ATLAS OF THE DISTRIBUTION OF ALPINE PLANTS IN HOKKAIDO

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Preface

Upto the present, the senior author has published papers1)-6) on the alpine plants of Northern Japan. But an atlas of the distribution of alpine plants has not yet been published. The materials of the present study were mostly based on specimens preserved in the Herbarium of the Agriculture, Hokkaido University.

This atlas should elucidate the character of the distribution of alpine plants in Hokkaido. For convenience, the scientific names of the species mostly follow OHWI's Flora of Japan, English edition.

We must express our sincere thanks to Prof. Dr. Toshio ISHIKAWA and Prof. Dr. Yoshio KATSUI in the Geological Institute of the Faculty of Science, Hokkaido University for their valuable help in supplying data concerning the geological composition of Hokkaido.

Phisiography

Hokkaido known under the name of "Yezo" from olden times, extends from Lat. 41°24'N. to 45°31'N., and from Long. 139°45'E. to 145°49'E. It

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is almost rhombic in outline, with a fish tail shaped extension called the Oshima Peninsula on the southwest and two small bifurcate arms called the Shiretoko and Nemuro Peninsulæ at the east end. Its maximum length from south to north and its greatest width from east to west are about 386 km in each direction, and it has an area of 77,900 square kilometers. Hokkaido, separated on the south from Honshu by the Tsugaru Strait and on the north from Sakhalin by the Sōya Strait, is surrounded by the Sea of Japan on the west, the Sea of Ochotsk on the north, and the Pacific Ocean on the south. As Hokkaido is situated at the conjunction of the elongational lines of the mainland of Japan, Sakhalin and the Kurils, the distribution of the alpine plants under consideration occupies a very important place in respect to their phytogeographical positions and their interesting relationships to the flora of the mainland.

From physiographical and geological points of view, Hokkaido may be divided into four, viz. the southwestern, the central, the northwestern and the eastern parts running parallel to the former three in a longitudinal direction (J. Suzuki, 1952 and 1958; Geol. Surv. Japan, 1967). The northwestern and the central parts from the southwestern part are distinctly separated by a median depression, extending from the Ishikari plain to the vicinity of Tomakomai on the Pacific coast, though the eastern and central parts are not so sharply delimited. The depression zone is now deeply buried under alluvial deposits.

Southwestern Part: The whole surface of southwestern Hokkaido is mountainous, though high peaks are not numerous. It consists of the Neogene Tertiary, the basement rocks of pre-Cretaceous age, and various kinds of plutonic and volcanic rocks. The basement rocks which include the fossiliferous limestones of Carboniferous and Jurassic periods, is represented in the mountain group of the Matsumae district at the southwestern side. On the eastern side, there are, however, many active and extinct volcanoes belonging to the extension of the Nasu volcanic belt and extending from south to north, of which the following are noted: —Mt. Komagatake (1133 m); Mt. Yōtei (1893 m), Mt. Nisekoan-nupuri (1309 m), Mt. Usu (725 m), Mt. Tarumae (1024 m), and Mt. Eniwa (1320 m). The highest peak is Mt. Yōtei, otherwise known as Yezo-fuji from similarity in a graceful shape to the famous Fuji in Honshu. The alpine flora of this mountain is under the protection of the natural monument regulation.

Central Part: The Central Mountain System (the so-called Yezo Mountain System) situated in central Hokkaido, forms the backbone of the main island, trending in a south-south-east to north-north-west direction from
near Cape Erimo to Cape Soya. It comprises the most prominent mountain ranges consisting of many high mountain chains and having a very complex construction. These mountains are made up partly of the pre-Cretaceous sediments, partly of plutonic and metamorphic, and partly of volcanic rocks. The six mountain groups are defined from south to north, viz. the Apoi Massif, the Hidaka Range, the Yūbari Range, the Central Plateau, the Uryu Massif and the Kitami Range.

The Hidaka Range occupies the southern part of the Yezo Range. Comparatively high peaks, a few of which exceed 1900 m in height, are located in this range. It is mostly composed of rocks of the Hidaka supergroup, regional metamorphic rocks, and granitic and other plutonic rocks. The summits are densely covered with straggling dwarf pine and its alpine flora is comparatively poor in species. Slight traces of glaciers were recently discovered, though there are no glaciers at present in our district. It is believed that the presence of the glacial features indicates a former gliation probably contemporaneous with that of Pleistocene time in Hokkaido.

The Apoi Massif, a disjunctive small mountain group, is situated in the western part of the southernmost Hidaka Range. It is composed of peridotite belonging to Mesozoic time and connected to the northwest with the Yūbari Range. Only two mountains, namely Mt. Apoi (811 m) and Mt. Pinneshiri (958 m) are prominent. In spite of the rather low altitude, the Apoi Massif has a wonderful alpine flora including many endemic and rare plants. At present it is kept under the protection of the natural monument regulation.

