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Finnish botanists on the Kola Peninsula (Russia) up to 1918

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Finnish botanists actively studied the flora of Karelia (Karelian Republic) and the Kola Peninsula (Murmansk Region) when Finland was a Grand Duchy of Russia in 1809–1918. J. Fellman's expeditions in 1829 were the first notable botanical expeditions to the area. Geologically and floristically the area was similar to Finland, and exploring the area was considered to be a national duty for Finnish biologists. Almost 40 Finnish scientists who travelled on the Kola Peninsula collected significant amounts of herbarium specimens from there. The specimens are mostly in H, but duplicates were distributed widely. The collectors include M. Aschan, W. M. Axelson (Linnaniemi), V. Borg (Kivilinna), M. Brenner, V. F. Brotherus, R. Envald, J. Fellman, N. I. Fellman, C. W. Fontell, E. af Hällström, H. Hollmén, P. A. Karsten, A. Osw. Kihlman (Kairamo), F. W. Klingstedt, H. Lindberg, J. Lindén, A. J. Malmberg (Mela), J. Montell, F. Nylander, J. A. Palmén, V. Pesola, P. A. Rantaniemi, J. Sahlberg, and G. Selin. A short description is given of the biographies of the most important collectors with notes on their itineraries. Details of the collections from the Kola Peninsula are mostly taken from the vascular-plant specimens kept in the Finnish main herbaria and entered in the Floristic database Kastikka of the Finnish Museum of Natural History. As to bryophytes, lichens and other fungi, only a small proportion has been entered into the database.

A network of biogeographic provinces for the Kola Peninsula was created by Finnish scientists in the mid 1800s, and it is still commonly used. Changes in the boundaries of provinces in the peninsula are discussed. The herbarium data are given according to the provinces.

Introduction

The research interest by Finnish scientists in Russian Karelia and the Kola Peninsula in the 19th century was prompted by several considerations. In Sweden, northern areas had been actively studied for a long time, and both Linnaeus (1737) and Wahlenberg (1812) wrote works entitled *Flora Lapponica*. Lars Levi Laestadius (1800–1861), a vicar in the Swedish Karesuando parish on the Finnish border and an active amateur botanist, extended his excursions to the westernmost part of Finnish Lapland. Further east Lapland was botanically almost unknown up to the early 1800s; only Göran Wahlenberg (1780–1851) had visited in the east (*Lapponia inariensis* and the eastern part of *Lapponia kemensis*). So there was a demand for surveys in that area when the first scientific society in Finland, *Sällskap för Finsk Zoologi och Botanik,* later *Societas pro Fauna et Flora Fennica*, was founded in 1821. Inventories of the fauna and flora of Finland and the establishment of a national natural-history collection in Finland were included in the main goals of its activity. Later, Wirzén (1837) pointed out that the Finnish Natural Area extends to Karelia and the Kola Peninsula. Inventories of these virtually unknown remote eastern areas were regarded as a national duty

for Finnish biologists. Moreover, in 1809 Finland had become an autonomous Grand Duchy of Russia. Inventories and studies of the natural wealth of the empire were valued by the administrators (Leikola 1996), and this made it easier to obtain letters of recommendation, travel permissions and the like and could also facilitate fundraising for scientific travels. Also travels by Russian botanists at the end of 1830s and 1840s (e.g. von Baer 1837, Boehtlingk 1840) might have inspired the organization of expeditions.

Altogether at least 73 Finnish scientists visited the Kola Peninsula before the First World War (Rantala 2010), when Finland became independent. Almost 40 of them collected significant amounts of herbarium specimens on their expeditions (Table 1). Not all of these scientists were primarily botanists, but instead entomologists, ornithologists, foresters, geologists and even linguists; however they also collected plants when they had the chance to visit unknown areas.

Material

This paper is based mainly on a selection of herbarium specimens of vascular plants in the main Finnish herbaria, which were entered into the database Kastikka (the floristic database of the Botanical Museum, Finnish Museum of Natural History, Helsinki; H) up to the end of November 2013. As to the area and time period concerned, label information from ca. 8600 specimens (sheets) was available in the database. 8543 sheets were collected by Finnish botanists. Most of them are from H (7957), smaller numbers are from OULU (Oulu) 259 sheets, TUR (Turku) 62, TUR-A (Turku) 140, JYV (Jyväskylä) 63, VOA (Vaasa) 50 and KUO (Kuopio) 11. The systematic coverage varies in different herbaria. As to H, almost all specimens from *Regio kuusamoënsis*, *Lapponia petsamoënsis* and *Lapponia tulomensis* are included and for the other provinces all ferns and fern allies, conifers and monocots, and dicots that are ”rare and/or threatened in any Region of the Russian East Fennoscandia”. This means that in H there are altogether approximately 10 000 specimens of vascular plants from Murmansk Region collected up to 1918, excluding the apomictic groups *Hieracium*, *Taraxacum* and *Ranunculus auricomus* s. lat. All specimens in VOA and a majority of specimens in JYV from the area are included in the database, but in the case of the other herbaria only small proportions are included. Some specimens have been checked also in LE (St. Petersburg), S (Stockholm) and UPS (Uppsala).

As to other groups, a small number of specimens in H from Russian East Fennoscandia have been entered in the herbarium database of H. As to the area and period concerned, data from 152 specimens of lichens, 29 of other fungi and 493 of hepatics were available for this paper. There is no estimate of the total number of specimens from these groups collected in this period from the Kola Peninsula. However, the numbers of bryophytes and lichens, at least, are remarkable high, because so many collectors concentrated also on these groups.

The Herbarium Journal of the Botanical Museum in Helsinki (H) (*Journal 1885–1915, Museum botanicum Helsingforsiense*), written by hand and kept in the archives of the Botanical Museum, has been checked and cited as Herbarium Journal in the text. Annual reports of the accessions to the East Fennoscandian herbarium, published in *Meddelanden Societatis pro Fauna et Flora Fennica* (in a detailed form since vol. 33, 1907) and since 1927 in *Memoranda Societatis pro Fauna et Flora Fennica* are important sources especially for the most recent years. Less detailed information is available for the earlier excursions from the annual reports of the *Societas pro Fauna et Flora Fennica* (published in *Notiser, Sällskapet Fauna Flora Fennica* and *Meddelanden Societatis pro Fauna et Flora Fennica*) and the University of Helsinki (*Redogörelse för Kejserliga Alexanders-Universitetets i Finland*, given by the Rector). Despite this effort, however, some minor collectors may be missing from this compilation if their specimens are not represented in the material so far entered into the database Kastikka.

Many travelers in the 1800s wrote some kind of itinerary or travel diary, and travel grants received, especially from the *Societas pro Fauna et Flora Fennica*, provided important reasons for writing itineraries. Reports of the travels were expected and at that time they were mostly published in the journal of the society. All discovered

itineraries of expeditions to the area have been utilized and cited as well as a selection of the most important papers on the scientific results.

Several earlier overviews were consulted (Hällström & Hintikka 1922, Linkola 1942, Saalas 1942, Elfving & Palmgren 1943, Hiitonen 1958a, Silfverberg 1988, Rantala 2008, 2010, and Uotila 2012); they are in Finnish or Swedish, except for Rantala (2008, 2010) with text in English, Finnish, Russian, Sami and Swedish.

The locality names are used in the text in their present form, often with a frequently used (mostly Finnish) equivalent within parentheses when first mentioned. Furthermore all localities mentioned in the text can be found with their synonyms used on labels and in the literature and in Cyrillic from the gazetteer at the end of the paper. The names of the persons who collected plant or fungi specimens are in bold when mentioned for the first time. All persons mentioned appear in an Index on pages 102–103.

Limits and biogeographic provinces of the area

The biogeographic provinces of the Grand Duchy of Finland and adjacent Russia ("Finnish Flora Area") were outlined and for the first time shown on the map in W. Nylander & Saelan (1859). In this exercise the Russian part was divided only into *Karelia rossica* in the south and *Lapponia rossica* (known also as *Lapponia orientalis*) in the north, and the border between them was drawn along the Kem River and the 65th parallel of latitude. In the northwest, *Lapponia rossica* extended to the Pechenga River (Petsamojoki) and the Gulf of Pechenga (Petsamonvuono). In the 1870s some collectors started to divide *Lapponia rossica* into *Lapponia rossica occidentalis* and *Lapponia rossica orientalis*.

A more detailed province division was adopted for *Karelia rossica* and *Lapponia rossica* in the second edition of *Herbarium Musei fennici* (Saelan & al. 1889, Bomansson & Brotherus 1894; both with a detailed map and the former also with a generalized map; Fig. 1). However, the detailed and generalized maps had already been published one year earlier as appendices in Hjelt (1888), with partially different abbreviations for the eastern provinces. Furthermore, Brotherus and Saelan (1890) published slightly amplified province boundaries on a map drawn by A. Petrelius on the basis of observations during the Great Kola Expedition (see below), and as to the abbreviations they followed Hjelt. In the long run the abbreviations used by Hjelt became established, but others can be seen in some publications and on herbarium labels. The border between Finnish Lapland (the province of *Lapponia inarensis*; *Li*) and Russian Lapland (*Lapponia tulomensis*; *Lt*) was drawn with an almost straight line along the watershed between the rivers Paz (Paatsjoki, Pasvikelva) in the west and Pechenga and Lotta (Lutto) in the east. As to changes in the eastern limit of Fennoscandia, the term introduced by Ramsay (1898), see Leikola (2011).

In 1926 the *Societas pro Fauna et Flora Fennica* appointed a committee to evaluate the province boundaries and in 1927 the society fixed the revised boundaries, which affected in particular the northern part of East Fennoscandia (Palmgren 1929). A new province *Lapponia petsamoënsis* (*Lps*) was created from the eastern part of *Lapponia inarensis* and the western part of *Lapponia tulomensis*. The western boundary of *Lps* followed the border between Finland and Norway and the eastern boundary was drawn as a straight line following the Finnish – Russian border from the Korvatunturi fell to the isthmus in the middle of the Rybachiy Peninsula (Kalastajasaarento), and from there north to Vayda-Guba (Vaitolahti). The other boundaries on the Kola Peninsula remained unchanged. However, the limit between *Lapponia kemensis* (*Lkem*) and *Kuusamo* (at present *Regio kuusamoënsis*; *Ks*) in Finland changed: earlier *Lkem* extended to the Finnish/Russian border and included the parish Kuolajärvi (since 1936 Salla), but now Kuolajärvi was moved to *Ks* (Fig. 2).

The new boundaries were published on a map in a supplement to vol. 4 of *Memoranda Societatis pro Fauna et Flora Fennica* in 1927 and subsequently in almost all volumes up to vol. 13 (1937), and in several other Finnish periodicals and some books.

A revised map was published in *Memoranda Societatis pro Fauna et Flora Fennica* 22 (1946). The new Finnish borders after the Second World War were drawn on the base map. The in-

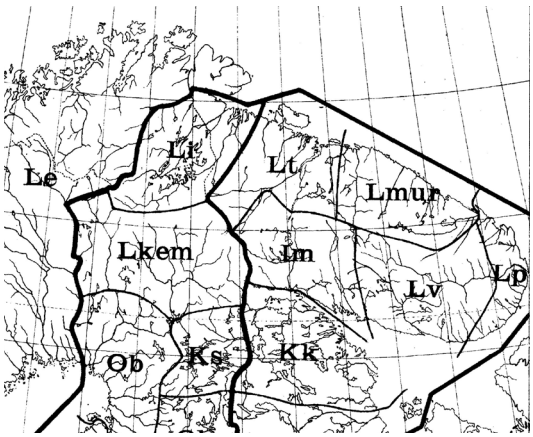


Fig. 1. Biogeographic provinces of the northern part of the "Finnish Flora Area" according to Saelan & al. (1889).

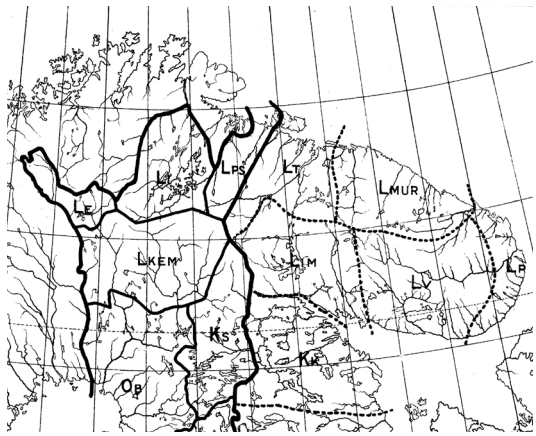


Fig. 2. Biogeographic provinces of the northern part of East Fennoscandia according to *Meddelanden Societatis pro Fauna et Flora Fennica* vol. 31 (1900). For provinces and abbreviations, see Fig. 1.

Provinces and accepted abbreviations (also for Figs. 2 and 3); other abbreviations used are given in parentheses.
Kk (*KK*) *Karelia keretina*
Ks *Regio kuusamoënsis* (*Kuusamo*)
Le (*LE*) *Lapponia enontekiensis*
Li (*LI*) *Lapponia inarensis*
Lim (*LIm, Im*) *Lapponia Imandrae*
Lk (*LKem*) *Lapponia kemensis*
Lm (*Lmur, LMur*) *Lapponia murmanica*
Lp (*LP*) *Lapponia ponojensis*
Lps *Lapponia petsamoënsis*
Lt (*LT*) *Lapponia tulomensis*
Lv (*LV*) *Lapponia Varsugae*
Ob *Ostrobottnia borealis*

ternational border divided the province of *Regio kuusamoënsis* into the Finnish and Russian parts.

