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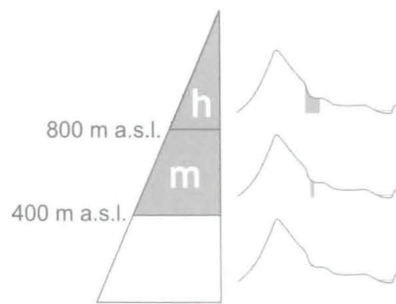
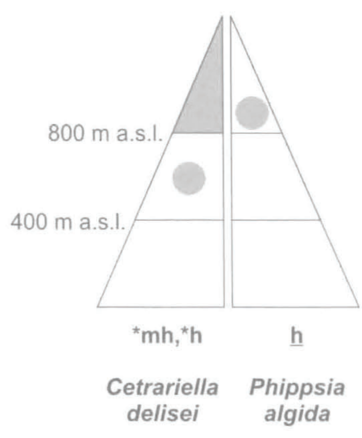
Vegetation and Altitudinal Zonation in Continental West Greenland

Birgit Sieg, Birgit Drees & Fred J.A. Daniëls



Phippsietum algidae-concinnae



BIOSCIENCE 57 · 2006

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Meddelelser om Grønland · Bioscience 57 · 2006

Birgit Sieg, Birgit Drees & Fred J.A. Daniëls. Vegetation and Altitudinal Zonation in Continental West Greenland. – Meddelelser om Grønland Bioscience 57. Copenhagen, The Commission for Scientific Research in Greenland, 2006.

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Cover front: Relevé of the Phippsietum algidae-concinnae, 950 m a.s.l. and the analysis of altitudinal indicator values of the association and of two typical species.
Cover back: Altitudinal indicator species *Campanula uniflora* (left) and *Salix herbacea* & *Stereocaulon alpinum* (middle). Mid and high altitudes (510-1070 m a.s.l.) in Angujârtorfik (right).

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Printed by Special-Trykkeriet Viborg a-s

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Accepted August 2006
ISSN 0106-1054
ISBN 87-90369-77-7

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Abstract

Birgit Sieg, Birgit Drees & Fred J.A. Daniëls. Vegetation and altitudinal zonation in continental West Greenland. – Meddelelser om Grønland Bioscience 57. Copenhagen, The Commission for Scientific Research in Greenland, 2006, 93 pp.

Following the principles of the Braun-Blanquet approach a detailed investigation of the vegetation types of mountains in continental West Greenland is presented. The vegetation types are analysed regarding their subdivision into subassociations, variants and elevation forms, as well as the prevailing environmental conditions of their habitats. Special attention is paid to bryophytes and lichens as these play an important role in arctic plant communities and ecosystems.

Based on 394 relevés the following communities are dealt with: Calamagrostio lapponicae-Salicetum glaucae ass. nov., Hylocomio splendentis-Cassiopetum tetragonae, Empetro hermaphroditi-Betuletum nanae, Ledo decumbentis-Betuletum nanae (all Loiseleurio-Vaccinietea), Carici nardinae-Dryadetum integrifoliae, Thuidio abietini-Kobresietum myosuroides ass. nov., Rhododendro lapponici-Vaccinietum microphylli, Tortello arcticae-Caricetum rupestris ass. nov., Saxifrago nathorstii-Kobresietum simpliciusculae (all Carici-Kobresietea), Plagiomnio elliptici-Salicetum glaucae ass. nov. (Salicetea purpureae), *Cerastium arcticum-Poa* community, Pediculari flammeae-Caricetum bigelowii ass. nov. (both Salicetea herbaceae), Caricetum saxatilis, Caricetum rariflorae (both Scheuchzerio-Caricetea) and *Racomitrium lanuginosum* community (Thlaspietea rotundifolii).

Moreover, the importance of all vegetation types in the study area (incl. Phippsietum algidae-concinnae, Cassiopetum hypnoidis, a.o.) regarding the characterization and delimitation of altitudinal vegetation belts is assessed. For this purpose, their altitudinal distribution, elevation forms, change in habitat-type preferences and the substitution of communities along the altitudinal gradient as well as altitudinal indicator values of selected species are discussed. It resulted that the existence of three altitudinal belts with boundaries at 400 and 800 m a.s.l. can be confirmed and that a variety of the considered criteria is necessary for a comprehensive distinction of these vegetation belts. Furthermore, it was shown that differences between vegetation in mid and high altitudes are more pronounced than between low and mid altitudes. The lowlands and mid altitudes are dominated by erect dwarf-shrub heath vegetation. The associations Rhododendro-Vaccinietum and Ledo-Betuletum are mainly restricted to these altitudes. Mid altitudes are differentiated from the lowlands by elevation forms and change in habitat-type preferences of vegetation types as well as by occurrence of snowbed communities and absence of shrub vegetation. High altitudes are dominated by graminoid and prostrate dwarf-shrub vegetation of the classes Salicetea herbaceae and Carici-Kobresietea. They are differentiated from mid altitudes not only by elevation forms and change in habitat-type preferences of plant communities, but also by substitution of vegetation types. Tortello-Caricetum, Pediculari-Caricetum and *Racomitrium lanuginosum* community are restricted to these altitudes.

Keywords: Altitudinal indicator species; Arctic; elevation forms; mountain vegetation; syntaxa; toposequence; substitution of plant communities; vegetation pattern.

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1. Introduction

In the last decades several studies focused on latitudinal vegetation zonation schemes of the Arctic (e.g. Alexandrova 1980, Bliss 1997, Daniëls et al. 2000, Edlund & Alt 1989, Elvebakk 1985, 1999, Walker et al. 2002, Young 1971, Yurtsev 1994). The increased interest in this topic resulted in the accomplishment of the Circumpolar Arctic Vegetation Map (CAVM). For the first time this map shows the vegetation variation of the whole arctic territory according to uniform concepts and methods (CAVM Team 2003, Walker et al. 2005). The map depicts five bioclimate subzones (fig 1) characterized by the mean July temperature and vegetation features on 'zonal' sites in the lowlands. However, as nearly 80 % of the ice-free land in Greenland consists of mountain complexes, these latitudinal vegetation subzones can only be applied to the small lowland part of the country. Since mountain vegetation in Greenland and the Arctic and its altitudinal zonation is poorly studied so far it is preliminarily presumed that altitudinal vegetation belts correspond to the latitudinal subzones (CAVM Team 2003). To enhance knowledge about these topics the AZV (Altitudinal Zonation of Vegetation in continental West Greenland) Project was initiated in 2002 (cf. Sieg & Daniëls 2005).

The AZV project includes a phytosociological survey of the mountain vegetation in continental West Greenland and the mapping of vegetation pattern with main emphasis on altitudinal aspects. Based on these results a detailed model of altitudinal vegetation belts will be developed, which considers altitudinal indicator species as well as the altitudinal differentiation of plant communities, vegetation pattern and environmental conditions (Sieg & Drees, in prep.). This model will be compared with the latitudinal vegetation subzones to test the altitudinal zonation hypothesis of the CAVM. Moreover, it will be compared with altitudinal zonation in Scandinavia and other oroarctic areas, which might lead to a better characterization and understanding of altitudinal zonation in arctic areas (e.g. Dahl 1986, Daniëls 1985, Elvebakk 1985). This might also allow an extrapolation to the numerous remote and poorly known mountain ranges in continental arctic territories.

Moreover, the results contribute to improvement of the circumpolar vegetation classification system, which is an important tool for nature conservation and further ecological research. As the Arctic will be strongly affected by global warming (e.g. Hagen et al. 2001, Førland et al. 2004), a detailed knowledge about arctic vegetation is essential as a basis for future monitoring (cf. Sieg 2004). The potential of mountain vegetation as climate change indicator is especially high, since strong temperature gradients along short distances can be observed in mountains and thus vegetation changes are expected to occur over much shorter distances in comparison with changes between latitudinal vegetation subzones.

2. Study area

The study area is located in the Søndre Strømfjord region (West Greenland, fig. 1) and encompasses the research sites Kangerlussuaq (67°00'N, 50°40'W) and Angujârtorfik (66°40'N, 51°30'W). The former is located at the head of the Søndre Strømfjord where the influence of the nearby inland ice (e.g. dry foehn winds) is more pronounced than in Angujârtorfik, which is situated 50 km to the SW (fig. 2). Topographically the research sites consist of mountains rising up to 700 m a.s.l. (Kangerlussuaq) and up to 1070 m a.s.l. (Angujârtorfik) with lake-rich, partly extensive plateaus at different elevations. The mountains have rounded summits as a result of the glaciation in the Pleistocene.

The study area is characterized by a low arctic-subarctic continental macroclimate (Ministeriet for Grønland 1980). Data from the closest weather station in Kangerlussuaq show a mean annual temperature of –5.7°C and a mean annual temperature range of 32.1°C (–21.4°C February/10.7°C July). Annual precipitation averages 149 mm (all data 1973-1999 from Cappelen et al. 2001).

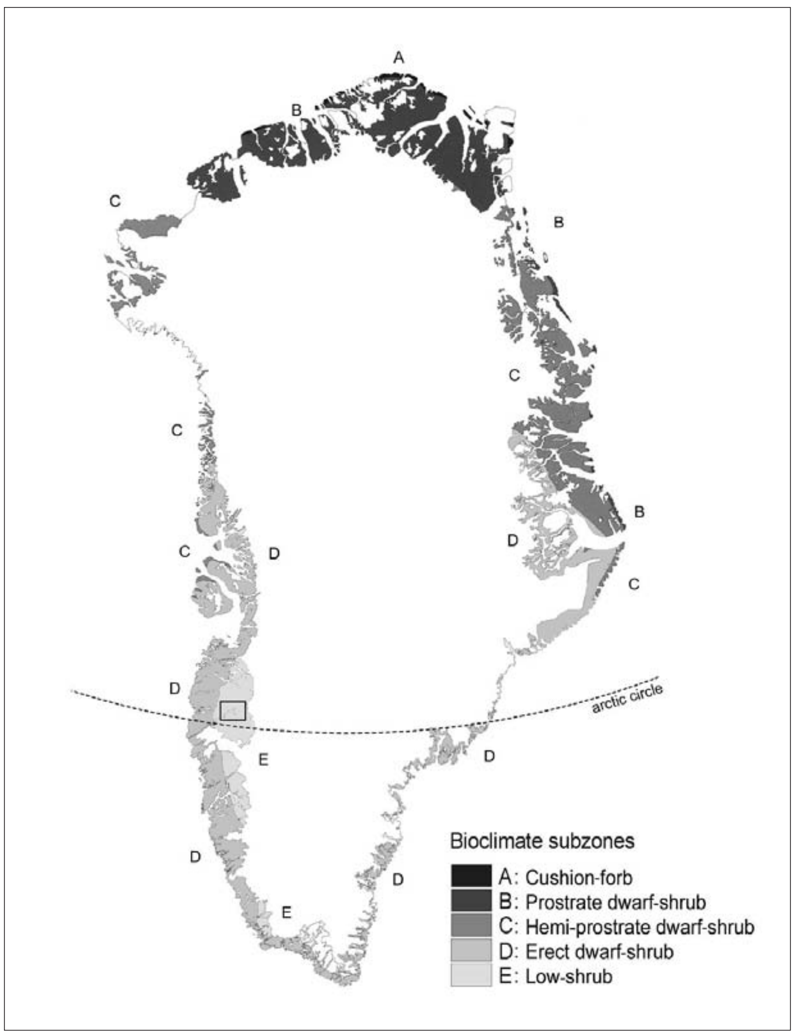


Fig. 1. Study area and bioclimate subzones of Greenland (CAVM Team 2003, modified).

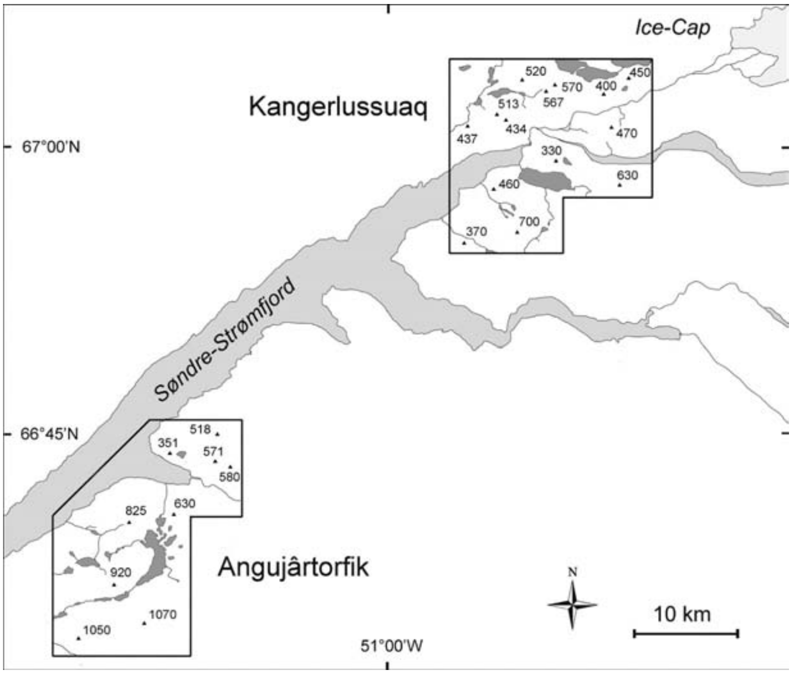


Fig. 2. Research sites with mountain summits, lakes and rivers outlined.

Bedrock consists of gneiss with basic schlieren and lenses and is partly covered by moraines, fluvioglacial, and eolian deposits (Dijkmans & Törnquist 1991, Grønlands Geologiske Undersøgelse 1971, 1982, Scholz & Grottenthaler 1988). Kangerlussuaq is situated in the zone of continuous permafrost and Angujârtorfik in the transition zone between continuous and discontinuous permafrost (Brown et al. 1998). However, the depth of unfrozen soil in summer (active layer) strongly depends on substrate, exposition and vegetation. Most of the soils are affected by cryoturbation and solifluction (cf. Ozols & Broll 2003) and are classified as Cryosols (FAO/EC/ISRIC 2003).

On the CAVM both research sites are assigned to the noncarbonate mountain complex of subzone E, which is characterized by low-shrub and dwarf-shrub vegetation in the lowlands (CAVM Team 2003, fig. 1). Kangerlussuaq and its near surroundings are botanically well known, especially by the many activities of Böcher (1954, 1959, 1963) and his colleagues (e.g. Fredskild 1996). The area is proposed as 'arctic hotspot site' and thus intensive floristic, vegetation and bioclimatic studies are recommended as basis for climate change monitoring (Elvebakk 2005). For further information about the study area the reader is referred to Sieg & Daniëls (2005).

3. Methods

Vegetation was studied in accordance with the principles of the Braun-Blanquet approach (Braun-Blanquet 1964, Westhoff & van der Maarel 1973). Field work was carried out in 2000 (Sult 2001), 2002 (Daniëls, Morgenstern 2003, Sieg, Sult) and 2003 (Arp, Daniëls, Sieg, Sult). Stands of physiognomically and floristically different vegetation were sampled by relevés. We aimed at distribute the sample plots along the whole altitudinal and ecological range of all common vegetation types. Depending on the extension of the stand as well as size and distribution pattern of the vegetation components plot size varied between 1 and 4 m² (16 m² for shrub vegetation). These plot sizes are commonly used in arctic vegetation analysis (a.o. Böcher 1954, Daniëls 1982, Dierssen & Dierssen 2005). For each plot, all vascular plants, bryophytes and lichens were recorded. Samples of all cryptogams and of some critical vascular plants were collected for final identification in the laboratory. Cover-abundance of all species was principally estimated according to the scale of Wilmanns (1998). However, due to the small plot sizes the delimitation between the categories '1' and '2m' was set to 20 individuals instead of 50. Moreover, the abundance scale of cryptogams with a cover less than 5 % was modified as follows:

'r': species occurred with reduced vitality and cover less than 1 % on a single spot. The same applies for species with reduced vitality which were only detected afterwards in the collected samples. '+': species well developed with cover less than 1 %. The same applies for well-developed species found later in the samples.

Table 1. Presence criteria for differential-species.

syntaxon **A**	syntaxon **B**
V	≤ II
IV	≤ I
III	≤ I
II	≤ +
(I)	(≤ r)

'1': species with a cover between 1 % and 5 %.

Maximum height and canopy height of the stands were measured. Cover percentages of different plant groups (shrubs, dwarf shrubs, graminoids, herbs, bryophytes, lichens) and non-vegetated substrate types (soil, stones, litter) were estimated (cover values less than 5 % are set to '2 %' in the tables). Furthermore, the size of each stand, locality (GPS) and position in the landscape were recorded. Cryoturbation and solifluction phenomena were noted, wind shelter, soil moisture as well as duration of snow cover were estimated (table 2). Several other habitat factors such as altitude (altimeter, GPS), slope (inclinometer), aspect (compass) as well as depth of ground water and organic layer were measured. The depth to permafrost was recorded using a steel rod of 40 cm length.

In each stand five soil samples from the rhizosphere were randomly collected, mixed and air-dried in the field. In the laboratory the samples were sieved (<2 mm), and pH and conductivity were measured afterwards in distilled water using a WTW device. Soil organic matter (dry weight-%) was determined by loss-on-ignition.

A total of 394 relevés were arranged in 11 community and two synoptic tables following the principles of the Braun-Blanquet sorted-table method (e.g. Dierschke 1994). The character-species are defined according to the scheme of Westhoff & van der Maarel (1973). Differential-species in this paper meet the following criteria (table 1):

1) A differential-species should occur in a syntaxon (A) with a presence at least twice as high as in the syntaxon compared with (B). Furthermore, its cover-abundance values should be higher than or the same as in the other syntaxon (B) (cf. Daniëls 1982).
2) A differential-species of a syntaxon (A) should occur in all its subunits (e.g. subass.) with at least a presence of II and should not differentiate between the subunits of this syntaxon (A).

Table 2. Explanations to environmental conditions estimated in the field.

Category	Soil moisture	Snow cover	Shelter
1	very dry	no snow cover in winter	very exposed (e.g. ridge)
2	dry	between 1 and 3	between 1 and 3
3	mesic	moderate snow cover in winter, early free of snow	moderately exposed (e.g. plain)
4	moist	between 3 an 5	between 3 and 5
5	wet	deep snow cover in winter, very late free of snow	very sheltered (e.g. snowpatch)
6	partly inundated	–	–

3) Furthermore, the presence values of this differential-species of syntaxon A should be at least twice as high in all its subunits compared with all subunits of the other syntaxon (B) (see criteria of table 1).

Thus, the distinction between two syntaxa by the here defined differential-species is not correlated with the number of relevés per subunit in one syntaxon. If of special interest, mean cover-abundance values are indicated. These are calculated using the mean cover percentages of the classes of the cover-abundance scale (2m was set to 4 %, + to 0,1 %, r was omitted, see Dierschke 1994).

Detrended Correspondence Analysis (DCA) was used to improve and confirm the vegetation typology and to detect important differentiating environmental factors. The analyses were carried out with CANOCO (version 4.5, Ter Braak & Šmilauer 2002) using default options. The cover-abundance values 'r, +, 1, 2m, 2a, 2b, 3, 4, 5' were transformed into values 1-9 respectively (cf. Westhoff & van der Maarel 1973) and species occurring only once in the data set were omitted.

All vegetation types of the study area are discussed in detail in this paper with the exception of arctic steppes and associated communities (Calamagrostietea purpurascentis prov.), which will be dealt with in a forthcoming paper.

In this paper altitudinal boundaries between presumed altitudinal belts are as follows: 'Low altitudes' include areas between 0-400 m a.s.l., 'mid altitudes' between 400-800 m a.s.l. and 'high altitudes' between 800-1070 m a.s.l. These boundaries were derived from field observations and floristical transects (Arp 2005) and will be checked and further analysed in this paper. The concept of altitudinal indicator species and methods to assess their indicator values are dealt with in chapter 4.2.1. The definition of 'zonal' sites follows Walker et al. (2002, p. 4554): 'Zonal sites are flat or gently sloping, moderately drained sites with fine-grained soils that are not influenced by extremes of soil moisture, snow, soil chemistry, or disturbance and which fully express the influence of the prevailing regional climate.'

Nomenclature of syntaxa and diagnostic species mainly follows Daniëls (1994, 2002), Dierssen (1992, 1996) and Lünterbusch & Daniëls (2004). The International Code of Phytosociological Nomenclature (ICPN) was taken into account (Weber et al. 2000). The nomenclatural type is indicated for each association and subassociation in the header of the corresponding chapter and, if necessary, nomenclatural changes are discussed beneath.

The nomenclature follows Böcher et al. (1978) for vascular plants, Santesson et al. (2004) for lichens, as well as Corley et al. (1981), Corley & Crundwell (1991), Hedenäs (2003), Hedenäs & Bisang (2004) and Grolle & Long (2000) for bryophytes. Exceptions are given with complete author citation in the tables. Species indicated by '/' between names could not always be distinguished und thus were aggregated in the tables. If necessary, lichen substances were determined with thin layer chromatography (cf. Culberson & Amman 1979). *Cladonia merochlorophaea, C. cryptochlorophaea* and *C. chlorophaea* were combined to '*Cladonia chlorophaea* s.l.' and *Peltigera* specimens with smooth upper surface to '*Peltigera polydactylon* s.l.'.

Explanations to the tables

Autor: **BS/FD/OM**: relevés recorded by Sieg/ Daniëls/ Morgenstern and collected species samples all identified by Sieg; **CS**: relevés recorded by Sult and collected species samples identified by Sult and Drees.

Table 3. Biological distribution types of vascular plants in Greenland (Böcher 1975).

A	Arctic, widespread	**L**	Low arctic	**B**	Boreal
AC	Arctic, continental	**LC**	Low arctic, continental	**BC**	Boreal, continental
AH	High arctic	**LO**	Low arctic, oceanic	**B**	Boreal, oceanic-montane
AM	Middle arctic				

Area of the stand: Stands larger than 100 x 100 m^2 are included in the category '10000 m^2'.
Altitudinal indicator value: see table 17 and ch. 4.2.1
nd: 'not determined'
Tables 4-18 are included in the appendix. The complete locality data for the relevés (GPS coordinates) can be obtained from the authors on request.

4. Results and discussion

4.1. Vegetation types

A survey of all vegetation types including numbers of chapters and abbreviations used in the text and tables is shown in fig. 3.

4.1.1. Acidophytic dwarf-shrub heaths and related vegetation (Loiseleurio-Vaccinietea, Thlaspietea)

Table 4 (synoptic table), tables 5-7 (community tables)

Mesic sites with acidic and humus rich soils are covered by communities of the Loiseleurio-Vaccinietea. In the study area the class is mainly differentiated against the Salicetea herbaceae by the occurrence of erect dwarf-shrub species (*Betula nana, Cassiope tetragona, Empetrum nigrum, Ledum palustre, Salix glauca, Vaccinium uliginosum)* and some herbs (*Pedicularis lapponica, Pyrola grandiflora*). Against the class Carici-Kobresietea it is mainly negatively differentiated by low presence of basiphilous species (ch. 4.1.4). Furthermore, some species of acidic soils are more prominent (e.g. *Cladonia cyanipes, Dicranum elongatum, D. laevidens, Ledum palustre, Polytrichum strictum, Vaccinium vitis-idaea*).

Four different associations of the class were recorded in the study area. Shrub vegetation (Calamagrostio-Salicetum) only occurs on zonal sites in low altitudes (ch. 4.1.2). The dwarf-shrub heath communities Ledo-Betuletum and Empetro-Betuletum also occur in mid altitudes, where the Empetro-Betuletum replaces the shrub vegetation on zonal sites. The Ledo-Betuletum is mainly found on moister and humus-richer sites on north-facing slopes. The Hylocomio-Cassiopetum occurs in all altitudes showing a strong altitudinal differentiation and main distribution on north-facing slopes in mid altitudes. Due to its strong relation to the Loiseleurio-Diapension, the *Racomitrium lanuginosum* community (Thlaspietea) has been included in this chapter. This community is confined to exposed north-facing slopes below ridges in high altitudes.

Phyllodoco-Vaccinion Nordh. 1936

The Hylocomio-Cassiopetum as well as the Ledo-Betuletum including their *Sphagnum*-dominated stands are assigned to the Phyllodoco-Vaccinion (Daniëls 1982, Dierssen & Dierssen 2005). In the study area *Anastrophyllum minutum, Dicranum laevidens, Hylocomium splendens, Hypnum holmenii* and *Peltigera polydactylon* s.l. are differential-species of the alliance (table 4). The alliance is mainly restricted to arctic and oroarctic areas with (sub)oceanic climates (Daniëls 1982). This explains the exclusive occurrence of its communities on north-facing slopes or on moist sites in the study area. These sites have a higher air humidity, are richer in humus and longer snow-protected, and thus have a shorter growing season than typical sites of Loiseleurio-Diapension communities.

