

A Preliminary Study of the Flora of Chirpoi, Kuril Islands

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Abstract. The flora of Chirpoi, Kuril Islands, was poorly known prior to field work performed under the auspices of the International Kuril Island Project (IKIP) in 1995. A preliminary plant list is provided here. The flora of Chirpoi is compared with that of the nearest large islands, Urup and Simushir. Of 105 species identified from Chirpoi, one hundred species occur on both Urup and Simushir, four (*Ledum palustre* subsp. *diversipilosum*, *Mertensia pterocarpa* var. *pterocarpa*, *Ixeris repens* and *Carex macrocephala*) on Urup but not on Simushir, and one (*Persicaria scabra*) is absent from the adjacent Islands. Chirpoi is the eastern distribution limit of the temperate taxon, *Ledum palustre* subsp. *diversipilosum*. Three taxa (*Mertensia pterocarpa* var. *pterocarpa*, *Ixeris repens* and *Carex macrocephala*) have a bilateral distribution pattern — they occur on both southern and northern islands in the Kurils, but have not been reported from the middle islands. *Persicaria scabra* has a similar distribution pattern, but has not been found in the northern Kurils. Chirpoi is the eastern limit of migration from the south for these five taxa. Possible causes (land bridges, sea currents, and geographical distance) of these floristic features are discussed.

Key words: bilateral distribution pattern, Chirpoi, flora, Kuril Islands

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The Kuril Islands stretch between Hokkaido, the northernmost main island of Japan, and the Kamchatka peninsula of Russia, for a total distance of about 1200 km. Two floristic regions, the Circumboreal and the Eastern Asiatic, are adjacent to each other in this chain of islands (Takhtajan, 1986). A shift of floristic regions in an archipelago is very rare, and thus the Kuril Islands make an attractive field site for investigations into the migration, extinction, and evolution of plant species.

Chirpoi (area 21 km², maximum elevation 691 m) is, with Brat Chirpoev, one of the two uninhabited Chiornye Bratia islands, both of which are situated between two much larger islands, Urup (450 km²) and Simushir (353 km²) (see Fig. 1). The Chiornye Bratia islands lie on the shallow eastern seabed of Urup. These islands are volcanic in origin. The central part of Chirpoi is composed of three volcanic peaks, from north to south: Mt. Chirpoi, Mt. Chiernogo, and Mt. Snow. The southern two volcanoes are active; Mt. Snow last erupted in 1960 (Rudich, 1978).

The flora of the entire Kuril Island chain has been documented by

Miyabe (1890), Vorobiev (1956), Tatewaki (1957), and Vorobiev et al. (1974). However, the flora of each individual island has not been fully explored (Takahashi, 1996), primarily due to inaccessibility. Early floristic reports on the Kuril Islands by Japanese scientists (Matsudaira, 1895; Miyabe, 1901) included some fragmental floristic data on Chirpoi, but since then no botanical surveys have been reported. Considering that it may be many years before botanists again land on Chirpoi, we present here a preliminary, and first, plant list for this island. In addition, we compare the floristic data with those of the nearest large islands, Urup and Simushir.

Scientific names for plants of the Kuril Islands are a subject of much discussion and debate among plant taxonomists working in the region. Japanese taxonomists tend to apply the varietal or subspecific rank and/or to use names of temperate plants native to the Eastern Asiatic region. Russian taxonomists tend to apply specific rank to recognize fine morphological distinctions and/or to use names of plants native to Kamchatka, Sakhalin, and the Circumboreal region. Hultén (1968) used a broad