In addition, inland boundaries of the provinces on the Kola Peninsula and in Karelia were redrawn to follow watersheds (Fig. 3). However, as earlier, the province boundaries were not exactly defined, so causing some inconsistencies on labels. As to the Kola Peninsula, a marked change occurred where *Lapponia Imandrae* (*Lim*) and *Lapponia tulomensis* adjoin, the boundary earlier following the southeastern shore of Lake Notozero and the Nota River was moved southward to the watershed between the Lake Imandra and Lake Notozero drainage basins. Also *Lapponia murmanica* was expanded southward to include Lake Lovozero and in part the Lovozero Mts. In the south, Cape Turiy was earlier included in *Lim*, but now mostly moved to *Lapponia varsugae* (*Lv*).

However, because of the new accessions of herbarium specimens from the Kola Peninsula and because Finnish botanical activity in general in that area practically ceased for six decades after the First World War, these latest alterations were not always taken into account. Some herbarium specimens in H were later replaced in accordance with the new boundaries, but most of the material remained as it was earlier. Uncertainty and mistakes in labels increased in the border areas of *Lim* / *Lt* and *Lim* / *Lm*, and is reflected in Table 1.

Recently, Urbanavichus & al. (2008) separated the peculiar high area of the Khibiny Mts. within *Lapponia Imandrae* as a province of its own, *Lapponia khibinensis (Kh)*. Furthermore they deliberately redefined the limit between *Lapponia Imandrae* and *Lapponia murmanica* by including the Lovozero Mts. in *Lim*. The small Russian corner of *Li* was not recognized but included in *Lps*.

The changes proposed in the boundaries after the Second World War may result in phytogeographically better provinces, but for practical work they cause problems, especially when not clearly explained. In this paper the changes in the boundaries after 1927 have not been taken into consideration, because the herbarium material, publications and the Kastikka database have not been checked according to the new limits and the

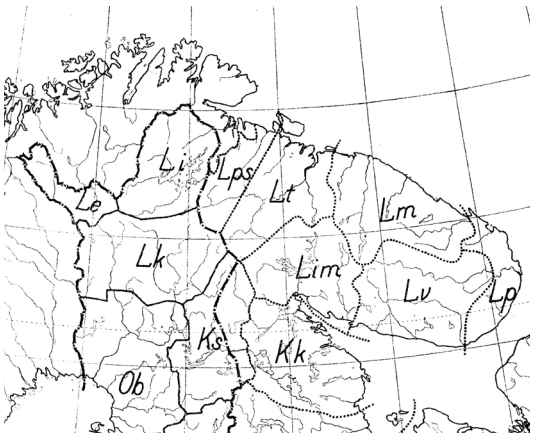


Fig. 3. Biogeographic provinces of the northern part of East Fennoscandia according to *Memoranda Societatis pro Fauna et Flora Fennica* vol. 22 (1947). For provinces and abbreviations, see Fig. 1.

changes have never been documented but merely drawn on a rather undetailed map. Consequently, the provinces here used in the given numbers and in the text have been delimited according to Fig. 2. However, in connection with this there are also some uncertainties in the specimen numbers of *Lim*, *Lm* and *Lt*.

For practical reasons the Kola Peninsula is here defined as covering the whole of Murmansk Region, even though the westernmost part, *Regio kuusamöensis*, *Lapponia petsamoënsis*, the Paz River valley (Jäniskoski area) of *Lapponia inarensis*, and parts of *Lapponia tulomensis*, are not really parts of the Kola Peninsula, as well as *Karelia keretina* (*Kk*) in the south. *Karelia keretina* and *Regio kuusamoënsis* are divided roughly along the Polar Circle between the Karelian Republic and Murmansk Region. Older specimens and other data from these provinces have not always been clearly defined so that it is sometimes difficult to place them either in the Karelian Republic or in Murmansk Region. Furthermore, the Regions have not been indicated in the Kastikka database, and specimen numbers given in Table 1 for the Murmansk Region part of the divided provinces *Ks* and *Kk* may include some mistakes. If not otherwise mentioned, with regard to *Ks* and *Kk* only the specimens and excursions belonging to the parts belonging to Murmansk Region have been included and discussed in this paper.

Jacob Fellman, the first Finnish botanist on Kola Peninsula

Jacob Fellman (1795–1875; Fig. 4) worked as a priest at Utsjoki parish in the northernmost corner of Finland. He was also a pioneer in the study of the flora of Finnish Lapland, and he was the first Finnish botanist who travelled to the Kola Peninsula (Erkamo 1945, Väre 2011). His first excursion to the area took place in 1820 from Utsjoki to Norway and by boat from Vadsø and Varangerfjord to the shores of *Lapponia petsamoënsis*, from where he returned to Inari along the Paz River. During the one-month-long journey he visited at least the Ainov Islands (Heinäsaaret) (Rantala 2010, Väre 2011). In 1826 Fellman travelled from Oulu to Keret and across the White Sea to Arkhangelsk, and from there along the east and north coast of the Kola Peninsula to northern Norway. He collected very few specimens on these travels.

Botanically important were Fellman's visits to the peninsula in 1829. He travelled from Oulu via Hyrynsalmi and the northern part of *Karelia pomorica occidentalis* to Kem, where he stayed ca. one month, up to the end of June. He continued along the White Sea coast to Keret, Kovda (Kouta) and Kandalaksha (Kantalahti) and from there along the traditional post route to the town of Kola. On the way he studied the flora in many places, e.g., in the Khibiny Mts. (Hiipinä) and the surroundings of Lake Imandra. At the end of July he returned to Finland along the Tuloma River – Lake Notozero (Nuortijärvi) – the Lotta (Lutto) River. In September he visited the area again, at least the Rybachiy Peninsula (N. I. Fellman 1869, Väre 2011).

Fellman collected many herbarium specimens from the Kola Peninsula during his travels in 1829. He sent duplicates to, e.g., C. F. Ledebour at Tartu, who cited these specimens in his *Flo-*

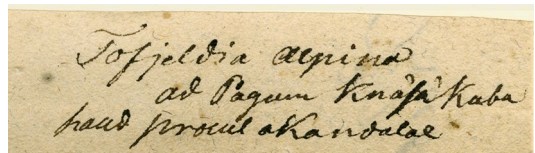


Fig 4. A label of by J. Fellman (*Tofieldia alpina*, *Kk*, ad Pagum Knäsäkuba, 1829; H 819366).

ra Rossica (Ledebour 1842–1853). Fellman also donated some material to the Imperial Alexander University of Helsinki (later University of Helsinki), when the new herbarium was established after the Great Fire of Turku in 1827 (Blinova & Uotila 2011). His own herbarium was received by the Finnish Museum of Natural History in the late 1800s, but remained untreated and separate for more than 120 years. Just recently the phanerogamic specimens were provided with labels and added to the systematic collection (Väre 2011). All in all the Botanical Museum at Helsinki (H) hosts about 150 vascular-plant specimens collected by Fellman from the Kola Peninsula. In addition, Fellman collected some bryophytes in 1829, and ca. 20 specimens from the Khibiny area and the headwaters of the Lotta River are preserved in H (Koponen 1996).

On the basis of his observations and specimens Fellman published the first list of vascular plants from the peninsula (J. Fellman 1831). The list includes 379 species, but several of them have been clearly recorded as only from the northernmost part of Karelia or from Varangerfjord (Norway) and ca. 350 are probably from the Kola Peninsula. His area in the peninsula covers only the western provinces *Lapponia petsamoënsis*, *Lapponia tulomensis*, *Lapponia Imandrae* and *Karelia keretina* (a list and map of collecting localities in Väre 2011).

Fellman seems to be the first botanist of the Russian Empire and in general who properly studied the flora of the Kola Peninsula. However, some explorers and "naturalists", especially from Great Britain, had already sailed along the coast of the peninsula and in the White Sea in the 1500s and 1600s (von Adelung 1846, Hamel 1847, 1854). In 1618 John Tradescant the elder visited the mouth of the Dvina River (Nikolo-Korelsky Monastery, at present in Severodvinsk, near the city of Arkhangelsk) where he studied the flora of islands at the mouth of the river, but there is no indication that Tradescant landed on the Kola Peninsula (Hamel 1847, 1854). Later on Russian botanists – in 1771 Nikolai Ozeretzkowski (Fradkin 1948) and 1772 Ivan Lepechin (Fradkin 1950) – travelled along the northern and southern coasts of the peninsula, respectively. Ozeretzkowski visited Kola Town and listed a few common phanerogams from there, and probably Ivan Lepechin collected some algae from the southern coast of the peninsula. At the end of the 1830s several Russian botanists visited the peninsula (For an overview, see N. I. Fellman 1869).

Fredrik and Anders Edwin Nylander

The oldest of the Nylander brothers from Oulu, **Fredrik Nylander** (1820–1880; Fig. 5), studied medicine and botany in Helsinki. He made long expeditions to North Finland, *Regio kuusamoënsis*, *Karelia keretina* and the Kola Peninsula during three summers in 1842–1844 (Väre 2008; with a list of collecting localities). In 1842 (F. Nylander 1842, Rantala 2009) and 1843 (F. Nylander 1844a) he studied especially the Kandalaksha area, the Khibiny Mts. and the surroundings of the town of Kola. In 1844 he sailed, with several stops, along the north coast from Kola to Ponoy in the east. During the first part of the trip in 1843 he was accompanied by the Swedish bryologist **Johan Ångström** (1813–1879; Ångström 1844).

During his expeditions Nylander concentrated on observations of vascular plants, but also collected lichens, bryophytes and algae. He included information on phanerogams in his *Spicilegium plantarum fennicarum* published in three volumes (F. Nylander 1843, 1844b, F. Nylander & Clásen 1846). In the *Spicilegium* he included rather more than 200 rare and taxonomically interesting species, almost 60 % of them monocots, and in particular the genus *Carex*. Less than half of the species were described as from the Kola Peninsula, but the *Spicilegium* was one of the main sources of information from *Lapponia rossica* in the first list of the vascular plants of East Fennoscandia (W. Nylander & Saelan 1859).

F. Nylander studied botany not only in Helsinki but also in Uppsala (1840–1842), where he

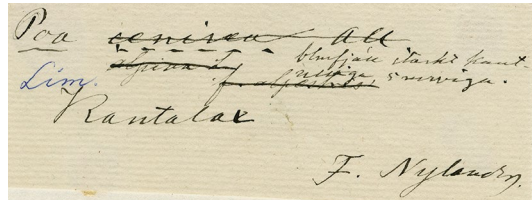


Fig. 5. A. label by F. Nylander (*Poa alpigena*, *Lim*, Kantalax; H 813008).

was supervised by Elias Fries, and in St. Petersburg (1843–1846), supervised by F. E. L. Fischer. In the first volume of the *Spicilegium* (Nylander 1843) there is a reference to an apprenticeship with Fischer. Nylander had good contacts with Fries also later and he wrote to Fries letters during his journeys (F. Nylander 1842, 1844a). Many of Nylander's specimens are in Uppsala (UPS), and he collected more than 20 exsiccate numbers from *Lapponia rossica* for Fries's *Herbarium Normale*. A representative collection is also in the Komarov Institute at St. Petersburg (LE), and Nylander's observations have been included in Russian floras (Ledebour 1844–1853, Ruprecht 1845). Nylander planned to write a new *Flora Lapponica*, including also information from the Kola Peninsula. However, his career as a botanist ended after he failed in two applications for scientific positions. Nylander left botany, continued his medical studies and made a career as a physician in North Finland, at Oulu (Väre 2008).

In July 1856 Fredrik Nylander's younger brother, **Anders Edwin Nylander** (1831–1890; Fig. 6), travelled together with **Johan Magnus Gadd** (1832–1891) from Inari along the Paz River to Pechenga Village. After some days in the field they continued to Vayda-Guba on the Rybachiy Peninsula, where they stayed for a couple of weeks and made excursions along the coast of the peninsula and to the Ainov Islands. The excursion was mainly zoological, Gadd and Nylander mostly studying the marine environment, but they also collected vascular-plant specimens, with Nylander adding some lichens. From the Rybachiy Peninsula they returned to Neiden (in Norway) on 12th August and back to Inari a couple of days later (A. E. Nylander 1857). – A. E. Nylander had already made an earlier visit to Lapland, in *Ks* (Kuolajärvi, Sallatunturi) in 1850.

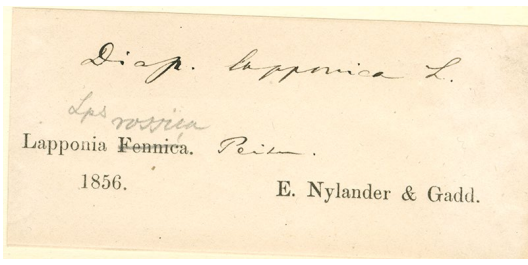


Fig. 6. A label by A. E. Nylander & J. M. Gadd (*Diapensia lapponica*, *Lps*, Peisen 1856; H 417283).

Kola expeditions initiated by the Societas pro Fauna et Flora Fennica

The excursions by Fellman, F. and A. E. Nylander and Gadd, as well as by Russian botanists, laid a sound basis for knowledge of the flora of the Kola Peninsula, but this knowledge was still regionally uneven, and in parts only fragmentary. Furthermore, excursions in Karelia, to the south of the Kola Peninsula, in 1850 by the third botanist member of the Nylander brothers, William Nylander (1822–1899), and his important compilation of the floristic knowledge of the area, *Collectanea in Floram Karelicam* (W. Nylander 1852), strengthened the mandate of Finnish botany in the area (Sihvo 1973). Accordingly there were discussions in the *Societas pro Fauna et Flora Fennica* concerning the possibilities of studying less-known areas of Russian Lapland. Alexander von Nordmann (1803–1866), the chairman of the society in 1849, supported the idea of organizing expeditions to the area. However, because of poor personal relationships with von Nordmann, the vice-chairman William Nylander strongly opposed the idea, and it did not materialize. But when William Nylander was elected as chairman in 1859 he eagerly supported the plan, and, together with the university, the society managed to arrange funding for two Kola expeditions in 1861 (Elfving 1921).