Ledo decumbentis-Betuletum nanae Böcher ex K. & B. Dierssen 2005

Nomenclatural type: K. & B. Dierssen 2005, table 4 no. 408 p. 870 (Holotypus)

Table 4 no. 3, 3.1-3.3, table 5

The Ledo-Betuletum is dominated by erect dwarf shrubs (*Betula nana, Empetrum nigrum, Ledum palustre, Vaccinium uliginosum* and *V. vitis-idaea*) and bryophytes (mean cover 95 %). *Ledum palustre* is selective character-species of the community. Differential-species against all other vegetation types of the class are *Peltigera scabrosa* and *Vaccinium vitis-idaea.* These species typically occur on very humic soils with a low pH value and sites with constant snow cover in winter. Against the Empetro-Betuletum the community is also differentiated by *Cladonia cyanipes* and *Empetrum nigrum.* For the differentiation against the Hylocomio-Cassiopetum see there.

Ledo-Betuletum typicum K. & B. Dierssen 2005

Nomenclatural type: like ass.

Table 4 no. 3.3, table 5 no. 47-67

The LB typicum is differentiated by several species of wet to moist sites such as *Aulacomnium palustre, Carex rariflora, Eriophorum angustifolium, Salix arctophila,*

Loiseleurio-Vaccinietea Eggler 1952 **4.1.1**
Rhododendro-Vaccinietalia Br.-Bl. in Br.-Bl. & Jenny 1926
– Calamagrostio lapponicae-Salicetum glaucae Sieg, Drees & Daniëls 2006 ass. nov. (CS) 4.1.2
Phyllodoco-Vaccinion Nordh. 1936 4.1.1
– Ledo decumbentis-Betuletum nanae Böcher ex K.& B. Dierssen 2005 (LB)
LB typicum K.& B. Dierssen 2005
LB peltigeretosum malaceae Sieg, Drees & Daniëls 2006 subass. nov.
– Hylocomio splendentis-Cassiopetum tetragonae Fries 1913 nom. invers., mut. et conserv. propos. (HC)
HC typicum Sieg, Drees & Daniëls 2006 subass. nov.
HC dryadetosum integrifoliae Sieg, Drees & Daniëls 2006 subass. nov.
Loiseleurio-Diapension (Br.-Bl., Sissingh & Vlieger 1939) Daniëls 1982
– Empetro hermaphroditi-Betuletum nanae Nordh. 1943 (EB)

Thlaspietea rotundifolii Br.-Bl. 1948 **4.1.1**
Androsacetalia alpinae Br.-Bl. in Br.-Bl. & Jenny 1926
Saxifrago-Oxyrion Gjaerevoll 1950
– *Racomitrium lanuginosum* community (Rc)

Salicetea purpureae Moor 1958 **4.1.2**
Salicetalia purpureae Moor 1958
Salicion phylicifoliae Dierssen 1992
– Plagiomnio elliptici-Salicetum glaucae Sieg, Drees & Daniëls 2006 ass. nov. (PS)
PS angelicetosum norvegicae Sieg, Drees & Daniëls 2006 subass. nov.
PS chamaenerietosum latifolii Sieg, Drees & Daniëls 2006 subass. nov.

Salicetea herbaceae Br.-Bl. 1947 **4.1.3**
Salicetalia herbaceae Br.-Bl. 1926
Salicion herbaceae Br.-Bl. in Br.-Bl. & Jenny 1926
– Cassiopetum hypnoidis Fries 1913 nom. mut. et conserv. propos. (Ch)
– Pediculari flammeae-Caricetum bigelowii Sieg, Drees & Daniëls 2006 ass. nov. (PC)
Saxifrago-Ranunculion nivalis (Nordh. 1943) Dierss. 1984
– Phippsietum algidae-concinnae Nordh. 1943 (P)
– *Cerastium arcticum-Poa* community (CP)

Carici-Kobresietea Ohba 1974 **4.1.4**
Kobresio-Dryadetalia (Br.-Bl. 1948) Ohba 1974
Dryadion integrifoliae Ohba ex Daniëls 1982
Dryadenion integrifoliae Sieg, Drees & Daniëls 2006 suball. nov.
– Carici nardinae-Dryadetum integrifoliae Daniëls 1982 (CD)
CD sphaerophoretosum globosi Sieg, Drees & Daniëls 2006 subass. nov.
CD lesquerelletosum arcticae Sieg, Drees & Daniëls 2006 subass. nov.
– Thuidio abietini-Kobresietum myosuroidis Sieg, Drees & Daniëls 2006 ass. nov.
Rhododendrenion lapponici Lünterb. & Daniëls 2004
– Rhododendro lapponici-Vaccinietum microphylli Daniëls 1982 (RV)
RV campylietosum Lünterb. & Daniëls 2004
RV sphaerophoretosum Lünterb. & Daniëls 2004
– Tortello arcticae-Caricetum rupestris Sieg, Drees & Daniëls 2006 ass. nov. (TC)
TC luzuletosum confusae Sieg, Drees & Daniëls 2006 subass. nov.
TC scorpidietosum cossonii Sieg, Drees & Daniëls 2006 subass. nov.
– Saxifrago nathorstii-Kobresietum simpliciusculae Daniëls & Fredsk. in Fredskild 1998 (SK) 4.1.5

Scheuchzerio-Caricetea (Nordh. 1936) R. Tx. 1937 **4.1.5**
Caricetalia nigrae (Koch 1926) Nordh. 1936
Caricion nigrae Koch 1926
– Caricetum saxatilis Nordh. 1928 nom. conserv. propos. (Cs)
Scheuchzerietalia palustris Nordh. 1936
Rhynchosporion albae Koch 1926
– Caricetum rariflorae Fries 1913 nom. conserv. propos. (Cr)

Fig. 3. Syntaxonomical survey.

Sphagnum girgensohnii and *S. warnstorfii*. Many lichens occurring in most other vegetation types of the class are rare (e.g. *Alectoria ochroleuca, Bryoria nitidula, Cladonia amaurocraea, Flavocetraria nivalis, Peltigera malacea*). The cover of lichens is low (mean 6 %), whereas the bryophyte layer is well developed (mean cover 99 %, height 4 cm). Soils are moist to wet, have high organic matter contents (mean 54 %) with organic layer thickness up to 30 cm (mean 14 cm) and a mean pH value of 5.1 (4.5-6.4). The surface is mostly hummocky (mean height 16 cm). In more than half of the recorded stands a permafrost layer between 15 and 30 cm depth or groundwater were detected. On strongly sloping ground in mid altitudes transitional types to moister stands of the Hylocomio-Cassiopetum exist (e.g. no. 62).

The LB typicum is confined to level to gently sloping sites with permanent water supply during the growing season (lake-shores, depressions).

Dierssen & Dierssen (2005) described several subassociations of the Ledo-Betuletum from West Greenland, which are differentiated by *Sphagnum* species and which are similar to the stands described here. Following Dierssen & Dierssen (2005) relevé no. 54 might be assigned to the LB sphagnetosum fimbriati, no. 48 to LB sphagnetosum fusci and the others to the LB typicum. However, regarding the strong floristic similarities between all moist stands of the Ledo-Betuletum in the study area, we assigned all these relevés to a single subassociation (LB typicum).

Corresponding types from West Greenland are described by Böcher (1954, 1963), from SE-Greenland by Daniëls (1982), and from S-Greenland by Stumböck (1993). Area differential-species are *Ledum palustre* (W-Greenland) and *Salix arctophila* (W-, S-Greenland).

Ledo-Betuletum peltigeretosum malaceae subass. nov. hoc loco

Table 4 no. 3.1-3.2, table 5 no 1-46, fig. 5, holotypus: table 5 no. 20

Differential-species of the LB peltigeretosum against the typical subassociation are *Dicranum acutifolium/ brevifolium*, as well as several lichens such as *Bryoria nitidula, Cladonia chlorophaea* s.l., *Flavocetraria nivalis* and *Peltigera malacea*. In the study area *Cladonia sulphurina* is restricted to this community. The subassociation occurs on drier soils than the LB typicum and is also much more abundant. Stands cover extensive areas on mesic to moist north-facing slopes in low and mid altitudes.

Dierssen & Dierssen (2005) assigned stands of the Ledo-Betuletum on drier soils to a subassociation 'aulacomnietosum turgidi' nom. nudum. Compared with this subassociation the stands described here are richer in species (especially concerning lichens) and contain less species of moist soils (e.g. *Carex rariflora, Eriophorum angustifolium, Salix arctophila*). Their differentiation against the LB typicum is thus more pronounced which is probably caused by the dry continental climate leading to strong differences between sites with and without permanent water supply. Consequently, we propose to assign the stands described here to a new subassociation 'peltigeretosum malaceae' rather than to the LB aulacomnietosum. Related communities are described from W-Greenland by Böcher (1954), from SE-Greenland by Daniëls (1982) and from Alaska by Walker et al. (1994).

The **LB peltigeretosum var. of *Pyrola grandiflora*** (Table 4 no. 3.1, table 5 no. 1-28) is differentiated against the following variant by *Nephroma expallidum*, *Peltigera didactyla*, *P. leucophlebia*, *Pyrola grandiflora*, *Psoroma hypnorum* and *Salix glauca*. Especially the low-elevation stands often have shallow active layers (<40 cm), which are mostly accompanied by a thick humus layer (mean 10 cm). Several stands are affected by solifluction and have a hummocky surface. The variant occurs on moderately sloping to steep north-facing slopes (mean 13°) with a mean soil pH of 5.0 (4.2-6.4).

Differential-species of the **LB peltigeretosum var. of *Barbilophozia binsteadii*** (Table 4 no. 3.2, table 5 no. 29-46, in Sieg & Daniëls 2005 as Ranunculo-Empetretum prov.) are typical of moist, peaty and acidic soils such as *Barbilophozia binsteadii, Calypogeia sphagnicola, Cladonia squamosa* and *Ranunculus lapponicus* (more abundant: *Dicranum elongatum, D. laevidens*). Stands occur on very steep north-facing slopes (mean 23°) which are strongly affected by solifluction. The latter also leads to the characteristic even surface of the stands. The mean pH value (4.5, 4.1-5.3) is lower than in all other plant communities. The humus layer is well developed (mean 19 cm) and mostly reaches the permafrost. In consequence, the vascular plants mainly root in the organic layer, and are small due to the unfavourable soil conditions (mean canopy height 6 cm). Above 500 m a.s.l. *Cassiope tetragona* shows up in the stands which leads to the replacement of this variant by the Hylocomio-Cassiopetum typicum above 600 m a.s.l. on similar sites.

Altitudinal differentiation

In the LB typicum and the LB peltigeretosum var. of *Barbilophozia binsteadii* altitudinal differentiation between stands in low and mid altitudes is marginal. Nevertheless, in the LB peltigeretosum var. of *Pyrola grandiflora* some typical altitudinal indicator species are present in mid altitudes (e.g. *Dactylina arctica, Ptilidium ciliare, Sphaerophorus globosus, Stereocaulon alpinum*). Thus, a low and mid-elevation form can be distinguished in this variant.

Above 700 m a.s.l. *Empetrum nigrum, Ledum palustre, Betula nana* and *Vaccinium vitis-idaea* disappear in both subassociations, and indicators for high altitudes appear (e.g. *Salix herbacea*). *Vaccinium uliginosum* benefits from the absence of most other erect dwarf-shrubs species and dominates some of the stands (e.g. no. 28, 64, 66). On sites with a prolonged snow cover, the Ledo-Betuletum is replaced by the graminoid-dominated Pediculari-Caricetum bigelowii (e.g. transitional relevé no. 66, ch. 4.1.3).

Hylocomio splendentis-Cassiopetum tetragonae Fries 1913 nom. invers., mut. et conserv. propos.

Nomenclatural type: Fries 1913 (as *Andromeda tetragona-Hylocomium*-Ass.), the single relevé p. 90 (Holotypus)

This name replaces the invalidly published Cassiopetum tetragonae Böcher 1933 (by Daniëls 1982), which is not accompanied by a sufficient original diagnosis (ICPN, art. 7). Consequently, the Cassiopetum tetragonae typicum and ledetosum are also invalidly published (ICPN, art. 4a). The *Cassiope tetragona-Diranum fuscescens*-ass. by Nordhagen 1955 and the *Andromeda tetragona*-Lichen-ass. by Fries 1913 are treated as synonyms.

Table 4 no. 4, 4.1, 4.2, table 6, fig. 4

The Hylocomio-Cassiopetum is chiefly characterized against other dwarf-shrub heaths by the dominance of *Cassiope tetragona*. Differential-species mainly occur in high altitude stands of the community (e.g. *Bryonora castanea*, *Dactylina ramulosa, Huperzia selago, Timmia austriaca*). Snow cover in winter is the most important factor for the development of *Cassiope* communities on mesic sites (e.g. Böcher 1963, Hartmann 1980). This explains the higher abundance of snowbed species and species with an oceanic distribution (e.g. *Barbilophozia hatcheri, Cladonia rangiferina, Conostomum tetragonum, Luzula arctica, Pertusaria geminipara, Salix herbacea, Tritomaria quinquedentata*). Some altitudinal indicator species such as *Cetraria islandica, Dactylina arctica, Ptilidium ciliare* and *Racomitrium lanuginosum* are more prominent compared with the floristically related Ledo-Betuletum. On the one hand, this is caused by the different altitudinal distribution of these communities (mean altitude a.s.l.: HC: 651 m, LB: 403 m). On the other hand, these species likely benefit from high disturbance in stands of the Hylocomio-Cassiopetum, which are generally affected by solifluction, frost heave or cryoturbation. These processes lead to reduced competition from vascular plant species and the creation of varied micro sites (e.g. hummocks) or gaps in the vegetation cover, which are invaded by less competitive plants such as bryophytes, lichens and small vascular plants. This also explains the high species density (mean 57 spp.) with more than two third of the species being cryptogams. Compared with the Ledo-Betuletum soils are less humic (mean 17 %) with a less developed organic layer (mean thickness 5 cm). In consequence, common humicolous species of the Ledo-Betuletum are scarce (e.g. *Barbilophozia binsteadii, Calypogeia sphagnicola, Peltigera scabrosa*).

The meso- and chionophytic association mainly occurs on steep north-facing slopes above 550 m a.s.l., where it often covers extensive areas. In the lowlands it is extremely rare and restricted to extreme snow-patches with very cold microclimate. In high altitudes it is found in snow-covered depressions. As the altitude is the strongest differentiating ecological factor in the association, table 6 mainly shows the elevation forms of the community (see ch. 4.2.2.3). The subassociations, which occur on sites with different soil pH, are indicated on the right and will be discussed in the following paragraphs.

Many authors described *Cassiope tetragona* communities from the Arctic (e.g. Alaska: Walker et al. 1994; Canada: Batten & Svoboda 1993, Muc et al. 1994, Nams & Freedman 1993; Greenland: Böcher 1933, 1954, 1959, 1963, Daniëls 1982, Fredskild 1998, Fredskild & Mogensen 1997; Svalbard: Eurola 1968, Möller 2000, Hadač 1989, Hartmann 1980, Rønning 1965, Thannheiser et al. 2001, Virtanen et al. 1997; Chukotka: Razzhivin 1994) and oroarctic areas (Cooper 1986, Dierssen 1996, Koroleva 1994, Nordhagen 1955, Peinado et al. 2005). *Cassiope tetragona* communities on acidic and non-acidic soils are mostly assigned to different classes: communities on acidic soils to the Loiseleurio-Vaccinietea (e.g. Hylocomio-Cassiopetum) and *Dryas*-rich communities on base-rich soils (e.g. Dryado octopetalae-Cassiopetum Hadač 1989, Cassiopo-Dryadetum alaskensis Cooper 1986, Saliceto-Cassiopetum Daniëls et Fredsk. in Fredskild 1998) to the Carici-Kobresietea. Due to the considerable number of acidophilous species (e.g. *Anastrophyllum minutum, Betula nana, Cladonia gracilis, Empetrum nigrum, Hypnum holmenii, Pyrola grandiflora, Salix herbacea*) and the relatively few differences in floristic composition and ecology, we assigned the stands occurring on base-richer soil to a new subassociation HC dryadetosum rather than to a new association of the Carici-Kobresietea.

Hylocomio-Cassiopetum dryadetosum integrifoliae subass. nov. hoc loco

Table 4 no. 4.2, table 6 no. 1, 2, 4, 5, 8, 21, 23, 30, 31, 33, holotypus: table 6 no. 8

The HC dryadetosum is differentiated by some basiphilous species (e.g. *Dryas integrifolia, Hypnum revolutum, Rhododendron lapponicum* (absent in high altitudes), *Tomentypnum nitens*), and is thus transitional to the class Carici-Kobresietea. It occurs on strongly disturbed soils with a higher pH (mean 6.0, 5.4-6.5). The number of vascular plant species per plot is higher than in the typical subassociation (mean resp. 16 and 11). The HC dryadetosum is quite rare in the study area and mostly occurs in snow-patches in contact to vegetation types of the Carici-Kobresietea.

Most low-elevation stands of the Hylocomio-Cassiopetum belong to the HC dryadetosum. This is probably due to the narrow ecological range of the association in the lowlands, where it is restricted to cold and disturbed sites, which normally also have raised pH values due to base enrichment by soil processes (solifluction, cryoturbation). These special habitat conditions also lead to extraordinary occurrences of mid or high-altitude species in lower altitudes (e.g. in no. 1, 8).

Hylocomio-Cassiopetum typicum subass. nov. hoc loco

Table 4 no. 4.1, table 6 no. 3, 6, 7, 9-20, 22, 24-29, 32, 34, 35, holotypus: like ass.

The typical subassociation is differentiated against the HC dryadetosum by some acidophytic cryptogam species (e.g. *Cetraria aculeata/muricata, Cladonia rangiferina, Conostomum tetragonum, Peltigera malacea, Polytrichum alpinum, Sphaerophorus globosus*). Soils are mesic to moist, and pH ranges from 4.4 to 6.0 (mean 5.1). Species numbers are generally high (mean 57). Stands are abundant on north-facing slopes above 550 m a.s.l. and often occur in contact to snowbed communities or other vegetation types of north-facing slopes. They can also be found on ecologically similar sites as the LB peltigeretosum var. of *Barbilophozia* (very steep north-facing slopes) and replace this vegetation type above 600 m a.s.l. On moister soils *Aulacomnium palustre, Ranunculus lapponicus* and *Sphagnum girgensohnii* are more prominent, while lichens are underrepresented. These sites are often more sheltered, have less inclination, higher organic matter contents, and a shallower active layer (e.g. no. 6, 15). Such stands are transitional to the Ledo-Betuletum typicum.

The Cassiopetum tetragonae typicum nom. invalidum described by Daniëls (1982) from the Angmagssalik District in SE-Greenland is included in the HC typicum. Daniëls (1982) classified the west-greenlandic *Cassiope tetragona* stands with *Betula nana, Equisetum arvense, Ledum palustre, Rhododendron lapponicum* and *Stellaria longipes/monantha* as subassociation ‘ledetosum’ nom. invalidum. Apart from *Stellaria* spp. all these species have a southern or continental distribution and in the area mostly occur below 650 m a.s.l. Thus, we consider this subassociation here a low-elevation form of the HC typicum.

Loiseleurio-Diapension (Br.-Bl., Sissingh & Vlieger 1939) Daniëls 1982

The alliance comprises sub to low arctic, northern, (sub)alpine and mainly achionophytic dwarf-shrub communities (Daniëls 1982). In comparison with the Phyllodoco-Vaccinion, the vegetation is less snow-protected and soils are drier. In the study area the alliance is only represented by the Empetro-Betuletum.

Empetro hermaphroditi-Betuletum nanae Nordh. 1943

Nomenclatural type: Nordhagen 1943, table 7 no. XVIII-35 p. 91 (Lectotypus Daniëls 1982, p. 49)

Table 4 no. 2, table 7 no. 1-36, fig. 5

In the study area the Empetro-Betuletum is differentiated against communities of the Phyllodoco-Vaccinion by species requiring drier and less humic soil conditions (e.g. *Ceratodon purpureus, Cynodontium strumiferum, Physconia muscigena, Poa glauca* (low altitudes), *Tortula ruralis*). Furthermore, *Empetrum nigrum* is completely absent in the stands. Daniëls (1982) and Nordhagen (1943) also described stands of this association without *Empetrum nigrum*, which occur on drier and more wind-exposed sites. This might explain the absence of this species in all stands of the study area, since such conditions likely concern all habitats of the association due to the continental climate.

The stands are rich in species (mean 41) and comparatively tall (mean 16 cm). In comparison with Phyllodoco-Vaccinion communities the moss layer is less developed (mean cover 54 %), while the cover of dwarf shrubs (mean 79 %) and of litter (mean 37 %) is rather high. PH ranges between 4.3 and 6.9 (mean 5.1).

The association replaces the Calamagrostio-Salicetum above 400 m a.s.l. on zonal sites. These mesic sites are level or slightly sloping with predominantly eastern or southern exposure. In low altitudes, the stands occur on sites which are unfavourable for shrub vegetation, such as soils with permafrost or bedrock within the upper 40 cm.

The Empetro-Betuletum has a suboceanic-continental, low alpine, (sub-)low arctic distribution (Daniëls 1982). It is known from SE-Greenland (Daniëls 1982), Iceland (Hövelmann 1995) and boreal mountains (e.g. Dierssen 1996, Koroleva 1994, Nordhagen 1943). Corresponding communities are published in e.g. Böcher (1954, 1963, W-Greenland), Dahl (1956, Scandinavia), Haapasaari (1988, Scandinavia) and Knapp (1964, S-Greenland).

The edaphical differentiation of the association is not well expressed and needs further study. On south-facing slopes some species of arctic steppe communities (*Calamagrostis purpurascens, Campanula gieseckiana*, *Arnica angustifolia*) occur in the community (e.g. no. 14, 15). Stands on north-facing slopes or other sites with a higher soil moisture (e.g. no. 7, 23) show a strong affinity to the Ledo-Betuletum. Stands with a higher pH value (e.g. no. 3) are transitional to the Carici-Kobresietea.

Altitudinal differentiation

At least two elevation forms can be distinguished. The mid-elevation form is differentiated against the low-elevation form by e.g. *Cetraria islandica, Dactylina arctica, Hierochloe alpina, Sphaerophorus globosus* and *Stereocaulon alpinum.* These species likely benefit from the higher air humidity in mid-altitudes. Mid-elevation stands with *Vaccinium uliginosum* and few *Betula nana* (e.g. no. 30, 32) have similarities with the oceanic-distributed Sphaerophoro-Vaccinietum microphylli Daniëls 1982, but they are also floristically and ecologically strongly related to the other mid-elevation stands of the Empetro-Betuletum. Thus, we consider them a *V. uliginosum* facies of the Empetro-Betuletum.

In high altitudes the association is very rare and only represented by the facies of *V. uliginosum*, which probably benefits here from the absence of most other erect dwarf-shrub species. Such stands are additionally differentiated by several high-altitude indicators (e.g. *Dactylina ramulosa, Luzula arctica*), and are thus transitional to the *Racomitrium lanuginosum* community. The strong floristical similarity between these two vegetation types might be comparable to the situation in Iceland, where the Empetro-Betuletum is considered a later successional stage of a *R. lanuginosum*-dominated community (Carici bigelowii-Racomitrietum (Du Rietz 1925) Dahl 1957, Hövelmann 1995). However, due to the extreme climatic conditions in high altitudes we consider the *Racomitrium* community as a rather stable plant community ('Dauergesellschaft').

Racomitrium lanuginosum community (Thlaspietea rotundifolii)

Table 7 no. 37-41, fig. 4

This community is characterized by the dominance of *Racomitrium lanuginosum*. It is differentiated by many altitudinal indicator species (e.g. *Campanula uniflora, Papaver radicatum, Potentilla hyparctica, Saxifraga nivalis, Silene acaulis*), as well as by the absence of all erect dwarf-shrub species. The community is very rich in species (mean 57). It is only found in high altitudes on shallow and stony soils at the northern side of ridges. These sites are wind-exposed but have a longer snow cover, higher air humidity and soil moisture in comparison to the ridges. Stands which are transitional to ridge vegetation (Carici-Dryadetum, e.g. *Carex rupestris, Dryas integrifolia, Kobresia myosuroides*) occur on more exposed sites or on soils with a higher pH (no. 40, 41).