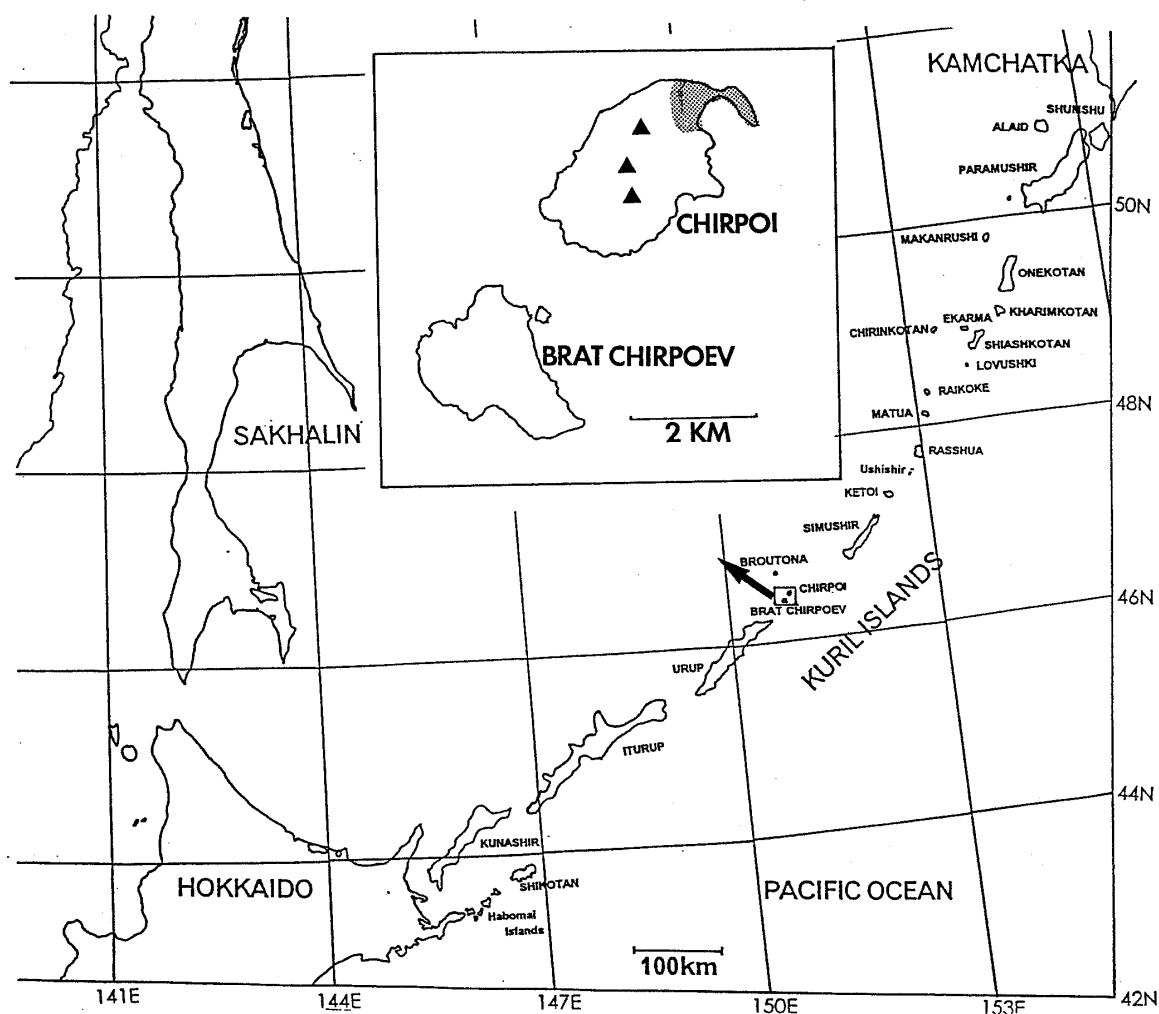


FIG. 1. Map showing the explored area on Chirpoi in the Kuril Islands.

species concept and promoted the use of the rank of subspecies for widely distributed infraspecific circumpolar taxa that differed from the typical element. The differences in taxonomic interpretations make comparative phytogeographical studies in the Kuril Islands difficult without first reconciling the nomenclature. Cooperative plant taxonomic work between the neighboring countries is highly desirable, and is necessary for furthering an understanding of the region's phytogeography.

Materials and Methods

The four botanists from Japan, Russia and the USA landed at Pestchanaya Bay on Chirpoi in the middle Kuril Islands on August 23, 1995 (Fig. 1). They collected plants independently during the day on the northeastern part of the island, and later exchanged information to compile a plant list for the island. The northeastern part of the island exhibits a variety of habitats, including a rich subalpine meadow, and it may be the best preserved part of the island because it probably escaped at least the most recent volcanic eruption.

The circumscription and order of families in the floristic list follows Melchior (1964) to make it easier to compare our list with earlier floristic works. At this stage it is difficult to assign names conclusively to many plants of the Kuril Islands, but synonyms adopted by scientists in adjacent regions are given in the list (see Appendix). Scientific names adopted in Japan follow Akiyama (1955), Tatewaki (1957), Satake *et al.* (1982a, b), Osada (1989), and Iwatsuki *et al.* (1993, 1995a, b), those adopted in Russia follow Czerepanov (1995). To compare the plants of Chirpoi with those of Urup and Simushir Islands, and to clarify distribution patterns in the Kurils, we used Tatewaki (1957), Hultén (1930, 1968), Hultén and Fries (1986), Starchenko (1991) and Barkalov (1981, 1992), and our recent investigations on Urup and Simushir in 1995 and 1996.

Results and Discussion

Chirpoi exhibits several plant communities as described in Tatewaki (1957). Sandy beach vegetation includes *Mertensia maritima* subsp. *asiatica*, *Ixeris repens*, *Leymus mollis*, and *Carex macrocephala*. Inland, on low moist slopes, tall herbaceous meadow includes *Aconitum maximum*, *Artemisia unalaskensis*, and *Petasites japonicus* subsp. *giganteus*. Rich subalpine meadows on hillsides contain a diverse assemblage of plants including *Anemone narcissiflora*, *Trollius riederianus*, and *Lagotis glauca*. Grasslands on the slopes of Mt. Chirpoi are dominated by *Calamagrostis langsdorffii*. On exposed uplands, heaths dominated by *Empetrum nigrum* and *Vaccinium uliginosum* include mats of *Ledum palustre* subsp. *diversipilosum*, *Diapensia lapponica* subsp. *obovata*, *Cassiope lycopodioides* and *Arctous alpinus* var. *japonicus*.

