex obtusifolius</i>	+	.	.	+
<i>Potentilla pulchella</i>	.	.	+	.
<i>Potentilla villosa</i>	+	+	+	+
<i>Sanguisorba stipulata</i>	.	.	.	+
<i>Pachypleurum alpinum</i>	+	.	.	.
<i>Gaultheria Miqueliana</i>	.	.	+	.
<i>Arctostaphylos Uva-ursi</i>	.	.	.	+
<i>Vaccinium ovalifolium</i>	+	+	.	+
<i>Gentiana acuta</i>	.	+	+	+

* secondary element.

Districts	I	II	III	IV
Species				
<i>Swertia perennis</i>	•	•	•	+
<i>Mertensia maritima</i>	+	+	+	•
<i>Pedicularis Langsdorffii</i>	•	•	•	+
<i>Galium Aparine</i>	•	+	+	+
<i>Campanula uniflora</i>	•	•	•	+
* <i>Chrysanthemum segetum</i>	•	•	+	•
<i>Saussurea nuda</i>	+	•	•	+
<i>Taraxacum collinum</i>	•	•	•	+
* <i>Taraxacum vagans</i>	•	•	•	+

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.

Polyodiaceae: *Woodsia*, *Asplenium*, *Pteridium*.

Pinaceae: *Picea*, *Tsuga*, *Abies*, *Thuja*, *Chamaecyparis*, *Juniperus*.

Potamogetonaceae: *Phyllospadix*.

Scheuchzeriaceae: *Schuechzeria*.

Gramineae: *Stipa*, *Phippsia*, *Podagrostis*, *Danthonia*, *Beckmannia*, *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
<i>Polystichum Andersonii</i>	.	.	+	.
<i>Agrostis alaskana</i>	+	+	+	.
<i>Podagrostis aequivalvis</i>	+	.	.	.
<i>Podagrostis Thurberiana</i>	+	.	.	.
<i>Calamagrostis inexpansa</i>	+	.	.	.
<i>Calamagrostis nutkaensis</i>	+	+	.	.
<i>Melica subulata</i>	+	.	.	.
<i>Poa brachyanthera</i>	.	+	.	.
<i>Poa hispidula</i>	+	+	+	+
<i>Poa stenantha</i>	+	+	.	.
* <i>Poa trivialis</i>	+	+	+	.
<i>Poa Turneri</i>	+	+	.	+
<i>Puccinellia nutkaensis</i>	+	+	.	.
<i>Puccinellia phryganodes</i>	.	+	.	.
<i>Bromus sitchensis</i>	+	+	+	+
<i>Elymus hirsutus</i>	.	.	+	.
<i>Carex anthoxantha</i>	+	+	+	.
<i>Carex circinata</i>	+	+	+	.
<i>Carex nigricans</i>	+	+	.	+
<i>Carex pribylovensis</i>	+	+	+	+
<i>Carex bicolor</i>	+	.	.	.
<i>Carex Hindsii</i>	+	+	+	+
<i>Carex Enanderi</i>	+	.	.	.
<i>Carex pluriflora</i>	+	+	+	.
<i>Carex physocarpa</i>	+	+	+	.
<i>Juncus Drummondii</i>	+	+	+	.
<i>Juncus ensifolius</i>	+	+	+	.
<i>Juncus Mertensianus</i>	+	+	+	.
<i>Luzula spicata</i>	+	.	.	.
<i>Sisyrinchium littorale</i>	.	.	+	.
<i>Platanthera stricta</i>	+	.	.	.
<i>Platanthera unalascensis</i>	+	.	.	.
<i>Spiranthes Romanzoffiana</i>	+	+	.	.
<i>Salix alaxensis</i>	+	.	.	+
<i>Salix Barclayi</i>	+	.	.	+

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

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

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			
	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 character 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 secondary 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 brought 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 II. Secondary elements

Families	Districts				
	Species	I	II	III	IV
<i>Gramineae</i>	<i>Phleum pratense</i>	•	+	•	+
	<i>Agrostis stolonifera</i>	•	•	•	+
	<i>Dactylis glomerata</i>	+	•	•	+
	<i>Poa annua</i>	+	+	+	+
	<i>Poa pratensis</i>	+	•	•	+
	<i>Poa trivialis</i>	•	+	+	+
	<i>Bromus tectorum</i>	•	+	•	•
	<i>Anthoxanthum odoratum</i>	•	•	•	+
<i>Polygonaceae</i>	<i>Rumex Acetosa</i>	•	•	•	+
	<i>Rumex Acetosella</i>	+	+	•	•
	<i>Rumex domesticus</i>	•	•	•	+
	<i>Rumex obtusifolius</i>	•	•	•	+
	<i>Polygonum Convolvulus</i>	+	•	•	+

