

History of the floristic study of the Karelian Isthmus, Leningrad Region

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The Karelian Isthmus is located in the Leningrad Region, NW Russia, between the Gulf of Finland and Lake Ladoga. The political boundaries have changed several times during the history. The state boundary has in practice also defined the study areas of Russian and Finnish botanists working in the area in different times. This has especially been true after Finland became independent in 1917, and again after World War II. The first floristic records from the area date back to 1749–1752, when the Russian geographer S. P. Krascheninnikov travelled in the area. A more systematic study started in the mid 1840's. The first Finnish floristic study on the isthmus was made by W. Nylander, based on his travels in 1844, 1849 and 1850. This pioneer work of the floristic study in Finland was followed by several others, and rather intensive floristic exploration by Finnish botanists was carried out on the isthmus until World War II. The most important explorers were I. Hiitonen and V. Erkamo. The Russian botanists studying the area during the latter half of the 19th century included K. F. Meinshausen and I. F. Schmalhausen. On the Russian side, there was an interruption in the floristic study from the 1920's to 1947, when the first inventories for the "Flora of the Leningrad Region" were started; the four-volume flora was printed in 1955–1965. Since then, several botanists have carried out field work on the Karelian Isthmus, which today is floristically rather well known. Finally, in the 2000's two handbooks with keys and a thorough conspectus were published on the vascular plant flora of the Karelian Isthmus and its adjacent regions.

1. Introduction

The Karelian Isthmus is the isthmus between the Gulf of Finland of the Baltic Sea and Lake Ladoga (Fig. 1). As understood in this article, it is outlined as the part of the Leningrad Region (including the city of St. Petersburg) north of the Neva River, up to the Russian–Finnish border and the border of the Republic of Karelia (Russia), thus including a wide area west and north which is not part of the proper geographic concept of the Karelian Isthmus.

It ranges 150–180 km from south to north, and 55–110 km from west to east, with an area of about 15,000 km².

Karelian Isthmus (Latinized as *Isthmus karelicus*) is also the name of one of the traditional Fennoscandian biogeographical provinces. However, the area of this province is more limited than the isthmus itself, and for practical reasons, we discuss here the whole area inside the borders described above. Thus, those parts of the biogeographical provinces of South Karelia (*Karelia aus-*



Fig. 1. The study area at the Karelilian Isthmus. 1 St. Petersburg, 2 Vyborg/Viipuri, 3 Priozersk/Käkisalmi, 4 Sestroretsk/Siestarjoki, 5 Zelenogorsk/Terijoki, 6 Toksovo/Toksova, 7 Lembolovo/Lempaala, 8 Pervomaiskoe/Kivennapa, 9 Polyany/Uusikirkko, 10 Primorsk/Koivisto, 11 Sovetskii/Johannes, 12 Pravdino/Muolaa, 13 Lakes Rakovyve/Äyräpäänjärvet, 14 Sosnovo/Rautu, 15 Zaporozhskoe/Metsäpirtti, 16 Mel'nikovo/Räisälä, 17 Kamenogorsk/Antrea.

tralis, including, e.g. Vyborg/Viipuri) and Ladoga Karelia (*Karelia ladogensis*, including, e.g. Priozersk/Käkisalmi), which belong to the Leningrad Region, are also included. The outer islands in the Gulf of Finland (like Gogland/Suursaari) are, however, excluded. In addition, we include the southernmost part of the area, between the former Finnish boundary and the Neva River (or the 60th latitude), called by Hiitonen (1962) *Isthmus ingricus*. This province has not been in use and it has not normally been included in Fennoscandia.

The Karelilian Isthmus has a complicated political history. Up to the 1300's the area, inhabited by Karelians (a major division of Finns), did not clearly belong to any state. Sweden and the principality of Novgorod were continuously fighting over its possession. In a treaty of 1323 the isthmus was finally officially divided between the powers. The division continued until Sweden occupied the area and even Ingermanland south of the Neva River from 1617 to c. 1700 (nominally until 1721). In 1703 Czar Peter the Great founded St. Petersburg at the southern margin of the Karelilian Isthmus and it served as the capital of Russia between 1712 and 1918. After the beginning of the 1700's almost the whole area (and all of it after 1743) be-

longed to Russia. Most the area was annexed to the autonomous Grand Duchy of Finland (under the Russian Empire) between 1812 and 1917. In 1917, when Finland became independent, most of the isthmus was included in Finland. In the World War II the Soviet Union occupied the area from early 1940 to the summer 1941, being reoccupied by Finland between 1941 and 1944. From 1944 (officially from 1947) the area has belonged to the Soviet Union/Russia.

From the phytogeographical point of view it is essential to note the directions and nature of traffic during different historical periods. The traffic determines the migration history of numerous archaeophytes and later adventive species in the area. Naturally during the Russian-dominated periods most of the traffic and agricultural methods (and seeds) came from the south, while during the Swedish or Finnish periods most of the goods came from the west and north. Even the human population moved. In the 1600's Finns efficiently colonized the Karelilian Isthmus and Ingermanland, and accordingly many Karelians and Russians moved away, for instance to the present Tver Region. Again, after 1944 the Finnish population was totally evacuated to the rest of Finland and the area

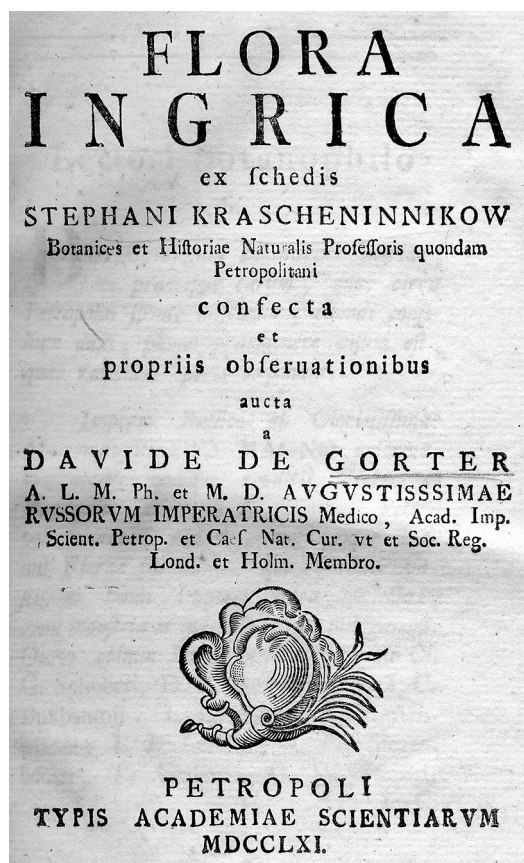


Fig. 2. Stephan Petrowich Krascheninnikov's *Flora Ingrica* was published posthumously by Davide de Gorter (1761). – Library of the Botanical Museum, Helsinki.

was recolonized by Russians, Ukrainians and other Soviet people.