Racomitrium lanuginosum-dominated stands have been described from many parts of the Arctic and boreal mountains (e.g. Greenland: Böcher 1954, 1963, Daniëls 1982, Knapp 1964, Stumböck 1993; Iceland: Hövelmann 1995; Norway: Dahl 1956, Haapasaari 1988). Dierssen (1996) includes most of these stands in the Carici bigelowii-Racomitrietum lanuginosi (Du Rietz 1925) Dahl 1956 (Loiseleurio-Diapension). This association is best developed in boreal, oceanic areas with a higher percentage of southern-distributed species than in stands of the study area. In contrast, the Sphaerophoro-Racomitrietum (Hadač 1946) Hofmann 1968 (Thlaspietea rotundifolii) described from Svalbard (e.g. Hadač 1989, Hartmann 1980, Möller 2000) and the High Arctic of Canada (Daniëls, pers. observations) is characterized by a higher number of northern-distributed species. This association is found in an intermediate position between ridge and snowbed and replaces Loiseleurio-Diapension communities in higher altitudes and northern latitudes (Elvebakk 1985, 1994). Regarding the floristic similarities and the environmental conditions, the *R. lanuginosum* community might be assigned to the Sphaerophoro-Racomitrietum.

4.1.2. Salix glauca shrub vegetation (Loiseleurio-Vaccinietea, Salicetea purpureae)

Shrub vegetation is defined here as vegetation mainly characterized by woody and strongly branching plants with a height of at least 50 cm. In the study area *Salix glauca* is the only shrub species. The mean height of the *Salix glauca* shrub vegetation is around 1 m, but single shrubs can reach heights up to 4 m. The stands are clearly stratified with the dominating shrub layer shading the undergrowth. Due to this dominance and the high litter deposition, species numbers are comparatively low, especially lichens and hepatics are rare. Moreover, the mild microclimate under the canopy favours the occurrence of southern-distributed taxa such as low arctic or boreal species (e.g. *Betula nana, Calamagrostis langsdorfii, C. lapponica, Equisetum arvense*).

Shrub vegetation of *Salix glauca* only occurs in the lowlands (highest stand 425 m a.s.l.) on south-facing slopes, along streams or on mesic sites with level to slightly sloping ground. Stands in these three habitat types are clearly differentiated by their floristic composition and thus belong to widely different syntaxa (see also Böcher 1963). On south-facing slopes the *Salix* shrub vegetation is associated with arctic steppes and differentiated by several steppe species (e.g. *Artemisia borealis, Calamagrostis purpurascens, Campanula gieseckiana, Carex supina, Melandrium affine/triflorum, Potentilla hookeriana*). This community should be assigned to the steppe class Calamagrostietea purpurascentis prov. (cf. Daniëls et al. 2000) and will be treated in a forthcoming paper. The riparian shrub vegetation (Plagiomnio-Salicetum) and the shrub vegetation of mesic sites (Calamagrostio-Salicetum) are discussed in this chapter.

Dwarf-shrub heaths (<50 cm) dominated by *Salix glauca* are differentiated from shrub vegetation by a higher species diversity (mean 40 spp.). Especially the cryptogams benefit from the more favourable light conditions and less litter deposition in these stands. In consequence, the *Salix glauca* dwarf-shrub vegetation shares several cryptogam species (e.g. *Alectoria ochroleuca, Bryoria chalybeiformis, Hypnum holmenii, Peltigera polydactylon* s.l., *Pohlia nutans, Rhytidium rugosum, Timmia austriaca*) with other dwarf-shrub heath communities, which are absent or rare in shrub vegetation. Such stands are mainly found on north-facing slopes with stronger inclination, solifluction, and shallower active layer (<40 cm). Schickhoff & Walker (2002) also explained the replacement of tall by low willows by a decrease of active layer depth and lower soil temperatures. Thus, a shorter growing season, unfavourable (shallow and cold) soil conditions and disturbance probably inhibit the development of shrub vegetation. The dwarf-shrub willow stands thus constitute the transition between shrub and dwarf-shrub heath communities (cf. Böcher 1963) and are assigned here to the latter based on floristics, structure and ecology (e.g. table 5 no. 4, table 7 no. 3).

Calamagrostio lapponicae-Salicetum glaucae ass. nov. hoc loco (Loiseleurio-Vaccinietea)

Table 4 no.1, table 8, fig. 5, holotypus: table 8 no. 17; in Sieg & Daniëls 2005 as Betulo-Salicetum prov.

The Calamagrostio-Salicetum is characterized by a dense shrub layer of *Salix glauca* 55 to 210 cm tall (mean 73 cm), which is mostly accompanied by a dwarf-shrub layer of *Betula nana, Empetrum nigrum* or *Vaccinium uliginosum*. *Calamagrostis lapponica* is selective character-species of the association. Moreover, it is differentiated from other Loiseleurio-Vaccinietea communities by *Brachythecium groenlandicum,* and by the absence or rareness of several cryptogam species (e.g. *Alectoria ochroleuca, Bryoria nitidula, Cladonia amaurocraea, C. borealis, C. gracilis, Flavocetraria cucullata, F. nivalis, Ochrolechia frigida, Pohlia nutans, Polytrichum strictum, Thamnolia vermicularis*) as well as a low species richness (mean 18). Differential-species against riparian shrub vegetation are species of comparatively drier soils such as *Ceratodon purpureus, Hypnum revolutum, Peltigera didactyla, P. rufescens, Empetrum nigrum, Thuidium abietinum* and *Tortula ruralis*. In none of the stands hummocks, solifluction, cryoturbation or permafrost in the upper 40 cm of the soil were detected. PH values range between 4.8 and 6.9 (mean 6.0). The ground is covered by a litter-layer with a height of 1 to 10 cm (mean 3 cm) as well as by a considerable humus-layer (mean 6, 3-17 cm).

The Calamagrostio-Salicetum mainly occurs on zonal sites in the lowlands of the study area. However, especially in the mountainous area of Angujârtorfik such sites are not widely distributed and thus stands are scattered. In the Kangerlussuaq area extensive stands occur on high river terraces without present-day riparian influence. The association is also found on downslope sites of south-facing slopes as far as the soil is not too dry. In these stands a few steppe species (e.g. *Carex supina, Campanula gieseckiana, Calamagrostis purpurascens*; e.g. no. 37, 40, 41) indicate the transition to the steppe associated shrub vegetation (Calamagrostietea pupurascentis prov.). On north-facing slopes the community is rarely found due to the occurrence of permafrost.

Similar mesic low shrub communities from Greenland are reported by Böcher (1954, 1963), Daniëls (1982), Knapp (1964) and Stumböck (1993). Those described by Böcher from the continental part of West Greenland certainly belong to the Calamagrostio-Salicetum. The Festuco-Salicetum glaucae (Betulo-Adenostyletea) from SE Greenland (Daniëls 1982) is a rather thermophytic community and comprises *Salix glauca* shrub and dwarf-shrub communities rich in forbs. The stands described by Stumböck (1993) and Knapp (1964) from South Greenland contain a considerable number of forbs and southern species which are rare or absent in our study area.

The Calamagrostio-Salicetum undoubtedly belongs to the Loiseleurio-Vaccinietea. However, as the classification of the *Salix glauca* shrub vegetation in Greenland needs further study, we refrain from assigning it to an alliance.

Plagiomnio elliptici-Salicetum glaucae ass. nov. hoc loco (Salicetea purpureae)

Table 9, fig. 5, holotypus: table 9 no. 4

The riparian *Salix glauca* shrub vegetation is characterized by *Plagiomnium ellipticum* and *P. medium.* If sterile, these two species could not always be separated and thus were aggregated in the table. However, the investigation of fertile material showed that both species are present in the Plagiomnio-Salicetum and also mixed stands occur. Both type relevés defined here (no. 4, 21) contain fertile specimens of *P. ellipticum*.

In comparison with the Calamagrostio-Salicetum species of moist or disturbed sites are more abundant (e.g. *Equisetum arvense, Polygonum viviparum, Sanionia uncinata)*, herbs and bryophytes are more prominent, whereas lichens are absent. The individual plants are considerably taller than in any other plant community of the study area (e.g. *Salix* shrubs up to 4 m tall with a stem diameter up to 4.4 cm). On most sites groundwater was found in depths between 5 and 50 cm. pH values range between 5.4 and 6.7 (mean 6.2). Due to erosion, the depth of the humus-layer varies strongly (0-25 cm).

The stands exclusively occur in the lowlands along rivers, rivulets and water tracks. They are probably flooded during snowmelt and after strong rain events.

In comparison with the hygrophytic *Salix* shrub vegetation in other areas (e.g. Greenland: Böcher 1954 (W-coast), Stumböck 1993 (S); Alaska: Cooper 1986, Schickhoff et al. 2002, Walker et al. 1994; Scandinavia: Dahl 1956), stands are floristically impoverished, and thus an assignment to an alliance based on floristic composition is difficult. However, considering the structural and especially the ecological characteristics (cf. Dierssen 1996, Schickhoff et al. 2002) we assigned the Plagiomnio-Salicetum to the alliance Salicion phylicifoliae.

Plagiomnio-Salicetum angelicetosum norvegicae subass. nov. hoc loco

Table 9 no. 1-6, holotypus: table 9 no. 4

Differential-species are *Calliergon cordifolium*, the low arctic oceanic *Angelica archangelica* ssp. *norvegica*, and the boreal sylvicolous *Calamagrostis langsdorfii* (cf. Böcher 1975). Dwarf shrubs are mostly absent, whereas grasses and herbs are prominent (mean cover graminoids: 29 %, herbs 71 %) and vigorous (mean height graminoids 58 cm, herbs 76 cm). Also the shrub layer is considerably tall (mean height 2 m). The sites are probably richer in nutrients, have a more oceanic microclimate and the subassociation thus shows affinities to the less rheophytic shrub and tall herb vegetation of the Betulo-Adenostyletea.

Plagiomnio-Salicetum chamaenerietosum latifolii subass. nov. hoc loco

Table 9, no. 7-28, holotypus: table 9 no. 21; in Sieg & Daniëls 2005 as Chamaenerio-Salicetum glaucae prov.

Differential-species are e.g. *Carex bigelowii, Chamaenerion latifolium, Climacium dendroides, Poa pratensis/arctica* and *Pohlia wahlenbergii*. Moreover, the subassociation is differentiated by the erect dwarf shrubs *Betula nana* and *Vaccinium uliginosum* and thus it is transitional to the Calamagrostio-Salicetum. The presence of these dwarf-shrub species might be a consequence of less disturbance leading to a higher affinity to non-riparian communities (cf. Gould & Walker 1999). *Chamaenerion latifolium*, which is a typical colonizer of moist gravel or other disturbed sites (e.g. Lünterbusch et al. 1995), has previously been reported as a typical species of a riparian *Salix* shrub community by Gould & Walker (1999) and Schickhoff et al. (2002).

4.1.3. Chionophytic graminoid and other snowbed vegetation (Salicetea herbaceae)

Table 10

Communities of the class Salicetea herbaceae are typical for sites with a prolonged snow cover and thus a short growing season. Moreover, the habitats are affected by irrigation during snowmelt and have a relatively high air humidity, low summer temperatures, and a low annual temperature range ('oceanic microclimate'). In the study area the following species have their main occurrence in communities of this class: *Anthelia julacea/juratzkana, Barbilophozia kunzeana, Bartramia ithyphylla, Cladonia acuminata, C. trassii, Conostomum tetragonum, Pertusaria geminipara, Potentilla hyparctica* and *Saxifraga foliolosa*. Typical snowbed species with a more restricted occurrence within the class are e.g. *Cetrariella delisei, Oxyria digyna, Phippsia algida, Pohlia drummondii, Polytrichum sexangulare, Ranunculus pygmaeus, Saxifraga cernua, S. hyperborea* and *Stereocaulon rivulorum*. In high altitudes several snowbed species (e.g. *Blepharostoma trichophyllum, Luzula arctica, Salix herbacea*) also occur in vegetation types of other classes, and thus their diagnostic value is weakened. Their increased 'activeness' (= enlargement or narrowing of the ecological amplitude of a species under changing environmental conditions, Yurtsev 1994) is likely a consequence of the more oceanic local climate in high altitudes (cf. Sieg & Daniëls 2005).

The vegetation of late-melting snowbeds (Phippsietum algidae-concinnae Nordh. 1943, nomenclatural type: Gjaerevoll 1950, tab. 15 no. 7 p. 426, neotypus Dierssen 1992) and early-melting snowbeds (Cassiopo-Salicetum herbaceae (Fries 1913) Nordhagen 1936) have been discussed in Sieg & Daniëls (2005). Concerning the latter association the following nomenclatural changes are made here: The name Cassiopo-Salicetum is replaced by Cassiopetum hypnoidis Fries 1913 nom. mut. et conserv. propos. (nomenclatural type: Fries 1913, single relevé p. 71, holotypus) since it was not in accordance with the prior name (*Andromeda hypnoides*-Lichen ass.) in Fries (1913, p. 70). Moreover, in Nordhagen (1936) this name explicitly referred to a sociation (ICPN, Art. 3d). The name Cassiopetum hypnoidis has been used later by several authors (e.g. Böcher 1933, De Molenaar 1976, Nordhagen 1943).

In the following paragraphs the graminoid-dominated communities, which mainly occur in high altitudes, are dealt with. For comparison, the high-elevation forms of Cassiopetum hypnoidis and Phippsietum are included in the community table.

The graminoids benefit from the absence of most erect dwarf-shrub species in high altitudes. As a consequence, the dwarf-shrub heaths of the class Loiseleurio-Vaccinietea are replaced by graminoid-dominated communities (table 10 no. 1-16). The latter are mainly dominated by *Carex bigelowii, Luzula confusa* or *Poa pratensis/arctica* (mean cover graminoids 34 %), and contain several cryptogam species of the Loiseleurio-Vaccinietea (e.g. *Alectoria ochroleuca, A. nigricans, Cladonia cyanipes, Dicranum laevidens, Hylocomium splendens, Hypnum holmenii),* as well as of the Salicetea herbaceae (e.g. *Blepharostoma trichophyllum, Conostomum tetragonum, Luzula arctica, Salix herbacea*). Furthermore, a number of indicator species for high altitudes occur in the stands (e.g. *Cardamine bellidifolia, Potentilla hyparctica, Racomitrium lanuginosum, Tritomaria quinquedentata*). Considering the habitat conditions (prolonged snow cover, high soil moisture especially in spring), structure (graminoid-dominated), and floristics (e.g. the absence of many important Loiseleurio-Vaccinietea species such as the erect dwarf shrubs) we assigned these stands to the Salicetea herbaceae.

The graminoid-dominated stands cover extensive areas on north-facing slopes in high altitudes. They often occur close to the Tortello-Caricetum, but on more acidic, humus-richer soils. These develop on longer snow-protected, more sloping sites, which are less affected by cryoturbation than by solifluction. The graminoid aspect of the high altitudes in the study area resembles that of the mid-alpine belt in Scandinavia (cf. Dahl 1956, Dierssen 1996, Nordhagen 1943).

Pediculari flammeae-Caricetum bigelowii ass. nov. hoc loco

Table 10 no. 8-16, fig. 4, holotypus: Table 10 no. 9

The Pediculari-Caricetum bigelowii is differentiated against all other communities of the class by predominance of *Carex bigelowii* and the occurrence of *Hierochloe alpina.* Differential-species against the Phippsietum and the Cassiopetum hypnoidis are the mentioned cryptogams species of the Loiseleurio-Vaccinietea (cf. previous paragraph), whereas *Cetrariella delisei, Oxyria digyna* and *Peltigera malacea* are absent. Against the *Cerastium-Poa* community and the Phippsietum it is furthermore differentiated by *Blepharostoma trichophyllum, Huperzia selago, Pedicularis flammea, P. hirsuta, Peltigera leucophlebia, Polygonum viviparum* and *Salix herbacea*. Cover percentages of graminoids (mean 39 %) and bryophytes (mean 94 %) as well as the species richness (mean 61) are high, whereas the cover of lichens is low (mean 8 %). The acidic soils (mean pH 5.3, 4.9-5.9) are mostly affected by solifluction and have a considerable organic layer (mean 3.2 cm) in comparison to most other communities in high altitudes.

On moister sites, mostly situated below big snowbeds with high water supply especially during snowmelt, several hygrophilous species (e.g. *Eriophorum angustifolium, Oncophorus wahlenbergii, Scapania* spp., *Sphagnum* spp.) occur (variant of *Eriophorum angustifolium*).

The association covers extensive areas on north-facing slopes on mesic as well as moist sites. In comparison with the Phippsietum and Cassiopetum hypnoidis the sites are less sheltered, earlier free of snow and show a higher humus accumulation.

Ecologically related *Carex bigelowii*-dominated communities have been assigned to the Nardo-Caricion bigelowii Nordh. 1936 (e.g. Caricetum bigelowio-lachenalii Nordh. 1943, cf. Dahl 1956, Dierssen 1996, Fredskild 1996, Nordhagen 1943). However, they occur on more acidic soils and contain many species which are absent in the Pediculari-Caricetum (e.g. the low arctic oceanic *Agrostis mertensii, Alchemilla alpina, Diphasiastrum alpinum, Vahlodea atropurpurea*, and the boreal-temperate *Deschampsia flexuosa, Nardus stricta*). Moreover, the alliance mainly contains anthropogenic-zoogenous communities.

Carex bigelowii-dominated stands are also described from oceanic W-Greenland (Böcher 1954) and SE-Greenland (De Molenaar 1976). De Molenaar discussed the controversial assignments of these chionophilous graminoid communities to higher syntaxa and classified the Hieracio-Caricetum bigelowii (=Caricetum bigelowio-lachenalii, Dierssen 1992) into the Nardo-Caricion. This community differs from the association described here by less affinity to snowbed communities and a lower mean pH.

Cerastium arcticum-Poa community

Table 10 no. 1-7

Concerning the vascular plants, the *Cerastium-Poa* community is dominated by *Poa pratensis/arctica* or *Luzula confusa*. Prostrate dwarf shrubs and sedges are almost absent, while some species of the Phippsietum occur (e.g. *Cerastium arcticum, Saxifraga cernua*). Differential-species against the Phippsietum and the

Cassiopetum hypnoidis are the mentioned cryptogams species of the Loiseleurio-Vaccinietea (see introduction ch. 4.1.3). Compared with the Pediculari-Caricetum the sites often have a higher inclination resulting in strong solifluction. The sheering effect in this process probably damages roots and rhizomes of *Salix herbacea* and *Carex bigelowii,* whereas the tuft-forming *Luzula confusa* and the *Poa* species with high regeneration capacity might be less affected.

Some of the stands (e.g. no. 1-3) are intermediate between early-melting (Cassiopetum hypnoidis) and late-melting snowbeds (Phippsietum) and thus occur as a small band between these communities. The accumulation of organic matter in these stands is low, and the absence of *Salix herbacea* might also be explained by the very short growing season (cf. Sieg & Daniëls 2005).

The absence of sedges and dwarf shrubs in the *Cerastium-Poa* community, the habitat (cold, disturbed sites) as well as the floristic composition with many northern species, resemble grass and rush heaths of the polar semi-desert (cf. e.g. Batten & Svoboda 1984). The community might be assigned to the Saxifrago-Ranunculion nivalis (Nordh. 1943) Dierss. 1984. The Cerastio regelii-Poetum alpinae Dierss. 1992 known from Svalbard (e.g. Dierssen 1992, Möller 2000) might be related.

4.1.4. Dwarf-shrub heaths and graminoid vegetation on base-rich soils (Carici-Kobresietea)

Table 11 (synoptic table), tables 12-14 (community tables)

In the study area *Dryas integrifolia, Carex rupestris, Cladonia pocillum, Kobresia myosuroides*, *Distichium capillaceum/inclinatum, Ditrichum flexicaule, Myurella julacea* and *Tortella tortuosa* mainly occur in communities of the North-American alliance Dryadion integrifoliae (Carici-Kobresietea). Other typical species with a more restricted occurrence within the syntaxon include e.g. *Armeria scabra, Campanula uniflora, Carex misandra, C. scirpoidea, Meesia uliginosa, Myurella tenerrima, Pedicularis lanata, Rhododendron lapponicum, Tofieldia pusilla* and *Saxifraga oppositifolia*. The alliance is typical for base-rich soils and is divided into the Dryadenion with xerophytic communities and the Rhododendrenion with meso-hygrophytic communities.

Dryadenion integrifoliae suball. nov. hoc loco

Nomenclatural type: Carici nardinae-Dryadetum integrifoliae Daniëls 1982 (Holotypus)

Differential-species are *Candelariella terrigena/placodizans*, *Carex supina, Encalypta rhaptocarpa*, *Poa glauca* and *Potentilla hookeriana/nivea*. Due to the extreme continental climate in the study area with high summer temperatures the communities are enriched with steppe species (e.g. *Artemisia borealis, Calamagrostis purpurascens, Carex supina, Campanula gieseckiana, Melandrium affine/triflorum*). The communities of the Dryadenion occur on comparatively dry sites and are represented by the Carici-Dryadetum on very wind-exposed sites and by the Thuidio-Kobresietum in more sheltered habitats with accumulation of organic matter. A ‘typical suballiance’ of the Dryadion integrifoliae has firstly been mentioned by Lünterbusch & Daniëls (2004).

Carici nardinae-Dryadetum integrifoliae Daniëls 1982

Nomenclatural type: Daniëls 1982, tab. 16 no. 3 p. 58 (Holotypus)

Table 11 no. 5, 5.1, 5.2, table 12 no. 1-48

In the study area the association is characterized by *Carex nardina* and differentiated against all other vegetation types of the class by *Calamagrostis purpurascens*. Furthermore, it is differentiated against the Thuidio-Kobresietum by *Alectoria ochroleuca, Bryoria nitidula, Dryas integrifolia, Hypogymnia austerodes, Pertusaria panyrga* and *Silene acaulis* (table 12).

The cryoxerophytic Carici-Dryadetum occurs on very wind-exposed, cold and dry sites of the study area. The open plant cover (mean 49 %) and little or absent snow cover in winter lead to extreme daily and annual temperature changes. The high evaporation, the coarse-grained soil, and the negligible humus accumulation due to low productivity of the plant cover accelerate the loss of soil water. In consequence, the plants must be able to endure water deficiency stress and very low temperatures and thus are mainly small or prostrate (mean canopy height 4 cm). Despite the extreme environmental conditions the species richness is high (mean 48), which is mainly caused by high diversity of lichens. The slow-growing lichens benefit from little interspecific competition and from the long continuity of the habitat (Dierssen 1996).

The Carici-Dryadetum is also known from subcontinental W-Greenland (Lünterbusch 2002), NE-Greenland (Fredskild 1998) and SE-Greenland (Daniëls 1982). Furthermore, the *Carex nardina-, Dryas-Carex nardina-* and partly the *Carex rupestris*-sociations described by Böcher (1954, 1963) from W-Greenland, the *Potentilla-Campanula uniflora* community described by Fredskild (1998) as well as the *Dryas-Campanula uniflora* ass. and the *Dryas-Salix uva-ursi* ass. reported by Knapp (1964) from continental mountains in South Greenland undoubtedly belong to this association.

All stands of the Carici-Dryadetum show a strong floristic similarity over entire Greenland, however some geographical variation exists (cf. Daniëls 1982). The high arctic *Salix arctica* is an area differential-species for the northern greenlandic stands, whereas in S- and SE-Greenland the arctic-continental *Carex rupestris* is lacking (cf. Fredskild 1996). The CD caricetosum rupestris, described from NE-Greenland (Fredskild 1998), might thus be better considered a geographical race. The SE-Greenland stands (Daniëls 1982) are enriched with southern-oceanic species, whereas in S-Greenland (Knapp 1964) *Salix uva-ursi* is an area differential-species. W-Greenland stands (Böcher 1954, 1963, Lünterbusch 2002, this study) are differentiated by continental species such as *Saxifraga tricuspidata* and *Artemisia borealis*. In the inland, steppe species such as *Calamagrostis purpurascens* and *Carex supina* are more prominent.

The Caricetum nardinae Nordh. 1935 is a vicarious European association reported from Svalbard (e.g. Elvebakk 1994, Möller 2000, Rønning 1965) and Scandinavia (e.g. Dierssen 1996, Nordhagen 1955). The related Selaginello-Dryadetum octopetalae (Walker et al. 1994) and Cetrario tilesii-Caricetum nardinae (Cooper 1986) are known from Alaska.

In the study area the Carici-Dryadetum is differentiated into two subtypes, which occur on soils with different pH values. Literature research confirmed such a subdivision of the xeric *Dryas-Carex nardina* vegetation in Greenland (e.g. Fredskild 1998, Lünterbusch 2002). Thus, two subassociations are established here in spite of the small number of relevés in one subtype.

Carici-Dryadetum sphaerophoretosum globosi subass. nov. hoc loco

Table 11 no. 5.1, table 12 no. 8-48, holotypus: table 12 no. 29

Differential-species are many cryptogams such as *Alectoria nigricans, Cladonia borealis, Gymnomitrion corallioides, Pertusaria coriacea, Pohlia* spp., *Polytrichum* spp., *Pseudephebe pubescens* and *Sphaerophorus globosus*. Concerning the vascular plants, *Cerastium alpinum, Draba nivalis, Festuca brachyphylla, Minuartia rubella, Salix glauca* and *Saxifraga tricuspidata* are differential-species. The CD sphaerophoretosum is very rich in species (mean 50) with a high diversity and cover of lichens (mean 27 spp., cover 26 %). It occurs on sites with lower pH (mean 6.3, 5.5-6.9) and conductivity values (mean 29 μS x cm^{-1}). The subassociation is very common in the study area and found in all altitudes.

