Shrubby vegetation along Bujan River on Bering Island.

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Dendroflora of the Commander Islands, Russia

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The Commander Islands are the western group of the Aleutian Islands, the western extremity and the upper part of a huge underwater volcanic range, which protrudes from east to west for up nearly 2,000 kilometres. They lie in the northern part of the Pacific Ocean, 175 km east of the Kamchatka Peninsula, between latitudes 55º 25′ and 54º 31′ north and longitudes 165º 04′ and 168º 00′ east. The Archipelago of the Commanders consists of two larger islands, these are Bering Island (about 1667 sq. km) and Medny Island (186 sq. km). There are also Toporkov Island (0,4 sq. km), Arij Kamen Island (0,08 sq. km) and numerous small islets, rocks, cliffs and stones. The Islands of Bering and Medny stretch from north-west to south-east with a 49 km wide strait between them. The Islands are of considerable phytogeographic interest because they function as an important bridge for the dispersal of plants between North America and North-East Asia. The total flora is rich and diverse, a wonderful mixture of plants from both continents. The Islands provide a nesting habitat for more than 600,000 sea birds, and they have been included into The International Birds Areas (IBAs) since 1998, being one of the most important regions of the globe for bird life conservation. Most part of the Commanders have been included into the Commander Nature Reserve since 1993. Administratively they belong to the Aleutsky district of the Kamchatka region.

The beginning of botanical research at the Commanders was marked by Georg Steller. Carl von Linne called him "a born collector of plants". During his extreme and adventurous stay at Bering Island, where Vitus Bering died, Steller collected a rich herbarium and compiled *Catalogus plantarum in insula Beringii observatarum*, in which he included 218 names of vascular plants and algae. It was the period of the first glorious and famous expeditions to investigate the vast territories of the Russian empire. One of the outstanding expeditions was the Great Northern, or Second Kamchatka expedition (1732-1743) managed by Vitus Bering. Georg Steller took part in it, and he was the first and the only Russian botanist at that time, to visit America (Kadiak Island), make observations and collect there. As L. Steineger (1936) wrote, Steller was not only the first white man to set foot on Alaskan soil, but he was also the first naturalist to collect, study and describe Alaskan plants and animals at a time when the world did not know even of the existense of Alaska. He was not only the first naturalist in Alaska, but was the first naturalist-traveller to explore any region on the North Pacific. Splendid results were obtained during this expedition, and there were a lot of adventures and trials for its participants. Lasting 11 years, the Second Kamchatka expedition covered nearly the whole of Siberia and the seashores of America and Japan. As a result, north-western America was discovered, and the Kuril Islands, seashores of northern Japan and northern Siberia investigated and described (Gnucheva, 1940).

Steller departed from Saint-Petersburg at the end of 1737, and on 21 September 1740 he arrived to Kamchatka (Pekarsky, 1870). After the call of Bering to accompany him in his voyage to the shores of America, he arrived to Petropavlovskaya harbour in March 1741. On 4 June 1741 the packet-boat "Svjatoj Petr" (Saint Peter) departed from Kamchatka, and on 20 July it reached Kadiak Island near Alaska. The subsequent journey was not a happy event: the explorers spent the rest of July and the whole of August sailing between the Aleutian Islands which were unknown at the time. Scurvy disease began two months after departure. In September and October they suffered severe storms, and on 5 November the ship broke up on the shores of an unknown and uninhabited island. The captain, Bering, died at the beginning of winter. Georg Steller did not stop his research activity despite the cold, starvation and deprivation. In August 1742 the rest of the crew built a new boat from the remains of the broken one, and returned to Kamchatka successfully, where they had long since been thought to be dead.