The most striking feature of Chirpoi's vegetation is the lack of *Pinus pumila*, *Sasa kurilensis* and *Sphagnum*; these taxa are common and

dominant in places on both of the nearest large islands. It is also notable that we found only two species of pteridophytes on the island. Few pteridophytes are found also on the small island of Ushishir (5 km²), which has only three species of pteridophytes among 109 vascular plants (Tatewaki, 1957). The composition of plants on the smaller Kuril Islands may be an interesting topic for future study.

Among the 105 identified species of plants native to Chirpoi, one hundred species occur on both of the adjacent islands of Urup and Simushir. Four taxa, *Ledum palustre* subsp. *diversipilosum*, *Mertensia pterocarpa*, *Ixeris repens* and *Carex macrocephala*, occur on Urup but not on Simushir. *Pericaria scabra*, collected from Chirpoi has not been found on either Urup or Simushir.

Of these four taxa which occur on Urup but not on Simushir, *Ledum palustre* subsp. *diversipilosum* occurs on Sakhalin, Hokkaido, and in the southern Kurils (Iwatsuki *et al.*, 1993), but has not been found on the more northern Kuril Islands and Kamchatka. The populations on Chirpoi are at the eastern distribution limit of this subspecies in the Kurils.

The other three taxa; *Mertensia pterocarpa* var. *pterocarpa*, *Ixeris repens*, and *Carex macrocephala*, share a similar distribution pattern in the Kuril Islands (Hultén, 1930; Tatewaki, 1957; Barkalov, 1981, 1992; Starchenko, 1991), that is, a bilateral distribution pattern in which the species occur on both the southern and northern islands of the chain but are missing from the middle islands. This discontinuous distribution pattern was noticed in plants by Tatewaki (1947) and in animals by Velizhanin (1970). The latter author supposed that the present Kuril Islands fauna was formed mostly during the last ice age when animals migrated to the island chain from both the southern and northern mainlands (i.e., from Hokkaido and Kamchatka). We consider that Chirpoi is the eastern limit of migration from the south and explains the distributional pattern of these three plant species.

Two species, *Ixeris repens* and *Carex macrocephala* grow on sandy beach on Chirpoi. The sea currents in the Sea of Okhotsk, flowing from the southwest to the northeast in the southern Kurils, may promote the migration of such maritime plants from Urup to Chirpoi. Although the flora of the Kuril Islands is not yet fully known, the absence or at least rarity of both species on Simushir may indicate that the deep strait between Chirpoi and Simushir interrupts the sea current from the southwest to the northeast.

Pericaria scabra (as *P. lapathifolia* S. F. Gray, Tatewaki, 1957; Tzvelev, 1989) has been reported from Kunashir, Shikotan, and Iturup of the southern Kurils, but has not been found on islands in the middle and northern Kurils, including Urup and Simushir. This species is widely distributed in north temperate regions and is found on Hokkaido, Sakhalin and Kamchatka in the neighborhood of the Kurils (Tzvelev, 1989). We therefore consider that *Pericaria scabra* has a somewhat bilateral distribution pattern, if not found in the northern Kurils. Chirpoi is the eastern limit of migration from the south for this species, just as for the above-mentioned four species.

The flora of Chirpoi is more similar to that of Urup than Simushir.

Almost all the species in the flora of Chirpoi are also found on Urup. This may be due in part to the possible temporary connection between Chirpoi and Urup during the greatest Pleistocene sea regression. Chirpoi stands 27 km from Urup on its shallow eastern seabed and the sea depth between the two islands is estimated to be less than 100 m (Soloviev, 1945). Thus, if the sea level lowered 100 m during the last ice age as was supposed by Flint (1957), Chirpoi was connected to Urup by a land bridge. On the other hand, the Bussol Strait, the deepest channel in the Kuril Islands, about 2000 m deep (Zenkevitch, 1963), separates Chirpoi from Simushir. Chirpoi and Simushir could scarcely have been connected during the last ice age. The distance between Chirpoi and Urup is less than half as great as the ca. 65 km that separates Chirpoi from Simushir (Soloviev, 1945). The shorter distance may also allow for easier migration between the two islands and account for the greater floristic similarity between Chirpoi and Urup than between Chirpoi and Simushir.

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APPENDIX

List of the vascular plants of the Chirpoi Island, the Kuril Islands.

