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durchforscht und kartiert wird (Sauna). Weiter zu den Südbergen Kotkapahta und Linkkapahta (mit Arten wie *Erysimum hieraciifolium* und *Lappula deflexa*; an ähnlichem Ort der Umgebung der einzige europäische Fundort von *Dryopteris fragrans*). Zurück nach Utsjoki. Abends Diskussions-sitzungen.

26. Juli: Fahrt nach Süden zu einem der grossen, von Ruuhijärvi untersuchten Palsamoore unter dem Petsikkotunturi, dessen 2–4,5 m hohe Palsen das ganze Jahr Eis enthalten, dann zurück über Kaamanen nach Inari. Hier fand das letzte gemeinsame Essen mit den finnischen Führern statt, denen die ausländischen Teilnehmer ihre grosse Leistung herzlich verdankten. Dann führte uns der Autobus gegen Westen an die norwegische Grenze, die am Inarijoki (Anarjokka) nahe seiner Vereinigung mit dem Karasjokka (gibt den Tenojoki) erreicht wurde. Dort wurde, nahe dem norwegischen Dorf Karasjok, die Exkursion von den norwegischen Führern übernommen und abends von dem Lappen Per HÄTTA mit Lappengesängen (Joiking) begrüsst.

## Part II: North Norway

by O. I. RØNNING

The Norwegian part of the excursion started on the Finnish-Norwegian border near the river Anarjokka. From Utsjoki in Finland the excursion went into Norway, crossing the border a little south of the junction of the Anarjokka and Karasjokka rivers, where they arrived at 7 p.m. on July 26. Here the excursion was taken over by the Norwegian leaders, professor Rolf NORDHAGEN, Oslo, professor Olav GJÆREVOLL, Mrs. GJÆREVOLL and associate professor Olaf I. RØNNING, Trondheim.

The first stop was made just after the crossing of the border where the vegetation along the banks of the river Anarjokka was examined. On gravel as well as in scree slopes a rich flora was found with plants like *Thymus serpyllum* ssp. *tanaënsis*, *Astragalus frigidus*, *Agropyron mutabile*, *Cerastium glabratum*, *Luzula parviflora*, *Polemonium acutiflorum*, *Rubus arcticus* and *Viscaria alpina*. Of special interest was the occurrence of *Elymus arenarius*.

After this short trip the excursion group was taken to Karasjok, for night lodging in the hotel (Karasjok Gjestgiveri). Karasjok is mainly a Lapp

village with about 700 inhabitants. The surroundings are partly covered with pine forest mixed with birches.

July 27: After breakfast the excursion started at 9 a.m. in a bus that for the next ten days was to take the excursion to the different places it was going to visit.

Leaving Karasjok we travelled northwest towards the mountain plateau of Finnmarksvidda. The major part of this slightly rolling interior plateau averages an altitude of about 400 m above sea level. It is a vast, rather desolate-looking area of heath, bogs and lakes with a flora comparatively poor in species. The greater part of the plateau is situated above the tree line. The predominant species are for example *Betula nana*, dwarfed *B. tortuosa*, *Salix glauca*, *Vaccinium myrtillus*, *V. uliginosum*, *Empetrum hermaphroditum* and a rich lichen flora mostly consisting of the reindeer lichens, *Cladonia rangiferina*, *C. silvatica* and *C. alpestris*. Of other common species could be mentioned *Calamagrostis lapponica*, *Cornus suecica*, *Pedicularis lapponica*, *Trientalis europaea* and others. The bog and fen vegetation comprise mostly *Carex fusca*, *C. rotundata*, *C. canescens*, *C. rostrata*, *Eriophorum vaginatum* and in some places also *E. russeolum* in the fen areas, and in the bogs a great abundance of *Rubus chamaemorus*.

After having crossed the mountain plateau we reached the little village of Skoganvarre. A little south of the village the pine forest appears again. The road follows the river Lakselv almost straight north. Along the road in south- and westfacing steep slopes several warmth-demanding species were seen of which could be mentioned *Fragaria vesca*, *Erysimum hieraciifolium*, *Arabis hirsuta*, *Agropyron caninum*, *Poa nemoralis* and *Lappula deflexa*. Mostly they also are accompanied by a number of alpine species as *Agropyron latiglume*, *Draba daurica*, *Cerastium alpinum*, *Potentilla nivea*, *Saxifraga cernua* and *S. tenuis*.