The bay, where the packet-boat of the Second Kamchatka Expedition "Svjatoj Petr" was broken, is Komandor (Commander) Bay. It is situated on the eastern coast of Bering Island. The whole bay is now an archeological monument and there is a memorial at the place where the crew of the packet-boat "Svjatoj Petr" stayed for the winter, and where the graves of Vitus Bering and five members of his crew are situated. Nearly all cruise ships visiting the Commander Islands, make a stop at the Komandor Bay.

Since that time the Commander Islands have been visited by both Russian and foreign researchers. The results of early botanical investigations were

described by V. Vasiljev (1957) in Russian and by E. Hulten (1960, 1968) in English. In a flora of vascular plants of the Kamchatka region (Belaja et al., 1981) the Commander Islands were described as one of 12 floristic districts of Kamchatka, with a set of endemic species *(Arnica unalaschensis, Erigeron peregrinus, Rhinanthus borealis),* occurring nowhere in the Far East but on the Commanders. The newest data on local plants are published in monograph of O. Mochalova and V. Yakubov *Flora of the Commander Islands*, published in 2004 in Russian.

The upper point of Bering Island is Steller's Mountain at 755 m above sea level, and of Medny Island is Steineger's Mountain at 647 m elevation, the relief being mostly mountainous. The Commanders' climate is characterized by strong winds and frequent and often violent cyclonic storms. The Islands are called "the country of winds and fogs". Cool, wet, windy and cloudy or foggy conditions, controlled locally by topography, are prevalent. The climate is moderately oceanic, with positive annual air temperature (+2,1ºC). The annual air temperature fluctuation is low (about 15ºC), the amount of precipitation is about 500 mm per year. Both cold streams from the Arctic Ocean and branches of warm stream from the Kurosio influence contribute to this peculiar climate with rather mild winter and cool summer. The ocean around the islands is not frozen in winter, but minimum temperature may fall down to -18 (-24ºC). There is a cyclonic type of weather, which develops most strongly from November until April, with hurricane winds from any direction, up to 40 m per second. There is a high relative humidity, the whole year round which exceeds 80%. The snow covers the ground from November to December, and in gorges and shady places it may lie until July or August. Modern volcanic activity is absent.

Woody vegetation is absent at the Commanders as is the shrubby belt. The main reasons for the absence of real forests are apparently the lack of positive summer temperatures (lower than +10ºC), strong winds and the constant cloud cover, which reduces radiation from the sun. Despite of the fact, that the Commanders are situated in region with a wide distribution of dwarf Siberian pine and alder thicket associations, here such communities are absent. There are in places shrubby willows (*Salix alaxensis* and *Salix lanata*), and also shrubby rowan, (*Sorbus sambucifolia*). A tundra type of vegetation and meadows dominate, with many perennial species and dwarf shrubs

Below is a list of 44 species from the arboreal flora of the Commander Islands, with short comments.

***1. Andromeda polifolia* L. (Ericaceae)**

Dwarf shrub, in optimal conditions of its wide circumpolar distribution to 30 cm high. Monotypic genus, consisting of one species. Sedge-moss and sedge-dwarf shrubby tundra, thickets of *Betula exilis,* bogs. Common at Bering Island. At Medny Island common in central part, more seldom at the north and south.

***2. Arcterica nana* (Maxim.) Makino (Ericaceae)**
Dwarf creeping shrub to 10 cm high with north-west Pacific distribution. Dwarf shrubby and stony dwarf shrubby tundra. Medny Island: frequent on the south of island. There are old literature records of single findings at Bering Island.

***3. Arctous alpina* (L.) Neidenzu (Ericaceae)**
Dwarf shrub with creeping shoots, to 50 cm long. Different types of tundra, shrubby thickets along slopes. Very common on both Islands. Berries are red in summer, on ripening become dark-purple or nearly black.

***4. Betula exilis* Sukacz. (Betulaceae)**
In optimal conditions shrub up to 0.9 (1.2) m high, at the Commanders dwarf shrub, to 0.2-0.4 m high. A component of different types of sedge-moss and sedge-moss-dwarf shrubby tundra and of dwarf shrubby mountain tundra (rare). Only at certain places in the north, it forms its own associations (erniki), which is one version of tundra vegetation. Bering Island: rather common in the northern plane part and seldom in the central part.