According to the original plan the four participants were supposed to travel in pairs to the town of Kola by using two different routes, enabling them to study both the western and eastern part of the peninsula. They were to meet at Kola and travel home together. However, the plans were significantly modified and the groups did not meet.

The entomologist Karl Emil Inberg (1838–1895) and the botanist **Gustaf Selin** (1836–1862; Fig. 7, 8) left Helsinki in mid-June for the Solovetskiy Islands via Petrozavodsk and the harbour at Sumskiy posad (Suma). Selin became ill on the islands, and Inberg had to continue alone. However, Selin later recovered and sailed to Keret and from there to Umba. He studied the coast only up to Varzuga in the east, returning along the coast to Kandalaksha. Despite the late season (end of August) he continued along the inland route to Kola and for several days studied the coast of the

Barents Sea, also visiting Kildin Island (Kiltinänsaari). On the way back Selin climbed to the summit of the Khibiny Mts. in mid-September. He returned to Finland via Kandalaksha and Kuusamo on 3rd October (Selin 1869). Selin did not publish his results, and he died soon after in the following year. However, Selin's rich collections of vascular plants, bryophytes and lichens were published by N. I. Fellman (1869), Brotherus and Saelan (1890) and W. Nylander (1866), respectively.

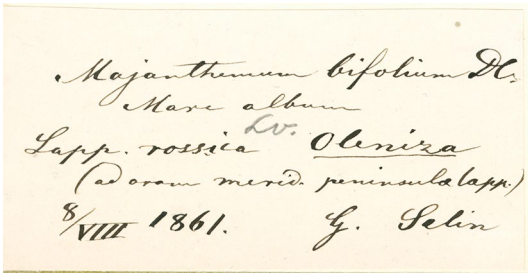


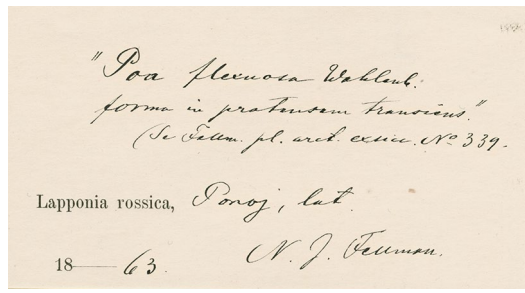
Fig. 7. A label by G. Selin (*Maianthemum bifolium*, *Lv*, Oleniza, 1861; H 228948).

Fig. 8. A wooden box, hand-made on the Kola Peninsula, used by G. Selin for a collection of algae specimens from *Lt* Kola. Photo P. Uotila.

The other members of the group, **Nils Isak Fellman** (1841–1919; Fig. 9), Jacob Fellman's 20-year-old son, and the mycologist **Petter Adolf Karsten** (1834–1917; Fig. 10) started their expedition from Oulu at the beginning of July 1861. They travelled in two weeks to the town of Kola via Kuusamo, Kandalaksha and Lake Imandra. From Kola they continued for another fortnight to the coast of the Barents Sea. After that they returned to Kola and for three weeks made excursions from the town. Due to shortage of money they had to return via the same route earlier than planned, and the whole expedition lasted for only a little over two months. However, they collected a good number of specimens, consisting of ca. 1300 species of vascular plants, bryophytes, algae, lichens and other fungi. Karsten collected fungi in particular (Ohenoja 2012), Fellman vascular plants and lichens. Finds relating to the fungi were published by Karsten (1866), while those concerning lichens and vascular plants were published together with the results from Fellman's second expedition.

N. I. Fellman's second expedition

The eastern part of the south coast was still poorly studied, and Nils Isak Fellman wanted to travel again to the Kola Peninsula. W. Nylander arranged a grant for him from the University of



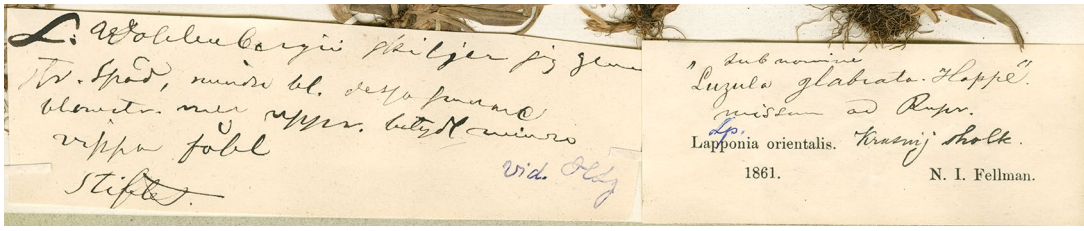


Fig. 9. Labels by N. I. Fellman (*Luzula wahlenbergii*, *Lp*, Krasnij Sholk, 1861; H 240065. *Poa alpigena*, *Lp*, Ponoj, 1863; H150763).

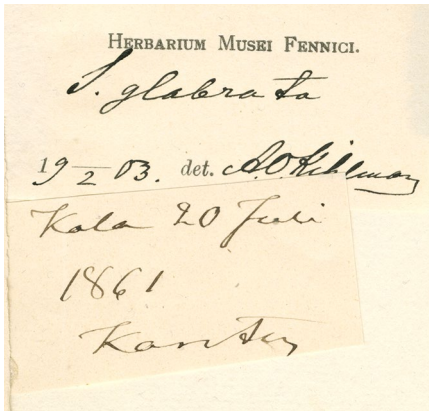
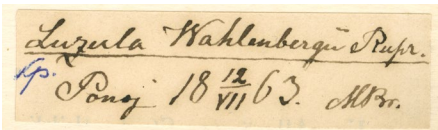


Fig. 10. A label by P. A. Karsten (*Sorbus aucuparia*, *Lt*, Kola, 1861; H 381427), with a determination slip by A. Osw. Kihlman.



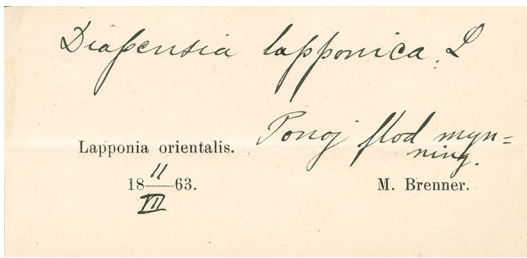


Fig. 11. Labels by M. Brenner (*Luzula wahlenbergii*, *Lp*, Ponoj, 1863; H 240066. *Diapensia lapponica*, *Lp*, Ponoj, 1863; H 417238).

Helsinki for a new Kola expedition in 1863. Two younger students, **Mårten Magnus Wilhelm Brenner** (1843–1930; Fig. 11), later a well-known hieraciologist, and **N. J. Laurin** (1842–1872), accompanied him partly at their own expense. The group travelled from Helsinki through Vyborg, Sortavala and Petrozavodsk to the harbor of Sumskiy Posad. From there they sailed via the Solovetskiy Islands and Kem to Keret, which was reached on June 27th, ca. one month after they had set out. From Keret they sailed to Umba, and visited Cape Turiy among other places. They continued by vessels to Kuzomen and further up to Ponoy. In the surroundings of Ponoy they made excursions for almost three weeks, including more than 30 kilometers up the Ponoy River. The group continued by ship along the north coast to the town of Kola where they arrived on the 17th of August. The journey back to Helsinki was commenced a week later via Lake Imandra, Kandalaksha and Kuusamo, and the Finnish border was crossed on 2nd September (N. I. Fellman 1863).

The whole coast of the peninsula had now been explored in a preliminary fashion and a large number of herbarium specimens were collected during the expedition. According to W. Nylander's wish Fellman had collected many lichens, while Brenner and Laurin had concentrated more on vascular plants. Nylander determined the lichens and Fellman prepared an *exsiccata* series of his lichen specimens (N. I. Fellman 1865). Fellman's specimens played an important role in the comprehensive paper *Lichenes Lapponie orientalis* by W. Nylander (1866). Fellman also prepared an *exsiccata* series of vascular plants (N. I. Fellman 1864), and discussed his specimens in the publication *Plantae vasculares in Lapponia orientali sponte nascentes* (N. I. Fellman 1869). He listed 489 spermatophytes and 28 pteridophytes, often with notes on variation, localities and distribution, and references to J. Fellman's and F. Nylander's publications and to his own *exsiccata* series. Unfortunately, although the paper had been completed in 1864, publication was delayed until 1869, when it appeared as a preprint of the periodical *Meddelanden Societatis pro Fauna et Flora Fennica*; the volume itself was printed in 1882. Also two other papers dealing with the results of the expedition in 1861 were printed as preprints of the same volume, that for lichens by W. Nylander (1866) and for fungi by Karsten (1866).

Fellman (1869) pointed out that there was still much to do in researching the flora of the Kola Peninsula: in particular the interior parts of the peninsula were in need of new expeditions. But active work was discontinued because the key persons gave up: W. Nylander moved to Paris in 1863 and Fellman himself abandoned his botanical career and moved on to study law. Later he had a prominent career as a lawyer, but still kept his interest in plants and the Kola Peninsula. Nils Isak Fellman edited his father's diaries so that they were published in four bulky books (J. Fellman 1906), and he was one of the private supporters of the Great Kola Expedition two decades later.

The next twenty years

Berndt Axel Nyberg became a member of the *Societas pro Fauna et Flora Fennica* in 1864, and in the same year he received a grant to study plants in *Ostrobothnia borealis* (*Ob*). He seems to have extended his excursions up to the north-eastern *Ks*, at that time also part of *Ob*. – Another early collector (1869–1870) in *Ks* was the pharmacist **Karl Henrik Eberhardt**.

The entomologist **Johan [John] Reinhold Sahlberg** (1845–1920; Fig. 12) travelled in Karelia south of Kem in 1869. He wanted to continue further north and in 1870 received a grant from the *Societas pro Fauna et Flora Fennica* to study insects in the Kola Peninsula. The expedition materialized in the same year, and Sahlberg was accompanied by his friend **August Johan Malmberg** (later Akusti Juhana Mela; 1846–1904; Fig. 13), who decided to fund his travel by collecting specimens of vascular plants with duplicates to be sold later. Sahlberg and Malmberg started from Kuopio on 1st June. In Oulu they met F. Nylander who gave them useful advice. From Oulu they travelled via Kuusamo to Kandalaksha, crossing the Finnish border on 15th June. Sahlberg (in Sahlberg & Saalas 1952) describes well how difficult travel was at that time. Sahlberg and Malmberg needed 12 porters and, for the lake stage, eight rowers for the leg from Kuusamo to the village of Kandalaksha. Walking and rowing from the Finnish border to Knyazhaya Guba on the coast of the White Sea and from there to Kandalaksha took seven days.

During the first three weeks they made excursions in the surroundings of Kandalaksha and in the mountains on both sides of Lake Imandra. Despite the difficult circumstances they managed to collect many specimens (Malmberg 1926). Their original plan was to walk from Kandalksha to Kola, continue by ship along the north coast to Ponoy and return along the south coast. However, they failed to get porters for such a long walk, and they had to sail along the south coast to Ponoy. The journey took three weeks because in stormy weather the boat had to remain at anchor for several days in sheltered bays. Malmberg and Sahlberg stayed in Ponoy for more than a fortnight, and all the time stormy northern winds and daily rain showers prevailed. The return by the same coastal route was more pleasant and it was possible to make several stops for collecting before arriving at Knyazhaya Guba on 10th September. The return to Kuopio took two weeks.

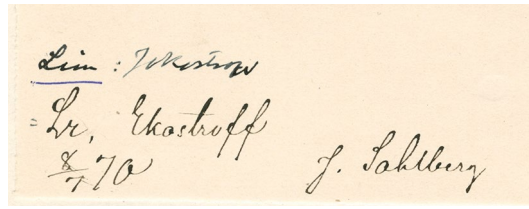


Fig. 12. A label by J. Sahlberg (*Juncus triglumis*, *Lim*, Ekostroff, 1870; H 223872).

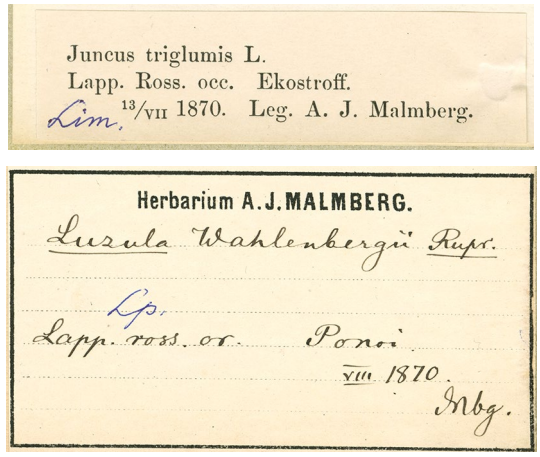


Fig. 13. Labels by A. J. Malmberg (*Juncus triglumis*, *Lim*, Ekostroff, 1870; H 223870. *Luzula wahlenbergii*, *Lp*, Ponoi, 1870; H 240058).

In addition to insects Sahlberg also collected vascular plants and bryophytes. Malmberg focused solely on vascular plants and collected numerous duplicates of each specimen. According to the report on the University's work in 1869–1872 (Lindelöf 1872: 70) the Botanical Museum bought from Malmberg ca. 1400 exx. of 95 species collected from Russian Lapland. The material was mostly used in exchange but exceptionally many duplicates of his specimens are also in H. Malmberg even prepared a manuscript of the botanical results of the expedition ("*Plantae in nonnullis plagis Lapponiae rossicae*"), which, for some reason, remained unpublished (Lappalainen 1959: 70).