In some of the stands *Carex rupestris* is dominant (e.g. no. 25, 44, 46). They occur in less exposed habitats and are transitional to the Thuidio-Kobresietum, in which the species can be dominant too. These *C. rupestris* stands resemble the Carici rupestris-Dryadetum octopetalae (Nordh. 1928) Dierss. 1982, which replaces the Caricetum nardinae in Scandinavia and Svalbard on less exposed sites (e.g. Dierssen 1996, Koroleva 1994, Möller 2000, Rønning 1965, Thannheiser et al. 2001). However, in the study area the floristic differences between *C. rupestris*-dominated stands and other stands of the CD sphaerophoretosum (and Thuidio-Kobresietum) are rather small, which refrain us from considering these stands as a separate association comparable with the situation in Scandinavia and Svalbard (see above).

Carici-Dryadetum lesquerelletosum arcticae subass. nov. hoc loco

Table 11 no. 5.2, table 12 no. 1-7, holotypus: table 12 no. 5

The CD lesquerelletosum is differentiated by *Artemisia borealis, Carex capillaris, Fulgensia bracteata*, *Lesquerella arctica* and *Stegonia latifolia*. The stands are less rich in species (mean 33), which is mainly due to the absence of many acidophytic cryptogam species. The stands occur on weakly alkaline sites (mean pH 8.0) and show a considerable percentage of unvegetated soil (mean 26 %). As this subassociation is probably typical of limestone habitats (cf. Lünterbusch 2002) and the substrate in the study area is less base-rich, the stands only occur on sites with an upward water movement due to high evaporation (ridges, dry and exposed lakeshores). This process leads to enrichment of the upper soil with bases and salts, which is expressed by a higher conductivity (mean 206 µS x cm^{-1}). Such habitats are rare in the study area and are mainly found in low altitudes or near the inland ice.

Altitudinal differentiation

The Carici-Dryadetum is present in all altitudes with an increasing importance from low to high elevations. In the low-elevation stands of the CD lesquerelletosum some species occur which are typical for higher altitudes in the CD sphaerophoretosum (e.g. *Carex nardina, C. rupestris, Silene acaulis*). This might be explained by reduced interspecific competition within the former due to the extreme habitat conditions (high salt contents). In low altitudes, stands of the CD sphaerophoretosum only occur on the most exposed ridges and can be considered as impoverished, as species diversity is comparatively low and several typical species are rare or absent (e.g. *Carex nardina, C. rupestris, Draba nivalis, Gymnomitrion corallioides, Minuartia rubella, Pertusaria panyrga, Silene acaulis, Thamnolia vermicularis*). The mid-elevation form, in which all these species are present, is well-developed and abundant on ridges as well as on less exposed sites. In high altitudes several altitudinal indicator species occur (e.g. *Campanula uniflora, Saxifraga oppositifolia, Taraxacum lacerum, Trisetum spicatum*), which allow the distinction of a high-elevation form. These stands are very species-rich (mean 60) and cover extensive areas. They even occur on south-facing slopes, where they seem to replace the arctic steppe vegetation (Arabido holboelli-Caricetum supinae Daniëls & Fredskild in Fredskild 1998) in this habitat type. A similar observation was made by Böcher (1963) regarding the replacement of steppe vegetation by *Dryas* communities along the latitudinal gradient.

Thuidio abietini-Kobresietum myosuroidis ass. nov. hoc loco

Table 11 no. 4, table 12 no. 49-58, holotypus: Table 12 no. 54

Kobresia myosuroides is regional preferential character-species of this association. Differential-species against the Carici-Dryadetum are typical for humus-richer, moister soils such as *Aulacomnium turgidum, Carex bigelowii, Cladonia gracilis, Rhytidium rugosum* and *Thuidium abietinum*. Other species of less extreme sites are more prominent (e.g. *Dicranum flexicaule/fuscescens, Polygonum viviparum, Salix glauca*), and graminoids (*Carex rupestris, Kobresia myosuroides*) are dominant. The total vegetation cover (mean 91 %) as well as cover of bryophytes and herbs is higher. The stands are rich in species (mean 47). PH values range between 5.4 and 6.6 (mean 6.1). Compared with the Carici-Dryadetum, the association occurs on more sheltered sites with higher organic matter contents (mean 20 %). Several stands have a southern exposure and are transitional to the arctic steppe vegetation due to the warmer microclimate. The pronounced shelter of the habitats and their higher organic matter contents also lead to some floristic similarities to the Rhododendro-Vaccinietum sphaerophoretosum.

Related *Kobresia myosuroides*- and *Carex rupestris*-dominated stands from Greenland were reported by Lünterbusch & Daniëls (2004), Böcher (1959, 1963), Knapp (1964) and Stumböck (1993). The association is probably vicarious to the Scandinavian Campanulo unifloro-Elynetum bellardii (Nordh. 1928) Dierss. 1992 (e.g. Nordhagen 1955, Dierssen 1996) and the Salici dodgeanae-Kobresietum myosuroides Cooper 1986 from Alaska with several Beringian species (Cooper 1986). Area differential-species against the Scandinavian association are the western-arctic *Carex supina* ssp. *spaniocarpa*, *Dryas integrifolia* and *Saxifraga tricuspidata* as well as *Festuca brachyphylla* and *Tortella tortuosa* var. *arctica*.

Rhododendrenion lapponici Lünterb. & Daniëls 2004

Nomenclatural type: Rhododendro-Vaccinietum Daniëls 1982 (Holotypus Lünterbusch & Daniëls 2004, p. 263)

The suballiance is differentiated by several hygrophilous species such as *Campylium stellatum, Carex misandra, Pedicularis flammea, Equisetum arvense, Hylocomium splendens, Meesia uliginosa, Oncophorus wahlenbergii* and *Tomentypnum nitens*. The main environmental gradients in this suballiance are altitude, which leads to the differentiation of Tortello-Caricetum from the Rhododendro-Vaccinietum, and soil moisture, which separates the Saxifrago-Kobresietum from the formerly mentioned communities (see ch. 4.1.5).

Rhododendro lapponici-Vaccinietum microphylli Daniëls 1982

Nomenclatural type: Daniëls 1982, tab. 5 no. 7 p. 26 (Holotypus)

Table 11 no. 2, 2.1-2.3, table 13

The association is dominated by dwarf shrubs (*Betula nana, Dryas integrifolia, Rhododendron lapponicum, Vaccinium uliginosum*) and bryophytes. In the study area, the community is differentiated against all other vegetation types of the class by *Pyrola grandiflora,* which indicates an affinity to the dwarf-shrub heaths of the Loiseleurio-Vaccinietea. Differential-species against the Tortello-Caricetum are the erect dwarf shrubs mentioned above, whereas several altitudinal indicator species are absent. Against the Saxifrago-Kobresietum the association is furthermore differentiated by *Carex rupestris* and a number of lichens (e.g. *Cladonia arbuscula, C. chlorophaea* s.l., *C. gracilis, Peltigera leucophlebia*), as well as by the absence of several species of base-rich fens (see ch. 4.1.5). Daniëls & Lünterbusch (2004) discussed the interrelation between the Rhododendro-Vaccinietum and the Saxifrago-Kobresietum in West Greenland. Following their concept we distinguish these associations by occurrence of mire species, a higher importance of graminoids, and the absence of several species of drier soils in the Saxifrago-Kobresietum.

The Rhododendro-Vaccinietum occurs on mesic and moist, mainly base-rich soils (mean pH 6.2, 5.0-7.5) with more or less permanent water supply from higher sites in spring and desiccation of the soil surface later in summer. Species richness in the stands is high (mean 45).

In Greenland the Rhododendro-Vaccinietum is a widespread community distributed in subzones E, D and C (cf. Fredskild 1998, Lünterbusch & Daniëls 2004, Walker et al. 2005). In SE-Greenland the association mainly occurs in the more continental inland areas (Daniëls 1982). From the inland of West Greenland Böcher (1954, 1963) reported meso-hygrophytic and more or less calcicolous sociations (e.g. *Rhododendron-Vaccinium microphyllum* soc., *Dryas-Rhododendron* soc., *Dryas-Aulacomnium palustre* soc.) which belong to this association. Related communities are known from S-Greenland (Stumböck 1993) and Alaska (Walker et al. 1994).

The differentiation of the Rhododendro-Vaccinietum in two subassociations mainly corresponds to differences in soil moisture and shelter. Lünterbusch & Daniëls (2004) and Daniëls (1982) also emphasized the decisive differential role of these ecological factors in the association.

Rhododendro-Vaccinietum campylietosum stellati Lünterb. & Daniëls 2004

Nomenclatural type: Lünterbusch & Daniëls 2004, table 1 no. 22 p. 253 (Holotypus)

Table 11 no. 2.1, 2.2, table 13 no. 1-34, fig. 4

The RV campylietosum occurs on moister, more sheltered sites and is differentiated by hygrophilous species such as *Campylium stellatum, Equisetum variegatum, Myurella tenerrima, Sanionia uncinata, Tofieldia pusilla* and *Tomentypnum nitens*, as well as by species of other erect dwarf-shrub heath communities (*Betula nana, Empetrum nigrum, Pedicularis lapponica*).

The variant of *Aulacomnium palustre* (table 11 no. 2.1, table 13 no. 1-15) is mainly differentiated by hygrophilous species, which also occur in base-rich fens (e.g. *Carex gynocrates, C. rariflora, Eriophorum angustifolium, Salix arctophila*) and other wet sites (*Aulacomnium palustre*). Lichens are scarce. Stands mostly occur near lake-shores on moist level ground with a high percentage of organic matter (mean 42 %, histic gleysols). They often have a pronounced microrelief with hummocks overgrown by dwarf shrubs and hollows dominated by mosses. Compared with the RV campylietosum described by Lünterbusch & Daniëls (2004) from NW-Greenland the var. of *Aulacomnium palustre* is stronger related to the Saxifrago-Kobresietum.

The variant of *Alectoria ochroleuca* (table 11 no. 2.2, table 13 no. 16-34) forms a transition between the var. of *Aulacomnium palustre* and the subass. sphaerophoretosum. Thus it contains species of moist sites such as *Tomentypnum nitens, Campylium stellatum* and *Tofieldia pusilla,* as well as species of drier, more exposed sites such as many lichens (e.g. *Alectoria ochroleuca, Bryoria nitidula*, *Cladonia pyxidata, Peltigera rufescens, Rinodina turfacea*). The variant is similar to the RV campylietosum described from NW-Greenland (Lünterbusch & Daniëls 2004). It can be divided into subvariants, which mainly occur on slopes with different exposition. On south-facing slopes or more exposed sites *Rhododendron lapponicum* and species of drier or of mineral soils such as

Carex scirpoidea, Campylium stellatum and *Kobresia myosuroides* are more prominent (subvar. of *Kobresia myosuroides*). On north-facing slopes a moss rich subvariant with humicolous species such as *Aulacomnium turgidum, Dicranum acutifolium/brevifolium* and *Hylocomium splendens* occurs (subvar. of *Aulacomnium turgidum*). On very sheltered sites with stronger inclination *Cassiope tetragona* can be codominant (e.g. no. 18, 21). Such stands are transitional to the Hylocomio-Cassiopetum dryadetosum.

Rhododendro-Vaccinietum sphaerophoretosum globosi Lünterb. & Daniëls 2004

Nomenclatural type: Lünterbusch & Daniëls 2004, table 1 no. 4 p. 248 (Holotypus)

Table 11 no. 2.3, table 13 no. 35-45

Differential-species are e.g. *Hierochloe alpina, Physconia muscigena, Thuidium abietinum, Tortula ruralis*, and altitudinal indicator species such as *Stereocaulon alpinum, Racomitrium lanuginosum* and *Sphaerophorus globosus. Betula nana* is rare, lichens are more prominent and stands are richer in species (mean 54). The subassociation only occurs in mid altitudes on less sheltered, drier sites with a thinner humus layer. Due to these habitat conditions the RV sphaerophoretosum is transitional to communities of the Dryadenion. It is also described from NW-Greenland (Lünterbusch & Daniëls 2004) and can be divided into corresponding subvariants as the former community (subvar. of *Aulacomnium*, subvar. of *Kobresia*).

Altitudinal differentiation

The Rhododendro-Vaccinietum is restricted to altitudes below 800 m a.s.l. The altitudinal limit is represented by relevé no. 35 (800 m a.s.l.), which can be considered transitional to the Tortello-Caricetum (see ch. 4.2.2.2). In the RV campylietosum the differentiation between stands from low and mid altitudes is not well expressed. The RV sphaerophoretosum only occurs in mid altitudes, which might be due to compensation of the drier soil conditions by the higher air humidity there. Consequently, mid-elevation indicator species (e.g. *Cladonia stricta*, *Hierochloe alpina, Racomitrium lanuginosum, Sphaerophorus globosus, Silene acaulis, Stereocaulon alpinum*) mainly occur in this subassociation.

Tortello arcticae-Caricetum rupestris ass. nov. hoc loco

Table 11 no. 3, 3.1, 3.2, table 14, holotypus: Table 14 no. 9

The association is easily recognized by dominance of the moss *Tortella tortuosa* var. *arctica*. Differential-species against all other vegetation types of the class are *Cardamine bellidifolia*, *Dactylina arctica*, *Huperzia selago, Plagiochila porelloides, Polytrichum alpinum, Salix herbacea, Scapania* spp. and *Tritomaria quinquedentata.* Against the Rhododendro-Vaccinietum it is also differentiated by *Myurella julacea*. Other typical species are *Armeria scabra, Hypnum bambergeri, Ptilidium ciliare* and *Racomitrium lanuginosum*. The community is dominated by graminoids (*Carex bigelowii, C. rupestris*) and mosses. Erect dwarf shrubs are almost absent, whereas several prostrate dwarf-shrub species (*Dryas integrifolia, Salix herbacea, Saxifraga oppositifolia, Silene acaulis*) occur. The association is very rich in species (mean 58, 30-85). It occurs in high altitudes on seepage slopes with little inclination, moderate shelter and snow cover. The mesic to moist soils are shallow, stony and mostly affected by cryoturbation. The latter leads to low organic matter accumulation (organic layer 1-3 cm, mean organic matter rhizosphere 13 %) and relatively high pH values (5.2-6.8, mean 5.8).

Floristically related communities from corresponding habitats in the Arctic are mainly reported from northern areas or high mountains: *Tortella arctica* communities are abundant in northern Ellesmere Island (subzones A-C, Brassard 1971) and subzone B in N-Greenland (Holmen 1955). Lünterbusch (2002) describes a related *Tomentypnum nitens-Dryas integrifolia* community from suboceanic NW-Greenland (subzone C). A *Tortella tortuosa* subassociation of the *Dryas-Salix uva-ursi* association was reported from mountains in S-Greenland (Knapp 1964). Related communities are further described from nonsorted circles in Alaska (Junco biglumis-Dryadetum integrifoliae Kade et al. 2005), from Scandinavia (the hygrophytic Carici rupestris-Dryadetum octopetalae tomentypnetosum, cf. Dierssen 1996) and from Svalbard (‘moss tundra’, e.g. Wollesen 1997, Hartmann 1980).

Tortello-Caricetum luzuletosum confusae subass. nov. hoc loco

Table 11 no. 3.1, table 14 no. 1-11, fig. 5, holotypus: Table 14 no. 9

The TC luzuletosum is differentiated by several species of somewhat drier soil such as *Dryas integrifolia, Hypnum revolutum, Kobresia myosuroides, Luzula confusa, Saxifraga oppositifolia, Silene acaulis* and many lichens (e.g. *Bryoria nitidula, Cetraria islandica, Peltigera rufescens, Psoroma hypnorum, Rinodina turfacea, Sphaerophorus globosus, Stereocaulon alpinum, Thamnolia vermicularis*). Lichens are more prominent and the stands are very rich in species (mean 63). The subassociation is found on moderately exposed, mesic sites with constant water supply only in spring. It covers extensive areas in high altitudes on slightly sloping ground with mainly northern exposure.

Tortello-Caricetum scorpidietosum cossonii subass. nov. hoc loco

Table 11 no. 3.2, table 14 no. 12-16, holotypus: Table 14 no. 15

This subassociation is differentiated by hygrophytic species such as *Carex misandra*, *Eriophorum angustifolium, Fissidens osmundoides, Philonotis fontana/tomentella* and *Scorpidium cossonii.* It is less rich in species (mean 49), which is due to the smaller number of lichen species. The subassociation occurs on moister sites with constant supply of lateral soil water during the growing season. Moreover, the sites are more sheltered, less inclinated, and soils show a higher amount of organic matter.

Altitudinal differentiation

The association only occurs in high altitudes (see ch. 4.2.2.2) and consequently contains a number of indicator species for higher elevations such as *Cardamine bellidifolia, Dactylina arctica, D. ramulosa, Luzula arctica, Papaver radicatum, Salix herbacea, Silene acaulis* and *Stereocaulon alpinum*.

4.1.5. Fen vegetation (Carici-Kobresietea, Scheuchzerio-Caricetea)

Fens occur along lakeshores, rivers or in depressions with high water table. According to the soil pH, two groups of fen vegetation types can be distinguished. The base-rich fens (Saxifrago-Kobresietum, Caricetum microglochinis, mean pH 6.3, see table 15) are differentiated against all other vegetation types in the study area by *Carex microglochin*, *Catascopium nigritum, Euphrasia frigida, Juncus castaneus*, *J. triglumis, Kobresia simpliciuscula, Pinguicula vulgaris* and *Saxifraga aizoides.* Moreover, they are differentiated against the acidophytic fens (Caricetum saxatilis, Caricetum rariflorae, mean pH 5.4, see table 16) by *Carex capillaris, Distichium capillaceum/inclinatum, Dryas integrifolia, Ochrolechia frigida*, *Pedicularis flammea, Rhododendron lapponicum* and *Tofieldia pusilla*. The acidophytic fens are differentiated by *Polytrichum swartzii, Pseudocalliergon trifarium, Scorpidium revolvens, Warnstorfia exannulata* and *W. sarmentosa*. The species richness of the base-rich fens (mean 32) is considerably higher than of the acidophytic fens (mean 15).

Saxifrago nathorstii-Kobresietum simpliciusculae Daniëls & Fredsk. in Fredsk. 1998

Nomenclatural type: Fredskild 1998, tab. 10/11 no. 344 p. 33 (Holotypus)

Table 11 no.1, table 15 no. 1-13

The Saxifrago-Kobresietum is differentiated against less hygrophytic communities of the class Carici-Kobresietea by typical species of base-rich fens such as *Catascopium nigritum, Euphrasia frigida, Juncus castaneus*, *J. triglumis, Kobresia simpliciuscula, Pinguicula vulgaris* and *Saxifraga aizoides,* as well as by the absence of several species of drier soils such as many lichens (see ch. 4.1.4). Against the base-rich fens of the class Scheuchzerio-Caricetea the association is mainly differentiated by the higher presence of some dwarf-shrub species (*Dryas integrifolia, Rhododendron lapponicum, Vaccinium uliginosum*), as well as by *Carex misandra, C. gynocrates, Ditrichum flexicaule, Flavocetraria nivalis* and *Tortella tortuosa.* However, as can be clearly seen from table 15, the differences between these base-rich fens and the Saxifrago-Kobresietum are small. The floristic intermixture between communities of the distinct classes might be due to microtopographic variation (hummocks, hollows) and a seasonal variation in water supply, which enables typical species of both classes to grow side by side (Lünterbusch & Daniëls 2004, Fredskild 1998).

The association is quite rare in the study area and stands are of small extent. They occur as small patches around lakes on peaty as well as mineral soils with comparatively high pH values (mean 6.3, 5.6-7.1). Some transitional stands to the Rhododendro-Vaccinietum (no. 1, 2) and Tortello-Caricetum (no. 8) are included in the community.

Other base-rich fens (Scheuchzerio-Caricetea)

Table 15, no. 14-18

The graminoid-dominated base-rich fens are differentiated against the Saxifrago-Kobresietum by *Aneura pinguis* and *Calamagrostis neglecta*, and are related to the Caricetum microglochinis Nordh. 1928 (Caricion atrofusco-saxatilis Nordh. 1928, e.g. no. 15). Furthermore, some stands are transitional to salt-marsh vegetation (no. 17 with e.g. *Carex maritima, Lomatogonium rotatum, Triglochin palustre*) or to the Caricetum rariflorae (no. 14 with e.g. *Carex rariflora, Cinclidium arcticum/stygium*). These base-rich fens are rare in the study area and seem to occur on moister sites than the Saxifrago-Kobresietum.

Caricetum saxatilis Nordh. 1928 nom. conserv. propos.

Nomenclatural type: Nordhagen 1928 tab. p. 398 no. 10 (Lectotypus Sieg, Drees & Daniëls 2006 hoc loco)

We propose here to conserve this name instead of Calliergono-Caricetum saxatilis Nordh. 1928 as only the second part of the original name 'Calliergon sarmentosum-reiche Carex saxatilis-Ass.' in Nordhagen (1928) can be transferred to the rank of an association (s. ICPN). Moreover, the name Caricetum saxatilis has been used later by Nordhagen (1943).

Table 16 no. 1-12, fig. 4

The association is characterized by the dominance of *Carex saxatilis*. However, in some stands with high cover values of *Calamagrostis neglecta* the species is less prominent (e.g. no. 8). The association is poor in species (mean 12) and stands are relatively tall (mean 28 cm) resulting from the dominant graminoids. Dwarf shrubs are subordinate (cover 0-10 %) and lichens are absent. The association occurs along windward, steep and consolidated lakeshores on wet gleysols with a shallow or well-developed organic layer. Ground water was detected in depths between 0-20 cm (mean 9 cm) and pH values range between 4.6 and 6.3 (mean 5.6). Often, the Hippuridetum vulgaris Rübel 1912 occurs adjacent in deeper water. The Caricetum saxatilis is also reported from W-Greenland by Dierssen & Dierssen (2005) and SE-Greenland by De Molenaar (1976).

Caricetum rariflorae Fries 1913 nom. conserv. propos.

Nomenclatural type: Fries 1913, single relevé on p. 133 (Holotypus)

Table 16 no. 13-29

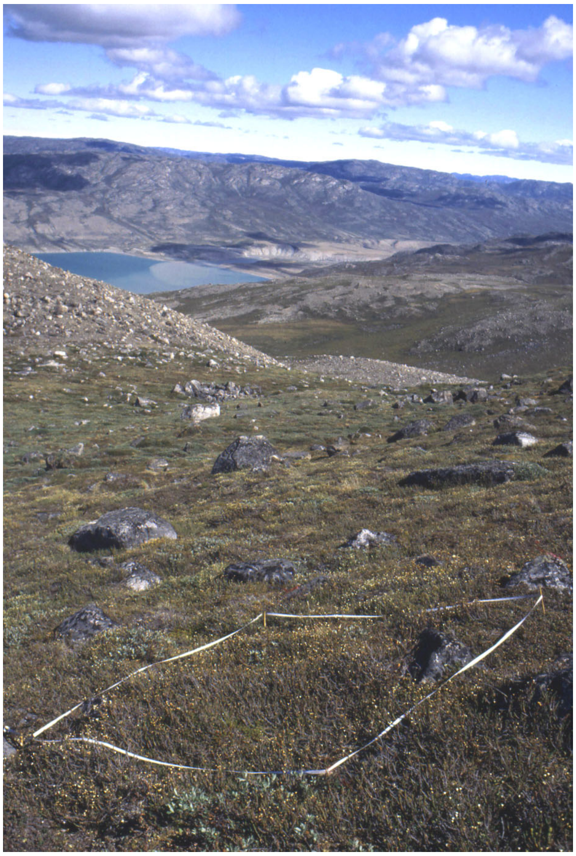
In the study area the association is characterized by *Loeskypnum badium, Meesia triquetra* and *Paludella squarrosa* as well as the dominance of *Carex rariflora*. Differential-species against the Caricetum saxatilis are furthermore *Aneura pinguis, Betula nana, Calliergon richardsonii, Cinclidium arcticum/stygium, Polygonum viviparum* and *Tomentypnum nitens*. The cover of graminoids is high (30-80 %), sometimes with *Eriophorum angustifolium* and *Salix arctophila* as codominant species. In comparison with the Caricetum saxatilis the stands are richer in species (mean 18) and canopy height is lower (mean 13 cm). The association is found along leeward and shallow lakeshores, along small rivulets and in depressions. It mostly occurs on soils with a shallow peat layer and sometimes also on mineral soils. PH values range between 4.6 and 6.0 (mean 5.3). The association is also reported from W-Greenland by Böcher (1954, 1963) and Dierssen & Dierssen (2005), and from SE-Greenland by Böcher (1933) and De Molenaar (1976).