***5. Betula* x *paramushirensis* Barkalov (*B. ermanii* Cham. x *B. exilis* Sukacz.) (Betulaceae)**
Prostrate tree or shrub. The largest height is 1.5 m in the environs of Sarannoje Lake of Bering Island, but mostly not more than 0.5 to 1 m high. Component of dwarf shrubby tundra with hilly microrelief, through the bottoms and slopes of depressions. Bering Island: seldom, at the northern part. This is hybridogenic taxon described by V.Yu. Barkalov (1984) from Paramushir Island (North Kuril Isles). Typical *Betula ermanii* is absent at the Commanders.

***6. Bryanthus gmelinii* D. Don (Ericaceae)**
Dwarf shrub, forming dense carpet close to the soil surface, 5 to10 cm high, with thin shoots and small leaves. Monotypic genus, the species with north-west Pacific distribution. Dwarf shrubby and shrubby tundra, stony scree, bogs. One of the dominant species on dry stony-dwarf shrubby and *Empetrum* tundra. Bering Island, Medny Island: common.

***7. Cassiope lycopodioides* (Pall.) D. Don (Ericaceae)**
Dwarf creeping shrub with long trailing shoots. One of four species from the Asian part of Russia, widely distributed through the Russian Far East, also in Japan and Alaska (amphypacific distribution). Stony-dwarf shrubby and dry dwarf shrubby tundra, maritime slopes and slopes along rivers. Very common at both Bering and Medny Islands.

***8. Chamaepericlymenum suecicum* (L.) Aschers. et Graebn. (Cornaceae)**
Dwarf sub-shrub, in optimal conditions of its circumpolar distribution up to 40 cm high (Koropachinsky, Vstovskaya, 2002), but of small size (up to 20 to 25 cm high) at the Commanders. Different types of dwarf shrubby tundra, shrubby thickets on slopes, sedge-moss tundra, stony-grassy maritime slopes. Common at Bering and Medny Islands. Another species, *C. canadense* (L.) Graebn. may be found here as well.

***9. Comarum palustre* L. (Rosaceae)**
Dwarf creeping boggy sub-shrub of wide circumpolar disrtibution. Different types of sedge-, sedge-dwarf shrubby tundra, banks of rivers and lakes, bogs and boggy meadows. Bering Island: common. Medny Island: seldom at northern and central part, very seldom at the south.

***10. Diapensia obovata* (Fr. Schmidt) Nakai (Diapensiaceae)**
Typical arcto-alpine species of wide distribution in Asia and North America. Form loose cushions about 5 cm high. Stony-dwarf shrubby tundra, nival glades. Bering and Medny Islands: not seldom.

Commander Bay with graves of Vitus Bering and his companions.

***11. Empetrum nigrum* L. s.l. (Empetraceae)**
Dwarf shrub to 20 (30) cm high, forming dense soil covering carpet. One of the most widely distributed vascular species at the Commanders. Different types of tundra. At seashore maritime terraces may form monodominant communities. *Empetrum kardakovii* V. Vassil. with red, not black, fruits was described from this territory (environs of Nikolskoje village, Orliny Cape of Bering Island) by V. Vasiliev depending on herbarium specimen. But in fact, during last years *Empetrum* with red berries was not discovered here. Only unripened fruits have poor reddish tinge, later on it completely disappears, fruits turning black. This phenomenon is quite common through Kamchatka region.

***12. Juniperus sibirica* Burgsd. (Cupressaceae)**
Low shrub (35-60) cm high at the most part of its natural habitat (Koropachinsky, Vstovskaya, 2002). Dwarf prostrate shrub, 20 to 30 cm high at the Commanders, and the only conifer here. Dwarf shrubby and *Rhododendron* – dwarf shrubby tundra at low parts of mountain slopes. Occurs occasionally throughout the whole Bering Island.