Two years later, in 1872, the bryologist **Viktor Ferdinand Brotherus** (1849–1929; Fig. 14)

received a grant from the *Societas pro Fauna et Flora Fennica* to study Russian Lapland. In the same summer he travelled with his young schoolboy brother, **Arvid Hjalmar Brotherus** (1855–1888), along the east and north coast of the Kola Peninsula (Brotherus 1873). They collected both bryophytes and vascular plants, and in April 1885 donated to H ”352 well prepared vascular plant specimens from Russian Lapland, e.g., *Eritrichium villosum*, new for the herbarium” and one year later ”354 *Bryaceae*, 138 *Hepaticeae* and 81 *Sphagnum* from Russian Lapland” (Herbarium Journal).

In 1885 V. F. Brotherus was awarded a generous grant for a bryological expedition to the Kola Peninsula. Together with the entomologist Klas (Clas) Kristian Edgrén (1864–1904) he travelled to Kandalaksha via Kuusamo in June 1885. They studied the Chuna-tundra for eight days and the Khibiny Mts. for five days. The latter half of July was used for excursions on the coast of *Lapponia tulomensis*, to Kildin Island and in the eastern part of the Rybachiy Peninsula. The return home through Norway and Inari Lapland took more than two weeks (Brotherus 1886). Next spring Brotherus donated to the Herbarium 573 bryophyte specimens collected during the excursion (Herbarium Journal). Some duplicate material was sent at least to St. Petersburg (LE) and of vascular plants six specimens were distributed in *Plantae Finlandiae Exsiccatae*.

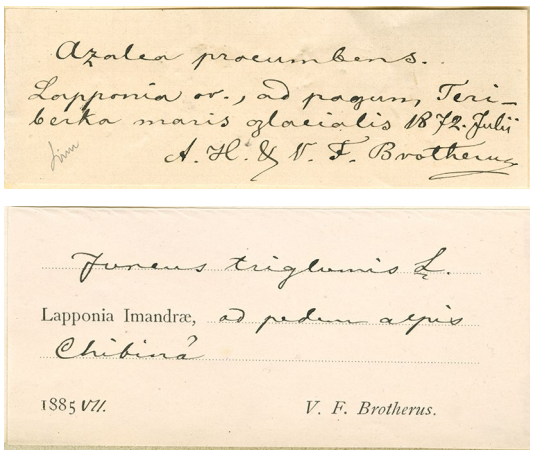


Fig. 14. A label by A. H. & V. F. Brotherus (*Loiseleuria procumbens*, *Lm*, Teriberka, 1872; H 414877) and of V. F. Brotherus (*Juncus triglumis*, *Lim*, Chibinä, 1885; H 223871).

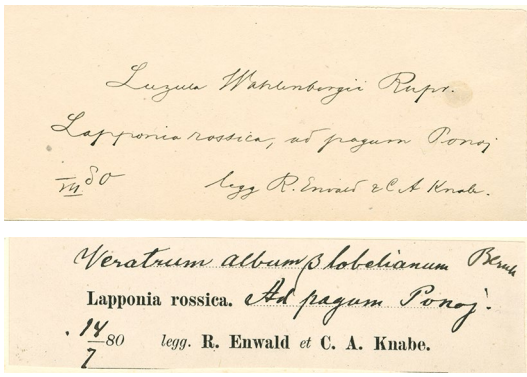


Fig. 15. Labels by R. Envald & C. A. Knabe (*Luzula wahlenbergii*, *Lp*, Ponoj, 1880, H 240067. *Veratrum album*, *Lp*, Ponoj, 1880; H 226900).

Edvard August Vainio (Lang, Wainio; 1853–1929), later a well-known lichenologist, travelled in Lapland along the borderland between Finland and Russia in 1878. On the Russian side he made excursions in *Ks* round Salla village during a couple of days at the end of June and along the Paz River from the Finnish border (the first localities are in the present Russian part of *Lapponia inarensis*) to the mouth of the river and after a week back along the same route. Because of shortage of funding, the time planned for the studies on the Russian side was cut considerably (Alava & al. 2004; with a map of collecting localities; all specimens in TUR). On the field excursions he collected material for his theses (Wainio 1878).

In the 1880s the entomologist **Reinhold Bernhard Envald** (’Enwald’; 1860–1892) visited the Kola Peninsula during four summers. In July – August 1880 he, together with **Carl Arnulf Knabe** (1862–1922; Fig. 15), studied *Ponoi Lapland*, where they travelled via Petrozavodsk, Solovetskiy and Arkhangelsk (Knabe 1881, Haapasaari 1994). They planned to continue to Kola and to the Imandra area and stay there for the whole of August, but that part of their expedition seems to have been abandoned. They collected a good number of specimens with many duplicates, and after the expedition they prepared duplicate sets of the collections, which were sold through the magazine *Botanisches Centralblatt*. Because of this the Envald/Knabe duplicates have a different distribution as compared with duplicates from other Finnish expeditions to the Kola Peninsula, which were mostly distributed through

the Botanical Museum at Helsinki. For instance Jean Michel Gandoger from France bought one set of their duplicates and described a new species *Castillea pallida* on the basis of their specimen in his possession (Gandoger 1889)[1].

In June 1882 Envald and the entomologist **Hans Brynolf Hollmén** (1855–1891; Fig. 16) travelled in eastern Salla (*Ks*) and *Lim* Lake Girvas (Hirvasjärvi) (Haapasaari 1994[2]); they collected a significant number of specimens from *Ks* and a few from *Lim*. Next year in June-August Envald travelled again with Hollmén, now in *Lapponia Imandrae* and *Lapponia tulomensis*. The route led from Kuusamo to Kandalaksha, Kola and Jeretik Island at the mouth of the Gulf of Ura, and they returned along the Tuloma and Nota Rivers. This expedition was supported by the *Societas pro Fauna et Flora Fennica*, and many vascular-plant, bryophyte and lichen specimens were collected, in particular in the Lake Notozero area (Enwald 1886, Haapasaari 1994). 132 phanerogam, 23 moss and 82 lichen specimens from the expedition were donated to the Herbarium in 1891 by Mrs. Hollmén (Herbarium Journal).

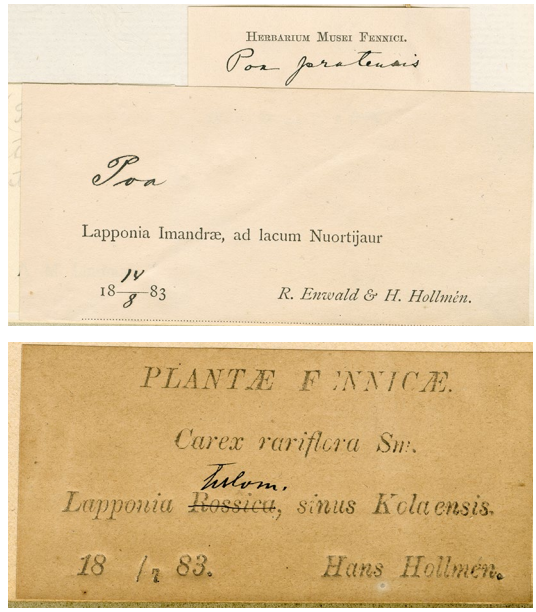


Fig. 16. A label by R. Envald & H. Hollmén (*Poa alpigena*, *Lt*, Nuortijaur, 1883; H 819781) and H. Hollmén (*Carex rariflora*, *Lt*, Sinus Kolaensis, 1883; H 751175).

The Great Kola Expedition

All early expeditions on the Kola Peninsula had been directed to four areas, 1) along the coasts, 2) near the old post route over lakes and valleys from Kandalaksha to Kola, 3) along the Paz River to Salmijärvi and Pechenga or Lotta and Tuloma Rivers to Kola, and 4) to the borderland between Finland and Russia. In the mid 1880s the professor of zoology **Johan Axel Palmén** (1845–1919) conceived the idea of planning a larger expedition to study the interior parts of the peninsula, which were still unknown in the early 1880s. Half of the funding was received from the University of Helsinki and the *Societas pro Fauna et Flora Fennica*, and the rest from private individuals; the expedition was to be organized in 1887. There were eight participants, six of them scientists. The leader was Palmén, and another zoologist in the group was R. Envald, who had been on the Kola Peninsula earlier and had also collected plants there. The botanists were V. F. Brotherus, who had been twice in the area, and Dr. **Alfred Oswald Kihlman** (later Kairamo; 1858–1938; Fig. 17). Palmén himself also collected many plants (Fig. 18). Wilhelm Ramsay (1865–1928) was the group's geologist and Alfred Gustaf Petrelius (1863–1931) the cartographer; in addition Gustaf Nyberg and David J. Sjöstrand served as technicians.

[1] According to Egger (2008: 75) the holotype of *Castilleja lapponica* Gand. (validated by Rebristaya 1964) is in LY-Gand, and Egger had seen isotypes in S and TUR. He paid attention to the fact that the holotype was collected on Aug, 12, 1880, and that the isotypes have a different date, Aug. 10, 1880. The three sheets of the collection in H bear the same date Aug, 10. The specimens have been collected from Svatoj Nos, a cape in *Lp* north of Ponoy. Envald and Knabe stayed at Svatoj Nos for several days, and probably collected *Castilleja* on different days and perhaps also from slightly different places, and the sheets collected on different days from the holotype cannot be real isotypes.

[2] According to Haapasaari (1994), Envald travelled with Knabe. However, in 1882 Envald was accompanied by Hollmén; in 1882 Knabe made a whole-summer-long expedition along the Swir River to Karelia, and to the Solovetskiy Islands and Arkhangelsk (Knabe 1885).

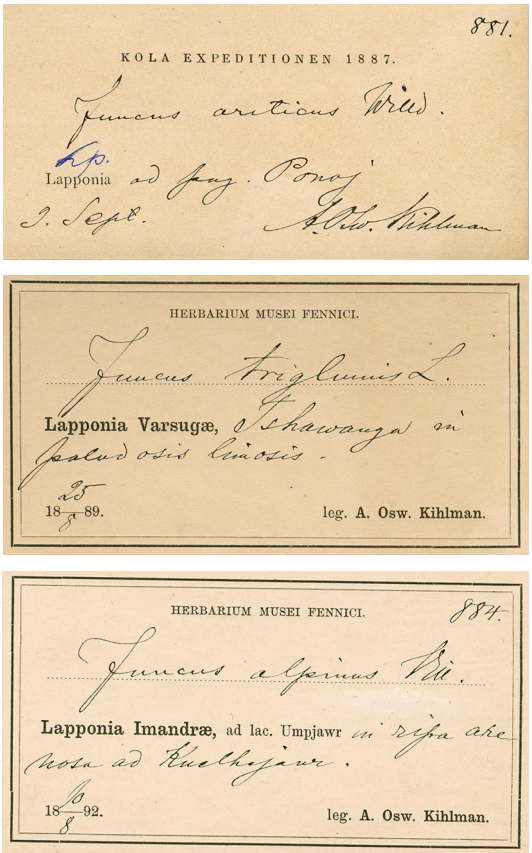


Fig. 17. Labels by A. Osw. Kihlman (*Juncus arcticus*, *Lp*, Ponoj, 1887; H 222297. *Juncus triglumis*, *Lv*, Tschavanga, 1889; H 223867. *Juncus alpinoarticulatus*, *Lim*, Umpjawr, 1892; H 85954).

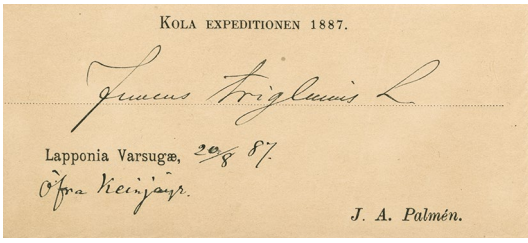


Fig. 18. A label by J. A. Palmén (*Juncus triglumis*, *Lv*, Öfre Keinjäyr, 1887; H 223868).

As early as mid-April Kihlman and Envald left Helsinki and travelled via Oulu and Kuusamo to Kandalaksha and Kola to take care of the transport of equipment to the interior parts of the peninsula, in particular to Voronje Village. However, the expedition met immediate difficulties because of the exceptionally early spring, making it hard to get reindeer to carry the equipment. The others travelled a month later.

Already in the spring Kihlman was making excursions from Kola to the coast, and further to the mouth of the Voronje River and upstream to Lake Lovozero, at the foot of the Lovozero Mts. In early summer even Palmén and Envald made excursions from Kola. In late summer Kihlman and Ramsay walked east of Voronje to the mouth of the Jokanga River and continued by ship to Ponoy. At the same time Palmén and Petrelius trekked along the Ponoy River as far as the river mouth (Palmén & Kihlman 1888). Brotherus studied the coast from Kola to Varzino, and from there he made excursions to inland areas (Brotherus 1888). The routes have been drawn on the map prepared by Petrelius and included as a joint appendix in Kihlman & Palmén (1890) and Kihlman (1890b), and in Rikkinen (1980) and Uotila (2012). Rikkinen (1980) included also more detailed maps of the routes, but proper itineraries with lists of collecting localities are not available.

The goal of the expedition was accomplished and the interior of the peninsula was crossed along two separate routes. The area turned to be clearly less arctic than earlier supposed. All participants returned by ship to Arkhangelsk and from there to Helsinki, Brotherus already at the beginning of September and Kihlman as the last one in early October, but most of the collections and equipment were shipped via Norway to Helsinki (Kihlman & Palmén 1890, Rikkinen 1980).