Families	Districts				
	Species	I	II	III	IV
<i>Caryophyllaceae</i>	<i>Stellaria media</i>	+	+	+	+
	<i>Cerastium caespitosum</i>	.	.	.	+
<i>Ranunculaceae</i>	<i>Ranunculus acris</i>	+	.	.	+
	<i>Ranunculus repens</i>	+	+	.	.
<i>Cruciferae</i>	<i>Thlaspi arvense</i>	.	+	.	.
	<i>Brassica campestris</i>	.	+	.	+
	<i>Brassica Napus</i>	.	+	.	.
	<i>Brassica juncea</i>	.	+	.	.
	<i>Rorippa palustris</i>	+	.	.	+
	<i>Capsella Bursa-pastoris</i>	+	+	.	+
	<i>Capsella rubella</i>	.	.	.	+
	<i>Sisymbrium altissimum</i>	.	+	.	.
	<i>Alchemilla subcrenata</i>	+	.	.	.
<i>Leguminosae</i>	<i>Medicago denticulata</i>	+	.	.	.
	<i>Trifolium pratense</i>	.	.	.	+
	<i>Trifolium repens</i>	+	+	+	+
<i>Umbelliferae</i>	<i>Pastinaca sativa</i>	.	+	.	.
<i>Plantaginaceae</i>	<i>Plantago major</i>	.	+	.	+
	<i>Plantago media</i>	.	.	.	+
<i>Compositae</i>	<i>Bellis perennis</i>	.	.	.	+
	<i>Matricaria suaveolens</i>	+	.	+	+
	<i>Chrysanthemum</i> <i>Leucanthemum</i>	+	.	.	+
	<i>Chrysanthemum segetum</i>	.	.	+	.
	<i>Senecio vulgaris</i>	.	+	.	.
	<i>Taraxacum vagans</i>	.	.	.	+
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*, *Hierochloa alpina*, *Hierochloa odorata*, *Phleum alpinum*, *Alopecurus aequalis*, *Alopecurus 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 sulphureus*, *Ranunculus trichophyllus*, *Subularia aquatica*, *Cochlearia officinalis*, *Cardamine bellidifolia*, *Cardamine pratensis*, *Draba fladnizensis*, *Draba lactea*, *Draba nivalis*, *Drosera rotundifolia*, *Saxifraga caespitosa*, *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 Hornemanni*, *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 thrysiiflora*, *Armeria maritima*, *Menyanthes trifoliata*, *Prunella vulgaris*, *Veronica tenella*, *Pedicularis lanata*, *Pinguicula villosa*, *Pinguicula vulgaris*, *Utricularia minor*, *Plantago maritima*, *Galium Aparine*, *Galium trifidum*, *Sambucus racemosa*, *Linnaea borealis*, *Erigeron acris*, *Erigeron humilis*, *Artemisia borealis*, *Artemisia Tilesii*.

* HULTÉN, F.: Vår sällsyntaste 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*, *Cerastium 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 Tschukt-schorum*, *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 unalascensis*, *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 unalascensis*, *Mimulus guttatus*, *Castilleja unalascensis*, *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 kamschaticum*, *Cypripedium Yatabeanum*, *Platanthera tipuloides*, *Urtica platyphylla*, *Corydalis ambigua*, *Cardamine Regeliana*, *Chrysosplenium kamschaticum*, *Sorbus sambucifolia*, *Potentilla stolonifera*, *Filipendula kamschatica*, *Viola avatschensis*, *Cnidium ajanense*, *Bryanthus Gmelini*, *Arctericia nana*, *Gaultheria Miqueliana*, *Gentiana auriculata*, *Polemonium humile*, *Mertensia asiatica*, *Plantago camtschatica*, *Saussurea Tilesii*, *Cirsium kamschaticum*.

[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*, *Callitriche 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] Asiatic transgressing into Western North America

Saxifraga bronchialis, Gentiana algida.

[E. r] Eastern Asiatic

Pinus pumila, *Carex appendiculata*, *Salix cuneta*, *Betula Ermani*, *Claytonia arctica*, *Stellaria radicans*, *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*, *Cerasium 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*, *Andro-
meda polifolia*, *Oxycoccus quadripetalus*, *Diapensia lapponica*, *Erigeron acris*,
Artemisia borealis.