This list is compiled by the first author. The first scientific name listed is that adopted in the Japanese literature, the second name following dashes is that used in the Russian literature (see Materials and Methods for literature used). The specimens are deposited in the following herbaria: SAPT, Herbarium, Faculty of Agriculture, Hokkaido University; VLA, Herbarium, Institute of Biology and Soil Sciences, Russian Academy of Sciences, Far Eastern Branch, Vladivostok; WTU, Herbarium, Department of Botany, University of Washington.

LYCOPODIACEAE

Lycopodium annotinum L.: Rich meadows on low slopes, *Gage 1497* (WTU).

Lycopodium selago L. subsp. **chinense** (Christ.) Hult.—*Huperzia chinensis* (Christ.) Czer.: Subalpine meadows on hill slopes, *Zhuravlev & Ilushko 951* (VLA).

SALICACEAE

Salix kurilensis Koidz.: Dwarf shrubs on exposed uplands to subalpine meadows on hill slopes, *Takahashi 19849, 19855 A, B, C, 19864 A, B* (SAPT); *Zhuravlev & Ilushko 95411* (VLA); *Gage 1502* (WTU).

Salix sp.: Shrubs on rich meadows and on low slopes, *Takahashi 19890* (SAPT); *Gage 1495* (WTU).

BETULACEAE

Alnus maximowiczii Callier—*Duschekia maximowiczii* (Call.) Pouzar: Exposed upland on lava outcrops to subalpine meadows on hill slopes, *Zhuravlev & Ilushko 9579* (VLA); *Gage 1501* (WTU).

POLYGONACEAE

Bistorta vivipara (L.) S. F. Gray: Subalpine meadows on hill slopes, *Takahashi 19810* (SAPT); *Zhuravlev & Ilushko 95199* (VLA).

Persicaria scabra (Moench) Mold.: On seashore, *Zhuravlev & Ilushko 95206* (VLA).

Pleuropterypyrum weyrichii (Fr. Schm.) H. Gross var. **alpinum** (Maxim.) H. Gross — *Aconogonon savatieri* (Nakai) Tzvel.: Subalpine meadows on hill slopes, *Takahashi 19841* (SAPT); *Zhuravlev & Ilushko 95189* (VLA).

Rumex montanus Desf.—*Acetosa lapponica* (Hiit.) Holub: On low moist slopes to seashore, *Takahashi 19797* (SAPT); *Zhuravlev & Ilushko 95171, 95172, 95173* (VLA).

CARYOPHYLLACEAE

Cerastium fischerianum Seringe: Meadows on low slopes, *Takahashi 19796, 19825, 19879* (SAPT); *Zhuravlev & Ilushko 9584A* (VLA).

Honkenya peploides (L.) Ehrh. var. **major** Hook.: On sandy beach, *Takahashi 19792* (SAPT).

Stellaria ruscifolia Pall. ex Schlecht.: Subalpine meadows on hill slopes, *Takahashi 19871* (SAPT); *Zhuravlev & Ilushko 95138* (VLA).

RANUNCULACEAE

Aconitum maximum Pall. ex DC.: On low moist slopes, *Takahashi 19885, 19889* (SAPT); *Zhuravlev & Ilushko 9533* (VLA).

Anemone narcissiflora L. — *Anemonastrum villosissimum* (DC.) Holub: Subalpine meadows on hill slopes, *Takahashi 19811, 19836* (SAPT).

Pulsatilla taraoi (Makino) Takeda ex Zam. et Peagle: Subalpine meadows on hill slopes, *Takahashi 19840* (SAPT); *Zhuravlev & Ilushko 9534, 9535* (VLA); *Gage 1489* (WTU).

Trollius riederianus Fisch. et C. A. Mey.: Subalpine meadows on hill slopes, *Takahashi 19802* (SAPT); *Zhuravlev & Ilushko 9552, 9553* (VLA).

PAPAVERACEAE

Corydalis ambigua Cham. et Schltld.: *Tarao s. n.* in 1892 (SAPT).

BRASSICACEAE

Cochlearia officinalis L.: On seashore, *Zhuravlev & Ilushko 95389* (VLA).

Draba borealis DC.: On seashore, *Takahashi 19877* (SAPT); *Zhuravlev & Ilushko 95399, 95400* (VLA).

CRASSULACEAE

Rhodiola rosea L. — *Rhodiola sachalinensis* Boriss.: Subalpine meadows on hill slopes, *Takahashi 19834* (SAPT).

SAXIFRAGACEAE

Parnassia palustris L.: Subalpine meadows on hill slopes, *Takahashi 19820* (SAPT); *Zhuravlev & Ilushko 95487* (VLA).

ROSACEAE

Geum calthifolium Smith var. **nipponicum** (F. Bolle) Ohwi—*Parageum calthifolium* (Menz.) Nakai et Hara: Subalpine meadows on hill slopes, *Takahashi 19844* (SAPT); *Zhuravlev & Ilushko 95518* (VLA).

Potentilla megalantha Takeda: On seashore and subalpine meadows on hill slopes, *Takahashi 19817* (SAPT).