The Yūbari Range is located on the northwestern side of the Hidaka Range and on the southwestern side of the Central Plateau, extending from south to north. It is mostly of the Mesozoic, with peaks towering to a height of 1900 m. The alpine meadows of the Yūbari Range are well known in Japan as a vast treasury of the alpine plants and have a deep significance for the phytogeographer.

The elongation of the serpentine district is seen in the western part of the central Hokkaido, namely the Uryu Massif. Mt. Shiratori (776 m) has the representative alpine flora.

The Central Plateau, the highest mountain group in northern Japan, lies near the central part of Hokkaido. There are found the highest peaks in Hokkaido, having an elevation of about 2000 m. Alpine meadows and bogs are plentiful, with many interesting boreal plants. Nowhere in northern Japan are there more extensive alpine meadows so rich in species. Volcanic rocks developed in this group are composed of liparitic, andesitic, basaltic,
and their pyroclastic rocks. The Central Plateau consists of about 20 main peaks, among which Mt. Asahi (2290 m) and Mt. Tokachi (2077 m) are the representative volcanoes.

The Central Mountain System forks and becomes gradually lower to the north in the Kitami Ranges. It is partly of Paleozoic rocks. The highest peak of the cluster, Mt. Horonupuri, has a height of 839 m and has an interesting alpine flora.

**Northwestern Part:** The Kabato Massif is mainly composed of the pre-Cretaceous sediments, in the southern part, while of Pleistocene andesite in the northern part. There are Mts. Matsuneshiri (1100 m) and Kumaneshiri (971 m) in the former part and Mts. Syokanbetsu (1491 m) and Hama-masu (1258 m) in the latter.

Off the northern end of Hokkaido, Rishiri and Rebun islands are isolated, and they are one of the northern treasuries of alpine and subalpine species. The former is a typical volcanic island with a peak, Mt. Rishiri (1719 m), and is made up mainly of Pleistocene basalt and andesite associated with their pyroclastics. The latter is, on the contrary, generally hill with the altitudes of 200~300 m, excepting with Mt. Rebun (490 m), and consists mainly of Neogene Tertiary rocks, partly of the Cretaceous.

**Eastern Part:** Eastern Hokkaido is made up of low hills or uplands of Tertiary and Mesozoic formations with subordinate amounts of the Hidaka group. In the northeastern part, there is a chain of extinct and active volcanoes, running eastward to the extremity of the Shiretoko Peninsula. It extends from northeast to southwest and is recognised as a member of the southwestern extreme of the volcanic belt of the Kurils. Mt. Iwó (1563 m), Mt. Rausu (1661 m), Mt. Syari (1545 m), Mt. Oakan (1371 m) and Mt. Meakan (1499 m) are well known, and are composed mostly of andesitic rock. Among them, the alpine flora of Mt. Oakan and Mt. Meakan in the Akan National Park has been protected. The alpine vegetation of each peak differs from the other, showing the interesting contrast between flora of extinct and active volcanoes.
**Fig. 1.** Geological sketch map of Hokkaido
(simplified from Prof. Dr. J. SUZUKI, 1952*)

Fig. 2. Important mountains, Hokkaido
1. Lycopodium alpinum Linn.

2. Lycopodium selago Linn. var. appressum Desv.

3. Lycopodium sitchense Rupr. var. nikoense Takeda

4. Selaginella selaginoides Link

5. Botrychium lanceolatum Angstr.

6. Botrychium lunaria Swartz
7. Athyrium alpestre Rylands

10. Juniperus communis Linn. var. montana Ait.

8. Cryptogramma crispa R. Br.

11. Salix hidaka-montana Hara

9. Pinus pumila Regel

12. Salix hidewoi Koidz.
15. *Salix pseudo-paludicola* Kimura
17. *Salix yezoalpina* Koidz.
18. *Alnus maximowiczii* Callier
20. Oxyria digyna Hill
22. Polygonum bistorta Linn.
23. Polygonum nakaii Ohwi
24. Polygonum viviparum Linn.
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25. Polygonum weyrichii Fr. Schm.


27. Arenaria katoana Makino
   • var. katoana, ▲ var. lanceolata Tatew.

28. Arenaria merckioides Maxim.

29. Melandryum hidakalpinum Miyabe et Tatew.

31. Minuartia macrocarpa Ostenf. var. minutiflora Hult.

32. Minuartia verna Hiern: var. japonica Hara

33. Sagina saginoides Karsten

34. Silene repens Pers.

35. Stellaria calycantha Bongard

36. Stellaria nipponica Ohwi var. yezoensis Hara
37. *Stellaria pterosperma* Ohwi

38. *Stellaria ruscifolia* Willd.