***13. Ledum palustre* L. subsp. *decumbens* (Ait.) Hult. (Ericaceae)**
Dwarf shrub, distributed through North Asia and North America, usually 20 to 30 cm high. Sedge-moss, wet dwarf shrubby tundra, thickets of *Betula exilis*. Bering Island: seldom, only at northern part.

***14. Linnaea borealis* L. (Caprifoliaceae)**
Trailing dwarf shrub, 20 to 60 cm long. Monotypic genus of one circumpolar species. Different types of dwarf shrubby tundra, thickets of shrubs. Common on both islands.

***15. Loiseleuria procumbens* (L.) Desv. (Ericaceae)**
Dwarf shrub, much bunched and depressed to the ground, at times forms small cushions,

up to 15 cm high. Monotypic arcto-alpine genus of wide circumpolar distribution. Different types of tundra, nival glades. More often at middle and low elevations. Common on Bering and Medny Islands.

***16. Lonicera caerulea* L. (Caprifoliaceae)**
Polymorphic species of wide distribution throughout Europe, Asia and North America. Low shrub. Dwarf shrubby and multy-grass – dwarf shrubby tundra, thickets of shrubs along slopes and at river valleys. Low, prostrate form, 30 to 40 cm high, poorly fruiting and with densely pubescent leaves dominates at the Commanders. Shrubs more than 50cm high occur very seldom. Bering Island: occur in north, seldom in south.

***17. Oxycoccus microcarpus* Turcz. ex Rupr. (Ericaceae)**
Creeping, soil covering dwarf shrub. Of wide circumpolar distribution, including nearly all Siberia and Russian Far East. Sedge-moss and sedge-dwarf shrubby tundra, wet low grass-sedge glades, bogs, thickets of *Betula exilis*. Bering Island: common in north, seldom in south. Medny Island: seldom.

***18. Oxycoccus palustris* Pers. (Ericaceae)**
Dwarf shrub. The same as previous one, differs in larger fruits and leaves, by pubescent flower stalks. Bogs, sedge-moss tundra, wet places. Bering Island: sporadical in northern and central part. Medny Island: very seldom, northern part only.

***19. Phyllodoce aleutica* (Spreng.) Heller (Ericaceae)**
Arcto-alpine genus, mostly Pacific, with two species in Asian part of Russia, *P. aleutica* being amphypacific species. Dwarf creeping shrub, densely covered with leaves, up to 30 (40) cm high. Different types of tundra, detritus, nival glades, trains of slopes. Bering and Medny Islands: common. Besides, hybrid plants *P. aleutica* × *P. caerulea* can be found sporadically, with pale pink or nearly white, globose corolla.

***20. Phyllodoce caerulea* (L.) Bab. (Ericaceae)**
Dwarf shrub, to 25 cm high, similar to the preceeding one. With circumpolar distribution. Different types of dwarf shrubby tundra, thickets of shrubs along slopes, detritus, nival glades, trains of slopes. Bering and Medny Islands: common, but somewhat less profuse than *P. aleutica*.

***21. Rhododendron aureum* Georgi (Ericaceae)**
Low shrub, distributed in North Asia. Different types of dwarf shrubby tundra, thickets of shrubs on slopes, nival glades. Bering and Medny Islands: mass distribution. On Bering Island in places forms complete monodominant thickets, up to 50 to 70 cm high. The corolla of flower is pale-yellow or dirty-white.

***22. Rhododendron camtschaticum* Pall.**
Dwarf shrub, with Asian and west American distribution. Nival glades, different types of dwarf shrubby tundra, grassy maritime slopes, detritus. The most plentiful associations forms at hilly dwarf shrubby tundra, along streams at its upper reaches, trains of slopes.