Rosa rugosa Thunb.: On seashore, *Takahashi 19891* (SAPT); *Zhuravlev & Ilushko 95537* (VLA).

Sanguisorba tenuifolia Fisch. ex Link: Subalpine meadows on hill slopes, *Takahashi 19843* (SAPT); *Zhuravlev & Ilushko 95551, 95552* (VLA).

Sorbus sambucifolia (Cham. et Schltl.) Roemer: Subalpine meadows on hill slopes, *Takahashi 19842* (SAPT).

FABACEAE

Hedysarum hedysaroides (L.) Schinz. et Thell.—*Hedysarum confertum* (N. S. Pavlova) N. S. Pavlova: Subalpine meadows on hill slopes and exposed uplands, *Takahashi 19823* (SAPT); *Zhuravlev & Ilushko 95577, 95578, 95579* (VLA); *Gage 1505* (WTU).

Lathyrus japonicus Willd.: On sandy beach, *Takahashi 19882* (SAPT); *Zhuravlev & Ilushko 95596* (VLA).

Oxytropis retusa Matsum.: Subalpine meadows on hill slopes, *Tarao s. n.* in 1892 (SAPT); *Takahashi 19818, 19854, 19860* (SAPT); *Zhuravlev & Ilushko 95607, 95608, 95609, 95610, 95611, 95612* (VLA); *Gage 1512* (WTU).

Thermopsis lupinoides (L.) Link: On seashore to low slopes, *Takahashi 19795* (SAPT); *Zhuravlev & Ilushko 95623, 95624* (VLA).

Trifolium lupinaster L. — *Trifolium pacificum* Bobr.: Subalpine meadows on hill slopes, *Takahashi 19826* (SAPT); *Zhuravlev & Ilushko 95632* (VLA).

GERANIACEAE

Geranium erianthum DC.: On seashore to low slopes, *Takahashi 19794* (SAPT); *Zhuravlev & Ilushko 95694, 95695, 95696* (VLA).

CORNACEAE

Chamaepericlymenum sueticum (L.) Aschers. et Graebn.: Subalpine meadows on hill slopes, *Takahashi 19856* (SAPT); *Zhuravlev & Ilushko 95715, 95716* (VLA).

APIACEAE

Coelopleurum gmelinii (DC.) Ledeb.: On seashore to low slopes, *Takahashi 19793* (SAPT).

Conioselinum kamtschaticum Rupr. — *Conioselinum chinense* (L.) Britt., Sterns et Pogg.: Meadows on low slopes, *Takahashi 19873* (SAPT); *Zhuravlev & Ilushko 95720* (VLA).

Glehnia littoralis Fr. Schmidt ex Miq.: On sandy beach, *Takahashi 19880* (SAPT); *Zhuravlev & Ilushko 95722* (VLA).

Heracleum dulce Fisch.: On seashore, *Takahashi 19788* (SAPT).

Ligusticum hultenii Fernald: On seashore, *Tarao s. n.* in 1892 (SAPT); *Takahashi 19789* (SAPT).

Pleurospermum camtschaticum Hoffm. — *Pleurospermum uralense* Hoffm.: Subalpine

meadows on hill slopes, *Takahashi 19829* (SAPT).

Tilingia ajanensis Regel: Subalpine meadows on hill slopes, *Takahashi 19807* (SAPT).

DIAPENSIACEAE

Diapensia lapponica L. subsp. *obovata* (Fr. Schmidt) Hult. — *Diapensia obovata* (Fr. Schmidt) Nakai: On exposed uplands, *Takahashi 19898* (SAPT); *Zhuravlev & Ilushko 95431* (VLA); *Gage 1514* (WTU).

ERICACEAE

Arctous alpinus (L.) Niedenzu var. *japonicus* (Nakai) Ohwi — *Arctous japonica* Nakai: On exposed uplands, *Takahashi 19858, 19869* (SAPT); *Zhuravlev & Ilushko 95325, 95326* (VLA); *Gage 1508* (WTU).

Cassiope lycopodioides (Pall.) D. Don: Subalpine meadows on hill slopes to exposed uplands, *Tarao s. n.* in 1892 (SAPT); *Kodama s. n.* in 1893 (SAPT); *Takahashi 19847, 19897* (SAPT); *Zhuravlev & Ilushko 95330, 95331* (VLA).

Gaultheria miqueliana Takeda: On exposed uplands, *Gage 1515* (WTU).

Ledum palustre L. subsp. *diversipilosum* (Nakai) Hara: On exposed uplands, *Takahashi 19894* (SAPT); *Gage 1500* (WTU).

Loiseleuria procumbens (L.) Desv.: On exposed uplands, *Gage 1510* (WTU).

Phyllodoce aleutica (Spreng.) A. Heller: Subalpine meadows on hill slopes, *V. Teslenko s. n.* (SAPT); *Zhuravlev & Ilushko 95333* (VLA).