I-II: *Polystichum Braunii*, *Equisetum hiemale*, *Veratrum album*, *Phyl-
lodoce caerulea*, *Erigeron humilis*.

I-II-III: *Alopecurus 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 thyrsoiflora*.

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: *Alopecurus 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 unalaskensis*, *Rubus stellulatus*, *Potentilla villosa*, *Geum calthifolium*, *Geum Rossii*, *Viola Langsdorffii*, *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 unalascensis*, *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 polysepalum*, *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 unalaschkensis*, *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*, *Arctica nana*, *Polemonium humile*, *Plantago kamtschatica*, *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 pribylo-
vensis*, *Claytonia sibirica*.
 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 unalascensis*, *Salix glacialis*, *Epilobium leptocarpum*,
Epilobium Treleaseanum, *Primula egalikensis*, *Campanula latise-pala* (×),
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 transgressing 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 AmericaI-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								Total																							
	A		B			C	D			E	F	G	H																			
	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			
<i>Polypodiaceae</i>	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
<i>Ophioglossaceae</i>	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
<i>Equisetaceae</i>	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
<i>Lycopodiaceae</i>	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	6
<i>Selaginellaceae</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
<i>Isoetaceae</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PTERIDOPHYTA	5	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	36	
<i>Pinaceae</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
GYMNOSPERMAE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Sparganaceae</i>	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	
<i>Potamogetonaceae</i>	2	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	
<i>Scheuchzeriaceae</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

<i>Gramineae</i>	1	18	5	12	1	.	2	1	.	1	.	2	5	.	.	.	.	.	1	2	.	.	.	.	.	51
<i>Cyperaceae</i>	4	13	3	8	1	.	.	1	.	.	1	3	1	.	.	.	.	1	1	1	.	.	.	.	.	38
<i>Juncaceae</i>	.	7	3	1	2	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	2	.	.	.	.	16
<i>Liliaceae</i>	.	1	2	.	1	.	.	.	.	.	.	1	.	.	.	.	.	1	1	.	1	.	.	.	.	8
<i>Iridaceae</i>	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	2
<i>Orchidaceae</i>	.	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
<i>Salicaceae</i>	.	2	1	1	.	.	.	2	.	.	.	.	1	.	.	1	.	1	4	.	.	.	.	.	.	13
<i>Betulaceae</i>	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	3
<i>Urticaceae</i>	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
<i>Polygonaceae</i>	.	3	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	7
<i>Portulacaceae</i>	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	4
<i>Caryophyllaceae</i>	.	10	4	1	.	.	1	.	.	.	.	2	.	.	.	3	.	1	1	.	.	.	.	.	.	23
<i>Nymphaeaceae</i>	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
<i>Ranunculaceae</i>	.	6 (+1)	3	2	.	.	.	.	.	.	.	.	2	.	.	1	.	1	1	1	.	2	.	.	.	19 (+1)
<i>Papaveraceae</i>	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
<i>Cruciferae</i>	.	7	2	3	1	.	1	.	.	.	.	.	2	1	.	1	.	1	.	.	.	.	.	.	.	19
<i>Droseraceae</i>	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
<i>Crassulaceae</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1
<i>Saxifragaceae</i>	.	7	4	2	1	.	1	.	.	.	.	.	1	.	.	2	1	.	.	.	.	1	.	.	.	20
<i>Rosaceae</i>	.	7	5	2	3	1	.	1	.	1	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	23
<i>Leguminosae</i>	.	2	.	1	1	.	.	4
<i>Geraniaceae</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
<i>Callitrichaceae</i>	.	2	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3

3. Endemic Element

TABLE 13. Endemic element

Species \ Districts		Districts			
		I	II	III	IV
<i>Polystichum aleuticum</i>		+	•	+	•
<i>Calamagrostis bracteolata</i>		+	•	•	•
<i>Elymus aleuticus</i>		•	•	+	•
<i>Cerastium aleuticum</i>		•	+	+	+
<i>Draba aleutica</i>		+	+	+	•
<i>Saxifraga aleutica</i>		•	+	+	•
<i>Artemisia aleutica</i>		•	•	+	•
<i>Taraxacum chromocarpum</i>		•	•	•	+
<i>Taraxacum Eyerdamii</i>		•	•	•	+
<i>Taraxacum oncophorum</i>		•	+	•	•
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	Districts				Distribution Types
	I	II	III	IV	
<i>Polystichum Anderssonii</i>	•	+	•	•	N. American Pacific
<i>Polystichum Braunii</i>	+	+	•	•	Circumpolar
<i>Polystichum Lonchitis</i>	•	+	•	+	Circumpolar
<i>Blechnum Spicant</i>	•	•	+	•	European-W. N. American

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

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

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

Distribution	Districts				Total	
	I	II	III	IV		
Circumpolar	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 districts of the Aleutian Islands.