Other fen communities

Other types of fen vegetation are quite rare in the study area and consequently, only a few stands could be sampled by relevés (not included in this paper). The Eleocharidetum quinqueflorae Lüdi 1921 and the Drepanoclado-Trichophoretum austriaci Nordh. 1928 (both Caricion davallianae Br.-Bl. 1949) were observed in low altitudes, whereas the Eriophoretum scheuchzeri Fries 1913 (Caricion nigrae) occurs in all altitudes. In constantly wet pools and along shores of small lakes species-poor stands of the Drepanoclado-Ranunculetum hyperborei Hadač 1989 with *Ranunculus hyperboreus* and dominant bryophytes (*Warnstorfia exannulata, W. sarmentosa*) were sampled.

Altitudinal differentiation of fen communities

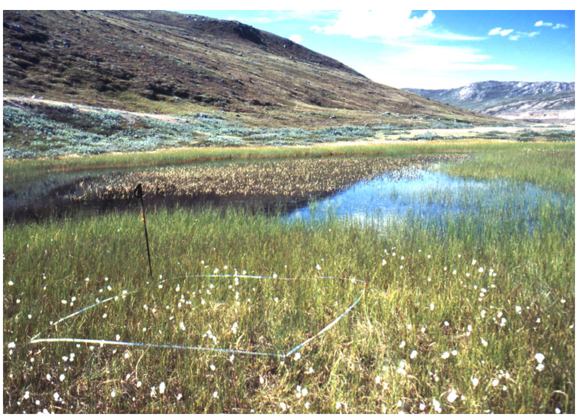
In accordance with their azonal character, the fen vegetation shows little altitudinal differentiation because extreme moisture conditions overrule the influence of



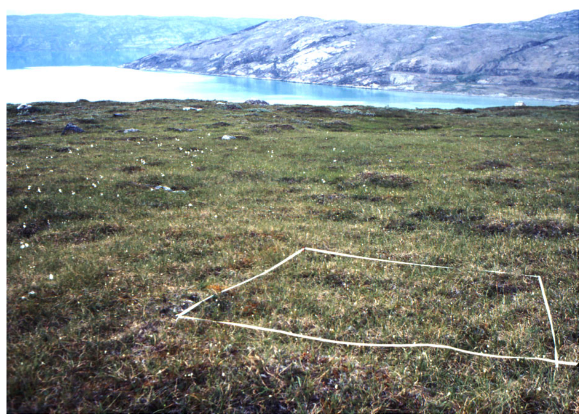
Hylocomio-Cassiopetum tetragonae, 640 m a.s.l.

Racomitrium lanuginosum community, 825 m a.s.l.

Pediculari-Caricetum bigelowii, 935 m a.s.l.



Caricetum saxatilis, 20 m a.s.l.



Rhododendro-Vaccinietum campylietosum, 205 m a.s.l.

Fig. 4. Pictures of some vegetation types of the study area, all from the research site Angujârtorfik.

the macroclimate (cf. Eurola 1971). There are also only few fen species which are suitable as altitudinal indicators (e.g. *Calamagrostis neglecta, Carex capillaris, C. microglochin, Euphrasia frigida, Pinguicula vulgaris*). These are boreal or low arctic species, which only occur in low and mid altitudes. Erect dwarf-shrub species are suitable as altitudinal indicators for low and mid altitudes mainly in the Saxifrago-Kobresietum.

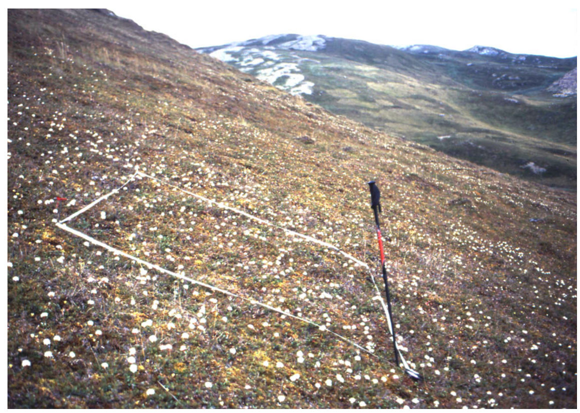
Lowlands

Low-shrub vegetation (Calamagrostio-Salicetum glaucae)

Plagiomnio-Salicetum glaucae, 100 m a.s.l.

Mid altitudes

Erect dwarf-shrub vegetation (Empetro-Betuletum)



Ledo-Betuletum peltigeretosum, 400 m a.s.l.

High altitudes

Snowbeds, graminoid and prostrate dwarf-shrub vegetation

Tortello-Caricetum luzuletosum, 860 m a.s.l.

Fig. 5. Pictures of altitudinal ranges in the study area and some of their typical vegetation types.

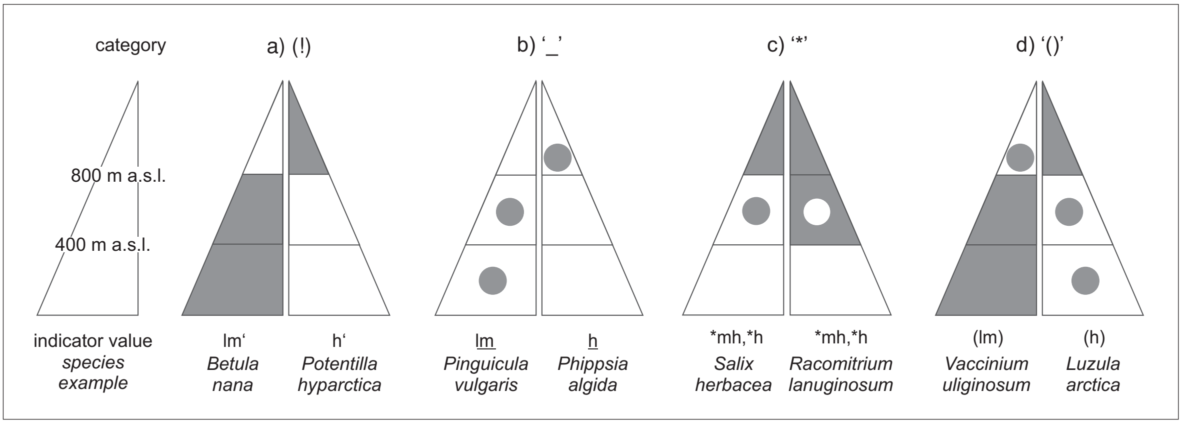


Fig. 6. Categories a-d of altitudinal indicator species. For each category two indicator values with species examples are shown. Grey: species present in several vegetation types, white: species absent, grey circle: species restricted to special vegetation type(s), white circle: species absent in special vegetation type(s).

4.2. Importance of vegetation types for characterization and delimitation of altitudinal vegetation belts

4.2.1. Altitudinal indicator species

Plant species can be used to distinguish elevation forms of vegetation types and to trace boundaries of altitudinal vegetation belts. For these purposes it is necessary to know their altitudinal indicator values. Derived from all relevés (incl. those in Sieg & Daniëls 2005) and additional field observations the total altitudinal distribution range of each species was identified and its altitudinal indicator value was assessed considering the following criteria (table 17).

An altitudinal indicator species must have a limited altitudinal distribution in most of the plant communities it occurs in. The main distribution range of the species within these plant communities is called 'indicated altitudinal range'. If its total altitudinal distribution shows several occurrences outside the indicated altitudinal range, the indicator value of the species is downgraded. The same applies to indicator values of species which are not common or not easily identifiable or observable in the field. Based on these criteria, altitudinal indicator species were selected and classified into four categories (a-d, table 17, fig. 6).

An obvious change in dominance of these species along the altitudinal gradient is also indicated in table 17 (last column). Such species, in particular, are important for field mapping of the boundaries of vegetation belts at meso-scale. The altitudinal indicator values of the species are also shown in all vegetation tables. The designations 'l' (low altitudes: 0-400 m a.s.l.), 'm' (mid altitudes: 400-800 m a.s.l.), and 'h' (high altitudes: 800-1070 m a.s.l.) refer to their indicated altitudinal range in the particular community.

a) General altitudinal indicator species (lm!, mh!, h!)
General altitudinal indicator species are abundant in several plant communities and have a limited and similar altitudinal distribution in all of them. That means that they are confined to one or two altitudinal ranges and their altitudinal indicator value is independent of vegetation type. Their total altitudinal distribution range lies within or slightly outside the indicated altitudinal range. However, in some cases, these species clearly occur outside the indicated range, but then always with a low presence, low cover-abundance and reduced vitality. Several of these species also show an obvious change in dominance along the altitudinal gradient. Downgraded species of this category are less abundant in some of the communities or have more occurrences outside the indicated altitudinal range.

The category 'a' encompasses several erect dwarf-shrub species (e.g. *Betula nana, Empetrum nigrum, Ledum palustre, Rhododendron lapponicum*), which are excellent indicators for low and mid altitudes. For example, in low and mid altitudes *B. nana* occurs in nine associations, in six of them with high cover-abundance values and in five as lm-indicator. In the remaining four associations *B. nana* is less abundant or the species cannot function as altitudinal indicator since the association in question is restricted to low and mid altitudes. In high altitudes *B. nana* is very rare, less vital and has low cover-abundance values. Its highest occurrence (860 m a.s.l.) is only little beyond the indicated range (0-800 m a.s.l.).

b) Altitudinal indicator species with narrow phytocoenological amplitude (l, lm, mh, h)
These altitudinal indicator species are mainly restricted to one vegetation type whereas they are rare or absent in other communities. Rare species which are altitudinal indicators in a few ecologically related vegetation types (e.g. snowbed communities) are also assigned to this category (table 17).

An example for this indicator group is *Vaccinium vitis-idaea,* which has its main distribution in low and mid-elevation stands of the Ledo-Betuletum. Its highest occurrence (625 m a.s.l.) as well as occasional occurrences in other communities are all within its indicated altitudinal range (lm).

Furthermore, the category 'b' contains several snowbed species (e.g. *Bryum cryophilum, Minuartia biflora, Phippsia algida, Ranunculus pygmaeus, Saxifraga hyperborea*), which are indicators for (mid and) high altitudes. This is due to the limited altitudinal distribution of snowbeds, which are well developed and common in high altitudes, but rare in mid altitudes and absent in the lowlands. The same applies to some species of the Carici-Dryadetum (e.g. *Draba nivalis, Minuartia rubella, Erigeron eriocephalus*), which also shows an increasing importance along the altitudinal gradient.

c) Altitudinal indicator species with change in 'activeness' (*mh, *h)
These altitudinal indicators also occur in several plant communities and in all of these with a limited altitudinal distribution. Additionally, they have a narrow phytocoenological amplitude in a part of their altitudinal range and a broad one in the rest of their range (= change in 'activeness', cf. Yurtsev 1994). As a consequence, these species are indicators for different altitudinal ranges in different plant communities. Furthermore, due to their limited altitudinal distribution they still have an indicator value when only their occurrence along the altitudinal gradient and not their phytocoenological amplitude is considered. However, in that case their indicator value can only be used for the distinction of two altitudinal ranges (fig. 6).

Salix herbacea, for example, is a species of mid and high altitudes. However, in mid altitudes it is mainly restricted to the Cassiopetum hypnoidis, whereas in high altitudes it occurs in many different plant communities. Thus, the species can be used for a distinction between low and mid altitudes by just recording its presence or absence. Additionally, it can be used to distinguish mid from high altitudes if its occurrences outside the Cassiopetum hypnoidis are regarded.

In the study area altitudinal indicator species of this category only occur in mid and high altitudes. Moreover, they are always characterized by a broadening of their phytocoenological amplitude along the altitudinal gradient. The plant communities in which the altitudinal indicator species have deviating indicator values are shown in table 17. It is obvious that this often concerns communities of the classes Salicetea herbaceae and Carici-Kobresietea, in which indicators of high altitudes occur in mid-elevation stands. This might be explained by the 'rule of habitat constancy' (cf. Walter 1990) as in mid altitudes the habitats of these communities show several similarities to the general environmental conditions of high altitudes: In snowbeds the prolonged snow cover, shorter growing season, high disturbance and high air humidity resemble the general high-elevation conditions. In some Carici-Kobresietea communities the windswept habitat with low organic matter content is similar to conditions on more exposed habitats in high altitudes.

Other species occur in several plant communities in mid and high altitudes, but they are absent in a few special communities in mid altitudes. These species mainly benefit from a changed habitat-type spectrum of particular vegetation types along the altitudinal gradient (see ch. 4.2.2.4). For example, species of more exposed habitats (e.g. *Racomitrium lanuginosum, Gymnomitrion corallioides*) also occur in Salicetea herbaceae communities in high altitudes because these vegetation types are also found there on less protected sites.

The general broadening of the phytocoenological amplitude of many cryptogams and small vascular plants with increasing altitude is probably also due to an increase of stress and disturbance and a decrease of competition from vascular plants, which allow these plant groups to invade a variety of new microhabitats. This is also favoured by an effective vegetative propagation.

d) Altitudinal indicator species with limited indicator value ((lm), (mh), (h))
These species occur in several vegetation types, but do not have a limited altitudinal distribution in all of them. Thus, their total altitudinal distribution always exceeds their indicated altitudinal range. Consequently, only recording their occurrence along the altitudinal gradient is not sufficient for the distinction of altitudinal belts. Such a species can only be used as altitudinal indicator if its occurrence in the particular plant community in which the species occurs outside the indicated range and thus does not have an indicator value is ignored.

For example, *Vaccinium uliginosum* is an altitudinal indicator for low and mid altitudes in most of the communities. However, it is also found in high altitudes in the Empetro-Betuletum and Ledo-Betuletum typicum. If the occurrences in these vegetation types are ignored, *V. uliginosum* can be used as good altitudinal indicator species for low and mid altitudes.

The particular plant communities which have to be ignored for indicator species are listed in table 17. The occurrences of the indicator species outside their indicated altitudinal range in these communities can mostly be explained by special habitat conditions. For example, in high altitudes the Empetro-Betuletum is very rare and only found on rather warm, sheltered sites. This habitat is also favourable for lm-indicators (e.g. *V. uliginosum*). Another example is the occurrence of mh-indicators (e.g. *Sphaerophorus globosus, Carex rupestris*) in the Carici-Dryadetum in low altitudes, which is probably due to its exposed habitat with reduced interspecific competition.

Concluding remarks

The analysis of altitudinal indicator species shows that some species (categories a, b) can be easily used for delimitation of vegetation belts or identification of elevation forms of vegetation types by just recording their occurrence along the altitudinal gradient. Others have a reduced (c) or no indicator value at all (d), if their occurrences in particular vegetation types are not taken into consideration.

The high amount of snowbed species among the high-elevation indicators is obvious. This is probably due to the more oceanic local climate with a prolonged snow cover in high altitudes and thus more favourable conditions for these species (cf. Sieg & Daniëls 2005). The importance of ridge species also increases along the altitudinal gradient. This is caused by strong wind exposition in higher altitudes and thus an increasing prominence of ridge habitats and their communities (Carici-Dryadetum, *Racomitrium* community). Moreover, the ridge species, which normally occur on mineral, base-rich soils, also benefit from less accumulation of acidic organic matter in higher altitudes.

The altitudinal indicator values of many species are confirmed by their biological distribution types in Greenland (table 17, Böcher 1975, Feilberg 1984, Fredskild 1996). Indicators for low and mid altitudes are mainly species with a boreal or low arctic distribution. This encompasses nearly all erect dwarf-shrub species and thus emphasizes the importance of the erect dwarf-shrub heaths in these altitudes. Indicators of higher altitudes (mh, h) are mainly widespread arctic, mid or high arctic species.

The indicated altitudinal ranges of indicator species are also correlated with their relative values of thermophily (cf. Karlsen & Elvebakk 2004), which is calculated for species of the Scoresby Sund region and based on the relation between mean July temperatures and northern distribution limits of the species on a circumpolar scale. Among more thermophilous plant groups with northern distribution limit at mean July temperatures higher than 5°C several altitudinal indicator species of low and mid altitudes (e.g. *Betula nana, Empetrum nigrum*) are found, whereas indicators of mid and high altitudes (e.g. *Salix herbacea, Ranunculus pygmaeus*) mainly belong to plant groups which reach their northern distribution limits at mean July temperatures between 3-5°C.

Moreover, the indicated altitudinal ranges generally agree with the 'Altitude Distribution Types' by Schwarzenbach (2000), which are based on extensive field observations in mountains of East and Northeast Greenland.

4.2.2. Vegetation types as altitudinal indicators

As discussed in the preceding chapter, plant species distribution along the altitudinal gradient is an important basis for the distinction of altitudinal vegetation belts. Additionally, vegetation types should be used as altitudinal indicators since this leads to additional criteria and thus to a better delimitation. For this purpose, the vegetation types of the study area are ana-

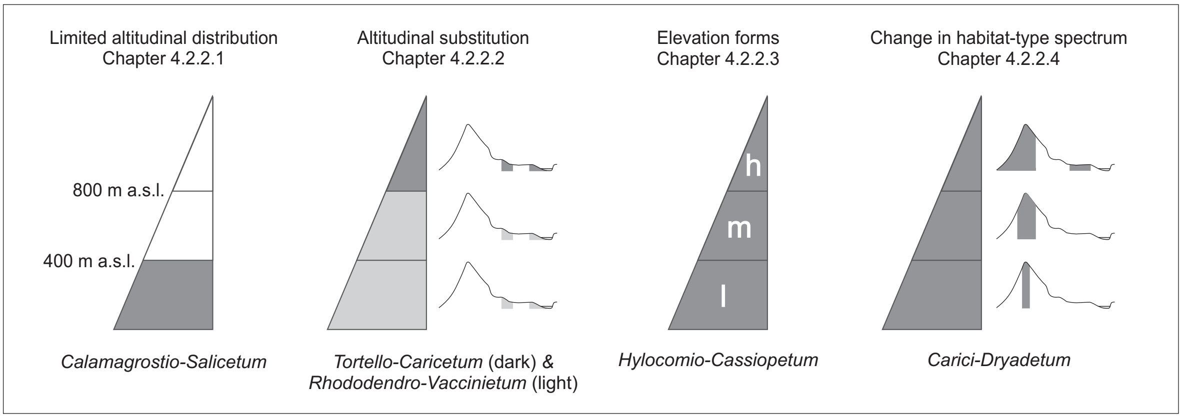


Fig. 7. Altitudinal differentiation of plant communities in the study area. For each type is shown a plant community example. Grey: community present, white: community absent, lmh: low/mid/high-elevation forms. On the right: preferred habitat-types of the community along the toposequence.

lysed regarding their altitudinal distribution, their subdivision into elevation forms and their habitat-type spectra in different altitudes. On this basis four types of altitudinal differentiation are distinguished (fig. 7). It should be noted that a particular plant community can be assigned to more than one of these types (e.g. the Cassiopetum hypnoidis has a limited altitudinal distribution and is additionally subdivided into elevation forms, table 18).

4.2.2.1. Limited altitudinal distribution of vegetation types

Most of the plant communities in the study area have a limited altitudinal distribution (table 18, fig. 7) and thus can be used as altitudinal indicators. Low altitudes are mainly indicated by shrub vegetation (Calamagrostio-Salicetum, Plagiomnio-Salicetum, Carici-Salicetum), and low and mid altitudes by several erect dwarf-shrub heath communities (Empetro-Betuletum, Ledo-Betuletum, Rhododendro-Vaccinietum). Snowbed communities (Cassiopetum hypnoidis, Phippsietum) are indicators for mid and high altitudes, whereas the graminoid-dominated associations Tortello-Caricetum and Pediculari-Caricetum as well as the *Racomitrium lanuginosum* community are restricted to high altitudes.

Vegetation classes also show clear altitudinal preferences: Loiseleurio-Vaccinietea communities mainly occur in low and mid altitudes, which is in accordance with the mainly low arctic distribution of their typical species. On the contrary, Salicetea herbaceae communities are absent in low altitudes, and their importance increases from mid to high altitudes. This is caused by the more oceanic conditions in higher altitudes with prolonged snow cover, lower temperatures and higher air humidity. Carici-Kobresietea communities occur in all altitudes, however they are more widespread in high altitudes due to more exposed habitats and base-rich soils with little humus accumulation. The azonal Scheuchzerio-Caricetea communities are locally found in all altitudes and are of little importance for the altitudinal differentiation. In general, the diversity in terms of vegetation types decreases with increasing altitude, which corresponds to the latitudinal decrease from South to North (e.g. Daniëls et al. 2000, Elvebakk 1985).

At first glance the communities on zonal sites seem to be most suitable as altitudinal indicators since in this habitat type a distinct community change between the different altitudinal ranges can be observed (table 18). The use of vegetation types on zonal sites for a distinction of vegetation belts would also simplify comparisons between belts and latitudinal subzones, since zonal sites play a principal role in the latitudinal zonation of the Arctic (cf. Walker et al. 2005). However, it is not always obvious which sites can be considered zonal for a particular altitudinal range. Zonal sites are mostly defined as flat or gently sloping, mesic sites with fine-grained soils that are not influenced by extremes of soil moisture, snow, wind exposition or disturbance (cf. Walker et al. 2002). Especially in high altitudes, sites with a combination of these habitat conditions are difficult to identify (see remarks in table 18), since flat sites are strongly wind exposed, affected by cryoturbation and soils are either relatively dry (Carici-Dryadetum) or mesic with lateral water supply (Tortello-Caricetum luzuletosum). Other mesic sites in high altitudes are mainly found in snow-protected depressions of boulder fields (Hylocomio-Cassiopetum). Generally, zonal sites are locally and not extensively distributed in mountainous areas due to the strong meso-scale heterogeneity of terrain, soil and climate (e.g. relief, exposition, shade, permafrost, soil texture). Thus, zonal vegetation alone can hardly be used for the delimitation of altitudinal vegetation belts.

Regarding the remaining habitat types the vegetation on north-facing slopes seems to be most suitable for a distinction of altitudinal belts, as all typical plant communities show a limited altitudinal distribution or at least different elevation forms (see ch. 4.2.2.3).

The indicator value of the vegetation types on south-facing slopes cannot finally be assessed, as a detailed analysis of the vegetation in this habitat type has not been finished yet. However, the altitudinal differentiation in this habitat type seems to be less pronounced than on north-facing slopes.

4.2.2.2. Altitudinal substitution of vegetation types

The altitudinal substitution of vegetation types is a special case of limited altitudinal distribution. In this case a community is replaced by another on similar habitats regarding soil moisture, pH and topographical position (exposition, inclination, shelter) along the altitudinal gradient. Since in this process the change of altitude-related environmental conditions (e.g. temperature, length of growing season, frequency and intensity of disturbance, organic matter accumulation) is not noticeably compensated by a change in habitat-type spectrum (see ch. 4.2.2.4), these vegetation types are mutually exclusive regarding their altitudinal distribution. Consequently, they are very good indicators for the characterization and distinction of altitudinal belts (fig. 7).

In the study area such altitudinal substitutions are only observed between mid and high altitudes and occur between Rhododendro-Vaccinietum and Tortello-Caricetum (see next paragraph), and probably also between Ledo-Betuletum and Pediculari-Caricetum bigelowii.

The Rhododendro-Vaccinietum (RV) and Tortello-Caricetum (TC) will be presented here as an example of altitudinal substitution (fig. 7, 8). Both communities occur on mesic to moist base-rich soils. However, the Rhododendro-Vaccinietum is mainly found below 800 m a.s.l. and the Tortello-Caricetum above that altitude. The floristic and structural differences between the two vegetation types are too pronounced for considering the Tortello-Caricetum an elevation form of the Rhododendro-Vaccinietum (ch. 4.1.4).

In figure 8 the relevés of the two associations are arranged in a DCA ordination diagram with selected species and a supplementary projection of important environmental variables. The first axis (eigenvalue = 0.336) explains about 9.5 % of the total species variability, which is a lot, given the high number of species in this data set (217 species in 61 relevés, cf. Lepš & Šmilauer 2003). The second axis explains about 5.5 % (eigenvalue = 0.210) of the floristic variability. Both axes are well correlated with the environmental data ($r_1 = 0.89$, $r_2 = 0.79$).

The two associations are mainly separated along the first axis, which is highly correlated with altitude ($r = 0.83$). Correspondingly, the differential-species between the two associations are also separated along the first axis: Differential-species of the Rhododendro-Vaccinietum (e.g. *Betula nana, Pyrola grandiflora, Rhododendron lapponicum, Vaccinium uliginosum*) are found on the left and those of the Tortello-Caricetum on the right side (e.g. *Dactylina arctia, Myurella julacea, Salix herbacea, Tortella tortuosa* var. *arctica*). The arrangement of the erect dwarf shrubs on the left and that of the graminoids (e.g. *Carex bigelowii, C. rupestris*) on the right side clearly reflects the different structure of the two vegetation types.