Rhododendron aureum Georgi: Subalpine meadows on hill slopes to exposed uplands, *Tarao s. n.* in 1892 (SAPT); *Kodama s. n.* in 1893 (SAPT); *Takahashi 19859* (SAPT); *Zhuravlev & Ilushko 95343* (VLA); *Gage 1503* (WTU).

Therorhodium camtschaticum (Pall.) Small — *Rhododendron camtschaticum* Pall.: Subalpine meadows on hill slopes to exposed uplands, *Takahashi 19846* (SAPT); *Zhuravlev & Ilushko 95395* (VLA); *Gage 1504* (WTU).

Vaccinium uliginosum L.: Subalpine meadows on hill slopes to exposed uplands, *Takahashi 19865* (SAPT); *Zhuravlev & Ilushko 95353* (VLA); *Gage 1499* (WTU).

Vaccinium vitis-idaea L.: Subalpine meadows on hill slopes, *Takahashi 19866* (SAPT).

EMPETRACEAE

Empetrum nigrum L. var. *japonicum* K. Koch — *Empetrum sibiricum* V. Vassil.: Subalpine meadows on hill slopes to exposed uplands, *Takahashi 19851* (SAPT); *Zhuravlev & Ilushko 95428, 95429* (VLA).

PRIMULACEAE

Trientalis europaea L.: Subalpine meadows on hill slopes, *Takahashi 19852* (SAPT).

GENTIANACEAE

Gentianella auriculata (Pall.) Gillett: Subalpine meadows on hill slopes, *Takahashi 19870* (SAPT).

Swertia tetrapetala Pall. — *Ophelia tetrapetala* (Pall.) Grossh.: Subalpine meadows on hill slopes, *Takahashi 19808* (SAPT); *Zhuravlev & Ilushko 95800* (VLA).

BORAGINACEAE

Mertensia maritima (L.) S. F. Gray subsp. *asiatica* Takeda: On sandy beach, *Takahashi 19884* (SAPT).

Mertensia pterocarpa (Turcz.) Tatew. et Ohwi var. *pterocarpa*: Subalpine meadows on hill slopes, *Takahashi 19827* (SAPT); *Zhuravlev & Ilushko 95830, 95831, 95832* (VLA); *Gage 1488* (WTU).

SCROPHULARIACEAE

Euphrasia mollis Ledeb. ex Wettst.: Subalpine meadows on hill slopes, *Takahashi 19828* (SAPT).

Pedicularis chamissonis Stev.: Subalpine meadows on hill slopes, *Takahashi 19815* (SAPT); *Zhuravlev & Ilushko 95875, 95876* (VLA).

Penstemon frutescens Lamb. — *Pennellianthus frutescens* (Lamb.) Crosswhite: Subalpine meadows on hill slopes to exposed uplands, *Takahashi 19861* (SAPT); *Zhuravlev & Ilushko 95900, 95901* (VLA); *Gage 1513* (WTU).

GLOBULARIACEAE

Lagotis glauca Gaertn.: Subalpine meadows on hill slopes, *Takahashi 19812* (SAPT); *Zhuravlev & Ilushko 95857, 95858* (VLA); *Gage 1492* (WTU).

CAMPANULACEAE

Adenophora triphylla (Thunb.) A. DC.: Subalpine meadows on hill slopes, *Zhuravlev & Ilushko 95951* (VLA).

Campanula chamissonis Fedorov: Subalpine meadows on hill slopes, *Takahashi 19850* (SAPT); *Zhuravlev & Ilushko 95954, 95955, 95956* (VLA).

Campanula lasiocarpa Cham. — *Campanula lasiocarpa* Cham. subsp. *latisepala* (Hult.) Hult.: Subalpine meadows on hill slopes, *Zhuravlev & Ilushko 95969, 95970, 95971* (VLA).

ASTERACEAE (COMPOSITAE)

Achillea ptarmica L. subsp. **macrocephala** (Rupr.) Heimerl — *Ptarmica macrocephala* (Rupr.) Kom.: Subalpine meadows on hill slopes, *Takahashi 19801* (SAPT); *Zhuravlev & Ilushko 951089* (VLA).

Anaphalis margaritacea (L.) Benth. et Hook. fil.: On low slopes, *Tarao s. n.* in 1892 (SAPT); *Takahashi 19886* (SAPT).

Arnica unalascensis Less. — *Arnica unalascensis* Less.: Subalpine meadows on hill slopes, *Takahashi 19804* (SAPT); *Zhuravlev & Ilushko 951005, 951006, 951007* (VLA); *Gage 1487* (WTU).

Artemisia stelleriana Bess.: On seashore, *Takahashi 19791* (SAPT); *Zhuravlev & Ilushko 951020, 951021* (VLA); *Gage 1496* (WTU).

Artemisia unalaskensis Rydb.: On low slopes, *Tarao s. n.* in 1892 (SAPT); *Takahashi 19887* (SAPT).