It is especially important to note that the area has experienced numerous wars throughout the centuries. During World War II, and even before and after it, the area was under massive military activities for about ten years. Still at that time, and naturally earlier, horses played a great role for the armies. Huge amounts of fodder (hay) were transported to the area from elsewhere. Horse traffic must be one of the major reasons for plant dispersal to the area. A Finnish botanist travelling on the Karelian Isthmus immediately notes the abundance of “Russian plants” (unusual in Finland), such as *Bunias orientalis*, *Berteroa incana*, *Artemisia campestris*, etc. in towns and villages.

The first known floristic records from the Karelian Isthmus date back to the 1750's. How-

ever, early explorers were few in number, and more systematic studies began only around the mid 1800's. Though the border between Russia and Finland was relatively open at the time, Russian and Finnish botanists gathered data on a rather national basis. Because of the existing language barrier (apart from the very first papers printed in Latin and German, floristic papers were usually printed in national languages), flow of information between Russian and Finnish researchers was rather low. This was especially true during the Soviet regime in 1917–1990. Communication and cooperation has become more active during the last two decades, and e.g. visits of Russian botanists to Finnish herbaria have made it possible to bring together data and research traditions in a new way.

2. The period before and during World War I

The floristic study of the Karelian Isthmus started in the mid 1700's. It was closely connected with the beginning of the study of the St. Petersburg Guberniya flora by Russian botanists on one hand and with the study of the Finnish flora by Finnish botanists on the other hand.

2.1 Russian botanists from S. P. Krasheninnikov to N. V. Shipchinskii

Stephan Petrowich Krascheninnikov (1711–1755) started the systematic investigation of the St. Petersburg Guberniya flora. He was a Russian explorer and geographer who made extensive travels to Siberia (1733–1736) and the Kamchatka Peninsula (1737–1741), and gave the first full description of Kamchatka. He was elected a member of the Russian Academy of Sciences in 1750. He made an expedition to the Karelian Isthmus in 1749–1752, and his routes covered a considerable part of the territory. Krasheninnikov's material was published posthumously by D. Gorter (1761; Fig. 2). This paper included 389 plant species.

Grigoriy Fedorowich Sobolewsky (1741–1807) published a flora of the St. Petersburg Guberniya (Sobolewsky 1799; Fig. 3). The flora included 685 vascular plant species, and the total

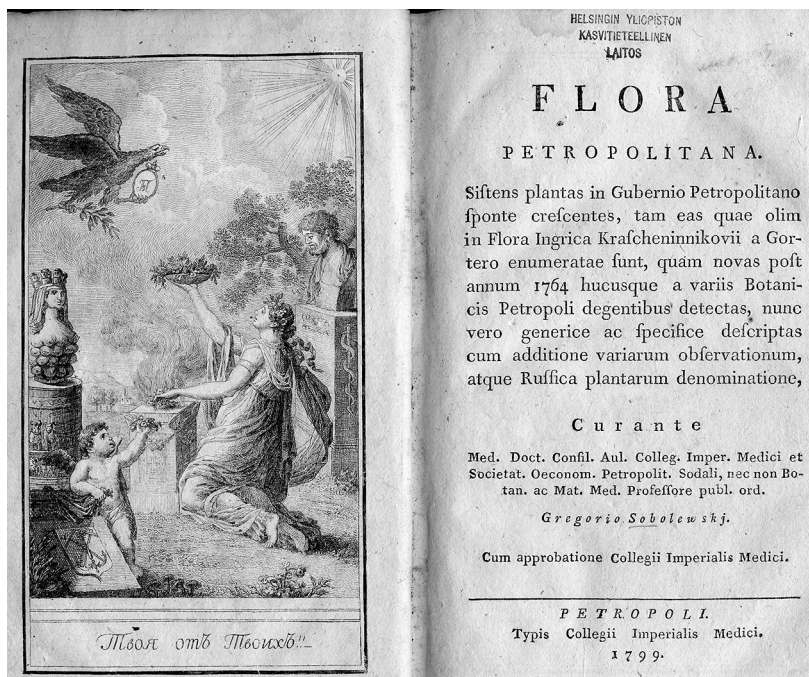


Fig. 3. The title spread of Gregorio Sobolewsky's *Flora petropolitana* (1799) – Library of the Botanical Museum, Helsinki.

number of species including mosses, lichens and fungi was 1019. Sobolewsky was a physician and botanist, head of the Imperial Botanical Garden in St. Petersburg (1779), and Professor in Botany at the Academy of Medicine and Surgery in 1795–1803.

Academician Franz Joseph Ruprecht (1814–1871, born in Austria) published the first volume of the critical summary “*Flora Ingrica...*” in 1860, listing 402 plant species (Ruprecht 1860; Fig. 4). In 1878 his pupil Karl Friedrich Meinshausen (1819–1899) published a flora of vascular plants of the St. Petersburg Guberniya (Meinshausen 1878; Fig. 5), based on his own collections made during c. 40 years. Meinshausen was born in Riga, Latvia. He began his career as the helper of the librarian of the Imperial Botanical Garden in St. Petersburg, when he also started his work in the Herbarium and the Botanical Garden. He travelled in northern Finland and the Kola Peninsula, in Central Asia and the southern Ural Mountains. He started to prepare the “*Flora Ingrica*” from 1860. This work covered only a small part of the Karelian Isthmus, mainly the southeastern section. The rare species *Ligularia sibirica* was found for the first time on the Karelian Isthmus in 1870 by Meinshausen. Later, in 1893 in the environs of the

village Levashovo/Levassova, he collected *Cypripedium calceolus* and *Calypso bulbosa*, which have not later been found there, and also e.g. *Carex livida* near the village of Lakhta/Lahti.