The Great Kola Expedition was very important both because of its scientific results and as a national effort. Even the press paid much attention to it during the planning, the expedition itself and afterwards. The first scientific results were presented in October at a meeting of the *Societas pro Fauna et Flora Fennica*, and a great fest was arranged for the participants. The plant material collected was very abundant, the total numbers of specimens, collected by Kihlman, Brotherus and Palmén from the excursions of 1887, 1889 and 1892, received by the herbarium up to 1899, were as follows: 3831 vascular plants (of which 1997 duplicates), 3160 bryophytes (2244 duplicates), 1247 lichens (715 duplicates), 187 algae, 55 cones, 76 seed samples and 70 sections of tree

stems (Herbarium Journal). Furthermore, dozens of vascular plants (e.g. 76 specimens of *Hieracium*) and other groups were received later.

Kihlman was the most energetic participant of the Great Kola Expedition (Kotilainen 1938, Vasari 1998, Leikola 2008), and he returned to the peninsula in 1889, staying there for about six months. In early spring 1889 Kihlman travelled to Lake Imandra, and from there, still under winter conditions, to Lovozero and directly to Cape Orlov on the east coast. He stayed at Orlov for three months and, in addition to biological specimens and observations, he collected among other things ethnographic data on the Kola Sami people (Kihlman 1890b). His excursion routes in 1889 were published, together with the routes of the previous expedition, on the map in the joint appendix in Kihlman & Palmén (1890) and Kihlman (1890b), and on the inside back cover of Rikkinen (1980), and as a fig. in Uotila (2012).

After a long excursion to northern areas in Arkhangelsk and Komi Regions in 1891, Kihlman visited the Kola Peninsula for the third time in 1892. On this occasion he travelled together with Ramsay in *Lapponia Imandrae*, and in particular they made excursions to the high summits of the Khibiny and Lovozero Mts. Ramsay had already continued his geological studies on the Peninsula in 1891, and later he studied the area in 1897, 1898, 1911 and 1914 (Rantala 2010). Again the number of collected specimens was significant, and five numbers were distributed in *Plantae Finlandiae Exsiccatae*.

The leading aim in all of Kihlman's expeditions was to study the forest limit and the factors affecting it. On the basis of the two first expeditions he wrote his professorial dissertation (Kihlman 1890a), which turned out to be one of the most important Finnish studies on ecological plant geography (Vasari 1998, Leikola 2008). The results of the third expedition mostly remained unpublished. In addition Kihlman collected many specimens of vascular plants and lichens and significantly added to the floristic knowledge of the peninsula (for lichens, see Kihlman 1892).

In the latter half of the 1800s coastal regions of Kola Peninsula were visited and studied also by some Swedish and Russian botanists. However, the knowledge of the interior parts of the peninsula was based on the results of the Great Kola Expedition, and a considerable portion of all the botanical information from the peninsula in the 19th century was collected during the Finnish expeditions.

Last excursions of the 19th century

Except for Kihlman in 1892 the other Finnish botanists visiting the Kola Peninsula in the 1890s mostly travelled through the northwestern interior parts of the peninsula. The area between the Finnish border and the Kola Peninsula proper was still poorly known (Lindén 1894). Several visits were also made to the eastern part of Kuusamo parish (*Ks*), which at that time belonged to Finland. In July – August 1891 **Frans Johan [John] Herman Lindén** (1867–1914; Fig. 19) studied the surroundings of Lake Notozero in *Lt* and *Lim* (Lindén 1891, 1893). In addition to information on the flora and vegetation he collected meteorological data and information on the general geography and the life of the small population of local inhabitants and Sami people (Lindén 1894). In 1895 he donated to H 195 vascular-plant specimens from Lake Notozero, "altogether 31 new taxa for the area and 20 species which were not earlier represented in the herbarium from *Lt*" (Herbarium Journal).

Hugo Johan Fredrik Stjernvall (Stjernwall) (1864–1904) did botanical field work in *Ks*, mostly Salla, in 1891 and 1892, and collected vascular plants there (Stjernvall 1892, 1893). In 1892 the student **Emil Theodor Nyholm** found *Draba cinerea* from Salla. The teacher **Kaarlo Arvi Sipola** (1870–1959) collected some specimens in his home parish, Salla, in 1896 and 1898.

The entomologist **Robert Bertil Poppius** (1876–1916; Fig. 20), the future Keeper of the Zoological Museum at Helsinki, travelled in 1897 in *Lapponia petsamoënsis* together with the forester **Arthur Wilhelm Granit** (1871–1956). In addition to insects they collected herbarium specimens of phanerogams. Granit made inventories of forest resources in the eastern part of Finnish Lapland, including *Lps* (Granit 1948), in several years between 1897–1907, but seems to have collected herbarium specimens only in 1897.

In the summer of 1898 the zoologist **Kaarlo Mainio Levander** (1867–1943) studied marine

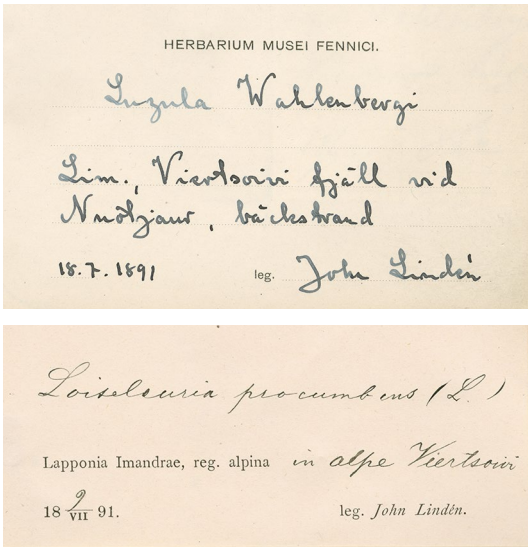


Fig. 19. Labels by J. Lindén (*Luzula wahlenbergii*, *Lim*, Viertsoivi, 1891; H 240074), *Loiseleuria procumbens*, *Lim*, Viertsoivi 1891; H 414872).

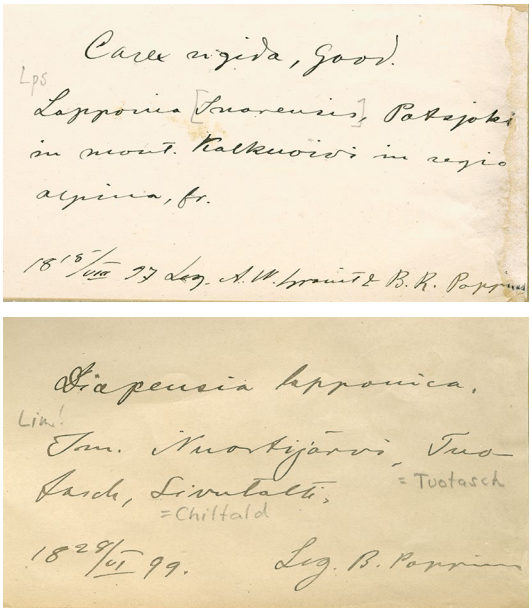


Fig. 20. A label by A. W. Granit & R. B. Poppius (*Carex bigelowii*, *Lps*, Patsjoki, 1897; H 818586) and of R. B. Poppius (*Loiseleuria procumbens*, *Lim*, Nuortijärvi, Tuotasch, 1899; H 417227).

fauna on the northwestern coast of the Kola Peninsula, but also invertebrates and planktonic algae in fresh water ponds on the Jeretik Island (*Lt*) (Levander 1901). On Jeretik he found 50 species of

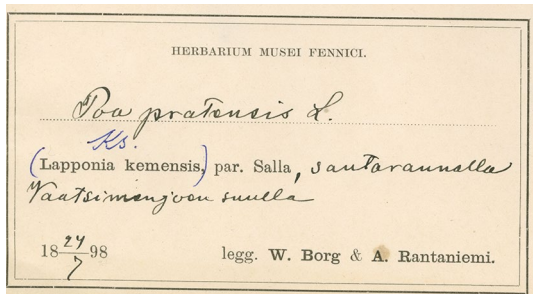


Fig. 21. A label by W. Borg & P. A. Rantaniemi (*Poa alpigena*, *Ks*, Salla, 1898; H 18283).

phytoplankton, and collected some vascular-plant specimens as well. Already in 1887 he, together with K. Edgren, had studied the south coast of the peninsula from Kandalaksha to Pyalitsa (*Lp*), but probably did not collect plant specimens, not even planktonic algae (Edgren 1888, Edgren & Levander in Kihlman & Palmén 1890). Levander (1905) published the plankton material collected by Kihlman and Lindén from inland lakes during their excursions and gave an overview of earlier publications of the planktonic algae of the area. His publication of the coastal plankton of the White Sea (Levander 1916) does not contain his own material at all, but instead specimens collected by the zoologist **Oscar Frithof Nordqvist** (1858–1925) in 1886, A. O. Kihlman in 1892, the zoologist **Karl Emil Stenroos** (later Kivirikko; 1870–1947) in 1894 and Harald Lindberg (see below) in 1913.

Väinö (Wäinö) Gabriel Borg (later Kivilinna) (1875–1950) and **Pekka Aappo [Ape] Rantaniemi** (1873–1952; Fig. 21) made botanical excursions in *Ks* (at that time *Lkem*) Salla, in 1898. They collected many phanerogams, including four numbers for *Plantae Finlandiae Exsiccatae*. Later Rantaniemi studied the flora of Finnish Lapland and did field work also in Salla, in the area which at present belongs to Russia. His field notes (preserved in the botanical archives of H) have been entered into the Kastikka database, and most of his specimens are in OULU.

In 1898 the student **Herman Viktor von Willebrand** (1876–1935) found *Fragaria vesca* in north-eastern *Ks* (Pyhäkuru) and also **O.** and **V. Möller** collected some specimens from Salla. The phycologist **Karl Engelbrekt Hirn** (1872–

1907) seems to have travelled to the White Sea coast in summer 1898. There are a few vascular plants collected by him from the Salla – Kovda road. Hirn (1895a, b, 1900) had earlier determined algal material collected by, e.g., Kihlman and Brotherus from their Kola expeditions, and studied the Karelian part of *Ks* in 1893.

In 1899 **Carl Wilhelm Fontell** (1873–1936; Fig. 22) and Bertil Poppius received a joint grant from the *Societas pro Fauna et Flora Fennica* to study the flora and insect fauna of *Lapponia tulomensis*. They travelled via St. Petersburg, Moscow and Vologda to Arkhangelsk, and from there by ship to Kola via Ponoy (Kvist 1978). Because of some difficulties travelling took almost two months, and the first collections in *Lt* Kola were made in mid-June 1899. Fontell and Poppius were accompanied by A. W. Granit, his brother forester Alfons Gabriel Granit, Emir Bernhard Bützov, Carl Anders Munsterhjelm and Ernst Leopold Blumenthal, who were to study the occurrence of coniferous forests in *Lapponia tulomensis*. Their field work was carried out mostly independently of Fontell and Poppius. At the beginning Fontell and Poppius mostly travelled together in *Lt* and extended their excursions even to *Lapponia inarensis*. In August Fontell travelled along the Paz River to the river mouth and to Petchenga, and made excursions in *Lapponia petsamoënsis* up to early September. From there he went through Norway (Kirkenes and Neiden) to Inari, from where the whole group returned south. (Kvist 1978; with a map and list of Fontell's collecting localities).

In 1909 Fontell donated to H his specimens collected in 1899 from *Li*, *Lt* (including *Lps*) and *Lim*, altogether 412 specimens (Lindberg 1909). The material was poorly and unclearly documented, without proper labels. Labeling was done afterward by H. Lindberg, B. Pettersson and J. Jalas. All the material was thoroughly treated by Kvist (1978), who was able to correct some misinterpretations in the labels prepared for Fontell's specimens. Only Jalas had kept the original notes with the labels while the others had not, and it is evident that there are still some mistakes in Fontell's labels.

The forester, versatile biologist and artist **Justus Elias Montell** (1869–1954; Fig. 23) travelled together with Fontell's group up to Ponoy. He had received a grant from the *Societas pro Fauna et Flora Fennica* to study birds and insects in Ponoy (Elfving 1921) and stayed in the area for the whole summer, also collecting many herbarium specimens. In 1900 he donated to H from *Lp* "rich and good material of 268 species of vascular plants, with 10 new species for the province, and 15 species of mosses" (Herbarium Journal); the specimens included *Paeonia anomala* for *Plantae Finlandiae Exsiccatae*. Of all Finnish plant collectors who visited Ponoy Montell worked there longest. He published about one hundred botanical notes (see Väre 2004), but practically nothing on the plants of *Lp*, just a small floristic note (Montell 1904). He received for his herbarium several specimens collected by two pupils, **J. Hämäläinen** and **S. Juselius**, from *Kk* and *Lv* in 1898. He presented their three interesting finds at a meeting of the *Societas pro Fauna et Flora Fennica* in 1900 (Montell 1900).

The twentieth century before the First World War

Travelling to the Kola Peninsula became easier at the beginning of the 1900s, and several botanists conducted short expeditions to the peninsula. Most of them concentrated on rather easily accessible areas along the main western inland road or in *Lapponia petsamoënsis*. A few Finnish botanists visited also the Murmansk Biological Station on the north coast at Alexandrovsk (now Polyarnyy), transferred there in 1899 from the Solovetskiy Islands. In addition there was considerable research activity in *Regio kuusamoënsis* (the whole province being at that time in Finland), which has some geological and geographical features unique to the country. Most of the excursions were directed to the southern part of *Ks* (mainly Kuusamo parish), and a few researchers paid visits also to the most remarkable localities in the north, to Salla parish (the eastern part at present almost totally in Murmansk Region). Research in that remote part of Finland was less active than at the most interesting places in Russian Lapland and was mainly carried out by different persons than in Russian Lapland. Only few journeys were supported by the *Societas pro Fauna*

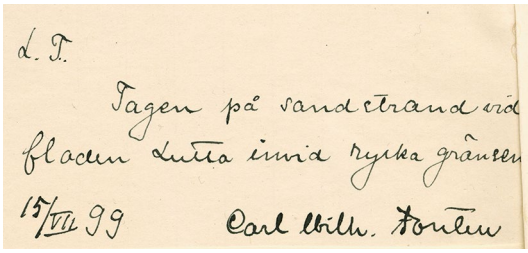


Fig. 22. A label by C. W. Fontell (*Carex bigelowii*, *Lps*, Lutto, 1899; H 753736).