The subtypes of both associations are differentiated along the second axis, which is negatively correlated with moisture ($r = -0.69$), snow cover ($r = -0.54$), shelter ($r = -0.49$) and organic matter content ($r = -0.49$). Consequently, differential-species of subtypes of both associations are found at the top (species of drier, more exposed habitats: e.g. *Bryoria nitidula, Hypnum revolutum*) and at the bottom of the diagram (species of moist habitats: *Eriophorum angustifolium, Salix arctophila*). The third axis, which seems to be irrelevant for the differentiation of the communities, is mainly correlated with pH value ($r = 0.36$).

It can be concluded that the Tortello-Caricetum

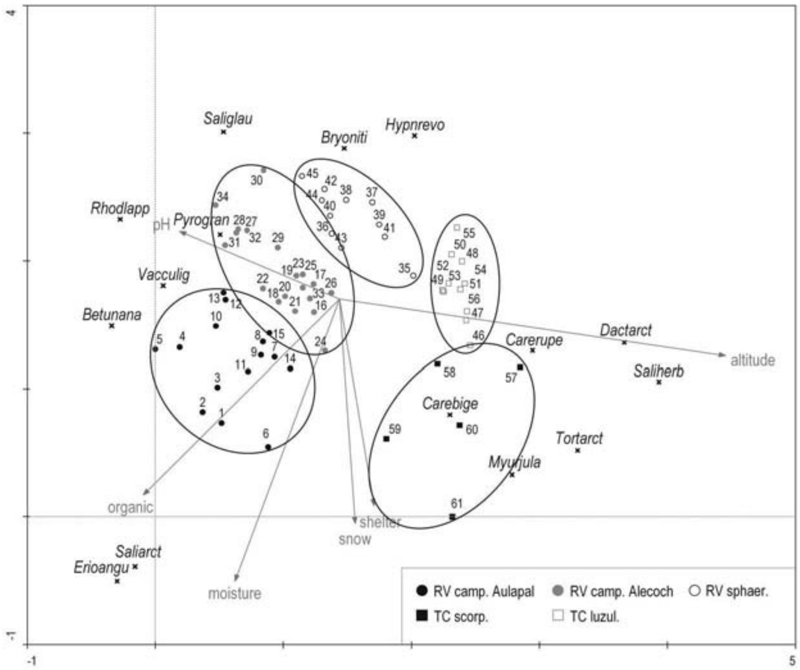


Fig. 8. DCA ordination diagram: Relevés of Rhododendro-Vaccinietum and Tortello-Caricetum with selected species and projected environmental variables. No. 1-45: table 13 no. 1-45; no. 46-61: table 14 no. 1-16.

and the Rhododendro-Vaccinietum occur on comparable sites regarding pH, soil moisture and topographical position, but they are clearly separated by altitude. Furthermore, the RV campylietosum var. of *Aulacomnium palustre* seems to be replaced by the TC scorpidietosum on moist sites, and the RV sphaerophoretosum by the TC luzuletosum on mesic sites, whereas the RV campylietosum var. of *Alectoria ochroleuca* seems to have an intermediate position. Thus, the substitution occurs over the entire ecological range of the two associations. This example also shows that altitudinal substitution is supported by a special floristic composition: Several diagnostic species of both associations are at the same time mutually exclusive altitudinal indicator species regarding their indicated altitudinal ranges (e.g. RV: erect dwarf shrubs (lm) vs. TC: *Salix herbacea* (h)).

4.2.2.3. Elevation forms of vegetation types

Floristic variation of a vegetation type along the altitudinal gradient can be expressed by elevation forms. These are differentiated by several altitudinal indicator species and can mostly easily be recognized in the field by a few conspicuous species. Concerning the vegetation types in the study area elevation forms were distinguished in the Hylocomio-Cassiopetum, Carici-Dryadetum sphaerophoretosum, Empetro-Betuletum, Ledo-Betuletum peltigeretosum var. of *Pyrola grandiflora,* and previously in the Phippsietum and Cassiopetum hypnoidis (cf. Sieg & Daniëls 2005; table 18, fig. 7). Since in the study area most of the vegetation types of low altitudes also occur in mid altitudes, these two altitudinal ranges cannot be adequately delimited by presence or absence of special plant communities. The distinction of elevation forms is thus of special interest for the delimitation of a low from middle altitudinal belt.

As the Hylocomio-Cassiopetum occurs from low to high altitudes with changing floristic composition, this association is a good example of a subdivision into elevation forms (table 6): Both subassociations show a similar and strong altitudinal differentiation by almost the same altitudinal indicator species. The low and mid-elevation forms share a number of erect dwarf shrub species (e.g. *Betula nana, Empetrum nigrum, Ledum palustre, Salix glauca, Vaccinium uliginosum*), which are good altitudinal indicators for most of the vegetation types in the study area. The mid and high-elevation forms are differentiated by indicator species of more exposed sites (e.g. *Alectoria nigricans, Hierochloe alpina*) and several cryptogams, which require a higher air humidity (e.g. *Dactylina arctica, Ptilidium ciliare, Racomitrium lanuginosum, Sphaerophorus globosus, Stereocaulon alpinum*). In the high-elevation form erect dwarf shrubs are almost absent, while snowbed species are more prominent (e.g. *An-*

thelia julacea/juratzkana, Huperzia selago, Salix herbacea, Solorina crocea, Tritomaria quinquedentata). Moreover, some small species occur, which benefit from pronounced disturbance and reduced interspecific competition (e.g. *Dactylina ramulosa, Protopannaria pezizoides, Silene acaulis*). From low to high-elevation forms the species densities, especially of lichens, increase. Furthermore, the total plant cover, content of organic matter, and depth of organic layer decrease, whereas the cover of stones increases.

The Hylocomio-Cassiopetum exemplifies the general features of elevation forms in the study area: Altitudinal indicator species for low-elevation forms are rare, whereas low and mid-elevation forms share a number of erect dwarf-shrub species. In mid and high-elevation forms the importance of species of more exposed sites or of habitats with a higher air humidity increases. The high-elevation forms are mostly differentiated by snowbed species or small species of disturbed habitats.

The example also shows that not all species with limited altitudinal distribution in a particular community (here: Hylocomio-Cassiopetum) can be classified as suitable indicator species (e.g. *Polytrichum strictum, Cladonia arbuscula*, see ch. 4.2.1). These are species with an irregular or unlimited altitudinal distribution in several other communities.

Another typical feature of elevation forms is the increase of species densities (especially lichens) along the altitudinal gradient. This is caused by enhanced frost action (cryoturbation, solifluction), higher desiccation by winds and the short growing season in higher altitudes which all reduce the competitive power of vascular plants. Together with frequently created gaps in the vegetation cover and generally increased microhabitat diversity due to small-scale disturbance (cf. Bültmann & Daniëls 2001) this leads to enhanced growth conditions for less competitive, stress-adapted species such as lichens, bryophytes and small vascular plants. In sub and mid-arctic ecosystems this biotic factor is considered more important for the growth of lichens than macroclimatic factors (Cornelissen et al. 2001).

Regarding the environmental conditions, the humus layer and organic matter content in the rhizosphere decrease in all elevation forms with altitude. This is a consequence of the decreasing productivity of the plant cover, but also of strong cryoturbation in higher altitudes. The burrowing of organic matter and the upward movement of unleached material during this process lead to higher base contents of the soils and thus to an improvement of decomposition conditions (cf. Broll et al. 1999). In lower altitudes, on the contrary, this process is often slowed by a thick acidic organic layer insulating the soil from incoming radiation, which results in a shallow active layer and unfavourable, wet and cold soil conditions.

4.2.2.4. Vegetation types with change in habitat-type spectrum

As already discussed, a delimitation of a low from a middle altitudinal vegetation belt by just the presence or absence of particular vegetation types is problematic due to local distribution of indicator communities and the occurrence of most other vegetation types in both, low and mid altitudes. However, apart from different elevation forms (see ch. 4.2.2.3) of plant communities, altitudinal belts can also be characterized by different habitat-type preferences of particular vegetation types (fig. 7). The idealized toposequence (fig. 9) shows habitat types with different topography (exposition, sloping, shelter) and resulting moisture conditions (e.g. with/without water supply from higher sites or contact to groundwater). In several vegetation types a reduction or broadening of their habitat-type spectrum along the altitudinal gradient can be observed. In particular near the upper or lower limit of their altitudinal distribution ranges, such vegetation types are often locally distributed and restricted to very special habitat conditions. The recognition of such different habitat-type preferences along the altitudinal gradient can thus be used for distinction of altitudinal belts.

Vegetation types with most conspicuous changes in habitat-type spectra in the study area are shown in figure 9 (see also table 18). Snowbed communities (Cassiopetum hypnoidis, Phippsietum) occur in mid altitudes only on protected sites with a very long snow cover; however, in high altitudes also on less sheltered sites. Increasing habitat diversity with altitude can be observed in the Carici-Dryadetum, which is restricted to very exposed ridges in the lowlands, in mid altitudes it also occurs on less exposed ridges and in high altitudes additionally on plains and south-facing slopes. On the contrary, the low arctic distributed Arabido-Caricetum supinae and Empetro-Betuletum

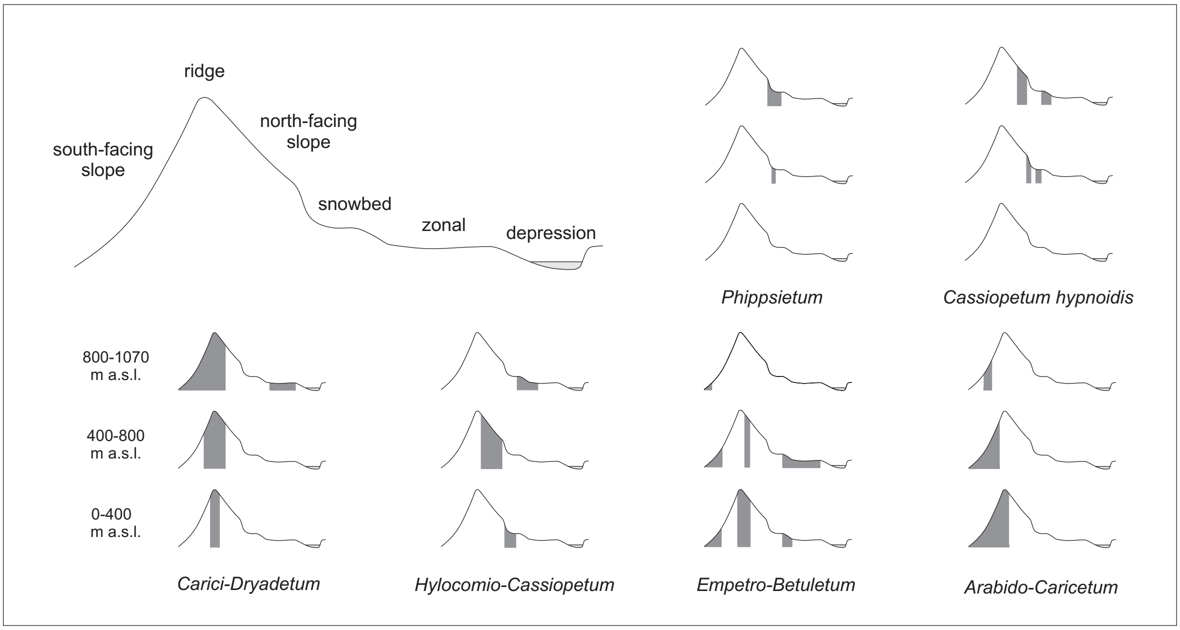


Fig. 9. Idealized toposequences of vegetation types with change in habitat-type spectra along the altitudinal gradient.

show a decreasing habitat-type diversity. In the latter this mainly concerns the transition from mid to high altitudes, whereas from low to mid altitudes the number of habitat types is constant. This is due to a habitat shift from less exposed ridges in low altitudes to zonal sites in mid altitudes where this association replaces the absent shrub vegetation. The habitat-type preferences of the Hylocomio-Cassiopetum show an irregular pattern: In low altitudes the association is restricted to very protected sites with an extraordinarily long snow cover and disturbance, which reduce competition from erect dwarf-shrubs species (e.g. *Betula nana, Ledum palustre*). Above 500 m a.s.l. several of the mentioned competitive species are weakened due to the shorter growing season, and the association can occur on less sheltered sites. In high altitudes, which are more strongly exposed to winds, the community can only survive on more protected sites. Thus, the occurrence of the community on very sheltered sites in the lowlands is likely caused by avoidance of competition and in high altitudes by avoidance of abiotic stress.

5. Conclusion

his study provides substantial, additional floristical and phytosociological information about continental West Greenland and represents a significant contribution to arctic phytosociology and vegetation classification according to the Braun-Blanquet approach. Especially the study of vegetation in the unexplored high altitude areas resulted in the distinction of new associations and in a first comprehensive account on the plant cover in these altitudes.

The detailed analysis of the altitudinal distribution range of plant species and communities as well as of the altitudinal differentiation of vegetation types reveals that both flora and vegetation provide many features for the characterization and distinction of altitudinal belts. The ecological considerations imply that altitudinal differentiation is not only directly ruled by temperature but also by a number of derived and additional factors such as wind shelter, frost processes (cryoturbation, solifluction), oceanity (air humidity, snow cover) and biotic interactions (competition).

Combined criteria resulting from these analyses confirm the existence of three altitudinal vegetation belts in the study area with preliminary boundaries at 400 and 800 m a.s.l. However, a more comprehensive finalization of the altitudinal extension of these belts needs further study, as the here defined altitudinal limits are mostly derived from vegetation on north-facing slopes. It is expected that the altitudinal limits vary according to slope exposition and thus, they might be somewhat higher on south-facing slopes.

Moreover, it can be concluded that the altitudinal boundary at 800 m a.s.l. is of higher rank than the one between low and mid altitudes (400 m a.s.l.), since the similarity of vegetation between low and mid altitudes is stronger than between mid and high altitudes: The altitudinal boundary at 800 m a.s.l. is not predominantly characterized by changes in habitat-type spectra and elevation forms of vegetation types, as can be observed at 400 m a.s.l., but also by substitution of plant communities and a distinct change in dominant growth forms (erect dwarf shrubs vs. graminoids, prostrate dwarf shrubs). This all corresponds to latitudinal zonation concepts of the Arctic in which the related boundary between subzones D and C (= boundary between Low and High Arctic) is also considered of higher rank than the boundary between the low arctic subzones E and D (e.g. Aleksandrova 1980, Bliss 1997).

Acknowledgements

We wish to thank Kirsten Arp, Ole Morgenstern and especially Carsten Sult who have greatly contributed to the project. We are also grateful to Dr. Helga Bültmann and Dr. Carsten Schmidt for their help with the identification of critical cryptogam species. We thank Dr. Jens Pallas for syntaxonomical advice and Prof. Dr. Klaus Dierssen for the help concerning the Ledo-Betuletum. Dr. Thilo Hasse and Birte Uhlig provided valuable comments on the manuscript. We are also grateful to the managers of the Kangerlussuaq International Science Support (KISS) as well as to the Danish Polar Center for granting research permission. The project was financially supported by the German Academic Exchange Service (DAAD), the German Research Foundation (DFG) and the University of Münster (Fördergesellschaft der WWU).

Appendix

Tables 4-18

Table 4. Synoptic table loiseleurio-Vaccinietea.

Distribution type [1]	Altitudinal indicator value [2]	Diagnostic value [3]	No.	1	2	3	4	3.1	3.2	3.3	4.1	4.2
			Vegetation type [5]	CS	EB	LB	HC	LBpP	LBpB	LBt	HCt	HCd
			Number of relevés	41	36	67	35	28	18	21	25	10
			Mean size of the stands [10 m²]	717	85	209	163	262	262	83	138	228
			Mean altitude [m a.s.l.]	106	421	403	651	408	303	507	684	559
			Mean slope [°]	4	6	13	16	13	23	4	16	16
			Mean cover total [%]	85	95	99	95	99	100	99	95	93
			Mean cover shrubs [%]	68	0	0	0	0	0	0	0	0
			Mean cover dwarf shrubs [%]	35	79	55	59	56	60	49	59	61
			Mean cover graminoids [%]	8	6	8	4	7	2	18	4	3
			Mean cover herbs [%]	24	9	5	5	5	5	6	5	6
			Mean cover bryophytes [%]	9	54	95	83	90	98	99	83	83
			Mean cover lichens [%]	3	14	14	17	18	15	6	19	12
			Mean cover soil [%]	14	2	0	1	0	0	0	1	1
			Mean cover stones [%]	0	3	0	4	1	0	0	3	7
			Mean cover litter [%]	100	37	5	3	9	2	3	3	3
			Mean canopy height [cm]	73	16	9	8	10	6	9	8	8
			Mean height stands max [cm]	100	33	25	19	27	25	21	19	21
			Mean pH value	6.0	5.1	4.9	5.3	5.0	4.5	5.1	5.1	6.0
			Mean organic matter rhizosphere [%]	nd	21	43	17	28	56	54	17	16
			Mean depth organic layer [cm]	6	nd	13	5	10	19	14	4	8
			Mean shelter [1-5]	3.1	2.8	3.3	3.2	3.2	3.2	3.6	3.1	3.5
			Mean snow cover [1-5]	nd	2.7	3.8	3.9	3.8	3.9	4.0	3.8	4.2
			Mean soil moisture [1-6]	2.2	2.8	4.0	3.6	3.6	3.9	4.8	3.6	3.7
			Mean species number of vascular plants	9	9	10	13	10	9	11	11	16
			Mean species number of mosses	7	11	9	13	9	9	12	12	14
			Mean species number of liverworts	1	1	4	5	3	4	5	6	5
			Mean species number of macrolichens	3	16	13	20	15	15	8	22	16
			Mean species number of microlichens	0	4	2	6	2	2	2	6	7
			Mean number of species	18	41	38	57	38	38	37	57	58
			ch / d Calamagrostio-Salicetum (CS)									
LC	l	.	*Calamagrostis lapponica*	III	.	I	.	I	.	I	.	.
.	[l]	.	*Brachythecium groenlandicum*	III	+	r	.	r	.	r	.	.
			ch / d Empetro-Betuletum (EB)									
.	.	.	*Cynodontium strumiferum*	.	III	r	+	+	.	.	+	.
.	.	.	*Physconia muscigena*	r	II	r	r	r	.	.	r	.
			ch / d Ledo-Betuletum (LB)									
LC	lm!	dC	*Ledum palustre* ssp. *decumbens*	r	.	IV[2b]	II[1]	IV[2b]	V[2b]	IV[2a]	II[1]	I[1]
.	.	.	*Peltigera scabrosa*	.	I	III	I	III	IV	IV	I	I
BC	lm	A2	*Vaccinium vitis-idaea* ssp. *minus*	.	+	II	+	II	II	II	+	+
			ch / d Hylocomio-Cassiopetum (HC)									
AC	.	as2	*Cassiope tetragona*	.	r	II[2a]	V[3]	II[1]	II[2a]	I[2a]	V[3]	V[3]
AC	(h)	.	*Luzula arctica*	.	+	.	III	.	.	r	II	IV
.	*h	.	*Dactylina ramulosa* (Hook.) Tuck.	.	+	.	II	.	.	.	II	II
.	.	.	*Bryonora castanea* s.str.	.	+	r	II	r	.	r	II	II
A	[h!]	A2	*Huperzia selago* spp. *arctica*	.	r	.	II	.	.	.	II	II
.	.	.	*Timmia austriaca*	r	+	r	II	r	.	.	II	II
			d Calamagrostio-Salicetum, Empetro-Betuletum									
.	.	.	*Tortula ruralis*	V	IV	+	I	I	.	.	I	II
.	.	.	*Ceratodon purpureus*	III	IV	r	I	+	.	r	I	+
A	.	.	*Poa glauca*	IV	II	r	.	+	.	.	.	.
.	.	.	*Thuidium abietinum*	II	II	r	.	r	.	.	.	.
			d EB, LB, HC (against Calamagrostio-Salicetum)									
.	.	dC	*Pohlia nutans*	I	V	V	V	V	V	V	V	IV
.	.	C, A1	*Flavocetraria cucullata*	I	V	IV	V	IV	V	IV	V	V
.	.	A2	*Cladonia gracilis*	r	IV	IV	V	IV	V	II	V	IV
.	.	.	*Cladonia amaurocraea*	.	IV	IV	V	IV	V	II	V	III
.	.	.	*Cladonia borealis*	r	IV	III	V	IV	II	II	V	IV
.	.	.	*Polytrichum strictum*	.	III	V	IV	IV	V	V	V	II

Table 4. Continued.

.	.	.	*Ochrolechia frigida*	.	III	IV	V	IV	IV	III	V	V
.	.	.	*Peltigera aphthosa*	+	II	IV	III	IV	V	III	IV	II
A	.	.	*Luzula confusa*	+	II	III	V	III	IV	III	V	V
			d Phyllodoco-Vaccinion									
.	.	A2	*Hylocomium splendens*	I	I	IV	V	IV	IV	III	V	V
.	.	.	*Peltigera polydactylon* s.l.	r	I	V	III	V	V	IV	III	III
.	.	.	*Anastrophyllum minutum*	.	+	III	IV	III	V	IV	IV	III
.	.	.	*Hypnum holmenii* Ando	r	+	IV	II	III	IV	IV	II	II
.	.	dC	*Dicranum laevidens*	r	r	IV	II	II	V	V	II	II
			d against Empetro-Betuletum									
L	lm!	C	*Empetrum nigrum* ssp. *hermaphroditum*	II	.	IV	II	III	V	V	II	II
			differential species of lower units									
.	.	.	*Peltigera malacea*	I	IV	III	III	IV	III	.	III	I
.	.	.	*Dicranum acutifolium / brevifolium*	II	V	III	IV	IV	III	+	V	III
.	.	dA1	*Flavocetraria nivalis*	I	IV	III	IV	III	IV	I	IV	IV
.	.	.	*Bryoria nitidula*	.	III	III	II	III	IV	+	III	II
.	.	.	*Cladonia chlorophaea* s.l.	I	IV	III	IV	III	III	I	IV	II
.	.	C, A1	*Alectoria ochroleuca*	.	IV	II	III	II	II	+	III	III
.	.	.	*Placynthiella icmalea*	.	II	II	III	II	II	+	III	III
.	.	.	*Cladonia sulphurina*	.	.	I	.	II	II	.	.	.
.	.	dA1	*Cetraria aculeata / muricata*	r	III	I	I	II	II	.	II	.
.	.	.	*Rinodina turfacea*	.	III	II	III	II	II	r	II	III
.	.	.	*Aulacomnium palustre*	I	+	II	+	r	.	V	+	.
.	.	dC	*Sphagnum warnstorfii*	.	.	II	r	.	.	IV	.	+
A	.	.	*Polygonum viviparum*	II	III	I	IV	I	.	III	III	V
.	.	A2	*Sphagnum girgensohnii*	.	.	I	+	.	I	III	I	.
.	.	.	*Straminergon stramineum*	.	.	I	r	.	.	III	.	+
L	.	.	*Carex rariflora*	.	.	I	.	.	.	III	.	.
.	.	.	*Tomentypnum nitens*	r	+	I	II	r	.	III	I	III
L	.	.	*Salix arctophila*	r	.	I	r	r	.	III	r	.
B	.	.	*Eriophorum angustifolium* ssp. *subarcticum*	.	.	I	r	r	.	III	.	+
.	.	.	*Cephalozia* spp.	.	+	I	I	r	.	II	I	I
.	.	.	*Polytrichum commune*	.	.	+	.	r	.	II	.	.
.	.	.	*Peltigera didactyla*	II	IV	III	III	IV	I	III	III	II
.	.	.	*Peltigera leucophlebia*	r	II	III	III	IV	I	III	III	III
AC	.	.	*Pyrola grandiflora*	IV	III	II	IV	III	+	II	IV	III
L	(lm)	.	*Salix glauca* coll.	V	V	II	III	III	.	II	III	II
.	.	.	*Nephroma expallidum*	.	II	II	IV	III	+	I	IV	IV
.	.	.	*Psoroma hypnorum*	r	III	II	V	III	I	I	V	V
.	.	A1	*Dicranum elongatum*	r	+	III	II	II	V	II	I	II
.	.	A2	*Cladonia carneola*	.	.	I	+	r	II	.	r	+
.	.	.	*Cladonia squamosa*	.	r	+	.	r	II	r	.	.
.	.	.	*Dicranum groenlandicum*	.	.	I	r	r	II	+	r	.
LC	.	.	*Ranunculus lapponicus*	.	.	III	+	I	IV	IV	+	.
.	.	dC	*Barbilophozia binsteadii*	.	.	II	+	.	IV	III	r	+
.	.	dC	*Calypogeia sphagnicola*	.	.	II	r	.	III	III	r	.
.	.	.	*Polytrichum alpinum*	.	r	II	III	II	IV	I	III	I
.	.	A2	*Cladonia rangiferina*	.	I	r	II	I	.	.	III	I
.	(mh)	dA1	*Sphaerophorus globosus*	.	II	I	III	II	I	+	III	I
.	[mh!]	C	*Alectoria nigricans*	.	I	I	III	II	I	.	III	I
.	[mh!]	.	*Pertusaria geminipara*	.	+	+	II	+	+	+	III	I
.	[h!]	.	*Conostomum tetragonum*	.	.	r	II	r	.	.	II	.
.	.	.	*Lichenomphalia* sp. (*Botrydina*- type)	.	.	I	II	I	I	II	II	.
.	[(mh)]	.	*Barbilophozia kunzeana*	.	.	II	II	I	I	II	II	+
.	*mh	C, A1	*Gymnomitrion corallioides*	.	.	+	II	+	.	+	II	+
.	.	.	*Lopadium coralloideum*	.	+	r	II	r	.	.	II	+
AC	.	.	*Dryas integrifolia*	.	I	r	II	r	.	r	I	IV
.	.	.	*Isopterygiopsis pulchella*	.	r	+	II	I	.	I	+	IV

Table 4. Continued.