The investigation of the St. Petersburg Guberniya flora by Russian university scientists started in 1870. Andrei Nikolaevich Beketov (1825–1902), the founder of the Saint-Petersburg Society of Naturalists, started to encourage students to carry out field work. Ivan (Iogann) Fedorovich Schmalhausen (1849–1894) was among the first members of the expeditions. Schmalhausen participated in three main fields of research: morphology and anatomy of higher plants, study of flora and taxonomy, and palaeobotany. After graduating from St. Petersburg University he stayed abroad working on anatomy and palaeobotany, acquainting himself with the Swiss, Tyrolean, north Italian and southern French floras, and collecting herbarium specimens. He obtained the position of a younger curator of the Imperial Botanical Garden (1876) and the degree of Doctor in Botany in 1877, giving lectures at the St. Petersburg University. Schmalhausen was Professor in Botany at the University and the director of the Botanical Garden of Kiev from 1879 until his death. He was elected a corresponding member of the Russian Academy

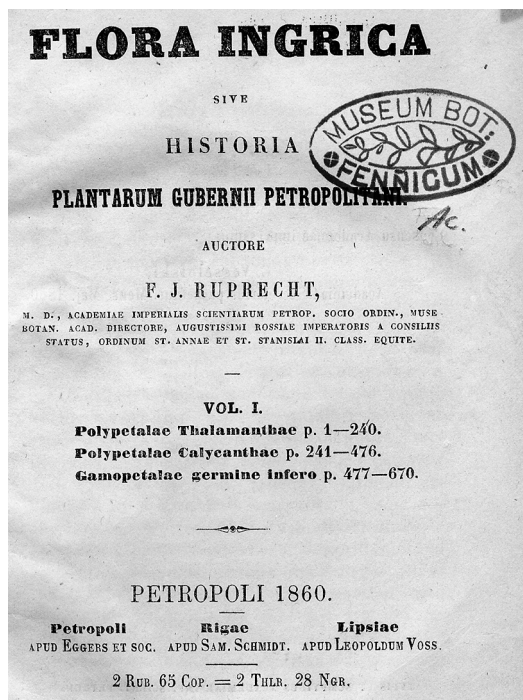


Fig. 4. The title page of Franz Joseph Ruprecht's *Flora ingrica* (1860). – Library of the Botanical Museum, Helsinki.

of Sciences in 1893. He compiled the first comprehensive floristic report on the European part of Russia in a two-volume book (Schmalhausen 1895–1897), which subsequently became one of the basic works for the composition of the “Flora URSS”. In the field season 1870 (from 24 April to 1 September), still as a student, Schmalhausen, at the request of the St. Petersburg Society of Naturalists, accomplished expeditions in St. Petersburg and Schlüsselburg uyezds, which were the administrative territories closest to Finland in that time. He visited the following places and their environs: Beloostrov/Valkeasaari, Voly/Volojärvi, Lakhta/Lahti, Levashovo/Levassova, Lembolovo/Lempaala, Lisii Nos/Revonnenä, Matoksa, Mor’ë, Nikulyasy, Osinovaiya Roshcha (near Levashovo) and Sestroretsk/Siestarjoki. Schmalhausen’s (1870) list includes 602 species wild growing vascular plants. He was the first to collect *Drosera intermedia* (near Sestroretsk/Siestarjoki and Lisii Nos/Revonnenä). In the vicinity of the Lembolovo/Lempaala village, he found *Pulsatilla vernalis*. Near the shore of Lake Ladoga Schmal-

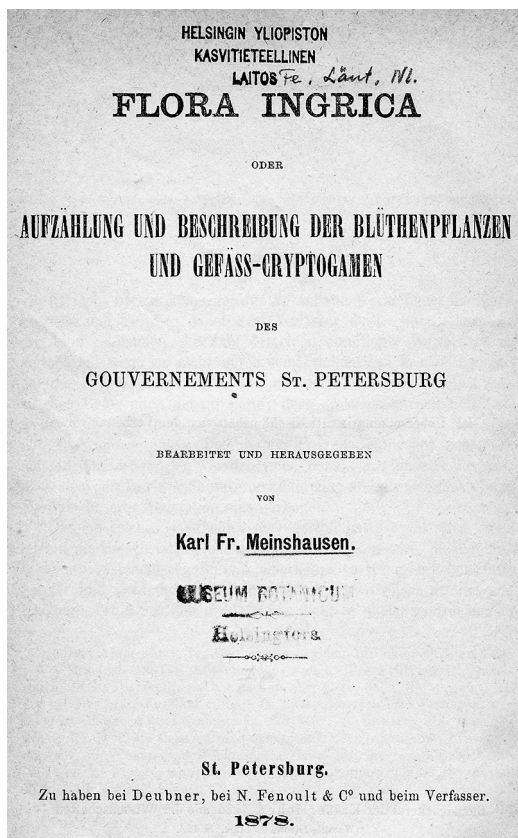


Fig. 5. Ruprecht's pupil Karl Friedrich Meinshausen published his own *Flora ingrica* in 1878. – Library of the Botanical Museum, Helsinki.

hausen collected for instance *Neottia nidus-avis*, *Agrimonia pilosa*, and *Trifolium montanum*, and from the shore of the lake e.g. *Rumex maritimus* and *Sium latifolium*. Close to Toksovo/Toksova he found e.g. *Geum aleppicum*; in the Osinovaiya Roshcha and Levashovo//Levassova area *Saxifraga hirculus* and *Epipactis palustris*; in the Beloostrov/Valkeasaari area *Juncus squarrosus*. From the coast of the Gulf of Finland he collected *Salsola kali*, *Lysimachia nummularia* and *Senecio paludosus*, among others.

The flora of the St. Petersburg (later Petrogradskaya) Guberniya and the Karelian Isthmus was studied in the late 1800's and the early 1900's by R. E. Regel (1867–1920), S. S. Ganeshin (1879–1930), N. I. Puring (1865–1904), V. A. Transhel (1868–1942), Yu. D. Zinzerling (1894–1938) and N. V. Shipchinskii (1886–1955), among others. The work covered the whole southwestern part of

the Karelian Isthmus. Regel reported *Arrhenatherum elatius*, *Cynosurus cristatus*, *Epipogium aphyllum*, and *Cardamine parviflora* for the first time from the area; Ganeshin's records included for instance *Leersia oryzoides* and *Carex heleonastes*. Puring found e.g. *Botrychium matricariifolium*, *Cinna latifolia*, *Juncus squarrosus*, *Conioselinum tataricum*, *Androsace filiformis* and *Ligularia sibirica*; Transhel *Cardamine parviflora* and *Viola uliginosa*; and Zinzerling *Draba nemorosa*.