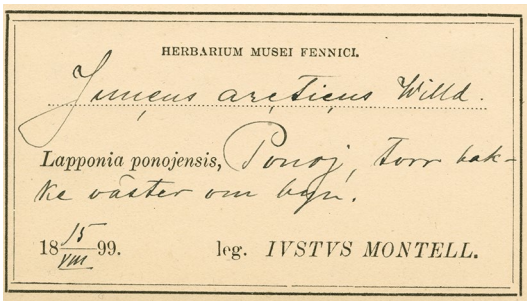
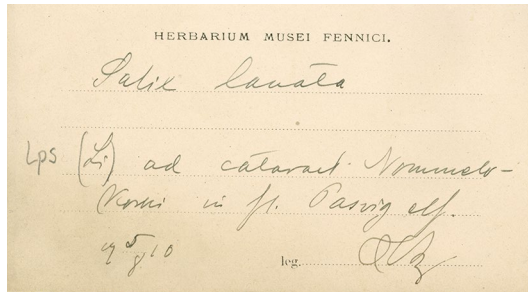


Fig. 23. A label by J. Montell (*Juncus arcticus*, *Lp*, Ponoj, 1899; H 222296).



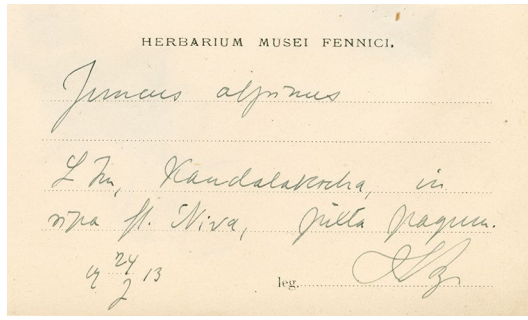


Fig. 24. Labels by H. Lindberg (*Salix lanata*, *Lps*, Pasvig elf, 1910; H 775762. *Juncus alpinoarticulatus*, *Lim*, Kandalakscha, 1913; H 85943).

et Flora Fennica, and only few itineraries were provided.

According to the data from herbarium specimens, **Harald Lindberg** (1871–1963; Fig. 24), just appointed Keeper of the Botanical Museum at Helsinki[3], visited the Paz River (*Lps*) in early August 1910. In 1913, together with **Martin Aschan** (1891–1920; Fig. 25), he undertook a longer expedition from *Ks* (Salla) to Knyazhaya Guba (*Kk*) and Kandalaksha and its surroundings (*Lim*) (Lindberg 1914a, Väre 2010). They returned via Arkhangelsk and the Dvina River, judging by Lindberg's donation of 56 specimens from there (Herbarium Journal). In autumn 1913 Lindberg donated to H 129 specimens collected from *Lim*, 91 specimens from *Kk* (both parts) and 71 specimens from north-eastern *Ks* (Herbarium Journal; Lindberg 1914b), and he published the most remarkable finds (Lindberg 1914a). The duplicates were sufficient for four numbers in *Plantae Finlandiae Exsiccatae*. Lindberg collected also bryophytes, especially in *Ks*.

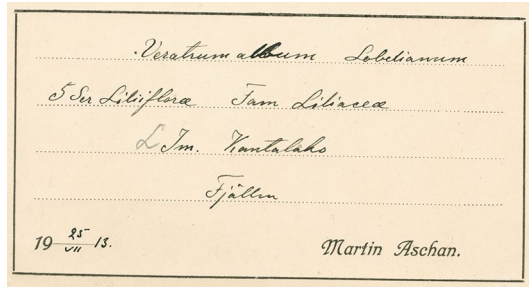


Fig. 25. A label by M. Aschan (*Veratrum album*, *Lim*, Kantalaks, 1913; H 226912).

Walter Mikael Axelson (later Linnaniemi; 1876–1953; Fig. 26) and Väinö Borg had travelled in Karelia up to *Kk* (the Karelian part) already in 1898. In 1901 they received a grant from the *Societas pro Fauna et Flora Fennica* to study the flora of Salla (*Ks*), but they extended their excursions further east, to *Lim* as far as Lake Girvas (Hirvasjärvi) in the north-western borderland (Borg 1903). According to the Herbarium Jour-

[3] According to Rantala (2008, 2010) Lindberg visited the Kola Peninsula earlier in 1893. However, this is a mistake, based on an error in citing information from Levander (1916). The mistake was copied to Väre (2010) and Uotila (2012).

nal in 1902 they donated to H ”366 specimens of vascular plants (247 taxa, 28 of them new for the province) from *Lim*”. Axelson visited Imandra and Kandalaksha also in 1903 (Rantala 2010), but probably did not collect herbarium specimens on that occasion.

Albin Torckell (1878–1944; Fig. 27), the representative of the Finnish Forest Service in Inari, and the forester Artur Philippe Eklund (1873–1947) investigated in 1904–1906 the possibilities of floating timber to the coast along the main rivers, and collected vascular plants along the Lotta, Nota and Tuloma Rivers in *Lt* and *Lps*. In 1906 Torckell was accompanied by **August Volmar Renvall** (1884–1925; Fig. 28), who collected in

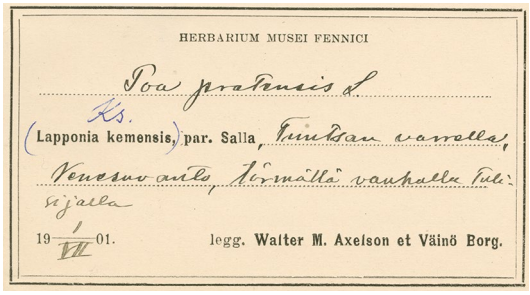


Fig. 26. A label by W. M. Axelson & V. Borg (*Poa alpigena*, *Ks*, Salla, Tuntsa, 1901; H 18287).

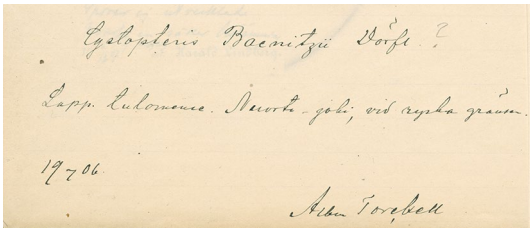


Fig. 27. A label by A. Torckell (*Cystopteris fragilis*, *Lt*, Nuortijoki, 1906; H 88842).

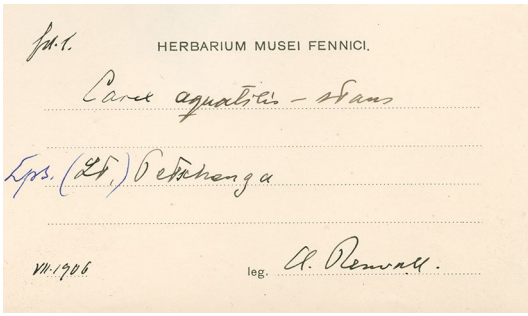


Fig. 28. A label by A. Renvall (*Carex aquatilis x nigra*, *Lps*, Pechenga, 1906; H 325250).

Fig. 29. A label by F. W. Klingstedt (*Poa rigens*, *Lt*, Vaidaguba, 1909; H 817255).

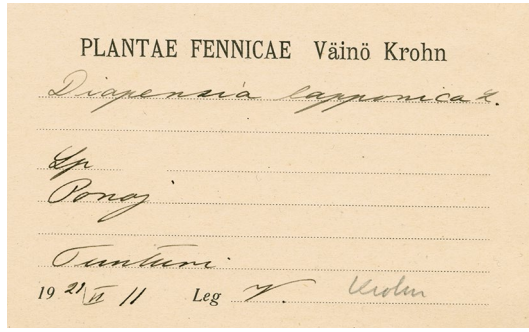


Fig. 30. A label by V. Krohn (*Diapensia lapponica*, *Lp*, Ponoj, 1911; H 259168).

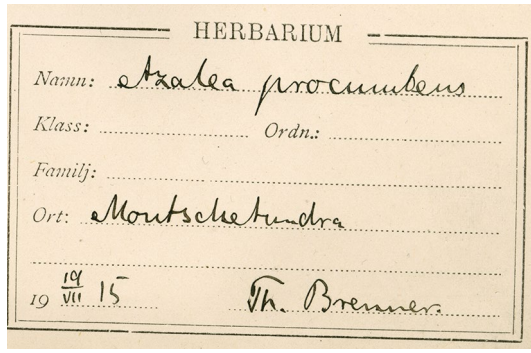


Fig. 31. A label by T. Brenner (*Loiseleuria procumbens*, *Lim*, Montschetundra, 1915; H 414873).

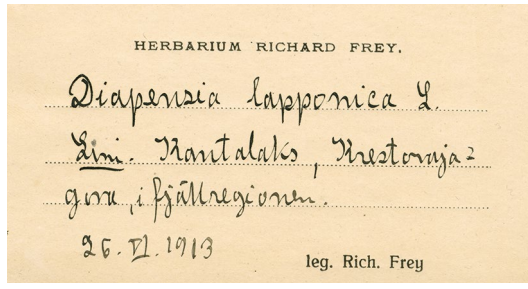


Fig. 32. A label by R. Frey (*Diapensia lapponica*, *Lim*, Kantalaks, 1913; H 417229).

addition some lichens (Räsänen 1943). At least Renvall also visited Ponoy and collected from there, e.g, *Cerastium trigynum* (= *C. cerastoides*) for *Plantae Finlandiae Exsiccatae*.

Edvard Johannes Gabriel af Hällström (1878–1957) was a forester living in Kuusamo. He regularly made excursions in *Regio kuusamoënsis* and also visited a few localities in northeastern Salla (at that time in *Lapponia kemensis*) in 1908–1910 and collected bryophytes and vascular plants from there, including 13 numbers for *Plantae Finlandiae Exsiccatae*. Other foresters who donated just sporadic specimens from *Ks* were **Karl Oskar Elfving** (1872–1946), in 1903, and **Kalle Airaksinen** (1885–1958), in 1915. The latter visited also *Lim* and donated to H 9 specimens of phanerogams from there (Herbarium Journal). **Elsa Ekstam** (1887–1927), the only woman among the Finnish plant collectors on the Kola Peninsula before 1918, pressed *Loiseleuria procumbens* from *Ks* (Sallatunturi) in 1903.

In 1909 the well-known botanists V. F. Brotherus and **Uno Alfons Saxén** (1863–1948) collected a few vascular plants from north-eastern *Ks*.

Alvar Fredrik von Fieandt (1885–1948) obtained a grant from the Geographical Society of Finland to study the geology of the Rybachiy Peninsula and Kildin Island (von Fieandt 1912). The grant also covered the expenses of **Fredrik Woldemar Klingstedt** (1881–1964; Fig. 29) who accompanied him as an assistant and to study the flora of the area. The researchers travelled by steamer from Vadsø, North Norway, to the Rybachiy Peninsula for more than a month from late June to late July 1909 (Klingstedt 1919). Klingstedt collected many plants and lichens from the whole peninsula (both *Lps* and *Lt*) and Kildin, and he published short notes on *Salix* hybrids (Klingstedt 1912, 1919). Floristic records (in total 469 from *Lps* and 444 from *Lt*) from his three Field Note Books (preserved in the botanical archives of H) have been entered into the Kastikka database.

Two students, the botanist **Väinö Julius Sakari Krohn** (1891–1969; Fig. 30) and the geologist **Thord Johannes Brenner** (1892–1949; Fig. 31), son of the botanist Magnus Brenner, accompanied W. Ramsay on his geological excursion to the area in 1911. They travelled from Arkhangelsk to Ponoy, and along the south coast to Kashkarantsy, Kandalaksha, and further to Imandra, Kola and Aleksandrovsk (Rantala 2010). Krohn collected vascular plants and published notes on *Paeonia anomala* from Cape Turiy (Krohn 1924). His specimens include some notable finds from the Kandalaksha area. The specimens are poorly labelled and almost all were received by H in 1970, after Krohn's death. Unfortunately some mislabelling has been traced from Krohn's specimens and there might be mistakes also in his early specimens (Blinova & Uotila 2013). – Brenner carried out geological studies in *Lapponia Imandrae* also in 1914 and 1915 (Rantala 2010), and at the same time collected some vascular-plant specimens.

The entomologists **Richard Karl Hjalmar Frey** (1886–1965; Fig. 32) and Wolter Hellén (1890–1979) made a two-month-long expedition to the Kola Peninsula in 1913. They arrived by train in Arkhangelsk on 9th June 1913, but had to wait there a week for the next steamer to the south coast of the peninsula (Frey 1915). By streamer they sailed to Kuzomen and stayed there one week until the next steamer, on which they sailed to Kandalaksha. After some excursions near the village they travelled to the Khibiny Mts. for ten days. They returned via Kandalaksha to Arkhangelsk, from where they took another steamer to Ponoy. After a week in Ponoy they took a steamer to Gavrilovo, from where they visited Teriberka. At the end of July Frey and Hellén arrived in Kola Town, and from there they moved to the Murmansk Biological Station at Alexandrovsk near the mouth of the Gulf of Kola. On 5th August Frey and Hellén began the return journey by steamer to North Norway and to Bergen, from where they travelled via Kristiania (Oslo) and Stockholm to Helsinki (Frey 1915). The excursion was mostly entomological, but Frey collected vascular plants in *Lim, Lv, Lp, Lm* and *Lt*, including two numbers from *Lp* for *Plantae Finlandiae Exsiccatae*. Frey was the last and at least the 16th Finnish scientist who visited Ponoy and collected vascular plants there.