TABLE 16. Species of eastern limit (*)

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

Species	Districts				Distribution Types
	I	II	III	IV	
<i>Bryanthus Gmelini</i>	*	.	.	.	N. Asiatic Pacific
<i>Arctericia nana</i>	*	.	.	.	N. Asiatic Pacific
<i>Gaultheria Miqueliana</i>	.	.	*	.	N. Asiatic Pacific
<i>Gentiana auriculata</i>	+	*	.	.	N. Asiatic Pacific
<i>Polemonium humile</i>	*	.	.	.	N. Asiatic Pacific
<i>Mertensia asiatica</i>	+	*	.	.	N. Asiatic Pacific
<i>Veronica grandiflora</i>	+	+	*	.	Northern Pacific
<i>Pedicularis eriophora</i>	*	.	.	.	Eastern Asiatic
<i>Plantago camtschatica</i>	*	.	.	.	N. Asiatic Pacific
<i>Lonicera coerulea</i>	*	.	.	.	Eurasiatic
<i>Solidago Virgaurea</i>	*	.	.	.	Eurasiatic
<i>Antennaria dioica</i>	+	+	*	.	Eurasiatic
<i>Achillea Ptarmica</i>	*	.	.	.	Eurasiatic
<i>Artemisia unalaskensis</i>	+	+	+	*	Northern Pacific
<i>Cacalia auriculata</i>	+	+	*	.	Eastern Asiatic
<i>Senecio palmatus</i>	+	*	.	.	Eastern Asiatic
<i>Saussurea Tilesii</i>	*	.	.	.	N. Asiatic Pacific
<i>Cirsium kamtschaticum</i>	+	*	.	.	N. Asiatic Pacific
<i>Picris hieracioides</i>	+	*	.	.	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 as follows :-

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				Total
	I	II	III	IV	
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 western limit in the floristic districts of the Aleutian Islands.

TABLE 18. Species of western limit (*)

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

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

Species	Districts				Distribution Types
	I	II	III	IV	
<i>Primula egalikensis</i>	.	.	.	*	N. American
<i>Gentiana aleutica</i>	.	*	+	+	N. American
<i>Romanzoffia unalascensis</i>	.	.	.	*	N. American Pacific
<i>Amsinckia Menziesii</i>	.	*	.	.	N. American
<i>Mimulus guttatus</i>	.	*	+	+	N. American Pacific
<i>Veronica Wormskjoldii</i>	.	.	*	+	European-American
<i>Castilleja unalascensis</i>	.	*	.	+	N. American
<i>Rhinanthus groenlandicus</i>	*	+	+	+	American-W. Europe
<i>Plantago macrocarpa</i>	*	+	+	+	N. American Pacific
<i>Campanula latisejala</i> (×)	.	.	.	*	N. American
<i>Solidago lepida</i>	.	.	.	*	N. American
<i>Solidago multiradiata</i>	.	*	+	+	N. American
<i>Aster foliaceus</i>	.	*	.	+	N. American
<i>Erigeron peregrinus</i>	*	+	+	+	N. American Pacific
<i>Antennaria pallida</i>	.	.	*	+	N. American
<i>Achillea borealis</i>	.	*	+	+	N. American
<i>Arnica Chamissonis</i>	.	.	.	*	N. American Pacific
<i>Taraxacum cinericolor</i>	.	.	.	*	N. American Pacific
<i>Prenanthes alata</i>	.	.	.	*	N. American Pacific
<i>Hieracium gracile</i>	.	.	.	*	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				Total
	I	II	III	IV	
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. Hulthenia 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 Asiatic and the North American Pacific needle-leaved forest ones.

2. The flora of the higher plants in Hulthenia 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 apparently the general character of the boreal floristic composition.

3. Hulthenia 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 district are 285 + 15* ; 260 + 18* ; 238 + 6* and 363 + 27*. (* secondary element)

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 Hulthenia, 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 Hulthenia 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%) and 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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