Sergei Sergeevich Ganeshin was a specialist in floristics, taxonomy, plant geography (in particular weeds), and he was also interested in algae and fungi. He worked from central Poland (before 1911) to Eastern Siberia and from the Khibiny Mountains on the Kola Peninsula to Kazakhstan. He was the head of the European Herbarium, today known as V. L. Komarov Botanical Institute (LE), and was appointed the leader of the botanical investigations of the Department of Researches of Volkhovstroï (in connection with building a of hydroelectric power station) in 1920. He was professor in different higher educational establishments during 28 years. Ganeshin was occupied by investigation of St. Petersburg Guberniya (later the Leningrad Region) since 1914. In 1915 (from late May to August) and partially in 1916 (two excursions in the spring) Ganeshin investigated the flora of the environs of the village Ostrovki north of the Neva River (to the east of the present-day settlement Imeni Sverdlova) and discovered there 465 vascular plant species (Ganeshin 1916). Among the most uncommon species were *Catabrosa aquatica*, *Draba nemorosa*, *Rubus arcticus* and *Lysimachia nummularia*. Ganeshin's list includes also some species of fungi and mosses, as well as some records of vascular plants from the vicinity of the south bank of the Neva River.

During the first quarter of the 1900's, N. V. Shipchinskii studied the district of the Lakh-ta/Lahti village north of the mouth of the Neva River, and the area further towards north along the coast of the Gulf of Finland. He found e.g. the following rare species: *Botrychium matricariifolium*, *Isoetes echinospora*, *Carex livida*, *Myrica gale*, *Pedicularis sceptrum-carolinum*, *Pinguicula vulgaris* and *Senecio paludosus* (Shipchinskii 1926).

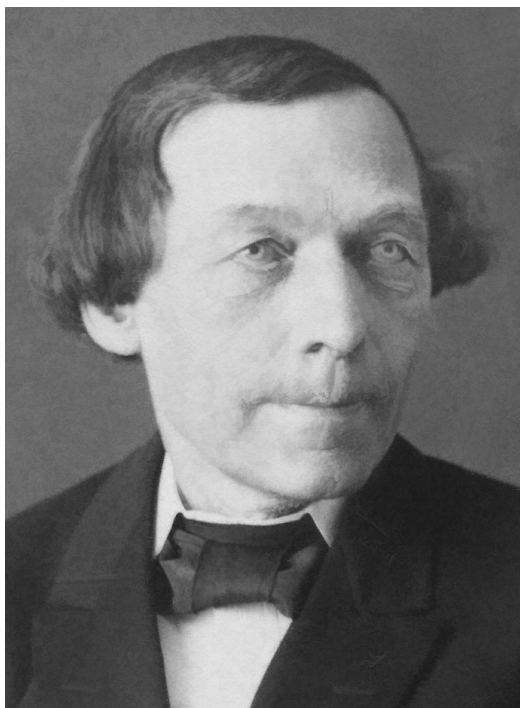


Fig. 6. William Nylander. – Archives of the Botanical Museum, Helsinki.

2.2 Research by Finnish botanists

The first known published records by a Finnish botanist in the area were made by Erik Laxmann (1737–1796), who served a few years as a clergyman in Polyany/Uusikirkko and a teacher in St. Petersburg. His findings were printed as an appendix (Gorter 1764) added later to Gorter's *Flora Ingrica* (Gorter 1761).

The flora of the part of the Karelian Isthmus within the Finnish territory was studied almost solely by Finnish botanists during the latter half of the 1800's and the first half of the 1900's, until the end of World War II. The first publication in Finland with some floristic data from the area was probably a general description of "Old Finland" by Knorring (1833). "Old Finland" comprised the areas east of the Kymi River annexed to Russia in 1721 and 1743, and returned to Finland in 1812. Knorring lists more than 200 species or genera, including e.g. 25 cultivated plants and 73 plants with herbal uses. However, the floristic description was very superficial, and the only species with a specified locality were *Larix sibirica* (cultivated in

Polyany/Uusikirkko since 1788) and *Lathyrus maritimus* ssp. *japonicus* (on the shores of Lake Ladoga and on the island Konevets/Konevitsa). Knorring (1792–1875) was a clergyman and author, who had also worked as a teacher in the Topographical Department of Haapaniemi Military Academy.

Among the first floristic explorers in the area was William Nylander (1822–1899; Fig. 6), the first Professor in Botany (1857–1863) at the University of Helsinki. He was the most famous lichenologist of his time, and spent the last decades of his life (since 1863) in Paris, devoted to lichenological studies. His lichenological herbarium, more than 50,000 specimens, is kept as a separate collection in the Botanical Museum of Helsinki University (H). Nylander travelled in Karelia, including also those parts of Karelia, which today belong to Finland and the Republic of Karelia, in 1844, 1849 and 1850. He published the results of these journeys in 1852 (Nylander 1852). This work has been regarded as one of the starting-points of the floristic study in Finland. His list included 332 vascular plants. Among his own records were e.g. *Artemisia absinthium*, *Scorzonera humilis*, *Tragopogon pratensis*, *Conium maculatum*, *Aethusa cynapium* and *Scleranthus perennis* from Vyborg (the last-mentioned species recorded later in 1880 by J. H. E. Nervander, in Anon. 1881: 253), *Hyoscyamus niger*, *Linum catharticum* and *Listera ovata* from Konevets/Konevitsa, and *Pulsatilla patens* from Michurinskoe/Valkjärvi. He also summarized records from previous literature, as well as the collections of the Botanical Museum in Helsinki.

J. J. Chydenius (1836–1890) and J. E. Furu-hjelm made a journey in their student years to Karelia in 1856. They travelled mainly in the province of Ladoga Karelia, now part of the Republic of Karelia, but also used ten days for excursions around Käkisalmi/Priozersk town. Their records (Chydenius & Furu-hjelm 1858–1859) included *Geranium robertianum*, *Epipactis helleborine* and *Hierochloë australis*. They also cited some records made by J. H. E. Nervander (1827–1909), Th. Simming, J. M. af Tengström (1793–1856), and others. Chydenius later became Professor of Chemistry at University of Helsinki, and Furu-hjelm teacher at the Evo Institute of Forestry.