Lunch was served in the hotel at Lakselv (Lakselv Gjestgiveri). At 2 p.m. departure for the river Brennelv. Along the river, near the shore line, a rich salt and brackish marsh vegetation of a specially arctic type was seen. This vegetation has a distinct zonal distribution with very typical and distinct associations. The lower zone is dominated by *Puccinellia phryganodes* and *Triglochin maritimum* and the middle zone by *Puccinellia phryganodes*, *Carex subspathacea*, *Triglochin maritimum*, *Stellaria humifusa* and *Juncus bufonius*. The third and highest belt is also the driest and is dominated by *Carex subspathacea*, *C. glareosa*, *Potentilla egedii*, *Gentiana detonsa*, *Agrostis stolonifera*, *Festuca rubra* and *Juncus bufonius*. In addition to these a very interesting plant society with *Hippuris tetraphylla* and *Scirpus uniglumis* was seen. It grows in brackish ponds. The excursion was undertaken at low water. But

before leaving the marshes the members met with an almost dramatic high water flow. Within some minutes the lower and greater part of the vegetation was overflowed by the tide water.

The last part of this trip was a walk across the highest beaches with dwarf shrubs and wind eroded bushes, mostly *Juniperus communis*. At 6 p.m. departure, and the main road, highway 50, was followed to Børselv where we arrived at about 7 p.m. Lodging was provided at the boarding-school of Børselv, where we were going to stay for two nights.

July 28: At 8.30 a.m. an easy walk started to the north side of the river Børselv. Along the lower part of the river and on the strand flats a peculiar and very interesting vegetation was seen with communities predominated chiefly by *Carex bicolor*, *Carex microglochin*, *Scirpus pumilus*, *Primula finmarchica*, *Thalictrum alpinum* and *Agrostis capillaris*. *Scirpus pumilus* is in Scandinavia only known from a few localities in Northern Norway. The communities here are influenced by the sea at high tide. Along the beaches also a great number of alpine plants were found to which great attention was paid.

After having studied this characteristic vegetation on the beaches and river flats, the members of the excursion went to the north side of the river Børselv, where there is a belt of dolomite mountains with a very characteristic vegetation of calciphilous species. The most conspicuous plant community on the exposed plateau or on the ridges are the big mats with *Dryas octopetala* and *Carex rupestris*, accompanied by a great number of other species, such as *Antennaria dioica*, *Carex capillaris*, *Leuchorchis albida*, *Astragalus alpinus*, *Thalictrum alpinum*, *Kobresia myosuroides*, *Salix reticulata*, *Selaginella selaginoides* and others. Relatively large areas display a mosaic of bare dolomite or dolomite polygons bordered with *Dryas octopetala*. In screes and loose gravel interesting species like *Arenaria norvegica*, *Braya linearis*, *Epipactis atrorubens* and *Veronica fruticans* were observed.

The area of Børselv is situated close up to the polar tree limit, but nevertheless a rather rich flora is met with both in the valleys and in the mountains. Plants like *Antennaria alpina*, *Arabis alpina*, *Arctostaphylos uva-ursi*, *Armeria sibirica*, *Dianthus superbus*, *Gentiana aurea*, *Melica nutans*, *Polemonium coeruleum*, *Saussurea alpina*, *Trollius europaeus*, *Veronica longifolia*, etc. should emphasize this.

In the evening an excellent dinner was given by the County of Kistrand, and through the courtesy of the Børselv Hunting and Fishing Association the excursion members were invited to try their luck at salmon fishing during the late evening in the Børselv river. Most of the members had more

luck in finding arctic plants along the beaches than in the noble art of fishing.

July 29: After breakfast in Børselv the excursion continued at 8.30 a.m. From Børselv we followed highway 50 back to Lakselv and then on the west side of the great Porsangerfjord. A short stop was made at Valddak, unfortunately this time in heavy rain. Here again salt marsh communities were studied, mostly with the same zonation as seen at Brennelv. In small ponds was seen an interesting society characterized by *Scirpus uniglumis* and *Hippuris tetraphylla*, and surrounded by a *Carex mackenziei*-society.

At 11 a.m. the bus was left a few hours and a military vehicle took us to the northernmost pine forest of the world in the valley of Stabbursdalen 70° 18' N. The pine in Northern Norway is *Pinus silvestris* L. ssp. *lapponica* (Fr.) Hartm. A few pines are found as far north as 70° 29' at the same side of the fjord.