39. *Aconitum yamazakii* Tamura et Namba

40. *Aconitum yuparense* Takeda

41. *Anemone narcissiflora* Linn.

42. *Aquilegia flabellata* Sieb. et Zucc. var. *pumila* Kudo
43. Calianthemum miyabeannum Tatew.

44. Pulsatilla nipponica Ohwi

45. Ranunculus acris Linn. var. nipponicus Hara

46. Trollius citrinus Miyabe

47. Trollius lodebourii Reichenb. var. polysepalus Regel

48. Trollius pulcher Makino
49. Trollius riederianus Fischer et Meyer (incl. var. japonicus Ohwi)

50. Dicentra peregrina Makino

52. Arabis lyrata Linn. var. kamtschatica Fischer

51. Papaver lauriel Fedde

53. Cardamine nipponica Franch. et Savat.

54. Draba japonica Maxim.
55. Draba mongolica Turcz.

56. Macropodium pterospermum Fr. Schm.

57. Thlaspi japonicum H. Boiss.

58. Sedum invidiae Miyabe et Kudo

59. Sedum rosea Scop.

60. Boykinia lycoctonifolia Engler
61. Saxifraga cherlerioides D. Don
  var. rebunhiranenis Hara, form. togakushieninis Ohwi

62. Saxifraga laciniata Nakai et Takeda

63. Saxifraga merkii Fischer var. merkii

64. Saxifraga nishidae Miyabe et Kudo

65. Saxifraga reniformis Ohwi

66. Alchemilla japonica Nakai et Hara
67. Dryas octopetala Linn. var. asiatica Nakai

70. Potentilla frutcosa Linn.

68. Geum calthaefolium Smith var. nipponicum Ohwi

71. Potentilla mats unræ Th. Wolf

69. Geum pentapetalum Makino

72. Potentilla miyabei Makino
73. Potentilla nivea Linn.

74. Sanguisorba stipulata Rafin.
   • var. stipulata, ▲ var. riishirensis Hara

75. Sibbaldia procumbens Linn.

76. Sorbus pseudogracilis Koehne

77. Sorbus sambucifolia Roem.

78. Spiraea betulifolia Pall. (incl. var. aemiliana Koidz.)
79. Astragalus adsurgens Pall.

80. Astragalus membranaceus Bunge var. obtusus Makino

81. Astragalus secundus DC.

82. Astragalus yamamotoi Miyabe et Tatew.

83. Hedysarum hedysaroides Schinz et Thell.

84. Hedysarum vicioides Turcz.
85. Oxytropis hidaka-montana Miyabe et Tatew.

88. Oxytropis rishiriensis Matsum.

86. Oxytropis japonica Maxim. var. sericea Koidz.

89. Oxytropis shokanbetsuensis Miyabe et Tatew.

87. Oxytropis kudoana Miyabe et Tatew.

90. Geranium erianthum DC.
91. Empetrum nigrum Linn. var. japonicum K. Koch

92. Rhamnus ishidae Miyabe et Kudo

93. Hypericum kamtschaticum Ledeb.

94. Viola alliariaefolia Nakai

95. Viola crassa Makino

96. Viola kitamiana Nakai
97. Viola repens Turcz.
98. Viola yubariana Nakai
99. Epilobium dicliii Leveillè

100. Epilobium foucaudianum Leveillè
101. Epilobium shiroumense Matsum. et Nakai
102. Angelica stemoloha Kitagawa
103. Bupleurum nipponicum Koso-Poliansky var. yessoense Hara

104. Bupleurum triradiatum Adams

105. Peucedanum multivittatum Maxim.

106. Tilingia ajanensis Regel

107. Tilingia tachiroei Kitagawa

108. Diapensia lapponica Linn. var. obovata Fr. Schm.
109. Arctica nana Matsumo

110. Arctous alpinus Niedenzu var. japonicus Ohwi

111. Bryanthus gmelinii D. Don

112. Cassiope lycopodioides D. Don

113. Harrimanella stelleriana Coville

114. Ledum palustre Linn. var. decumbens Ait.
115. Loiseleuria procumbens Desv.

116. Phyllodoce aleutica A. Heller

117. Phyllodoce caerulea Babington

118. Phyllodoce nipponica Makino var. oblongo-ovata Toyokuni

119. Rhododendron aureum Georgi

120. Rhododendron camtschaticum Pall.
121. Vaccinium ovalifolium J. E. Smith 
   (incl. var. cernuum H. Boiss.)

122. Vaccinium uliginosum Linn.

123. Vaccinium vitis-idaea Linn.

124. Androsace lehmanniana Speng.

125. Primula cuneifolia Ledeb.

126. Primula hidakana Miyabe et Kudo 
   ▲ var. hidakana, ● var. kamuiana Hará
127. Primula yuparensis Takeda

130. Gentiana glauca Pall.

128. Fauria crista-galli Makino

131. Gentiana jamesii Hemsl.

129. Gentiana algida Pall. var. igarashii Miyabe et Kudo

132. Gentiana nipponica Maxim.
133. Gentianella auriculata Gillett
134. Gentianella takedae Satake
135. Gentianella yuparensis Satake
136. Swertia c宜昌ata Kitagawa
137. Eritrichium nipponicum Makino var. albiflorum Koidz.
138. Mentonpa pterocarpa Tatew. et Ohwi var. yeziensis Tatew. et Ohwi
139. Lagotis glauca Gaertn.
   - var. glauca, ▲ var. takedana Kitamura