Cirsium kamtschaticum Ledeb.: On low moist slopes, *Tarao s. n.* in 1892 (SAPT); *Takahashi 19790* (SAPT).

Dendranthema arcticum (L.) Tzvel. subsp. **arcticum** — *Arctanthemum arcticum* (L.) Tzvel. subsp. *kurilense* (Tzvel.) Tzvel.: On seashore to subalpine meadows on hill slopes, *Takahashi 19833*, (SAPT); *Zhuravlev & Ilushko 95997* (VLA).

Ixeris repens (L.) A. Gray — *Chorisis repens* (L.) DC.: On sandy beach, *Takahashi 19881* (SAPT); *Zhuravlev & Ilushko 951037* (VLA).

Parasenecio auriculata (DC.) H. Koyama var. **kamtschatica** (Maxim.) H. Koyama — *Cacalia kamtschatica* (Maxim.) Kudo: On low moist slopes, *Takahashi 19892* (SAPT); *Zhuravlev & Ilushko 951032, 951033* (VLA); *Gage 1494* (WTU).

Petasites japonicus (Siebold et Zucc.) Maxim. subsp. **giganteus** (Fr. Schmidt ex Trautv.) Kitam.: On low moist slopes, *Takahashi 19888* (SAPT).

Saussurea riederi Herder subsp. **yezoensis** (Maxim.) Kitam.: Subalpine meadows on hill slopes, *Takahashi 19809, 19837* (SAPT); *Zhuravlev & Ilushko 951119, 951120* (VLA).

Saussurea kurilensis Tatew.: Subalpine meadows on hill slopes, *Takahashi 19835* (SAPT).

Senecio pseudoarnica Less.: On seashore, *Takahashi 19786* (SAPT); *Zhuravlev & Ilushko 951135* (VLA).

Solidago virgaurea L. subsp. **leiocarpa** (Benth.) Hult. — *Solidago paramuschirensis* Barkalov: Subalpine meadows on hill slopes, *Takahashi 19805, 19819* (SAPT); *Zhuravlev & Ilushko 951149, 951150* (VLA).

Taraxacum shikotanense Kitam.: On low slopes, *Takahashi 19872* (SAPT); *Zhuravlev & Ilushko 951175, 951175A* (VLA).

Taraxacum sp.: On sandy beach, *Takahashi 19875* (SAPT).

LILIACEAE

Allium victorialis L. subsp. **platyphyllum** Hult. — *Allium ochotense* Prokh.: Subalpine meadows on hill slopes, *Tarao s. n.* in 1892 (SAPT); *Takahashi 19798* (SAPT); *Zhuravlev & Ilushko 951113* (VLA).

Lilium medeoloides A. Gray — *Lilium debile* Kittlitz: Subalpine meadows on hill slopes, *Takahashi 19816* (SAPT); *Zhuravlev & Ilushko 951186, 951187* (VLA).

Lloydia serotina (L.) Reichenb.: Subalpine meadows on hill slopes, *Takahashi 19848, 19899* (SAPT); *Zhuravlev & Ilushko 951196, 951197* (VLA).

Maianthemum dilatatum (Wood) Nels. et Macbr.: Subalpine meadows on hill slopes, *Takahashi 19857* (SAPT); *Zhuravlev & Ilushko 951121, 951122* (VLA).

Veratrum album L. subsp. **oxysepalum** (Turcz.) Hult. — *Veratrum grandiflorum* (Maxim. ex Baker) Loes. fil.: On low moist slopes, *Takahashi 19893* (SAPT); *Zhuravlev & Ilushko 951111* (VLA); *Gage 1493* (WTU).

IRIDACEAE

Iris setosa Pall. — *Iris setosa* Pall. ex Link: *Zhuravlev & Ilushko 951123, 951123a* (VLA).

JUNCACEAE

Luzula capitata (Miq.) Miq.: Subalpine meadows on hill slopes, *Takahashi 19838, 19839* (SAPT).

Luzula kjellmanniana Miyabe et Kudo: Subalpine meadows on hill slopes, *Takahashi 19822, 19862* (SAPT); *Zhuravlev & Ilushko 951161, 951162* (VLA).

POACEAE

Calamagrostis langsdorffii (Link) Trin.: On low slopes, *Takahashi 19800* (SAPT); *Zhuravlev & Ilushko 951249, 951249A* (VLA).

Calamagrostis sesquiflora (Trin.) Tzvel. — *Calamagrostis urelytra* Hack.: Subalpine meadows on hill slopes, *Takahashi 19824* (SAPT); *Zhuravlev & Ilushko 951262, 951263* (VLA); *Gage 1491* (WTU).

Deschampsia flexuosa (L.) Nees — *Avenella flexuosa* (L.) Drej.: Subalpine meadows on hill slopes to exposed uplands, *Takahashi 19896* (SAPT); *Zhuravlev & Ilushko 951311, 951312, 951313* (VLA).