The vegetation of the bottom layer is poor in species and characterized by *Vaccinium myrtillus*, *V. uliginosum*, *V. vitis-idaea*, *Empetrum hermaphroditum*, *Deschampsia flexuosa* etc. and *Hylocomium*, *Polytrichum*, *Cladonia*, and *Stereocaulon* species.

After the visit to Stabbursdalen the journey continued to the little harbour of Russenes. Here we left the bus and the ship «Ingøy» took us to the fishing harbour of Honningsvåg at Magerøy. The boat trip lasted for about 4 hours, and lunch was served on board.

After arrival at Honningsvåg, where we were to stay the next two nights, dinner was served at the "Grand Hotel". The dinner was given by the Finnmark county and hosts were representatives of the governor.

At about 11 p.m. a bus trip was arranged to take us to North Cape to see the midnight sun at the northernmost outpost in Europe. Unfortunately the weather was rather cloudy and the midnight sun was not seen, but the landscape and magnificent sceneries were admired.

At about 2 a.m. we returned to Honningsvåg.

July 30: This day was used to a study of the dolomite flora on the northern part of Magerøy at the mountain Duken (230 m above sea level), a mountain plateau south of North Cape. At 11 a.m. we arrived in this area, which is substantially built up by limestone, dolomite and loose schists and strongly weathered. Considerable amounts of disintegrated gravel in situ occur. The mountain plateau drops towards east steeply to the fjord in a scree consisting of loose schist gravel.

What has made Duken a famous mountain for botanists is the occurrence of *Arenaria humifusa* and *Braya purpurascens*. These westarctic species

belong to a northern group of mountain plants in Scandinavia and have only few localities there. *Braya purpurascens* has on mountain Duken its only locality on the European mainland. It is known from Svalbard, Novaja Zemlja and Northern Ural. *Braya purpurascens* grows in scree slopes in the eastfacing steeps as well as on the plateau itself.

Besides these extremely rare species many common arctic-alpine plants are found here, especially in the *Dryas octopetala*-heaths. Here we only bring to mention interesting species like *Arenaria norvegica*, *Braya linearis*, *Carex glacialis*, *C. atrofusca*, *C. microglochin*, *Euphrasia lapponica*, *Salix reticulata*, *Juncus arcticus*, etc. Among Scandinavian botanists it is commonly presumed that parts of the island of Mageröy have not been wholly covered by ice during the last glaciation.

During the excursion the weather condition was not bad, but a strong wind swept the plateau the whole day, and this wind, better than many words, could explain the hardness of the flora and the many erosion phenomena occurring.

July 31: Before the boat returned to Russenes and highway 50, a short trip to the mountains about four km north of Honningsvåg was arranged. This trip lasted only about three hours. The mountains showed a flora closely related to the common flora on Mt. Duken, but also mixed with species like *Juncus arcticus* and *Silene maritima*.

The last part of the day was more or less dedicated to travelling. The boat left Honningsvåg at 12.30 p.m., and lunch was served on board. We arrived at the harbour of Russenes at about 4 p.m., where we got on the bus again to bring us to the last part of the excursion. The journey continued along highway 50, and after having crossed the low mountain passage between Porsangerfjord and Repparfjord, we entered the Repparfjord valley, turned left and followed the valley southwards. The valley is covered with birch forests. Leaving the valley the road ascends to about 300 m above sea level, crossing the rather remote mountain plateau Seinalandet and a little later descending towards the big Altefjord with the Alta valley and the estuary of the Alta river. On this rather long journey lasting for hours, several short stops were made for botanizing and photographing sceneries and at last, but not least, the Lapps.

In Alta highway 50 was left and a road was followed to the hotel of Gargia (Gargia fjellstue) for lodging.

August 1: This day departure was at 8 a.m. and the road was followed back to Alta and highway 50. The road runs along the fjord, and the first stop was made in Talvik where the vegetation near Jansnes was studied. Along the sea shore a flourishing vegetation is found with species like



*Heracleum laciniatum*, *Allium sibiricum*, *Thalictrum rariflorum*, *Gentiana aurea*, *Gentiana detonsa* and especially *Conioselinum vaginatum*. This last species is here close to its western and southern limit and is one of a north-eastern element in the Scandinavian flora, which *Allium sibiricum* also belongs to.