There are two subspecies, the typical one (subsp. ***camtschaticum)*** which is very seldom seen, is represented by higher plants, up to 50 cm high.

23. Rhododendron camtschaticum **Pall. subsp.** ***glandulosum*** **(Standl.) Hult.**
Dwarf shrub with smaller leaves, distributed in north-east Asia. Dominating subspecies, represented by low dwarf shrubs of lesser size (20 to 30 cm high), plants being submerged into substrate. Occurs everywhere at Bering and Medny Islands.

24. Rosa amblyotis **C.A. Mey. (Rosaceae)**
The north-eastern Asiatic species. At optimal conditions of its large habitat from Japan and Korea to Russian Primorsky kray may reach 1.5-2 m high, but is a low shrub less then 1 m high at the Commanders. Dwarf shrubby and shrubby thickets, along slopes, mostly at depressions of microrelief. Bering Island: not seldom in the central and north, rare in the south.

25. Salix alaxensis **Cov. (Salicaceae)**
Shrubby thickets along river valleys, may produce rarified or closely united stand. Widely distributed through Bering Island, produce both monodominant associations and together with *S. hastata* and *S. lanata*, the average height 2 to 2.5 m. At Medny Island rare in central part, up to 1 m high.

26. Salix arctica **Pall.**
Dwarf shrub, mostly to 50 cm high, prostate or nearly erect. The most widely distributed among shrubby willows. Typical subspecies is low, prostrate shrub. Rare at Bering Island and very common at Medny Island. Prefers higher elevations, stony scree, pebble banks of rivers.

27. Salix arctica **Pall. subsp.** ***crassijulis*** **(Trautv.) A. Skvorts.**
This shrub of a larger size than typical subspecies, also differs by larger leaves with highly protruding nerves from beneath and more densely pubescent catkins. Common in different ecological places at both Bering and Medny Islands, mostly dwarf shrubby tundra. Profuse in willow thickets along river floodland, where it can reach 1.5 (2) m high.

28. Salix chamissonis **Anderss.**
Low shrub (approximately 30 to 40 cm high) with long prostrate twigs. Native to northern Pacific region. Wet sedge-moss tundra, wet places along streams, over-humid glades and meadows. Of rare occurrence at both Bering and Medny Islands.

29. Salix fuscescens **Anderss.**
Low shrub to 50 cm high, of prostrate habit, with erect and rooted twigs. Wet sedge-moss, sedge-dwarf shrubby tundra, thickets of *Betula exilis,* nival places near snow heaps, banks of lakes and ponds. Common at both islands.

***30. Salix glauca* L.**
This circumpolar species at optimal conditions of Russian Far East up to 2 (2.5) m high, at the Commanders low shrub (1 m high). Rare species, only Bering Island. Middle reaches of Kamenka River. Willow floodland thickets with domination of *S. alaxensis.*

***31. Salix hastata* L.**
Shrub to 1.5 m high. Floodland willow thickets, usually together with *S. alaxensis*, in drier places of river valleys, pebbles along streams, very seldom on mountain slopes. Only Bering Island: common in north and central part, seldom in the south.

***32. Salix kurilensis* Koidz.**
Dwarf prostrate shrub with rooted twigs, not much protruding above the soil. There are only hybrids *S.kurilensis* with *S. arctica* at heath tundra, at both Bering and Medny Islands. Typical form is absent at the Commanders. This is a species of Kuril Islands and extreme south of Kamchatka.

***33. Salix lanata* L.**
In optimal conditions of its circumpolar distribution shrub to 3 m high, at the Commanders less than 1.5 m high. Bering Island: sporadically component of high shrubby willow stands along river valleys. Medny Island: single shrubs on valleys and low places of slopes in central part of island.