Irmer Forsius (1882–1930), a forestry student and later jaeger and soldier, conducted ornithological research in eastern Lapland in 1913 (Haapasaari 1994), and he collected at least one specimen from *Lt*.

Table 1. Finnish collectors of vascular plant specimens in the Kola Peninsula (Murmansk Region) up to 1918, their collecting years and number of collections according to the biogeographic provinces of *Kk*, *Ks*, *Lim*, *Lm*, *Lp*, *Lps*, *Lt* and *Lv*. Unclear cases are excluded. Due to lack of specimens the Russian *Li* is not included. The figures indicate numbers of herbarium sheets (including duplicates) entered into Kastikka, the floristic Database of the Botanical Museum (H), up to the end of November 2013 (see p. 76). The initials are according to commonly used collector names on the labels.

Name	Year	Total	*Kk*	*Ks*	*Lim*	*Lm*	*Lp*	*Lps*	*Lt*	*Lv*
Airaksinen, K.	1915	**11**		7	4					
Aschan, M.	1913	**123**	25	56	42					
Aschan, M. & Lindberg, H.	1913	**2**		2						
Axelson, W. M.	1901	**89**		81	8					
Axelson, W. M. & Borg, V.	1901	**356**		68	288					
Borg, V.	1898	**251**	2	249						
Borg, V.	1901	**29**		6	23					
Borg, V. & Rantaniemi, P. A.	1898	**180**	13	167						
Brenner, M.	1863	**316**	10		43	20	185	1	22	35
Brenner, M. & Laurin, N. J.	1863	**1**			1					
Brenner, Th.	1915	**5**			5					
Brotherus, A. H.	1872	**6**				3	3			
Brotherus, A. H. & Brotherus, V. F.	1872	**103**	1		9	19	71		1	2
Brotherus, V. F.	1872	**27**			2	2	23			
Brotherus, V. F.	1885	**292**	2		110	14		43	123	
Brotherus, V. F.	1887	**204**			1	174			29	
Brotherus, V. F.	1909	**1**		1						
Cajander, A. K.	1916	**9**		9						
Eberhardt, K. H.	1869	**2**		2						
Eberhardt, K. H.	1870	**2**		2						
Ekstam, E.	1903	**1**		1						
Elfving, K. O.	1903	**2**		2						
Envald, R.	1880	**16**				1	15			
Envald, R.	1882	**4**		4						
Envald, R.	1887	**12**				4			8	
Envald, R. & Hollmén, H.	1883	**204**			66	1			137	
Envald, R. & Knabe, C. A.	1880	**173**				31	142			
Fellman, J.	1820	**2**						2		
Fellman, J.	1826	**4**					4			
Fellman, J.	1829	**69**	12		23			4	30	
Fellman, N. I.	no year	**19**	1		2	2	7		5	2
Fellman, N. I.	1861	**284**	46	1	28	23	23	1	161	1
Fellman, N. I.	1863	**255**	14		29	13	125		58	16
Fieandt, A. von & Klingstedt, F. W.	1909	**1**						1		
Finnilä, C.	1914	**21**		21						
Fontell, C. W.	1899	**701**			20			552	129	
Forsius, I.	1913	**3**		1					2	
Frey, R.	1913	**33**			16	2	11		1	3
Gadd, J. M. & Nylander, A. E.	1856	**91**						91		
Granit, A. W.	1897	**4**						4		
Granit, A. W. & Poppius, R. B.	1897	**81**			1			80		
Hällström, E. af	1908	**4**		4						
Hällström, E. af	1909	**64**		64						
Hällström, E. af	1910	**129**		129						
Hämäläinen, J. & Juselius, S.	1898	**2**								2
Hirn, K. E.	1898	**2**	2							
Hollmén, H.	1883	**135**			34				101	
Itkonen, T. I.	1914	**8**				8				
Karsten, P. A.	1861	**70**	5	1	7	4	1	2	49	1

Name	Year	Total	*Kk*	*Ks*	*Lim*	*Lm*	*Lp*	*Lps*	*Lt*	*Lv*
Kihlman, A. Osw.	1887	**312**			85	203	18	1	2	3
Kihlman, A. Osw.	1889	**343**			3	2	257	2		79
Kihlman, A. Osw.	1892	**145**			144	1				
Klingstedt, F. W.	1909	**141**						91	50	
Knabe, C. A.	1880	**1**					1			
Kopperi, A. J.	1916	**1**		1						
Kopperi, A. J.	1917	**23**						23		
Krohn, V.	1911	**69**			23		21		20	5
Laurin, N. I.	1863	**1**					1			
Levander, K. M.	1898	**1**							1	
Lindberg, H.	1910	**20**						20		
Lindberg, H.	1913	**156**	32	52	72					
Lindén, J.	1891	**254**			48			1	205	
Malmberg, A. J.	1870	**260**	5		147	3	95	3	1	6
Malmberg, A. J. & Sahlberg, J.	1870	**2**			2					
Merikallio, E.	1917	**1**		1						
Merikallio, E. & Pesola, V.	1917	**1**	1							
Möller, O.	1898	**3**		3						
Möller, V.	1898	**1**		1						
Montell, J.	1899	**519**					519			
Nordström, Å.	1914	**5**		5						
Nyberg, B. A.	1864	**1**		1						
Nyholm, E. Th.	1892	**1**		1						
Nylander, A. E.	1850	**1**		1						
Nylander, A. E.	1856	**1**						1		
Nylander, F.	no year	**66**	2	1	33	3	6		21	
Nylander, F.	1842	**7**	2	2	2				1	
Nylander, F.	1843	**100**			24		35		41	
Nylander, F.	1844	**284**	1	1	66	81	95	1	39	
Nylander, F. & Ångström, J.	1843	**3**			2			1		
Palmén, J. A.	1887	**93**				1	3		1	88
Pesola, V.	1917	**593**		593						
Poppius, R. B.	1897	**5**						5		
Poppius, R. B.	1899	**39**			7			7	25	
Rantaniemi, P. A.	1898	**169**		169						
Rantaniemi, P. A.	1912	**3**		2				1		
Rantaniemi, P. A.	1914	**1**		1						
Rantaniemi, P. A.	1915	**45**		45						
Rantaniemi, P. A.	1916	**4**		4						
Rantaniemi, P. A.	1917	**6**		6						
Rantaniemi, P. A.	1918	**4**		4						
Renvall, A.	1906	**126**					45	10	71	
Sahlberg, J.	1870	**88**			55		31			2
Saxén, U.	1909	**1**		1						
Segerman, U. B.	1916	**4**						4		
Selin, G.	1861	**114**	2		59				23	30
Sipola, A.	1896	**4**		4						
Sipola, A.	1898	**1**		1						
Stjernvall, H.	1891	**3**		3						
Stjernvall, H.	1892	**7**		7						
Torckell, A.	1904	**5**						5		
Torckell, A.	1905	**5**						4	1	
Torckell, A.	1906	**53**						3	50	
Vainio, Edv. A.	1878	**11**		9				2		
Willebrandt, H. von	1898	**1**		1						
Total		**8513**	178	1798	1534	615	1737	966	1408	275

According to the Herbarium Journal and Lindberg (1915) the geologist **Jakob Johannes Sederholm** (1863–1934) donated to H *Hedysarum sibiricum* and *Plantago media* collected from *Lim* in 1914. However, the specimens have not been found since.

The ornithologist **Carl Johan Finnilä** (1892–1918) studied birds in eastern Finnish Lapland, including the easternmost Salla (Frey 1918). He also collected vascular plants during his excursions, 21 specimens from *Ks* Salla (Sallatunturi) in 1914. The teacher **Åke Nordström** (1882–1965) pressed several wetland and fjell plants from *Ks* in 1914.

Toivo Immanuel Itkonen (1891–1968; Fig. 33) travelled for linguistic and ethnographic purposes in the Kola Peninsula in 1912–1914, mostly in the western part, but in 1914 also in *Lm* (Itkonen 1918, Rantala 2010). He collected a few vascular plants from *Lm*.

The pharmacist and amateur botanist **Uno Birger Segerman** (1883–1959) collected many herbarium specimens from *Lps* in 1932, but visited the area also earlier, and at least four specimens were collected by him in 1916. His specimens are mostly in OULU.

The forestry professor and later politician **Aimo Kaarlo Cajander** visited *Ks* Salla (Pyhäkuru) in 1916 and collected eight vascular plant specimens there.

Alvar Johannes Kopperi (1894–1943) was a zoologist and teacher, who worked in Pechenga altogether three years in 1917–1918 and after the war in 1920–1921 (Roivainen 1943). He collected herbarium specimens from *Lps* in the 1920s and a few specimens also earlier, at least in 1917 (Kopperi 1927). In 1916 he visited in *Ks* (Salla).

Vilho Aleksanteri Pesola (1892–1983; Fig. 34) studied calcareous rocks in Finland, *Karelia ladogensis* and *Regio kuusamoënsis*, and in 1917 carried out field work in north-eastern Salla. In 1917 he and the ornithologist **Einari Fredrik Merikallio** (1888–1961) received a grant to study the most remarkable areas in Kuusamo for nature protection, and they visited both the Oulanka area (at present in the Karelian Republic) and Kutsa area (at present in Murmansk Region) (Haataja 1896). Pesola collected hundreds of specimens of vascular plants and lichens, almost all now in H, and published his vascular-plant results as an extensive monograph on the impact of limestone on plants (Pesola 1928) and in a number of shorter papers (e.g. Pesola 1918, 1952; see also Ulvinen 1996).

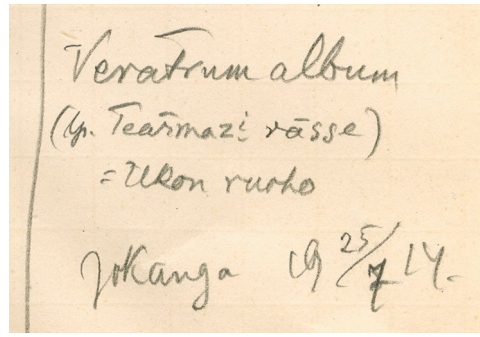


Fig. 33. A label by T. I. Itkonen (*Veratrum album*, *Lm*, Jokanga, 1914; H 226880).

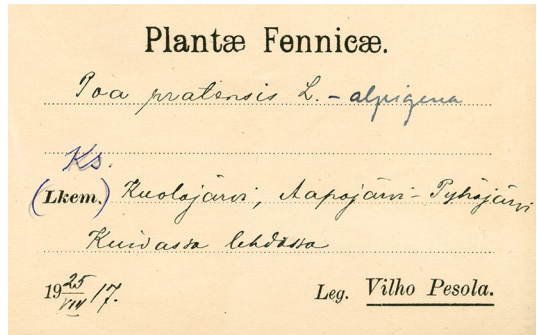


Fig. 34. A label by V. Pesola (*Poa alpigena*, *Ks*, Kuolajärvi, 1917; H 18289).

After the First World War Finnish excursions to the Kola Peninsula almost ceased, except for the Pechenga area, which was annexed to Finland in 1920–1944. In the 1930s Finnish botanists studied quite intensively areas which at that time belonged to Finland: *Lapponia petsamoënsis*, the easternmost corner of *Lapponia inarensis* (Jäniskoski), and the eastern part of Salla parish in *Kuusamo (Regio kuusamoënsis*). After the Second World War Murmansk Region became closed to Finnish scientists for 30 years. Since 1975 participation by Finnish botanists in some excursions to the area by Russian botanists has once more been allowed, and travelling in the area in now easier, as in other parts of modern Russia.

Discussion

Travelling from Finland to the Kola Peninsula was not so simple before the First World War. There were seven possibilities: 1) From Helsinki by road and canal to Moscow, Vologda and Arkhangelsk, and from there by ship to ports on the peninsula. 2) From Helsinki overland to Sortavala, Petrozavodsk and the harbour at Sumskiy Posad on the SW coast of the White Sea, and from there by ship to harbours on the south shore of the peninsula, usually via the Solovetskiy Islands, and sometimes further via Kem. 3) From Oulu to Hyrynsalmi parish and to the White Sea coast, mostly to Kem, and from there by ship or on foot to Kandalaksha. 4) From Oulu to Kuusamo or Kuolajärvi (at present Salla) parish and to the coast at Kovda or Knyazhaya Guba and from there to Kandalaksha. 5) From Inari Lapland along the Lotta and Tuloma Rivers to Kola Town. 6) From Inari Lapland over Lake Inarijärvi and along the Paz River to Lake Salmijärvi and from there to Pechenga. 7) From north Finland to north Norway and from Kirkenes or Neiden across the sea to Pechenga or the Rybachiy Peninsula. Often a different route was used for the return journey. Travel in just one direction would take at least two weeks, and sometimes more than a month. Roads in northern Finland were bad and travel by horse from inn to inn took time. From Kuusamo and Salla the journey across the wilderness to the coast was on foot and by boat, and many porters and rowers were needed. Sailing across the White Sea on small vessels might be difficult and even risky because of storms.

Most travellers were 25–30-year-old men with great enthusiasm for expeditions (and adventure). Most of them later entered a non-scientific career, e.g., as teachers, but others maintained their scientific interest and continued travelling with further visits to the peninsula or even more remote areas in Russia and other parts of the world (Uotila 2012). Usually they received small travel grants from the *Societas pro Fauna et Flora Fennica* (14 grants in all; Elfving 1921), and sometimes from other societies or the University, but some travelled at their own expense, and a few sold collected specimens to cover expenses. A few even had to borrow money for expeditions. Some expeditions had to be curtailed because money ran out.

Most travellers collected many herbarium specimens (Table 1). Even some entomologists collected quite numerous specimens of vascular plants in addition to their own group. Similarly some botanists collected specimens of invertebrates during their expeditions (see Poppius 1905, Paukkunen & Kozlov 2012).