.	.	.	*Hypnum revolutum*	III	II	+	II	I	.	.	+	III
AC	lm!	.	*Rhododendron lapponicum*	+	I	r	I	.	.	r	r	III
.	.	.	*Chamaenerion latifolium*	.	.	.	I	.	.	.	.	II
			other Loiseleurio-Vaccinietea									
L	(lm)	C	*Vaccinium uliginosum* ssp. *microphyllum*	III	IV	IV	III	V	IV	V	III	III
LC	lm!	C	*Betula nana*	V	V	V	II	V	V	V	II	III
.	.	dA1	*Thamnolia vermicularis*	r	IV	II	IV	II	III	I	IV	IV
.	(mh)	A2	*Cetraria islandica*	.	III	I	III	II	I	+	III	II
.	.	A2	*Cladonia arbuscula* ssp. *mitis*	.	III	II	IV	II	I	I	IV	III
.	.	C, A1	*Bryocaulon divergens*	.	II	I	I	II	I	.	I	+
LC	[lm!]	A2	*Pedicularis lapponica*	r	I	I	I	II	I	II	I	+
.	[mh!]	A1	*Cetraria ericetorum*	.	II	+	II	+	I	.	II	I
.	.	A2	*Cladonia cornuta*	.	r	I	+	I	II	r	.	II
A	[h!]	A2	*Cardamine bellidifolia*	.	.	r	I	r	.	.	I	I
			other altitudinal indicators									
.	mh!	.	*Stereocaulon alpinum*	.	III	II	V	III	II	r	V	III
.	mh!	.	*Ptilidium ciliare*	.	+	I	IV	II	I	r	V	II
.	mh!	.	*Dactylina arctica* (M.J. Richardson) Nyl.	.	II	II	IV	II	II	I	IV	III
.	*mh	dA1	*Racomitrium lanuginosum*	.	II	I	III	II	+	.	IV	III
AC	[mh!]	.	*Hierochloe alpina*	r	III	I	II	II	I	.	II	II
.	[mh!]	.	*Cladonia stricta* s.str.	.	II	+	III	I	.	+	III	II
.	(mh)	.	*Polytrichum piliferum*	.	II	r	II	I	.	.	II	I
.	[(mh)]	.	*Barbilophozia hatcheri*	r	I	I	IV	II	.	.	IV	II
LO	*mh,*h	.	*Salix herbacea*	.	+	+	III	r	.	I	III	II
.	[*mh],[*h]	.	*Dicranum spadiceum*	.	III	+	II	r	I	r	II	I
.	[*mh],[*h]	.	*Lopadium pezizoideum*	.	II	+	II	r	I	r	III	II
.	[h!]	.	*Blepharostoma trichophyllum*	.	.	+	II	r	.	II	II	II
.	[h!]	.	*Tritomaria quinquedentata*	.	+	+	II	+	+	I	II	III
AC	*h	.	*Pedicularis hirsuta*	.	.	+	II	I	.	I	II	I
A	*h	.	*Silene acaulis*	.	r	.	II	.	.	.	I	II
.	[h]	.	*Pleurocladula albescens*	.	.	r	II	.	.	+	II	I
			others [4]									
.	.	.	*Aulacomnium turgidum*	III	V	V	V	V	V	V	V	V
.	.	.	*Poa pratensis* coll. / *arctica*	III	IV	V	V	V	V	IV	V	IV
.	.	.	*Lophozia* spp.	I	II	V	IV	V	V	V	IV	III
.	.	.	*Stellaria longipes* coll.	IV	III	IV	IV	V	IV	II	IV	IV
.	.	.	*Sanionia uncinata*	III	II	IV	IV	IV	IV	IV	IV	III
.	.	.	*Cladonia cyanipes*	.	I	IV	III	III	V	III	IV	II
.	.	.	*Cladonia pyxidata*	I	IV	II	IV	II	I	I	IV	IV
B	.	.	*Equisetum arvense*	III	II	IV	II	IV	IV	V	I	II
.	.	.	*Cephaloziella* spp.	II	IV	III	II	III	III	III	II	II
.	.	.	*Peltigera rufescens*	II	II	I	IV	I	I	I	IV	II
.	.	.	*Bryum* spp.	IV	IV	r	II	I	.	.	II	IV
.	.	.	*Rhytidium rugosum*	+	IV	I	II	II	I	.	I	II
.	.	.	*Pohlia cruda*	I	II	+	III	I	.	.	III	IV
.	.	.	*Cladonia pleurota*	.	I	II	II	II	II	I	II	I
.	.	.	*Polytrichum juniperinum*	r	III	r	II	.	+	.	I	II
L	.	.	*Carex bigelowii*	r	I	I	II	I	.	II	II	II
.	.	.	*Dicranum flexicaule / fuscescens*	+	III	+	I	I	.	r	II	+
.	.	.	*Peltigera canina*	I	I	I	I	II	I	.	I	II
A	.	.	*Festuca brachyphylla*	I	II	+	+	I	.	.	+	+
			No.	**1**	**2**	**3**	**4**	**3.1**	**3.2**	**3.3**	**4.1**	**4.2**

Explanations [1]Böcher 1975, s. table 3. [2]Altitudinal indicator value s. chapter 4.2.1. [3]Diagnostic value (Daniëls 1994, Dierssen 1996, K. & B. Dierssen 2005): C Loiseleurio-Vaccinietea, O Rhododendro-Vaccinietalia, A1 Loiseleurio-Diapension, A2 Phyllodoco-Vaccinion, as2 Hylocomio-Cassiopetum. [4]Species with low presence not shown. [5]Vegetation types: CS: Calamagrostio-Salicetum, EB: Empetro-Betuletum, LB: Ledo-Betuletum (LBpP: LB peltigeretosum var. of *Pyrola,* LBpB: LB peltigeretosum var. of *Barbilophozia,* LBt: LB typicum), HC: Hylocomio-Cassiopetum (HCd: HC dryadetosum, HCt: HC typicum).

Table 5. Ledo decumbentis-Betuletum nanae.

Altitudinal indicator value	Vegetation type	Ledo-Betuletum peltigeretosum malaceae var. of *Pyrola grandiflora*																												
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
	Author	BS	BS	BS	OM	BS	OM	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	CS	BS	BS	BS	BS	BS	CS	BS	FD
	Relevé area [m²]	4	4	4	16	4	16	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Size of the stand [10 m²]	1000	20	40	40	1000	3	40	10	30	50	20	60	1000	100	3	20	40	1000	250	250	1000	20	1000	50	200	50	20	10	2
	Altitude [m a.s.l.]	70	115	130	145	200	220	245	290	320	370	385	410	420	420	440	445	450	480	515	535	560	580	590	590	590	595	600	710	90
	Slope [°]	16	3	24	5	12	35	14	16	3	0	20	5	24	18	2	18	20	12	12	5	14	20	10	5	18	24	10	0	5
	Aspect	n	n	n	ne	nw	n	ne	n	sw	-	n	sw	nne	n	sw	n	ene	n	nw	nw	ne	n	n	w	n	n	ene	-	n
	Cover total [%]	98	100	100	90	100	100	100	100	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Cover dwarf shrubs [%]	80	70	20	45	60	70	40	50	40	70	50	30	50	55	70	70	50	45	70	50	70	40	70	70	50	40	80	70	50
	Cover graminoids [%]	2	2	20	5	5	5	2	2	20	2	2	20	10	2	2	2	10	5	5	2	20	2	2	5	2	7	15	10	2
	Cover herbs [%]	2	2	2	20	2	10	10	15	2	2	10	2	2	2	20	7	2	7	2	2	2	7	2	10	2	2	2	2	8
	Cover bryophytes [%]	98	95	100	85	100	40	100	100	100	80	100	100	90	90	50	100	90	100	100	80	95	100	90	90	100	90	70	95	100
	Cover lichens [%]	2	5	30	5	5	5	25	20	40	15	30	9	30	30	20	10	40	15	5	40	20	15	2	10	15	25	20	10	2
	Cover soil [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cover stones [%]	2	0	0	10	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cover litter [%]	2	2	2	90	2	95	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	25	2	2
	Canopy height [cm]	10	10	20	40	7	25	10	4	15	15	5	7	5	5	5	5	5	5	7	10	12	6	5	10	5	10	8	5	10
	Height stand max. [cm]	35	35	50	50	25	35	20	15	50	40	20	30	20	25	15	20	30	25	20	20	40	15	15	25	25	15	20	20	25
	PH value	4.9	4.9	6.2	6.2	4.6	6.4	5.4	5.2	4.3	4.6	4.4	4.4	4.6	4.4	5.8	4.6	4.5	5.6	4.5	4.3	5.1	5.2	5.4	4.6	4.9	5.0	4.2	4.5	nd
	Organic matter rhizosphere [%]	38	74	11	48	53	4	69	63	34	37	25	30	3	12	15	27	11	20	26	25	53	15	26	20	7	9	8	18	nd
	Organic layer [cm]	3	15	4	10	nd	35	25	25	10	5	9	6	15	8	3	6	2	10	5	5	nd	5	6	5	6	12	nd	3	nd
	Depth of permafrost [cm]	25	25	35	40	22	55	25	25	25	-	25	35	-	10	35	20	-	-	-	15	-	-	35	-	-	-	-	-	nd
	Solifluction	-	x	-	-	x	x	-	x	-	-	-	-	x	x	-	-	x	x	-	x	-	x	x	-	-	x	-	-	x
	Shelter [1-5]	3	4	3	3	3	4	3	3	4	4	4	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3
	Snow cover [1-5]	4	4	4	4	4	4	3	4	4	4	4	2	4	4	3	4	4	4	4	4	4	4	4	3	4	4	3	3	4
	Soil moisture [1-6]	4	3	3	3	4	3	3	3	4	3	4	4	3	4	4	4	3	4	4	3	4	4	4	4	4	4	3	4	4
	Number of species	44	34	27	34	35	45	20	23	15	20	34	34	55	55	33	24	49	44	43	46	30	52	59	41	45	50	34	51	31
	ch / d Ledo-Betuletum																													
lm!	*Ledum palustre* ssp. *decumbens*	4	3	2a	.	4	2b	1	+	3	.	1	.	2a	2b	.	2b	2b	.	1	2b	.	2b	1	.	.	.	.	.	3
.	*Peltigera scabrosa*	.	.	1	.	+	.	.	1	.	2a	1	+	.	.	+	1	.	.	.	+	1	.	.	+	+	+	.	+	.
lm	*Vaccinium vitis-idaea* ssp. *minus*	.	.	.	.	1	.	.	.	2a	.	3	1	2a	2a	1	2a	2a	.	.	.	.	.	1	.	.	.	.	.	.
	d Ledo-Betuletum (against Empetro-Betuletum)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
lm!	*Empetrum nigrum* ssp. *hermaphroditum*	.	.	.	2a	1	2a	2a	1	2a	.	2a	.	.	+	2b	2a	.	.	.	.	.	2a	3	.	.	+	.	.	2a
.	*Cladonia cyanipes*	+	+	+	.	+	.	.	.	.	.	.	.	+	1	.	.	.	1	1	1	1	+	1	.	+	1	.	1	+
	d LB peltigeretosum																													
.	*Peltigera malacea*	1	+	.	1	+	+	+	.	.	+	1	.	1	+	.	+	1	.	+	2a	+	.	.	.	2a	1	2a	2a	.
.	*Dicranum acutifolium / brevifolium*	2b	2b	+	.	.	1	1	2b	.	1	1	.	3	2a	2a	.	2a	1	1	2a	1	1	1	2a	2b	.	2b	1	.
.	*Flavocetraria nivalis*	1	.	.	.	.	+	.	.	.	.	.	.	+	1	.	.	1	+	1	+	.	1	+	.	.	+	+	+	.
.	*Bryoria nitidula*	.	.	.	.	+	.	.	r	.	.	.	+	+	+	.	.	r	.	+	.	r	+	+	.	+	+	.	1	.
.	*Cladonia chlorophaea* s.l.	1	1	+	+	.	+	.	.	.	.	.	1	.	1	.	.	+	1	1	1	.	.	+	.	.	1	+	1	+
.	*Alectoria ochroleuca*	.	.	.	+	.	+	.	.	.	.	.	.	1	1	.	.	1	.	1	.	.	.	1	.	+	+	1	1	.
.	*Placynthiella icmalea*	.	.	.	.	+	+	.	.	.	.	.	.	+	+	.	.	+	.	.	+	.	.	+	.	.	.	+	1	+
.	*Cladonia sulphurina*	r	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	1	.	.	.	.	+	.	.	.
.	*Cetraria aculeata / muricata*	.	.	.	.	.	.	+	.	.	.	.	+	+	+	r	.	+	.	.	+	.	.	.	.	.	.	.	.	.
.	*Rinodina turfacea*	+	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	+	.	+	.	.	.	.	.	+	+	.	+	.
	d LB typicum																													
.	*Aulacomnium palustre*	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Sphagnum warnstorfii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Polygonum viviparum*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	+	.	.	.	1	.
.	*Sphagnum girgensohnii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Straminergon stramineum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Carex rariflora*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Tomentypnum nitens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Salix arctophila*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.
.	*Eriophorum angustifolium* ssp. *subarcticum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Cephalozia* spp.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Polytrichum commune*	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	d LB typicum and LB peltigeretosum var. *Pyrola*																													
.	*Peltigera didactyla*	r	+	1	+	+	.	2a	1	2b	2a	2a	1	1	.	.	+	.	.	+	1	+	+	.	2a	+	+	1	.	.
.	*Peltigera leucophlebia*	1	1	2b	+	.	+	.	1	3	1	1	+	.	.	2b	1	.	1	.	.	2a	1	.	.	.	+	.	1	.
.	*Pyrola grandiflora*	.	.	.	2a	+	2a	.	2a	.	1	.	.	.	.	.	.	1	2a	1	1	.	2a	1	2a	1	1	+	.	.
(lm)	*Salix glauca* coll.	2a	3	.	3	.	3	.	.	.	3	.	1	.	.	.	.	.	2a	2b	.	2a	2b	1	2b	2b	1	.	.	.
.	*Nephroma expallidum*	.	.	2a	.	.	.	.	.	.	.	+	.	2a	+	1	.	1	+	.	1	.	+	+	.	1	1	.	.	.
.	*Psoroma hypnorum*	+	.	.	+	.	.	.	.	.	.	+	1	1	.	+	.	+	+	+	+	.	1	.	.	1	+	.	1	.
	d LB peltigeretosum var. *Barbilophozia*																													
.	*Dicranum elongatum*	.	.	.	1	2b	.	.	.	.	.	.	.	.	2a	.	.	.	.	1	.	.	2a	2a	1	.	2a	.	.	1
.	*Cladonia carneola*	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Cladonia squamosa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.
.	*Dicranum groenlandicum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+
	d LB typicum and LB peltig. var. *Barbilophozia*																													
.	*Ranunculus lapponicus*	.	.	.	.	.	.	1	2a	.	.	2a	+	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
.	*Barbilophozia binsteadii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Calypogeia sphagnicola*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	d low- / mid-elevation forms																													
lm!	*Betula nana*	3	3	2b	2b	2a	2b	2a	2a	2b	4	2b	2a	1	1	2b	2b	1	2b	3	2b	4	2a	2a	4	2b	3	5	.	2a
[lm!]	*Pedicularis lapponica*	.	+	.	.	.	+	.	.	.	+	.	.	.	.	1	1	.	.	.	.	.	.	.	+	.	.	.	.	.
	d mid- / high-elevation forms																													
mh!	*Stereocaulon alpinum*	.	.	.	.	.	.	.	.	.	.	.	1	1	+	+	.	1	.	.	.	.	+	1	+	+	+	+	1	.

Table 5. Continued.

Ledo-Betuletum peltigeretosum var. of *Barbilophozia binsteadii*																	Ledo-Betuletum typicum																					Presence	LBpP	LBpB	LBt
30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**		**1-**	**29-**	**47-**
BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	FD	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS		**28**	**46**	**67**
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4		.	.	.
60	30	1000	250	50	40	40	30	50	20	30	1000	200	800	1000	100	20	15	5	8	3	50	1000	20	25	5	200	2	40	5	100	2	30	10	100	60	10	50		262	262	83
90	170	180	195	205	220	230	250	280	280	320	400	425	495	500	550	570	210	230	295	370	375	380	390	400	430	440	440	445	535	545	580	590	590	730	820	920	935		408	303	507
18	22	20	18	24	40	34	20	24	28	20	34	20	10	26	40	16	3	0	2	0	20	0	0	0	3	2	0	0	0	4	2	22	0	20	6	0	4		13	23	4
n	n	nnw	n	n	n	n	nnw	n	n	n	n	nnw	nnw	nw	nw	n	n	-	w	-	nne	-	-	-	nw	ne	-	-	-	nw	sw	ne	-	nw	n	-	n		.	.	.
100	100	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	95	100	100	100	90	100	100	100	98	100	100	100	100	100	100		99	100	99
50	65	60	75	45	30	50	40	90	80	80	60	65	40	85	60	60	30	70	40	60	50	80	50	60	40	80	30	90	30	50	40	70	40	70	15	40	2		56	60	49
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	7	5	10	2	50	10	25	40	2	70	2	30	2	30	2	2	2	15	35	10		7	2	18
2	2	2	2	5	5	0	2	7	2	2	5	15	2	10	8	7	2	2	5	2	10	2	7	2	2	2	2	2	2	15	2	7	20	2	10	5	15		5	5	6
100	100	85	90	100	100	100	100	100	100	100	100	100	90	100	100	100	100	100	100	100	100	95	95	100	100	95	90	100	100	100	100	100	100	100	100	100	100		90	98	99
20	10	10	30	20	30	12	15	7	15	10	20	10	35	10	5	7	2	20	5	2	7	5	2	2	10	2	0	5	2	2	2	30	7	7	7	2	7		18	15	6
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0		0	0	0
0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	0		1	0	0
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	2	2	2	2	2	2	2	2	2	2	2	0		9	2	3
5	5	10	7	7	15	5	7	5	5	5	5	4	5	5	3	7	10	8	7	5	7	15	7	7	20	5	20	8	8	10	10	5	5	6	10	5	10		10	6	9
30	25	30	25	30	25	20	15	25	35	25	20	25	25	20	20	25	15	15	20	15	25	25	25	25	50	10	30	20	12	25	20	20	20	15	20	20	15		27	25	21
4.4	4.3	4.1	4.3	4.7	4.6	4.1	4.4	4.6	4.4	4.8	4.2	5.3	4.4	4.5	nd	4.6	4.5	5.2	5.5	4.5	5.7	4.6	4.8	4.6	4.7	4.5	5.1	4.5	5.6	6.4	5.2	5.2	4.8	5.2	5.0	5.9	5.5		5.0	4.5	5.1
77	79	77	58	75	50	45	68	60	37	66	38	43	39	67	nd	16	90	66	82	43	59	37	27	76	29	72	60	27	78	85	40	67	30	11	37	67	41		28	56	54
20	20	23	20	20	25	17	25	20	30	20	7	25	5	20	nd	9	15	25	30	9	25	5	5	10	7	6	nd	2	nd	nd	nd	20	20	6	20	20	6		10	19	14
20	20	23	20	20	25	17	25	20	30	20	15	25	15	20	nd	20	30	25	30	20	25	30	30	30	30	15	-	-	-	30	-	20	20	-	30	-	-		.	.	.
x	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	x	-	x	-	-	-		.	.	.
3	3	3	3	3	3	3	4	3	3	2	3	4	3	4	4	4	4	4	4	4	4	4	3	3	2	4	4	3	4	4	3	3	4	3	4	3	4		3.2	3.2	3.6
4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	3	4	4	4	4	4	5	4	3	4	3	4	4	3	4	5	4	4	3	4	4	4	5		3.8	3.9	4.0
3	4	3	3	4	4	4	3	4	4	4	4	5	4	5	4	5	4	5	5	4	5	4	4	4	4	4	6	5	5	5	5	4	5	6	5	5	6		3.6	3.9	4.8
45	42	42	45	40	39	30	38	35	44	38	41	34	44	32	34	38	30	31	32	30	40	53	38	42	30	29	33	45	40	33	38	39	33	51	29	45	31		38	38	37
3	3	3	3	2a	2b	2a	3	3	4	1	3	2a	1	1	1	+	2b	2b	1	2b	+	+	3	1	.	2b	+	3	1	+	+	+	1	.	.	.	.	51	IV	IV	IV
2a	+	.	+	2a	.	2a	2a	2a	.	2a	2a	1	.	1	.	.	.	1	1	1	.	1	.	.	1	2a	.	.	1	1	+	.	.	2a	2a	+	2a	38	III	IV	IV
.	1	.	.	2a	.	.	.	.	.	.	1	.	2a	.	.	2a	.	.	.	2b	.	1	2b	1	.	3	.	2b	.	.	2a	.	1	.	.	.	.	23	II	II	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.				
2b	3	1	3	2b	1	3	2a	4	2b	3	1	4	2b	5	3	3	1	3	3	2a	3	3	1	2a	1	3	1	1	2b	2a	2b	3	2b	.	.	.	.	48	III	V	V
1	1	1	1	1	+	+	1	.	1	1	1	1	+	+	r	+	+	.	r	.	r	r	+	+	.	+	.	.	+	.	.	+	.	1	.	1	.	43	III	V	III
.	r	1	1	.	1	+	.	.	1	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	27	IV	III	.
1	1	.	.	.	.	.	.	+	.	2a	+	2b	1	.	.	2a	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	32	IV	III	+
r	1	+	1	1	1	+	1	r	1	.	+	+	.	+	+	.	.	.	r	.	.	.	.	.	.	.	.	.	+	.	.	r	.	.	.	.	.	30	III	IV	I
1	+	1	.	+	1	r	+	+	1	r	1	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	27	III	IV	+
.	+	+	+	+	.	.	.	.	.	.	+	.	+	.	r	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	+	.	.	.	.	.	27	III	III	I
+	.	+	.	.	+	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	+	.	.	.	18	II	II	+
.	+	+	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	17	II	II	+
.	.	1	1	1	1	.	+	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13	II	II	.
.	+	+	+	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	II	II	.
.	+	+	+	.	+	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	15	II	II	r
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	4	2b	2a	1	2a	4	3	2b	.	4	4	1	4	2b	+	1	2a	3	1	5	21	r	.	V
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2a	2b	2a	2b	.	2b	.	.	2a	2b	2b	.	2a	2a	.	2b	1	2b	2b	15	.	.	IV
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	.	.	2a	.	1	.	.	1	.	.	.	+	2a	1	2a	14	I	.	III
.	.	.	.	.	.	.	.	.	.	.	.	.	2b	4	.	2b	.	.	3	4	.	2b	.	2b	.	.	.	.	4	.	.	2b	5	.	.	4	+	12	.	I	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	+	1	+	.	.	2b	+	+	.	1	.	.	.	+	.	+	12	.	.	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	1	2a	.	1	2a	2b	.	.	2b	1	3	.	3	.	.	.	.	.	.	10	.	.	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2b	1	2a	.	2a	+	.	.	.	1	.	2b	1	2a	.	.	2a	2a	.	13	r	.	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	2b	.	2a	2a	.	2a	+	1	1	1	.	.	.	2a	.	.	12	r	.	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	1	.	2m	4	+	+	.	1	.	.	.	2a	1	1	12	r	.	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	1	+	+	.	.	+	.	.	.	+	.	8	r	.	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	1	.	+	.	.	.	.	+	.	.	.	.	6	r	.	II
.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	.	.	+	1	+	1	.	1	1	.	1	.	.	1	.	.	.	+	.	.	.	.	.	32	IV	I	III
.	.	+	.	.	.	.	2a	.	.	.	.	.	2a	.	.	.	+	1	+	+	1	.	.	+	1	.	.	.	.	+	1	2a	.	.	.	1	.	31	IV	I	III
.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	.	.	2a	.	1	.	1	.	1	.	22	III	+	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	r	.	.	.	.	.	.	.	.	1	.	.	.	2b	.	.	.	20	III	.	II
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	+	.	.	.	.	.	.	.	r	.	17	III	+	I
.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	+	r	+	.	.	.	.	.	.	.	.	.	.	.	.	20	III	I	I
2b	3	4	2b	2b	3	2b	3	1	4	2b	2b	1	.	2b	.	.	2a	.	.	.	1	.	.	1	.	.	.	.	1	1	2a	.	2a	+	.	.	.	31	II	V	II
1	.	.	+	1	+	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	r	II	.
+	.	+	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	7	+	II	r
.	.	1	1	.	.	.	3	.	.	.	.	.	.	.	.	.	2b	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	7	r	II	+
.	2m	.	.	1	.	.	1	1	1	.	2a	2a	2m	2a	2a	2a	1	1	2a	.	2a	2m	2m	1	1	2m	+	.	1	2a	+	.	.	.	2a	1	2a	33	I	IV	IV
1	3	.	1	.	1	1	1	.	1	+	2a	.	.	+	1	2a	.	.	+	.	.	+	.	2a	.	3	+	.	2b	.	1	.	1	3	.	2b	1	23	.	IV	III
+	1	.	.	.	.	+	+	1	.	.	.	+	1	+	+	.	1	.	1	1	1	.	.	1	.	.	+	.	+	.	.	1	+	.	.	.	.	19	.	III	III
2b	2b	2a	2b	2b	2a	1	2a	2b	2b	2b	2b	3	2a	2b	2b	2b	2a	2b	2a	2b	2b	2b	1	1	2a	2a	1	2b	1	+	1	2a	1	.	.	.	.	62	V	V	V
.	.	.	.	.	.	.	.	1	.	.	.	.	.	r	.	.	.	1	.	.	.	.	2m	.	+	.	.	1	.	+	.	.	.	.	.	.	.	13	II	I	II
.	.	.	.	r	.	.	r	.	.	.	1	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	18	III	II	r