Johan August Malmberg (later Mela; 1846–

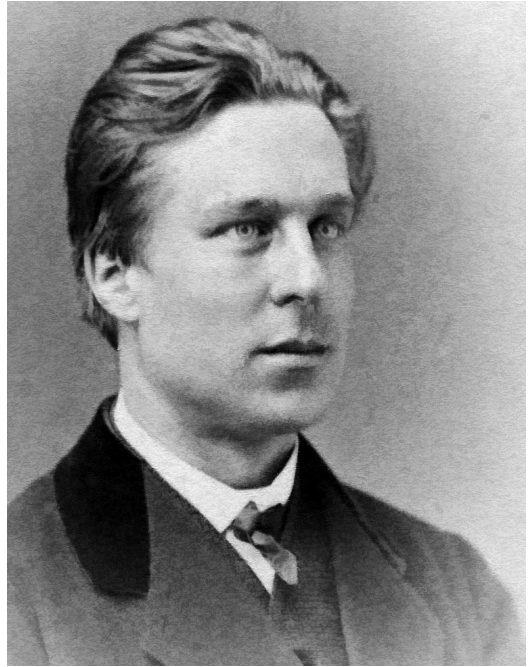


Fig. 7. Johan August Malmberg (later Mela), photographed c. 1870. – Archives of the Botanical Museum, Helsinki.

1904; Fig. 7), a teacher in biology and geography in the Teacher's Training School in Helsinki, was among the first Darwinists in Finland. He was one of the founder members and the first president of the Finnish Biological Society Vanamo. Still a student in 1866, he received a travelling grant from the Societas pro Fauna et Flora Fennica to make a floristic inventory on the Karelian Isthmus. The results were published in 1868 (Malmberg 1868). In this publication he also included records published earlier by W. Nylander (Nylander 1852), and also unpublished records from Vyborg/Viipuri received from J. H. E. Nervander. The work covered the following localities: Vyborg/Viipuri, Pravdino/Muolaa, Priozersk/Käkisalmi, Otradnoe/Pyhäjärvi, Gromovo/Sakkola, Sosnovo/Rautu, Michurinskoe/Valkjärvi, Pervomaiskoe/Kivennapa, Polyani/Uusikirkko, Ryabovo/Kuolemajärvi, Primorsk/Koivisto and Sovetskii/Johannes. Malmberg's list numbers 638 species of vascular plants, 27 of which were pteridophytes. Among his most interesting findings were *Asplenium trichomanes*, *Trichophorum cespitosum*, *Corydalis intermedia*, *Cardamine parviflora*, *Drosera intermedia*, *Saxifraga hirculus* and *Gypsophila fastigiata*.

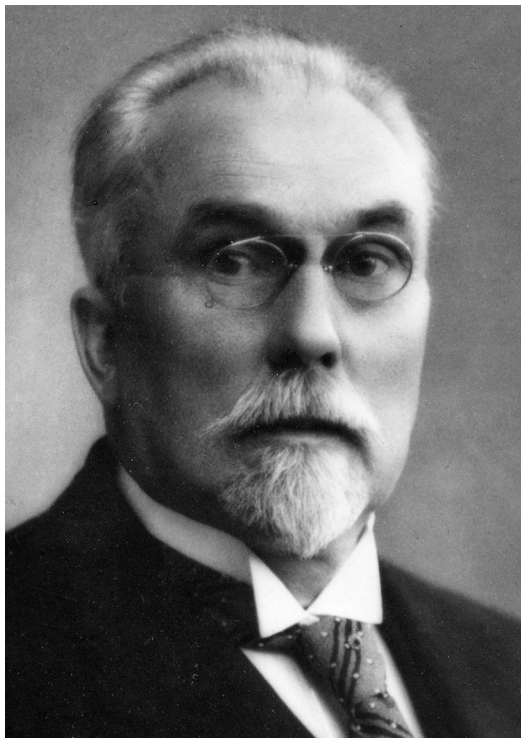


Fig. 8. Harald Lindberg, photographed in 1931.
– Archives of the Botanical Museum, Helsinki.

John Lindén (1867–1914) was a teacher and headmaster in the Secondary School of Sortavala in 1893–1897. Later he became teacher in Biology and Mathematics in the Teachers' College in Rauma and Heinola, and from 1913 on he was the Headmaster of the latter institution. In his student years, he made floristic studies in Kamengorsk/Antrea, Mel'nikov/Räisälä, Sevast'yanovo/Kaukola, Hiitola, Svobodnoe/Kirvu and Lesogorskii/Jääski in May–August 1888. The results were published a few years later (Lindén 1891). The paper includes a list of 530 vascular plant taxa. He made also phenological notes on 359 taxa. Interesting species collected by him were e.g. *Asplenium trichomanes*, *Hierochloë australis*, *Epipogium aphyllum*, *Neottia nidus-avis*, *Silene rupestris* and *Crassula aquatica*.

Harald Lindberg (1871–1963; Fig. 8) was one of the most skilled European vascular plant taxonomists of his day. In addition, he studied bryophytes and palaeobotany (e.g. Lindberg 1900b), being a founder of the latter discipline in Finland. He worked especially on the East Fennoscandian va-

scular flora, but he made also several expeditions e.g. to the Balkans, South Europe, North Africa and Russia. He was the custodian of the Botanical Museum of the University of Helsinki in 1910–1938. He worked on the Karelian Isthmus in 1894–1897. He discovered such rare species as *Botrychium simplex*, *B. lanceolatum*, *Diplazium sibiricum*, *Carex heleonastes*, *C. livida*, *C. mackenziei*, *Rhynchospora fusca*, *Juncus capitatus*, *J. stygius*, *Dactylorhiza traunsteineri*, *Listera cordata*, *Neottia nidus-avis*, *Salsola kali*, *Dianthus arenarius*, *Saxifraga hirculus*, *Corydalis intermedia* and *Centaurium erythraea*. Later he found e.g. *Najas tenuissima*, *N. marina*, *Eleocharis parvula* and *Tripleurospermum maritimum* ssp. *subpolare*. Information about some floristic finds was published in several papers (Lindberg 1895, 1896, 1898a,b, 1900a, 1920).