The journey continued towards west and south, and a stop was made at Burfjord, where we lunched at the hotel (Burfjord Gjestgiveri).

A few kilometres south of the boarding house on the gravel beaches of the Burfjord river, one of the two known localities of *Papaver lapponicum* was studied. Together with this poppy also other alpine plants like *Astragalus alpinus* occur there.

The longest stop this day was made at the Kvænangen Mts. about 500 m above sea level, 80 km south of Burfjord. Here, on this passage of Kvænangen Mts., extraordinarily much snow accumulates. The vegetation is characterized by acidophilous snow bed vegetation with a very pronounced zonation due to the differences in the thickness and duration of the snow cover. This is especially typical in dry slopes bordered with *Vaccinium myrtillus* heaths and transition zones to the lower societies dominated by *Alchemilla alpina*, *Deschampsia flexuosa*, *Salix herbacea*, *Gnaphalium supinum* and *Athyrium alpestre*. In wet places a meadow society characterized by *Ranunculus acer* and *Viola biflora* replaces the *Deschampsia flexuosa* communities.

From Kvænangsfjell we followed again highway 50 and now as far as the Nordreisa valley. From here we went up the flat valley along the river to Sappen, and were lodged in the boarding school, where we were to stay for the next three nights.

August 2: The Nordreisa valley is about 100 km long and for the greater part covered with pine forest at least 70 km upwards. The bottom of the valley is very flat.

The first day was spent on a rather long mountain trip to Mt. Javreoaive. We started early in the morning, the first few kilometers eastwards by bus to the starting point, but afterwards only on foot.

Mount Javreoaive is 1000–1200 m high and is among botanists known as one of the botanically richest mountains in Scandinavia. It is especially known because of its famous arctic-alpine flora. It is built up by mica schists easily disintegrating and offering excellent condition for the plants.

The ascent was rather easy through a broad belt of subalpine birch forest. Differences in this subalpine vegetation are mostly caused by the variation in snow cover and moisture.

On acid soils with a sufficient snow cover *Vaccinium myrtillus*, *Deschampsia flexuosa* and *Dryopteris linneana* are predominating species together with conspicuous species like *Cornus suecica*, *Solidago virgaurea* and others. Attention was also paid to the luxuriant community met with in localities with deep circumneutral mould with a good supply of water. The vegetation there was first and foremost characterized by taller plants like *Geranium silvaticum*, *Lactuca alpina*, *Saussurea alpina*, *Trollius europaea*, *Alchemilla glomerulans*, *Milium effusum*, *Cirsium heterophyllum*, *Ranunculus acer* and *Myosotis silvatica*.

Above the tree line the vegetation changes and we met the beautiful and very interesting alpine flora to the full. The vegetation is strongly influenced by the calcareous soils. Large heaths are covered with *Dryas octopetala* and *Cassiope tetragona* of which each species is predominating in its distinct associations. Together with them grow species like *Armeria sibirica*, *Pedicularis flammea*, *Platanthera oligantha*, *Rhododendron lapponicum*, *Astragalus frigidus* and *Saxifraga hieraciifolia*.

On exposed ridges with thin snow cover and heavy wind erosion communities with *Carex glacialis*, *C. nardina*, *Minuartia rubella*, *Campanula uniflora* and *Antennaria carpathica*, etc. occurred.

In fens rich in species were seen *Carex bicolor*, *C. microglochin* and *C. misandra* and in snow beds and solifluction terraces *Erigeron unalaschkense*, *Luzula arctica*, *Pedicularis hirsuta*, *Ranunculus nivalis*, *Saxifraga foliolosa* and *Stellaria crassipes* occurred.

Of special interest are the snow bed communities. Great areas with calcareous soil are covered with snow beds characterized by *Salix reticulata*, *Saxifraga oppositifolia* and *Carex misandra*, whereas in more extreme localities it is replaced by a society dominated by *Salix polaris*, etc.

Another snow bed community is physiognomically dominated by *Ranunculus nivalis* and *R. sulphureus*, and it may be the most interesting of the snow bed communities mentioned.

Besides the associations mentioned, the Javreoaive mountain has a great deal of species very rare in Scandinavia. We should here only bring to mention exclusive species like *Antennaria carpathica*, *A. porsildii*, *Arnica alpina*, *Carex arctogena*, *C. holostoma*, *Erigeron unalaschkense*, *Hierochloë alpina*, *Luzula arctica*, *Pedicularis hirsuta*, *Rhododendron lapponicum*, etc. which together with other species are all of great phytogeographical importance in Scandinavia.