***34. Salix ovalifolia* Trautv.**
Prostrate dwarf shrub, 10 to 15 cm high. This species has a wide area of distribution around the Bering Sea, widely distributed through Alaska. Episodically both at Bering and Medny Islands. Stony scree and stony-dwarf shrubby tundra.

***35. Salix polaris* Wahlenb.**
Dwarf creeping shrub of circumpolar distribution, with rooted twigs 3 to 5 cm long. Stony and detritus dwarf shrubby tundra, more often at detritus peaks and slopes. Bering and Medny Islands: episodically.

***36. Salix pulchra* Cham.**
Shrub up to 3 (4) m high in Russian Far East, low shrub up to 1 to 2 m high at the Commanders. Along streams (waterflows) and on mountain slopes. Bering Island: very seldom, only in the north (Sarannoje Lake, Kamenka River). North Asiatic and north American area of distribution.

***37. Salix reticulata* L.**
Dwarf creeping or nearly erect shrub, 10 to 40 cm high, with short rooted twigs, of circumpolar distribution. Different types of tundra, stony scree, from maritime slopes to upper levels of vegetation on mountainside. Infrequent at Bering and Medny Islands.

***38. Salix sphenophylla* A. Skvorts.**
Dwarf prostrate shrub, 10 to 30 cm high. Dwarf shrubby, multi-grassy or dwarf shrubby,

stony-dwarf shrubby tundra, maritime slopes, glades at mountain circuses. Bering and Medny Islands: not seldom

***39. Salix udensis* Trautv. et C.A. Mey.**
At the southern end of the Russian Far East a tree 12 to 20 m high, at the Commanders a shrub 0.5 to 1.5 m high. Rare on Bering Island. There is only one small grove, covering an area 8 by 15 m, with a complete monodominant stand up to 2.5 m high, among dwarf shrubby tundra, near Tonky Cape.

***40. Sieversia pentapetala* (L.) Greene (Rosaceae)**
Dwarf sub-shrub to 20 cm high. Tundra slopes at Medny island: rare. There are no typical species. Herbarium specimens have been collected, identified and named as *Sieversia x macrantha* Kearney with unclear relations, might be a hybrid between *Acomastylis rossii x Parageum calthifolium*, or a hybrid between *Sieversia pentapetala x Parageum calthifolium.*

***41. Sorbus sambucifolia* (Cham. et Schlecht.) M. Roem. (Rosaceae)**
Slopes with different types of dwarf shrubby tundra. Narrow gullies of water falls. Bering, Medny Island: common. In associations with *Rhododendron aureum* usually up to 1 m high, occasionally can reach 1.5 to 2 m high. In stony-dwarf shrubby tundra usually prostrate form dominates, not more than 30 cm high. Widely distributed through North-West Pacific region.

***42. Vaccinium ovalifolium* Smith (Ericaceae)**
Shrub up to 1.5 m high. American (North Pacific) species reaching at the west Russian territory, Commander Islands only. Different types of dwarf shrubby tundra, thickets of shrubs, at low places of microrelief protected from wind, right at the bottom of slopes. Bering Island: rather common in south and central parts. Medny Island: rare, not collected in the south.

***43. Vaccinium uliginosum* L.**
Dwarf shrub, of wide circumpolar distribution. Different types of dwarf shrubby tundra and stony-dwarf shrubby tundra, sedge-moss tundra, mostly at middle belt of mountains, nival glades, thickets of shrubs along slopes. Low prostrate and poorly fruiting plants dominate, which are considered to belong to subsp. *microphyllus* (Lange) Tolm. Bering and Medny Islands: not seldom.

***44. Vaccinium vitis-idaea* L.**
Dwarf shrub, of wide circumpolar distribution. Different types of dwarf shrubby tundra, stony-dwarf shrubby and sedge-moss tundra, thickets of shrubs along slopes. Bering and Medny Islands: common. Plants of small sizes and smaller leaves dominate, which at times have been considered to be an independent subspecies *minus* (Lodd.) Hulten. Plants of larger sizes corresponded to the typical subspecies which occurs much more seldom (in dwarf shrubby tundra, shrubby thickets on slopes). But clear difference between these two forms on Commanders and also on Kamchatka are absent. That is why it is not correct to divide the common lignon berry into subspecies.