A detailed summary of the knowledge of the Finnish vascular flora as a whole in the period between the late 19th century and the first quarter of the 20th century was published by Hjalmar Hjelt in the seven volumes of the "Conspectus Florae Fennicae" (Hjelt 1888–1926). Distribution information at the provincial scale for each taxon is also found in the Finnish flora by Cajander (1906), which covered the whole biogeographical East Fennoscandia, including the Russian Karelia and the Kola Peninsula.

3. The period between World War I and II

Shipchinskii remained the last Russian botanist to work on the Karelian Isthmus for more than 20 years. It is also possible to judge from the herbaria that practically no collections by Russians were made in 1930–1940 even in those parts of the area, which at the time belonged to Russia. After the Russian revolution and after Finland became independent, the Finnish-Russian border was closed in 1918. In the meantime, floristic research of the Finnish territory was carried out by a rather large number of professional and amateur botanists. Publications and herbarium specimens in the Finnish herbaria from this period remained largely unknown to Russian botanists until the collapse of the Soviet Union in 1990.

Viljo Erkamo (formerly Berkán; 1912–1990)

was born in Vyborg/Viipuri, and he made floristic inventories there already as a schoolboy. Later, he became Associate Professor in Botany at the University of Helsinki (1963–1975). His research interests were mainly in floristics and plant geography, but he was also interested in nature conservation. Erkamo investigated the environs of the Lake Nuijamaanjärvi/Nuiamairvi (now at the state boundary between Russia and Finland), and the parishes of Lesogorskii/Jääski, Kamennogorsk/Antrea, Veshchevo/Heinjoki, Vyborg/Viipuri, Sovetskii/Johannes, Primorsk/Koivisto, Ryabovo/Kuolemajärvi, Polyani/Uusikirkko and Zelenogorsk/Terijoki. Erkamo collected specimens of e.g. *Najas tenuissima*, *N. marina*, *Blysmus rufus*, *Rhynchospora fusca*, *Trichophorum cespitosum*, *Viscaria alpina*, *Crassula aquatica*, *Viola selkirkii*, *Myosotis ramosissima* and *Ajuga pyramidalis*. He made an extensive study of anthropochores in Vyborg/Viipuri in 1928–1934 (Erkamo 1938). The publication of this thorough survey of the anthropochorous flora, its origin and ways of immigration was presumably prevented by World War II, which in Finland was started by the Finnish-Russian Winter War in late 1939. He gives a detailed annotated list of 418 anthropochorous taxa, and further 10 native taxa with also clearly anthropochorous occurrences. The taxa are classified according to the way of immigration and the habitats they occupy. Erkamo's terminology differs from the one used in modern literature. Classified in modern terminology, his list includes 108 archaeophytes, 91 escapes from cultivation (29 of which established), 60 other established neophytes and 159 casual aliens. According to Erkamo, the native flora in Vyborg/Viipuri comprised of 436 taxa, which makes a total of 854 taxa. He recorded dozens of rare adventive species, many of which were new to Finland or the biogeographical province of South Karelia. Among these in Vyborg/Viipuri were e.g. *Ambrosia artemisiifolia* (today a typical bird seed alien) and *Epilobium ciliatum* (probably established in one locality already in the 1930's; today naturalized and widely distributed), as well as his records of such garden escapes as *Lupinus polyphyllus* and *Heracleum persicum* (the former today an aggressive established alien e.g. along roadsides regarded as a threat to natural vegetation, the latter an invasive poisonous weed causing phytoder-

matitis) (Erkamo 1938). He (Erkamo 1967) also recorded e.g. *Rosa rugosa* as a seashore plant in Zelenogorsk/Terijoki in 1937, an invasive species regarded today a threat to natural seashore sand vegetation.

K. J. Valle (1887–1956) was born in Lesogorskii/Jääski, where most of his specimens have also been collected. He was a botanist and entomologist. In 1943–1956, he was Professor in Zoology at the University of Turku. His collections include several rare indigenous and adventive species from the Karelian Isthmus.

Among collectors of rare species worth mentioning were also e.g. O. H. Porkka (1901–1939; e.g. *Nymphaea tetragona*, *Crassula aquatica*), L. Pansar (1906–?; e.g. *Potamogeton rutilus*, *Blysmus rufus*), L. Pohjala (1905–1962; e.g. *Potamogeton rutilus*, *Carex paniculata*, *Dianthus arenarius*, *Pulsatilla pratensis*, *Viola selkirkii*) and T. Hannikainen (e.g. *Gypsophila fastigiata*, *Pulsatilla pratensis*, *Saxifraga hirculus*). Both C.-E. Sonck (1905–2004) and L. Aario (formerly Engman; 1906–1998) collected several rare adventive species.

Lars Fagerström (1914–2001; Fig. 10) made floristic studies in the Karelian Isthmus during the 1930's. After nine years' field work in Zelenogorsk/Terijoki, he published a flora of the municipality (Fagerström 1940). His species list included 706 species and 28 infraspecific taxa of vascular plants. The large apomictic groups *Hieracium* and *Pilosella* were not included, but 61 species of *Taraxacum* were reported. The proportion of anthropochores was relatively high, approx. 35% of the flora, due to the vicinity of the Finnish-Russian border and the large railway yard at Rajajoki. Rare indigenous species included in his list were e.g. *Botrychium matricariifolium*, *Dentaria bulbifera* and *Galium saxatile*. After the war, Fagerström's interest was directed towards floristic studies in SE Finland. He was also interested in some apomictic groups, mainly the *Ranunculus auricomus* aggr. and the genus *Hieracium*. In 1946–1979, he worked first as a curator, later as head curator at the Botanical Museum in Helsinki.