The last part of the trip was a rather steep descent from the northern part of the Javreoaive (Bihka Hihtama) down to the valley of Juvusvagge. This



descent was both difficult and a little dangerous, but the participants succeeded in getting down without accidents of any kind.

The mountain trip started at 9 a.m. and arrival at the boarding school was between 9 and 10 p.m., so that the trip lasted for more than twelve hours. Fortunately we were favoured with excellent weather conditions, no wind, excepted on the mountain top, and bright sunshine, otherwise it would have been impossible to carry through this long excursion in a remote high mountain area.

August 3–4: After a fatiguing excursion like this, the program for the next two days was of an easier character. One of the two days left was at free disposal for the members of the excursion. The idea was that the participants should have a possibility to study vegetational problems of special interest to themselves. We got the impression that this arrangement was well received.

During these two days, half of the members of the excursion took a trip in riverboats up the river Reisa from Bilto to Nedrefoss, a distance of about 20 km. For this trip were used the long, narrow riverboats characteristic of the northern districts of Scandinavia. The upper part of the Reisa valley is a magnificent canyon-like valley with a luxuriant subalpine birch forest vegetation. Common species here are *Polemonium acutiflorum*, *Milium effusum*, *Luzula parviflora*, *Valeriana sambucifolia*, *Trollius europaeus*, *Cirsium heterophyllum*, *Pedicularis sceptrum-carolinum* and the in Scandinavia north-eastern species *Agropyron mutabile*. On the gravelly river bars numerous alpine species occurred, among which mention may be made of *Myricaria germanica*, *Trisetum subalpestre* and *Melandrium angustiflorum*. The last is only known from a very restricted area in Scandinavia. One day also the rare orchid *Epipogium aphyllum* was found.

The distance between the starting point Bilto and the final stop at Naustenes was about 20 km, and the whole trip was made in riverboats. Stops were made at the beautiful waterfall Mollius and on several gravelly river bars.

The trip itself was of importance not only botanically, but also as relaxation with an interesting mixture of plants, nature and adventure.

The next day the second party was on this excursion, and the first had the day at their own disposal.

August 5: Departure from Sappen at 8 a.m. At first along the road to highway 50 and then to Bakkeby on the south side of Reisafjord. Here the mountain Jövaren was ascended. It is built up by limestone with steep precipices towards NE. Here especially heaths with *Dryas octopetala* and *Kobresia myosuroides* were studied. In gravelly places many high mountain

plants growing in heavily wind-eroded places were found, as for example *Arenaria norvegica*, *Braya linearis*, *Minuartia rubella*, *Draba fladnizensis*, *D. nivalis* and *Carex nardina*.

From Mt. Jövaren we drove back again to highway 50, following it to the ferry crossing the Lyngenfjord at Olderdalen. On the way westwards one of the most magnificent sceneries in Northern Norway, the Lyngen Alps, were seen. It is a jagged mountain range with numerous glaciers along the whole western side of the fjord.

While we were waiting for the ferry, lunch was served at the hotel in Olderdalen (Olderdalen Gjestgiveri). The ferry took us across the Lyngenfjord (17 km) to Lyngseidet, a village on the west side of the fjord. From Lyngseidet the bus took us to the head of the fjord Balsfjord, where we left highway 50 to follow highway 860 to Tromsø.

In Tromsø, a city of about 15 000 inhabitants, the biggest in Northern Norway and situated about 69° 40' N, the XIIIth IPE ended.

The arrival in Tromsø was at about 7.30 p.m. and the bus stopped at the new building of Tromsø Museum. Those who wanted to stay the night in Tromsø were taken to the hotel. At 8.30 p.m. a dinner offered by the governor was given by the city of Tromsø and Troms county at the Grand Hotel. At about 11 p.m. the members went by bus to the foot of Mt. Fløyfjell, where a cable railway took us to the mountain plateau. A light meal with coffee was served. About midnight we watched a magnificent sunset and shortly after the sunrise, so beautiful and with such marvellous colours that the participants of our excursion got more enthusiastic than ever.

The first members of the excursion left by the coast steamer at 1.30 a.m., but the greater part started on their way home the next day.

The XIIIth IPE 1961 was ended.