Festuca rubra L.: Subalpine meadows on hill slopes to seashore, *Takahashi 19821, 19868* (SAPT); *Zhuravlev & Ilushko 951293, 951294, 951295, 951295A* (VLA).

Leymus mollis (Trin.) Pilger: On seashore, *Takahashi 19787* (SAPT); *Zhuravlev & Ilushko 951323* (VLA).

Poa macrocalyx Trautv. et C. A. Mey. var. **fallax** (Hack.) Ohwi — *Poa macrocalyx* Trautv. et C. A. Mey.: On sandy beach to subalpine meadows on hill slopes, *Takahashi 19867, 19878* (SAPT); *Zhuravlev & Ilushko 951364* (VLA).

Poa macrocalyx Trautv. et C. A. Mey. var. **tatewakiana** (Ohwi) Ohwi — *Poa tatewakiana* Ohwi: Subalpine meadows on hill slopes to low slopes on seashore, *Takahashi 19799, 19832, 19874* (SAPT); *Zhuravlev & Ilushko 951393, 951394, 951395, 951396* (VLA).

CYPERACEAE

Carex flavocuspis Fr. et Sav.: Subalpine meadows on hill slopes, *Gage 1490, 1498* (WTU).

Carex gmelinii Hooker et Arnott: On seashore and subalpine meadows on hill slopes, *Takahashi 19830* (SAPT); *Zhuravlev & Ilushko 951176* (VLA).

Carex macrocephala Willd. ex Spreng.: On sandy beach, *Takahashi 19876* (SAPT); *Zhuravlev & Ilushko 951179, 951180* (VLA).

Carex scabrinervia Fr.: Subalpine meadows on hill slopes, *Takahashi 19806, 19813* (SAPT).
Carex stenantha Fr. et Sav. var. *taisetsuensis* Akiyama — *Carex ktausipali* Meinsh.: On exposed uplands, *Gage 1509* (SAPT, WTU).

ORCHIDACEAE

Coeloglossum viride (L.) C. Hartm.: Subalpine meadows on hill slopes, *Takahashi 19863* (SAPT); *Zhuravlev & Ilushko 951134* (VLA).

Listera nipponica Makino: On exposed uplands in heath vegetation, *Gage 1506* (WTU).

Malaxis monophyllos (L.) Sw.: Subalpine meadows on hill slopes, *Takahashi 19853* (SAPT).

Orchis aristata Fisch.—*Dactylorhiza aristata* (Fisch. ex Lindl.) Soo: Subalpine meadows on hill slopes, *Takahashi 19803* (SAPT); *Zhuravlev & Ilushko 951132, 951133* (VLA).

Platanthera chorisiana (Cham.) Reichb. fil. var. *elata* Finet—*Platanthera ditmariana* Kom.: Subalpine meadows on hill slopes, *Takahashi 19831* (SAPT).

Platanthera hyperborea (L.) Lindl.—*Platanthera convallariifolia* Fisch. ex Lindl.: Subalpine meadows on hill slopes, *Takahashi 19814* (SAPT).

Platanthera tipuloides Lindl.: In heath vegetation, *Takahashi 19895* (SAPT); *Gage 1507* (WTU).

摘 要

高橋英樹¹・V.Y. Barkalov²・S. Gage³・Y.N. Zhuravlev²: 千島列島チルポイ島のフロラ研究

千島列島チルポイ島のフロラはこれまで断片的にしか知られていなかった。1995年の国際千島列島調査に基づき植物リストを作成し、隣接する大きなふたつの島、ウルップ島とシムシル島との比較をおこなった。同定した105種のチルポイ島自生種のうち、100種はウルップとシムシルの両島に分布している。残り5種のうちの4種(カラフトイソツツジ, チシマルリソウ, ハマニガナ, エゾノコウボウムギ)はウルップに分布するがシムシルには分布せず、1種(サナエタデ)はウルップ, シムシルのどちらにも分布せず南千島に分布する。植物相からみると、チルポイ島はウルップ島により似ている。チルポイ島はカラフトイソツツジの分布東限に位置している。またチシマルリソウ, ハマニガナ, エゾノコウボウムギの3種は、千島列島中では北と南の端にちかい島々に分布するが中央部の島々では欠落するといった特徴的な両側分布パターンを示す。サナエタデは北千島に分布しないがカムチャツカでは見つかっているので、両側分布の一型と思われる。これら4種の南の分布中心の東端にあたるのがチルポイ島である。このような植物相の特徴はチルポイ島とウルップ島との海峡が100メートル以下と浅く距離も短い(27キロメートル)のに対し、チルポイ島とシムシル島との間の海峡は2000メートル以上の深さがあり65キロメートルとより離れている、といった地形的な特徴と一致している。オホーツク海側を南東から北東へ向かう海流も海浜植物(ハマニガナ, エゾノコウボウムギ)のチルポイ島への分布に寄与したと思われる。

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