Ilmari Hiitonen (formerly Hidén; 1898–1986; Fig. 9), worked at the Botanical Museum in Helsinki, in 1954–1962 as a curator, and in 1962–1965 as the custodian of the vascular plant herbarium. His "Suomen kasvio" (Hiitonen 1933), the

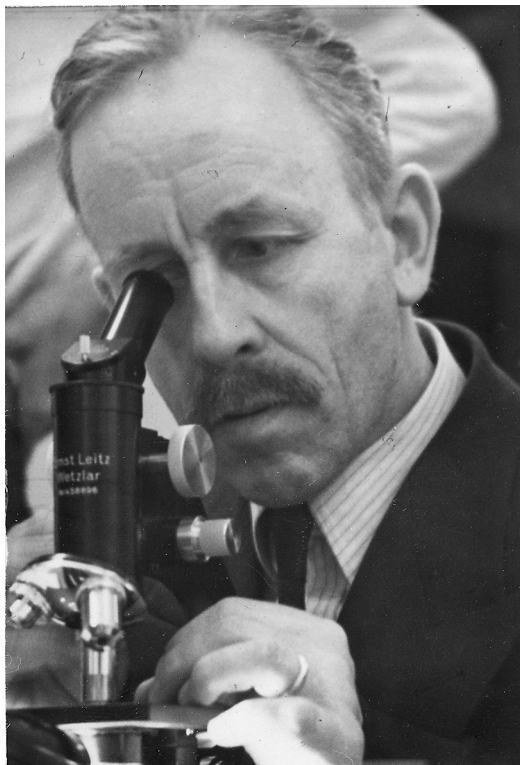


Fig. 9. Ilmari Hiitonen, photographed in 1963. – Archives of the Botanical Museum, Helsinki.



Fig. 10. Lars Fagerström, photographed in 1969. – Archives of the Botanical Museum, Helsinki.

vascular flora of Finland and the biogeographical East Fennoscandia is a valuable source of floristic information. Hiitonen made intensive floristic studies on the Karelian Isthmus in the 1920's and 1930's. His field work concentrated in Sakkola in 1921–1922, Priozersk/Käkisalme, Kamennogorsk/Antrea, Veshchevo/Heinjoki, Barishevo/Pölläkkälä, Ozerskoe/Vuoksenranta and Michurinskoe/Valkjärvi in 1923, Zelenogorsk/Terijoki and Priozersk/Käkisalme in 1925, Mel'nikovo/Räisälä in 1926, Mel'nikovo/Räisälä and Pontonnoe/Räihäranta in 1928, the islands of Lake Vuoksa/Vuoksi between Priozersk/Käkisalme and Mel'nikovo/Räisälä in 1929, Michurinskoe/Valkjärvi, Pontonnoe/Räihäranta and Otradnoe/Pyhäjärvi in 1936 and Lesogorskii/Jääski, Michurinskoe/Valkjärvi, Pervomaiskoe/Kivennapa, Sosnovo/Rautu, Zaporozhskoe/Metsäpirtti and Svobodnoe/Kirvu in 1939 (Hidén 1922, 1923, 1925a,b, 1931, Hiitonen 1946). He summed up the work in his dissertation about the history of the flora and immigration of the species along the Karelian Isth-

mus (Hiitonen 1946). His study area covered most of the part of the biogeographical province of South Karelia annexed to the Soviet Union (Russia) in 1944, and the southwesternmost part of the province Ladoga Karelia (now part of the Karelian Republic as the Western Priladozh'e territory). In addition, a minor corner around the Imatra town, which is still part of Finland, was included. The area west of the Gulf of Vyborg/Viipurinlahti, and the area south of the Finnish-Russian border of the time were not included in the study. In total, 864 vascular plant species (37 of them pteridophytes) were listed, and distribution maps were given for some of them (mostly rare species). The most interesting findings of I. Hiitonen include *Asplenium trichomanes*, *Botrychium virginianum*, *Carex paniculata*, *C. riparia*, *Coeloglossum viride*, *Gypsophila fastigiata* and *Chaerophyllum aromaticum*. I. Hiitonen was mainly interested in the migration routes of the native flora. In connection with this question he also studied the history and plant geographical division of the Karelian Isth-

mus (Hiitonen 1962). Many adventive species, which at the time were already collected by other botanists, were not included in his work.

In addition to the floristic studies mentioned above, several others have been published: Myrberg (1917), Valle (1917, 1918a, b, 1919a, b, c; 1927a, b), Porkka (1921, 1923, 1925), Hannikainen (1926), Engman (1927), Aario (1928, 1931), Paasio (1928), Rainio & Hilli (1928), Lindberg (1927, 1928, 1931, 1932, 1933, 1937, 1938), Berkán (1928), Hintikka (1929), Pantsar (1932, 1933), Pohjala (1933a, b), Erkamo (1935, 1936, 1937, 1939, 1943a, b, 1953, 1955, 1956, 1960, 1967), Kotilainen (1922, 1936), Fagerström (1938, 1939a, b, c, 1940, 1945, 1946), Räsänen (1944), Valta (1966), Uotila & Suominen (1976) and Suominen (1979, 1981). Doronina & Uotila (2007) compiled a list of vascular plant taxa earlier unknown in Russian floras, collected by Finnish botanists mainly in the 1920's–1940's, and kept in Finnish herbaria. Floristic information is also available in some ecological works, e.g. the peatland studies by Cajander (1913) and Paasio (1933). Herbarium specimens and floristic information by Krohn (e.g. 1925) have proved to be partly unreliable, and unfortunately one has to adopt a very sceptical attitude towards them and they are not accepted here.

4. The period after World War II

Finland ceded the Karelian Isthmus to the Soviet Union in 1940 and again in 1944. The extensive herbarium collections made by the Finns during the 100 passed years remained in Finnish herbaria, where they were practically unavailable for Russian botanists. Also the literature material in Finnish botanical series and the archives of especially the Botanical Museum in Helsinki, were largely unknown to, or overlooked by Russian scientists. The floristic study of the area was now directed from Leningrad (St. Petersburg), where also new herbarium collections were mainly deposited.

In 1940 V. L. Komarov gave the Department of Botany of the Leningrad State University the task to create a flora of the Leningrad Region. But only after World War II, from 1947 onwards it was possible to carry out the actual floristic field work, which covered also the Karelian Isthmus, and

made a compilation of the “Flora of the Leningrad Region” (Shishkin 1955–1965) possible.

Students of the Department of Botany of Leningrad (St. Petersburg) State University carried out floristic field work in various parts of the Karelian Isthmus since the 1970's. Several areas were studied: the environs of Bol'shoe Pole/Tervajoki (M. N. Kostolomov; Kostomolov 1975), the regional botanical reserve “Lindulovskaya Grove” near Roshchino/Raivola (L. V. Orlova; Spasskaya & Orlova 1993), the regional complex reserve “Lakes Rakovyeye/Äyräpäänjärvet” (T. V. Barbash), the vicinities of Komarovo/Kellomäki (N. V. Lukyanov; Baranova et al., 1995, Baranova & Baranov, 2002), Vozrozhdenie/Kavantsaari (A. V. Maksimova; Maksimova 1993) and Kuznechnoe (I. A. Sorokina; Baranova & Sorokina 1998).