140. Lagotis stelleri Rupr. var. yessoensis Miyabe et Tatewaki

141. Pedicularis apodachila Maxim.

142. Pedicularis chamissonis Stev. var. japonica Maxim.

143. Pedicularis boissiniana Tatewaki et Ohwi

144. Pedicularis oederi Vahl
145. Pedicularis verticillata Linn.
146. Penstemon frutescens Lamb.
147. Veronica Schmidtiana Regel

148. Veronica stelleri Pall. var. longistyla Kitagawa
149. Boschniakia rossica Fedtsch. et Flplov
150. Pinguicula vulgaris Linn. var. macroceras Herder
151. Linnaea borealis Linn.
152. Patrinia sibirica Juss.
153. Campanula chamissonis Fedorov
154. Campanula lasiocarpa Cham.
155. Anaphalis alpicoala Makino
156. Arnica unalascensis Less.
(tax. var. tschonoskiy Kitam.et Haral)

158. Artemisia trifurcata Serph., ex Spreng. var. pedunculosa Kitam.

159. Crepis hokkaidoensis Babcock

160. Erigeron miyabeanus Tatew. et Kitam.

161. Hypochoris crepidioides Tatew. et Kitam.

162. Leontopodium hayachinense Hara et Kitam. var. miyabeanum S.Watanabe
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163. Saussurea chionophylla Takeda

166. Scorzonera rekueno Tatem. et Kitam.

164. Saussurea riederi Herder var. yezoomia Maxim.

167. Senecio kawakamii Makino

165. Saussarea yanagisuwae Takeda

168. Taraxacum platypodium Biels
169. Taraxacum trigonolobum Dahlst.

170. Taraxacum yuparenses H.Koiz.

171. Sparganium angustifolium Michx.

172. Sparganium hyperboreum Laest.

173. Agrostis borealis Hartm.

174. Agrostis flaccida Hack.
173. Anthoxanthum odoratum Linn. var. furumii Ohwi

174. Deschampsia caespitosa Beauv. var. festucetofolia Honda, var. levis Ohwi

175. Calamagrostis purpurascens R. Br.

176. Deschampsia flexuosa Trin.

177. Deschampsia atropurpurea Wahlenb. var. paramushirensis Kudo

178. Elymus yunoshinensis Ohwi
181. Hierochloe alpina Roem. et Schult.

182. Hierochloe pluriflora Koidz.  
- var. pluriflora, ▲ var. intermedia Ohwi

183. Phleum alpinum Linn.

184. Poa hakusanensis Hck.

185. Poa hayachinensis Koidz.

186. Trisetum spicatum Richt.

190. Carex capitata Linn.

188. Carex bipartita Ait.

191. Carex curta Gooden.

189. Carex bigelowii var. Franch.

192. Carex eleusinodes Turcz.
199. Carex pyrenaica Wahlenb.

200. Carex scita Maxim. var. riishirensis Kükenth.

201. Carex rupensis Bell. ex All.

202. Carex stenantha Franch. et Savat. var. tohokuensis Akiyama

203. Carex tenuiformis Lév. et Vant.

204. Carex mertensii Presc. var. urostachys Kükenth.
205. Carex vaginata Tausch


207. Eriophorus schenckii Hoppe var. tenuifolium Ohwi

208. Kobresia bellardii Degland

209. Scirpus caespitosus Linn.

210. Scirpus maximowiczii C.B. Clarke
211. Juncus beringensis Buchen.
212. Juncus fauriei Buchen.
213. Juncus filiformis Linn.
214. Juncus kantshatensis Kudo
216. Juncus potaniinii Buchen.
217. Juncus triceps Roth.

219. Luzula oligantha G. Sm.

218. Juncus tigrinicus Linn.

219. Luzula parviflora Desv.

220. Luzula wahlbergii Rupr.

221. Luzula maximowiczii Regel
223. Lloydia serotina Reichb. f.
224. Tofieldia coccinea Richards.
225. Tofieldia okuboi Makino

226. Zygodon sibiricus A. Gray
227. Platanthera choriziana Reichb. fil.
228. Platanthera hyperborea Lindl.