Bird settlement on Arif Kamen Island (The Commander Islands are an International Bird Area).

The arboreal flora of the Commander Islands numbers 44 species and subspecies from 23 genera of nine families. Most of them grow on both Islands, but ten species are distributed only on the Bering Island and two only on Medny. To compare the total vascular flora of these islands numbering 432 species from 200 genera of 62 families (Mochalova, Yakubov, 2004). V.A. Nedoluzhko (1995) included them in the dendroflora of the whole Russian Far East which add up to 480 species and subspecies from 138 genera of 52 families (including several naturalized species). So, the Commander Islands' dendroflora makes up 9% of general dendroflora of the whole Russian Far East.

The largest family is Ericaceae, with 17 species of 11 genera; many of its genera are represented by single species. In second place is Salicaceae with one genus *Salix* including 15 species. Next comes *Rosaceae,* with four species from four genera, followed by Caprifoliaceae (two genera, two species) and Betulaceae (one genus, two species).

As for living forms, we can divide all arboreal species of the Commanders at least into two groups: dwarf shrubs (less than 0.5 m high) and real shrubs (0.5 to 2.5 m high or more). Dwarf shrubs with 29 species dominate. Real shrubs cover the rest 15 species (one third only). Certain tree species as *Betula* x *paramushirensis*, of prostrate shrubby appearance and less than 1.5 m high, may be included into the second group. A definition of "tree" which is commonly followed in temperate regions is "a woody plant growing on a single stem usually to a height of over two metres". This definition has been adopted by the IUCN/SSC Temperate Broadleaved Tree Specialist Group (Oldfield et al., 1998). Some willow species, such as *Salix udensis,* at more optimal conditions of its natural distribution exist in living form of tree of rather large sizes, but at the Commanders they are mostly shrubby. On the other side, dwarf sub-shrubs, such as *Comarum palustris* and *Chamaepericlymenum suecicum*, which take intermediate position between arboreals and perennials, we may include into the first group.

Circumpolar species dominate (17 species, 34%) in the dendroflora of the islands. Seven species are of wide distribution in north Asia and North America.

The next phytogeographic group form plants distributed in different areas of the West Pacific region. The Commanders' flora is peculiar and interesting, including such species of much more limited distribution as *Bryanthus gmelinii*, *Arcterica nana, Salix kurilensis*. Many of Commander arboreal plants have a habitat in common with the Kuril Islands, south of the Kamchatka peninsula and Aleutian Islands.

There are interesting peculiarities among the Commander Islands' plants which have adapted to the extreme conditions by diminishing in size, with a shortening of internodes, a more compact habit of both the whole plant and of its parts (inflorescenses), and more densely pubescent leaves and stems. There is a change among many species of dates of phenological phases: flowering, for example occurs much later, even at the very end of the vegetative season. Leaves have a tendency to be wider. And on the mountain slopes which are subjected to strong winds even native species , particularly the parts above the snow cover are subjected to frost damage.

Many of the Commanders ligneous plants are highly decorative. They may be of considerable interest for rock gardens *(Rhododendron camtschaticum, Loiseleuria procumbens*). Many species are still unknown or very seldom in cultivation *(Phyllodoce aleutica)*. They may be interesting first of all for introduction into Northern Europe, including north-western Russia and the north of Scandinavia. Botanic gardens in the Kamchatka region are absent but there is a tremendous amount of fascinating work to be done in cultivation with the plants from the Commander Islands. May I also say that the Commanders Islands may be of considerable interest for the IDS Members and Tours Committee to discover the exotic dendroflora and landscapes of this remote area in the north of the Russian Far East.

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