The “Manual of the higher plants of the north-west European part of USSR (Leningrad, Pskov and Novgorod regions; Minyaev 1981) was prepared by the Department of Botany of the Leningrad University. It added many new species to the four-volume “Flora of the Leningrad Region” (Shishkin 1955–1965). Grushvitskii et al. (1986) gave floristic information from the environs of the Nursery of the medicinal plants of the Saint-Petersburg Chemical-Pharmaceutical Academy in Steklyannii (southwest from Lembolovo/Lempala settlement).

Many interesting floristic finds were made by the collaborators of the Leningrad University (LECB) and V. L. Komarov Botanical Institute (LE): N. A. Miniaev, N. N. Tzvelev, G. Ju. Konechnaya and Ju. D. Gusev. Miniaev (1965a,b, 1969a,b, Bystrova & Minyaev 1965 etc.) studied some rare vascular plants of the northwestern European part of Russia and their possible immigration routes, and analysed the occurrences of these species on the Karelian Isthmus. Minyaev also made several excursions with collaborators and students, and collected specimens of a large number of rare species.

N. N. Tzvelev recorded many new species for the Karelian Isthmus (*Potamogeton trichoides*, *Koeleria delavignei*, *Melica picta*, *Corispermum membranaceum*, *Ranunculus subborealis*, *Eruca sativa*, *Sisymbrium orientale*, *Vicia biennis* etc.), and also confirmed the presence of some rare species registered earlier by Finnish botanists (*Diplazium sibiricum*, *Carex sylvatica*, *Corydalis inter-*

media, *Anagallis minima*, *Littorella uniflora* etc.) (Tzvelev 1991, 1992, 2000a etc.).

Since the end of the 1980's, collaborators of the Leningrad (St. Petersburg) University and the V. L. Komarov Botanical Institute particularly studied the flora and vegetation of the protected areas of the Leningrad Region, including the Karelian Isthmus. Floristic work was mainly carried out by G. Ju. Konechnaya, N. N. Tzvelev, V. I. Simachev and A. Ju. Doronina. Some information about the flora of the protected areas was published by Noskov & Botch (1999) and Noskov (2004b). Baranova & Baranov (2002) gave information about the flora of the "Komarovskii shore Nature Monument".

The "Illustrated manual of the Karelian Isthmus" (Budantsev & Yakovlev 2000) and a corresponding work covering the Leningrad Region (Budantsev & Yakovlev 2006) were aimed for the public, and the number of species included was limited. The second volume of the red data book of the Leningrad region (Tzvelev 2000b) included information and distribution maps of many rare plants and fungi on the Karelian Isthmus. Specimens kept in Finnish herbaria were checked by Finnish botanists for this work. Detailed information about records and the distribution of protected species in the St. Petersburg area was given by Noskov (2004a). Small-scale distribution maps of (most) vascular plants were also presented by Hultén (1950, 1971), including also data from the Finnish herbaria and botanical literature.

From 2002 on, E. A. Glazkova (V. L. Komarov Botanical Institute) studied the islands in the eastern Gulf of Finland belonging to the Karelian Isthmus. She recorded several rare species, as *Melica picta*, *Rumex stenophyllus*, *Silene rupestris* and *Crepis czerepanovii* (Glazkova, 2004, 2005). An inventory of the Berezovye ostrova/Koiviston-saaret was recently published (Tzvelev 2007) and new records from the islands were published by Uotila (2009) and Uotila & Ahti (2009).

A. Ju. Doronina started her floristic studies on the Karelian Isthmus in 1994. The work covered practically the whole territory, including e.g. floras of the Lembolovo/Lempaala, Nevskaya Dubrovka, Mor'e, Lesogorskii/Jääski, Borodinskoe/Sairala and Primorsk/Koivisto areas. Several, mainly casual alien taxa new for northwestern Russia (*Lupinaster albus* [syn. *Trifolium lupinaster* var. *albi-*

florum], *Euphorbia seguieriana*, *Ajuga chamaepitys*, *Linaria genistifolia*, *Asperula cynanchica*, *Jurinea arachnoidea*) and the Karelian Isthmus (*Setaria faberi*, *Koeleria glauca*, *Lepidium latifolium*, *Alchemilla xanthochlora*, *Potentilla supina*, *Anthyllis colorata* [syn. *A. vulneraria* ssp. *fennica*], *A. schiwereckii* [syn. *A. vulneraria* ssp. *polyp-hylla*], *Medicago romanica* [syn. *M. falcata* ssp. *romanica*], *Stachys recta*, *Verbascum phoeniceum*, *Campanula bononiensis*, *Pyrethrum corymbosum* [syn. *Tanacetum corymbosum*]) have been recorded. In addition, new localities of many rare native and adventive species have been found. Most of the results have been published (Doronina 1997, 1998a, b, 2000a, b, c, d, 2001, 2002a, b, 2003a, b, c, 2005a, b, c, 2007; Doronina & Baranova 1999 etc.). Doronina's work in Finnish herbaria resulted in a considerable amount of new unpublished information about rare and unrecorded species for northwestern Russia, the Leningrad Region and the Karelian Isthmus.

In the last few years, the heavy growth of industrial building has made it actual to study also the environmental changes of this activity. For example, terrestrial and aquatic environment was evaluated in the surroundings of the bulk terminal of the Primorsk/Koivisto town, which was equipped for large-scale oil transport. This work was published in the book "Nature environment of the seaboard and water area of the Gulf of Finland (district of the port "Primorsk")", with a report of the vascular flora and rare species growing in the area (Doronina 2003d). The flora of the area influenced by the building of an oil terminal in the bulk port of the Vysotsk/Uuras town was studied by G. Ju. Konechnaya in 2004 and A. Ju. Doronina in 2004–2006 (unpubl.).

The total number of native vascular plant species known from the Karelian Isthmus today is 820. In a classification used by Doronina (2007) they belong to 341 genera and 110 families. The adventive flora of the Karelian Isthmus consists of 589 species belonging to 323 genera and 66 families (including ergasiophytes). A thorough floristic analysis of the flora is found in the monograph by Doronina (2007).

Acknowledgements. We are obliged to Teuvo Ahti for his critical comments and additions to the manuscript.

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