N. I. Fellman published two *exsiccatae* series and F. Nylander's specimens were distributed in Fries' *exsiccata* series and donated to St. Petersburg. He also published all vascular plant finds known from the peninsula, W. Nylander did the same for lichens (including many species new to science) and Karsten likewise for other fungi (also many species new to science). So the results of the expeditions during the first half of the century were extensively published. Brotherus and Saelan (1890) collected information on moss finds from the area.

A good deal was published also of the botanical results from the expeditions in the second half of the century. Moreover thousands of specimens were added to the Botanical Museum of Helsinki (H), and some also to other Finnish herbaria, to Turku (TUR; TUR-A), Jyväskylä (JYV), Kuopio (KUO), Oulu (OULU) and Vaasa (VOA). The numbers of vascular-plant specimens counted for Table 1 from the Kastikka database cover only part of the material in Finnish herbaria. Furthermore, a large proportion of the specimens have rather little and even then inaccurate information on their labels, and it is impossible to say how many of the specimens included represent duplicates. No effort has been taken to exclude duplicates from the table, but the number of different collections is much less. For instance 136 sheets in the Kastikka database collected in 1870 from *Lim* by Malmberg include only 56 species and 65 different specimens (labels), and 130 sheets in the database collected in 1880 from *Lp* by Envald & Knabe include 66 taxa and 81 different collections. The specimens from these collectors are by far the richest in duplicates. Some concept of the large number of duplicates can be obtained from the Herbarium Journal of H, where it is often mentioned, e.g., the number of species and number of specimens of an accession. A rough esti-

mate indicates that ca. 15 % of the sheets in H from the Kola Peninsula are duplicates.

Because of selling and exchange of duplicates many herbarium specimens collected during the Finnish expeditions to the Kola Peninsula can be found in many European herbaria. The largest numbers are in Copenhagen (C), St. Petersburg (LE) and Stockholm (S)[4]. They were also given to or exchanged with some private herbaria, which later became incorporated into public collections, and in this way the number of duplicates increased in them, e.g., in H. Altogether 45 specimens collected by 12 persons from the Kola Peninsula were distributed in *Plantae Finlandiae Exsiccatae*, with the number of copies being 25 (see Väre 2010).

From specimens, publications and unpublished manuscripts the floristic information on vascular plants and mosses was collected in the catalogue *Herbarium Musei fennici* (Saelan & al. 1889, Bomansson & Brotherus 1894) and on vascular plants in *Conspectus florae fennicae* (Hjelt 1888–1926). At the end of the 19th century the number of vascular-plant taxa (some hybrids included) from each province was as follows: *Lim* 485, *Lv* 385, *Lp* 364, *Lt* (before separation of *Lps*) 385, *Lm* 318 (Kihlman 1899). In the 20th century serious expeditions to the area were few and published itineraries even fewer. However, many specimens were still collected and new species for provinces were added. In 1910 the corresponding figures (hybrids excluded) were: *Lim* 481, *Lv* 344, *Lp* 383, *Lt* 392, *Lm* 303 (Lindberg 1911).

Despite this century-long activity no proper vascular-plant flora from the area was ever written by Finnish botanists, not even later from the Pechenga area, which belonged to Finland in 1920–1944 (without Rybachiy Peninsula 1939–1944). However, A. Kalela seems to have collected available data for a flora of *Lapponia petsamoënsis* (M. Piirainen, pers. com.). Instead, a lichen flora was prepared from *Lps* by Räsänen (1943).

During the Soviet period, work on the Kola Peninsula by Finnish botanists was largely neglected. At that time it was difficult for Russian botanists to study specimens in Finnish herbaria and the number of duplicates from Finnish collections was relatively low in the Komarov Herbarium at St. Petersburg (LE). The language barrier hindered regular consultation of Finnish publications, even though they were often written in Latin or German.

In the Flora of Murmansk Region (Gorodkov 1953–1954, Pojarkova 1956–1966) the results of Finnish studies were scarcely mentioned (Hiitonen 1958b), and this inspired I. Hiitonen to prepare an overview of Finnish scientists' botanical exploration and results (Hiitonen 1958a). Unfortunately the paper was written in Finnish and in a periodical largely unknown in the USSR, so that it remained unknown outside Finland. The incomplete use of Finnish knowledge of the area is also evident from the information received from the Russian collaborators for *Atlas Florae Europaeae* in the 1970s and 1980s. At that time ca. 30 % of dots were added by the Secretariat in Helsinki. On the other hand, Shlyakov (1961) gives proper citations of publications by V. F. Brotherus (Brotherus 1886, 1923 and Brotherus & Saelan 1890) and Dombrovskaya (1970) of the main lichenological papers.

The situation was similar in the Karelian Republic, but since the 1980s local botanists have used Finnish publications and specimens extensively. The same development has begun in Murmansk Region (e.g., Shlyakov & Konstantinova 1981, Alm & al. 1997, Kotiranta & al. 1998, Urbanavichus & al. 2008, Fadeeva & al. 2011, Blinova & Uotila 2011, 2012, 2013, Blinova & Koistinen 2013).

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[4] The labeling of duplicate specimens has resulted in some changes from a collector's name to the name of the person who received the material or determined the specimen. Such mistakes have been corrected in the specimens and database at H, but may occur in the duplicate material in other herbaria.

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Gazetteer of localities

The following alphabetic list of localities includes all the names (mostly from Murmansk Region) mentioned in this paper. The accepted names are printed in bold (in Cyrillic in parentheses) and synonymous names and spellings include mostly Finnish and sometimes Swedish or Norwegian equivalents. The biogeographic province (in italics) or country/region (if not Murmansk Region) is given for each accepted name.The province names in parentheses indicate changes according to Fig. 3).

Ainov Islands (Айновы острова), *Lps*
Aleksandrovsk (Александровск), at present **Polyarnyy** (Полярный)
Arkhangelsk (Архангельск) city, Arkhangelsk Region
Arkangeli = Arkhangelsk
Barents Sea (Баренцево море)
Barentsinmeri = Barents Sea
Chavanga (Чаваньга) village, *Lv*
Chibinä = Khibiny Mts.
Chiltald (Чилталд) mount, *Lim* (*Lt*)
Chuna-tundra (Чунатундра), *Lim*
Dvina (река Двина) river, Arkhangelsk Region
Ekostroff = Jokostrov
Fiskarhalvön = Rybachiy Peninsula
Gavrilovo (Гаврилово) village, *Lm*
Girvas (озеро Гирвас) lake, *Lim* (*Lt*)
Gridino (Гридино), Republic of Karelia (*Kpoc*)
Gulf of Kola (Кольский залив), *Lt*
Gulf of Pechenga (Печенгский залив), *Lps*
Heinäsaaret = Ainov Islands
Hiipinä = Khibiny
Hirvasjärvi = Girvas
Imandra (озеро Имандра) lake, *Lim*
Imandrajärvi = Imandra
Imanterojärvi = Imandra
Inari village, *Finland* (*Li*)
Jäniskoski (Янискоски) rapids, *Li* (Russia)
Jeretik (Еретик), *Lt*
Jokanga (Иоканга) village, *Lm*
Jokanga (река Иоканга) river, *Lm*
Jokonsk = Jokanga
Jokostrov (Экостров) village, *Lim*
Kalastajasaarento = Rybachiy Peninsula
Kandalakscha = Kandalaksha
Kandalaksha (Кандалакша) town, *Lim*
Kandalax = Kandalaksha
Kannanlahti = Kandalaksha
Kantalaks = Kandalaksha
Kantalahti = Kandalaksha
Kashkarantsy (Кашкаранцы) village, *Lv*
Kaškarantsi = Kashkarantsy
Kaskiranta = Kashkarantsy
Keinjäyr = Koyniyjavr
Kem (Кемь) town, river, Republic of Karelia (*Kpoc*)
Kemi = Kem
Keret (Кереть) village, Republic of Karelia (*Kk*)
Khibiny (Хибины) mountains, *Lim*
Kieretti = Keret
Kildin Island (остров Кильдин), *Lt*
Kiltinänsaari = Kildin Island
Kipinä = Hiipinä
Kirkenes, Norway
Kirkkoniemi = Kirkenes
Knäsa = Knyazhaya-Guba
Knäsäkuba = Knyazhaya-Guba
Knäscha = Knyazhaya-Guba
Knäsö = Knyazhaya-Guba
Knyazhaya-Guba (Княжая Губа) village, *Kk*
Kola (город Кола) town, *Lt*
Korvatunturi (Корватунтури**)** fjell, *Lt/Lps*
Kouta = Kovda
Kovda (Ковда) village, *Kk*
Koyniyjavr (Койнийявр) lake, *Lv*
Krasnij Sholk = Krasnyy cape
Krasnyy cape (мыс Красный), *Lp*
Kuola = Kola Town
Kuolajärvi (Куолаярви), at present **Salla** (Салла)
Kuolankaupunki = Kola Town
Kuolanvuono = Gulf of Kola

Kuolla = Kola Town
Kuopio Town, Finland
Kuusamo village, Finland (*Ks*)
Kusomen = Kuzomen
Kuzomen (Кузомень) village, *Lv*
Lotta (река Лотта) river, *Lt/Lps*
Lovozero (Ловозеро) lake, *Lim* (*Lm*)
Lovozero (Ловозерские горы) mountains, *Lim* (*Lm*/*Lim*)
Lowosersk = Lovozero
Luttojoki = Lotta River
Luujärvi = Lovozero
Luutunturi = Lovozero Mts.
Luyavr-Urt = Lovozero Mts.
Monche-tundra (Мончетундра), *Lim*
Näätämö = Neiden
Neiden village, Norway
Nikolo-Korlesky Monastery (Николо-Корельский монастырь), Arkhangelsk Region
Nota (река Нота) river, *Lt*
Notozero (Нотозеро) lake, *Lt*
Nuortijärvi = Notozero
Nuortijaur = Notozero
Nuortijoki = Nota River
Nuotjaur
Nuotjok
Oleniy (Олений), *Lv*
Oleniza = Oleniy
Orlov (мыс Орлов) cape, *Lp*
Oulu Town, Finland (*Ob*)
Paatsjoki = Paz River
Paaz river = Paz River
Pasvig elf = Paz River
Pasvikselv = Paz River
Patsjoki = Paz River
Patsojoki = Paz River
Paz (река Паз) river, *Lps*
Pechenga (река Печенга) river, *Lps*
Pechenga (Печенга) village, *Lps*
Peisen = Pechenga
Petrozavodsk (Петрозаводск), Republic of Karelia (*Kol*)
Petsamo = Pechenga
Petsamojoki = Pechenga river
Petsamonvuono = Gulf of Pechenga
Pyalitsa (Пялица), *Lp*
Polyarnyy (Полярный) town, *Lt*
Ponoi = Ponoy
Ponoijoki = Ponoy river
Ponoy (Поной) village, *Lp*
Ponoy (река Поной) river, *Lp*
Pyhäkuru (Пюхякуру) gorge, *Ks*
Pyhätunturi = Sallatunturi
Rybachiy Peninsula (полуостров Рыбачий), *Lps/Lt*
Salla (Салла) village, *Ks*
Sallatunturi (Саллатунтури) fjell, *Ks*
Salmijärvi (Сальмиярви) lake, *Lps*
Severodvinsk (Северодвинск) town, Arkhangelsk Region
Solovetskiy (Соловецкий) island, Arkhangelsk Region
Solovetski = Solovetskiy
Sordavala = Sortavala
Sortavala (Сортавала) town, Republic of Karelia (*Kl*)
Suma = Sumskiy Posad
Sumskiy Posad (Сумский Посад) harbour, Republic of Karelia (*Kpor*)
Svir (река Свирь) river, Leningrad Region
Svjatoiniemi = Svjatoy Nos
Svjatoy Nos (Святой Нос) cape, *Lm*
Swir = Svir River
Swjätoj-nos = Svjatoy Nos
Syväri = Svir River
Teriberka (Териберка) village, *Lm*
Tschavanga = Chavanga
Tsunatundra = Chuna-Tundra
Tsunatunturi = Chuna-Tundra
Tšuintunturi = Chuna-Tundra
Tuadash (Туадаш тундры) fjell, *Lim* (*Lt*)
Tuatasch = Tuadash
Tuloma (река Тулома) river, *Lt*
Tulomajoki = Tuloma river
Tuntsajoki (Тунтсайоки) river, *Ks*
Turiy (полуостров Турий) cape, *Lv*
Turjanniemi = Cape Turiy
Tuulomajoki = Tuloma River
Umba (Умба), *Lim*
Umpi = Umba
Umpjawr = Umbozero
Umbozero (Умбозеро) lake, *Lm* (*Lim*)
Umptek = Khibiny Mts.
Ura-Guba (Ура-Губа) bay, *Lt*
Utsjoki village, *Li* (Finland)
Uura = Ura-Guba
Vadsö town, *Norway*
Vaitolahti = Vayda-Guba
Vayda-Guba (Вайда-Губа) village, *Lps* (/*Lt*)
Varangerfjord *Norway*
Varangerinvuono = Varangerfjord
Varsina = Varsino
Varsinsk = Varsino
Varsuga = Varzuga
Varzino (Варзино) village, *Lm*
Varzuga (Варзуга) village, *Lv*
Vesisaari = Vadsö
Vienanjoki = Dvina River
Vienanmeri = White Sea
Viertsoivi (Виертсоиви) fjell, *Lim* (*Lt*)
Viipuri = Vyborg
Vologda (Вологда) city, Vologda Region
Voroninsk = Voronje
Vronoje (Воронье), *Lm*
Vyborg (Выборг) town, Leningrad Region
Warsinsk = Varsino
Warsuga = Varzuga
White Sea (Белое море)
Woroninsk = Voronje