Table 5. Continued.

mh!	*Ptilidium ciliare*	.	.	.	.	.	.	.	.	.	.	.	.	1	2a	.	.	2a	.	.	2a	.	.	2b	.	1	.	+	2a	.
mh!	*Dactylina arctica* (M.J. Richardson) Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	1	.	.	.	.	.	+	+	.	+	.	1	.
[(mh)]	*Barbilophozia hatcheri*	.	.	.	.	.	.	.	.	.	.	.	.	1	2a	.	.	1	.	.	+	.	+	.	+	+	1	+	.	.
[(mh)]	*Barbilophozia kunzeana*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	2a	1	.	.	.	1	.
.	*Cassiope tetragona*	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	+	.	+	2a	.	1	.	.	.	.
(mh)	*Cetraria islandica*	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	1	.	.	1	.	.	.	.	.	.	.	+	.
*mh	*Racomitrium lanuginosum*	.	.	.	.	.	.	.	.	.	.	.	.	2a	2a	.	.	2a	.	.	+	.	.	1	.	+	.	.	.	.
[mh!]	*Alectoria nigricans*	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	+	.	.	+	1	.	.	.	.	+	.
.	*Carex bigelowii*	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	1	.	.	.	.	+	1	.	.	.	2a	.
(mh)	*Sphaerophorus globosus*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	+	+	.	.	.	+	+	.
[mh!]	*Hierochloe alpina*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	2a	.	.	1	+	1	2a	.	.
*mh	*Pedicularis hirsuta*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	+	.	.	.	.
	other altitudinal indicators																													
!	*Calamagrostis lapponica*	.	.	2b	.	.	.	.	.	2b	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*h	*Salix herbacea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.
[h!]	*Blepharostoma trichophyllum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.
	other *Sphagnum* spp.																													
.	*Sphagnum teres*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Sphagnum russowii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Sphagnum balticum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Sphagnum fuscum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Sphagnum fimbriatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	d Phyllodoco-Vaccinion																													
.	*Peltigera polydactylon* s.l.	.	1	1	1	+	+	2a	1	2a	+	1	+	+	+	.	+	+	1	1	2a	1	1	+	1	+	+	.	1	1
.	*Dicranum laevidens*	.	.	.	.	2b	.	1	.	.	1	2b	2a	.	.	.	2a	.	1	.	.	.	.	2a	1	.	2a	.	.	1
.	*Hylocomium splendens*	+	.	4	3	.	2b	.	2a	.	3	3	2a	2b	1	.	3	1	3	.	4	1	3	2a	3	2b	2b	2a	2a	.
.	*Hypnum holmenii* Ando	.	.	+	1	.	+	.	2b	.	.	2b	.	.	.	3	1	.	1	.	.	+	+	1	1	+	.	.	.	1
.	*Anastrophyllum minutum*	+	+	.	+	.	+	.	.	.	.	.	.	+	2a	1	.	.	.	.	.	.	1	2b	+	+	.	.	1	+
	other Loiseleurio-Vaccinietea																													
.	*Pohlia nutans*	1	+	+	+	+	+	1	1	1	2a	+	2a	+	1	+	.	+	1	1	1	1	+	+	1	1	+	+	1	1
.	*Vaccinium uliginosum* ssp. *microphyllum*	+	2b	1	2a	.	2a	2b	3	.	.	1	2b	3	3	3	3	3	3	3	2a	+	+	3	1	3	.	1	4	+
.	*Flavocetraria cucullata*	1	1	.	1	1	.	.	.	.	.	+	+	1	1	1	.	1	1	1	1	+	1	1	+	1	1	1	1	+
.	*Cladonia gracilis*	1	1	.	.	1	.	+	.	.	.	+	1	1	2a	.	.	1	1	1	1	.	1	1	+	1	1	+	1	+
.	*Cladonia arbuscula* ssp. *mitis*	.	1	.	.	.	.	.	.	.	.	.	+	.	1	1	.	1	.	.	.	.	1	.	.	.	.	.	1	.
.	*Cladonia cornuta*	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	r	.	+	.	.	.	.	.	.	.	.	+
.	*Bryocaulon divergens*	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.	+	+	.
	others																													
.	*Aulacomnium turgidum*	4	5	2b	2b	4	2a	5	3	5	3	3	3	3	3	2b	4	1	4	5	2b	4	4	3	3	5	2b	4	3	5
.	*Lophozia* spp.	+	+	1	+	+	+	+	.	.	1	+	1	1	+	.	+	+	+	+	1	1	+	+	+	.	1	+	1	+
.	*Poa pratensis* coll. / *arctica*	1	1	+	1	1	1	1	1	+	1	1	2m	2a	1	.	1	2a	1	2a	1	2a	1	1	1	1	1	1	+	+
.	*Polytrichum strictum*	2a	1	2a	.	1	.	.	.	1	1	+	2b	+	2a	.	1	1	1	3	1	2b	2a	1	1	.	2b	+	2a	1
.	*Equisetum arvense*	1	+	1	1	1	.	1	1	2m	1	1	1	1	+	2b	2a	.	1	1	1	.	1	1	.	1	1	.	.	2a
.	*Peltigera aphthosa*	1	.	.	.	1	+	2b	1	.	.	1	2a	1	2b	.	1	.	.	1	2b	2a	1	2a	2a	2a	2a	+	1	2a
.	*Sanionia uncinata*	.	+	1	.	+	+	.	2a	.	2a	1	4	+	+	+	1	.	1	.	1	.	1	.	1	.	+	.	+	+
.	*Ochrolechia frigida*	+	+	1	.	+	1	.	.	.	.	.	.	1	1	+	.	1	+	2a	+	.	+	1	+	+	1	+	1	+
.	*Cladonia amaurocraea*	1	1	+	+	+	.	.	.	.	.	+	+	1	+	.	.	1	+	1	+	1	1	1	+	1	1	.	1	.
.	*Stellaria longipes* coll.	1	.	1	1	1	1	2a	1	1	+	1	1	1	+	.	1	1	1	1	1	1	1	.	+	1	1	.	.	1
.	*Luzula confusa*	.	+	.	.	1	.	.	.	.	.	.	1	1	.	.	.	1	1	1	+	+	1	1	1	1	1	1	2a	+
.	*Cephaloziella* spp.	+	+	.	.	+	+	+	.	.	.	.	.	+	+	+	.	.	.	+	+	.	.	+	.	+	.	+	+	.
.	*Cladonia borealis*	+	1	.	.	+	.	.	.	.	.	.	+	+	+	1	.	+	1	+	1	+	1	+	+	+	.	+	1	.
.	*Polytrichum alpinum*	.	.	1	.	.	+	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	1	.	+	1	2a	+	1	+
.	*Thamnolia vermicularis*	.	.	.	.	.	+	.	.	.	.	.	.	r	+	1	.	1	1	.	+	.	+	1	.	.	1	.	.	.
.	*Cladonia pyxidata*	+	+	.	.	+	.	.	.	.	.	.	+	1	1	.	.	1	+	.	.	.	1	+	.	1	.	.	.	.
.	*Cladonia pleurota*	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	+	1	.	.	+	.
.	*Lichenomphalia* sp. (*Botrydina*-type)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.
.	*Peltigera rufescens*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2a	+	+	.	.	.	2a	.	.	.	.	.	.
.	*Peltigera canina*	.	.	2a	.	.	.	.	2a	.	.	2b	.	.	.	2a	+	.	.	.	1	+	.	.	.	2a	+	.	.	.
.	*Rhytidium rugosum*	1	.	.	2b	.	.	.	.	.	.	.	.	1	.	.	.	1	.	+	+	.	.	.	.	.	.	+	.	+
.	*Cladonia deformis*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	1	.	.	.	1	.	.	1	.	+	.
.	*Cladonia cenotea*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.
.	*Ochrolechia inaequatula*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	+	+	.	.
.	*Tofieldia pusilla*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2m	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**

Addenda Table 5 (other species with presence < 7):

1: *Bryum* sp. 1, *Dicranum spadiceum* 1, *Bryoria chalybeiformis* +, *Equisetum scirpoides* +, *Festuca brachyphylla* +, *Hypnum revolutum* +, *Pohlia cruda* +, *Tortula ruralis* +, *Parmelia omphalodes* r, *Poa glauca* r, *Saxifraga tricuspidata* r; **2:** *Equisetum scirpoides* 1, *Bryum* sp. +, *Cladonia fimbriata* +, *Festuca brachyphylla* +; **3:** *Pedicularis labradorica* +; **4:** *Saxifraga tricuspidata* 2a, *Brachythecium* sp. 1, *Hypnum revolutum* 1, *Ledum groenlandicum* 1, *Parmelia sulcata* 1, *Bryoria chalybeiformis* +, *Orthotrichum speciosum* +, *Tortula ruralis* +; **5:** *Tortula ruralis* +; **6:** *Equisetum scirpoides* 2a, *Dryas integrifolia* 1, *Tofieldia coccinea* 1, *Bryoria chalybeiformis* +, *Cladonia pocillum* +, *Hypnum revolutum* +, Microlichen indet. +, *Physconia muscigena* +, *Plagiomnium ellipticum / medium* +, *Thuidium abietinum* +, *Timmia austriaca* +, *Tortula ruralis* +; **9:** *Pedicularis labradorica* +; **11:** *Cladonia bellidiflora* +; **12:** *Dicranum flexicaule / fuscescens* 1; **13:** *Cynodontium* sp. 1, *Polytrichum hyperboreum* 1, *Cetraria ericetorum* +, *Cladonia* sp. +, *Gymnomitrion* corallioides +, *Polytrichum piliferum* +, *Pseudephebe pubescens* r; **14:** *Buellia papillata* 1, *Cetraria ericetorum* 1, *Cladonia rangiferina* 1, *Dicranum flexicaule / fuscescens* 2a, *Pertusaria geminipara* 1, *Cladonia stricta* s.str. +; **15:** *Cladonia stricta* s.str. +, *Isopterygiopsis pulchella* +, *Parmeliella triptophylla* +; **17:** *Cynodontium strumiferum* 2a, Microlichen indet. 1, *Polytrichum piliferum* 1, *Ceratodon purpureus* +, *Cladonia rangiferina* +, *Cladonia stricta* s.str. +, *Polytrichum hyperboreum* +; **18:** *Cladonia rangiferina* 1, *Peltigera* sp. 1, *Tritomaria quinquedentata* 1, *Isopterygiopsis pulchella* +; **19:** *Dicranum flexicaule / fuscescens* 1, *Festuca brachyphylla* 1, *Cladonia fimbriata* +, *Lopadium coralloideum* r; **20:** *Saxifraga tricuspidata* r; **22:** *Pertusaria geminipara* 1, *Ceratodon purpureus* +, *Cladonia phyllophora* +, *Festuca brachyphylla* +, *Pohlia cruda* +; **23:** *Pohlia cruda* 1, *Tritomaria quinquedentata* 1, *Brachythecium groenlandicum* +, Microlichen indet. +, *Hypogymnia austerodes* r; **24:** *Festuca brachyphylla* 1, *Pohlia cruda* 1, *Conostomum tetragonum* +, *Isopterygiopsis pulchella* +; **25:** *Hypnum revolutum* 1, *Bryonora castanea* s.str. +, *Bryum* sp. +; **26:** *Cardamine bellidifolia* +, *Cnestrum alpestre* +, *Dicranum flexicaule / fuscescens* +, *Lopadium pezizoideum* +, *Pertusaria panyrga* +; **27:** *Pertusaria* sp. +, *Polytrichum piliferum* +; **28:** *Stereocaulon paschale* 1, *Cladonia trassii* +, *Cynodontium strumiferum* +, *Pseudephebe minuscula* +, *Cladonia stricta* s.str. r, *Gymnomitrion corallioides* r; **30:** *Equisetum scirpoides* 1, *Cladonia bellidiflora* +;

Table 5. Continued.

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2a	2a	.	.	2b	1	2a	.	1	2a	3	2a	2b	2a	2b	2a	2a	.	2a	1	2a	2b	2a	2b	1	1	2b	2a	1	1	2a	1	1	1	1	1	1	+	45	II	V	V
1	.	.	.	1	1	3	.	2b	.	1	2b	2a	2b	2a	1	3	.	.	.	.	2b	1	.	.	4	+	+	.	.	+	.	4	.	2b	3	2a	2a	45	IV	IV	III
1	1	.	.	1	.	+	.	2a	.	1	2a	1	1	1	+	1	1	.	+	.	1	1	+	1	1	.	+	.	+	1	1	1	.	+	1	+	1	42	III	IV	IV
3	2a	1	2a	2b	2a	2a	2a	1	2b	2a	.	+	+	.	2a	.	+	1	.	.	2a	.	.	2b	.	1	+	.	1	+	+	+	1	1	.	+	.	40	III	V	IV
1	1	+	1	1	1	+	+	1	1	+	1	+	1	1	+	1	1	1	1	2a	+	1	1	1	2a	1	1	1	+	1	+	+	1	+	+	+	1	66	V	V	V
.	+	1	2b	1	.	.	1	.	.	3	+	1	1	.	.	2b	1	2a	2a	2a	2a	3	2b	3	2b	2a	3	2a	2a	3	2a	3	2b	4	.	3	.	54	V	IV	V
1	1	1	1	1	1	1	1	+	1	1	1	1	1	+	.	+	+	+	.	+	r	+	+	+	.	1	.	+	+	.	+	+	+	1	r	r	.	54	IV	V	IV
1	+	1	1	1	+	1	1	.	2a	+	+	+	1	+	+	+	+	.	.	.	.	.	1	+	.	.	.	+	.	r	.	+	.	+	.	+	.	44	IV	V	II
.	+	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	14	II	I	I
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+	2a	+	+	+	1	1	+	+	1	+	2a	2b	.	+	1	1	+	+	+	1	+	+	1	+	1	+	.	+	1	+	+	1	1	+	1	+	+	61	V	V	V
1	1	1	1	1	1	+	1	1	+	1	1	1	+	1	2m	1	.	.	.	+	1	1	1	1	+	.	1	+	.	1	.	1	1	+	1	1	2m	60	V	V	IV
2a	2a	1	2a	.	.	1	1	2a	1	1	1	2a	1	1	1	1	1	+	.	+	.	+	1	2b	2a	1	1	1	1	1	1	1	1	1	1	1	+	57	IV	V	V
.	1	1	1	1	1	.	.	2a	1	1	.	1	1	1	.	1	1	+	2a	1	2a	1	2m	1	1	.	1	2m	1	2a	.	2a	1	1	.	1	.	52	IV	IV	V
2a	2a	.	2a	2a	2b	2a	+	1	2a	1	2a	2a	2a	2a	2a	1	1	1	+	.	.	.	+	.	.	1	.	2a	.	.	.	2b	.	1	1	.	.	46	IV	V	III
1	+	.	.	1	1	.	.	2a	.	+	1	1	1	1	1	.	1	1	.	1	1	2a	1	.	1	+	1	1	.	.	1	+	.	.	+	1	2a	45	IV	IV	IV
+	+	2a	+	1	1	.	1	.	1	1	+	.	+	.	r	+	+	.	r	.	+	.	+	.	.	.	+	+	+	.	.	+	.	+	.	.	.	42	IV	IV	III
1	+	1	1	1	.	+	+	.	1	1	+	+	1	+	+	+	+	.	.	.	+	+	+	.	.	.	.	.	.	.	.	+	.	1	.	.	.	41	IV	V	II
+	.	1	2m	+	1	.	1	1	.	+	.	1	+	.	+	1	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	1	.	.	1	.	1	41	V	IV	II
.	r	1	+	+	+	1	.	+	1	+	.	1	1	.	.	+	.	.	.	.	+	+	.	+	.	.	.	1	.	1	.	.	1	+	2a	.	+	38	III	IV	III
+	+	.	+	+	.	.	+	+	.	.	.	+	.	.	+	.	+	.	+	+	.	+	+	.	.	+	+	+	+	.	.	+	.	1	.	.	.	33	III	III	III
+	.	.	.	.	.	.	1	.	+	1	+	.	+	.	.	.	.	.	.	.	r	+	+	+	.	.	.	r	+	.	.	.	.	1	.	+	.	32	IV	II	II
2b	.	.	.	1	3	+	.	.	3	2b	+	.	1	2a	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	25	II	IV	I
1	+	+	1	+	+	+	1	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	r	.	+	.	.	.	23	II	III	I
1	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	18	II	I	I
.	+	1	+	.	1	.	+	.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	17	II	II	I
.	.	.	+	.	.	r	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	+	+	+	+	13	I	I	II
.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	2a	.	.	.	.	.	r	.	.	+	.	.	.	.	.	.	+	2a	.	.	.	.	12	I	I	I
.	.	.	.	.	2a	.	.	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	II	I	.
.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	II	I	.
.	.	.	+	.	.	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	10	II	I	r
.	.	+	1	.	1	.	1	.	1	1	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	I	II	r
.	+	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	9	I	I	+
.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	+	.	.	1	.	.	.	.	.	.	7	r	I	I
30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**				

32: *Cladonia* sp. +, *Hypogymnia austerodes* +, *Lopadium pezizoideum* +; **33:** *Bryoria chalybeiformis* 1, *Cladonia bellidiflora* 1, *Polytrichum juniperinum* 1; **34:** *Tritomaria quinquedentata* 1; **35:** *Bryoria chalybeiformis* 1, *Lecidea* sp. +; **37:** *Parmelia* sp. r; **38:** *Equisetum scirpoides* 1, *Dicranum spadiceum* +; **39:** *Cladonia bellidiflora* 1, *Cetraria ericetorum* +, Microlichen indet. +, *Parmelia sulcata* r, *Pertusaria* sp. r; **40:** *Cladonia fimbriata* 1, *Lopadium pezizoideum* +, *Pertusaria geminipara* +; **41:** *Cetraria ericetorum* 1, *Cladonia scabriuscula* +; **42:** *Equisetum scirpoides* 1; **43:** *Dicranum spadiceum* 2a; **44:** *Parmelia omphalodes* +, *Pertusaria* sp. +; **45:** *Dicranum spadiceum* 1; *Stereocaulon rivulorum* +; **46:** Liverwort indet. +; **47:** Cladonia *scabriuscula* +; **48:** *Cephalozia bicuspidata* +; **50:** *Pedicularis labradorica* 1; **51:** *Tritomaria quinquedentata* 2a, *Cladonia stricta* s.str. r; **52;** *Carex saxatilis* 1, *Loeskypnum badium* 1, *Warnstorfia sarmentosa* 1, *Brachythecium* sp. +, *Ceratodon purpureus* +, *Pedicularis flammea* +, *Pertusaria geminipara* +, *Scapania* sp. +; **53:** *Pedicularis labradorica* +, *Sphagnum squarrosum* +; **54:** *Pedicularis flammea* +, *Pohlia schimperi* (C. Müll.) Andrews +; **55:** *Dicranum flexicaule / fuscescens* 1, *Isopterygiopsis pulchella* +, *Pohlia wahlenbergii* r; **56:** *Brachythecium groenlandicum* +; **57:** *Loeskypnum badium* +, *Pedicularis labradorica* +, *Pleurocladula albescens* +, *Gymnomitrion corallioides* r; **58:** *Calamagrostis neglecta* 2m, *Pedicularis labradorica* 1, *Cladonia scabriuscula* +, *Luzula groenlandica* +, *Scapania* sp. +, *Equisetum variegatum* r; **59:** Liverwort indet. +, *Pohlia schimperi* +, *Protothelenella sphinctrinoidella* +, *Rhododendron lapponicum* +; **60:** *Cephalozia bicuspidata* 1, *Dryas integrifolia* +, Moss indet. +, *Plagiomnium ellipticum / medium* r; **61:** *Pohlia schimperi* 1, *Cinclidium arcticum / stygium* +, *Loeskypnum badium* +, *Oncophorus wahlenbergii* +, *Pedicularis flammea* +; **63:** *Dicranum scoparium* +, *Pertusaria geminipara* +, *Pleurocladula albescens* +, *Polytrichum swartzii* +; **64:** *Cladonia stricta* s.str. 1, *Bryonora castanea* s.str. +, *Cladonia* sp. +, *Gymnomitrion corallioides* +, *Isopterygiopsis pulchella* +, *Lopadium pezizoideum* +, *Protopannaria pezizoides* +, *Protothelenella sphinctrinoidella* +; **65:** *Pohlia schimperi* 1, *Plagiomnium ellipticum / medium* +, *Splachnum sphaericum* +; **66:** *Tritomaria quinquedentata* 1, *Dicranum spadiceum* +, *Isopterygiopsis pulchella* +, *Luzula arctica* +, *Meesia uliginosa* +; **67:** *Saxifraga foliolosa* 1, *Tritomaria quinquedentata* 1, *Brachythecium turgidum* +, *Ranunculus pygmaeus* +.

Table 6. Hylocomio splendentis-Cassiopetum tetragonae.

Altitudinal indicator value	Elevation form	HC low-elevation form					HC mid-elevation form															
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	Author	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS
	Relevé area [m²]	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Size of the stand [10 m²]	1000	1	10	10	30	1000	50	10	100	1000	10	4	20	40	200	20	50	100	50	2	1000
	Altitude [m a.s.l.]	30	70	130	190	445	500	520	550	550	560	560	575	590	595	600	600	605	640	680	700	725
	Slope [°]	22	30	26	26	20	20	14	12	20	16	14	5	20	5	30	18	20	24	10	2	14
	Aspect	n	n	n	nnw	nnw	n	n	n	nw	n	n	n	n	nw	n	nw	nnw	n	n	n	n
	Cover total [%]	100	100	100	100	100	100	100	100	100	95	95	98	95	100	100	100	100	95	100	98	100
	Cover dwarfshrubs [%]	70	40	60	70	75	60	70	80	65	70	70	70	60	50	35	60	60	85	70	65	50
	Cover graminoids [%]	2	2	15	2	2	2	5	5	2	2	2	2	2	2	2	2	2	2	2	2	2
	Cover herbs [%]	5	2	15	2	2	5	7	20	5	2	2	5	10	2	15	2	2	2	2	2	2
	Cover bryophytes [%]	100	100	100	100	100	100	95	100	100	95	90	100	90	90	100	100	80	5	100	70	100
	Cover lichens [%]	7	15	20	2	2	20	20	10	10	20	30	2	15	30	5	2	30	2	20	20	7
	Cover soil [%]	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	2	0	0	0
	Cover stones [%]	0	0	0	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	0	2	0
	Cover litter [%]	2	2	2	5	2	2	2	2	2	2	2	2	5	2	2	2	2	5	2	2	2
	Canopy height [cm]	5	7	5	7	15	10	10	8	10	5	7	10	7	5	7	5	10	15	7	6	5
	Height stand max. [cm]	30	20	30	25	30	15	30	30	30	15	25	20	20	20	20	10	20	25	20	25	15
	PH value	6.3	5.9	5.8	6.5	6.1	4.8	4.8	5.4	5.1	4.7	4.9	4.9	4.4	5.8	4.6	5.3	4.9	5.3	4.4	4.4	5.9
	Organic matter rhizosphere [%]	50	21	13	3	11	31	23	28	19	23	19	25	22	10	51	20	11	21	12	19	19
	Organic layer [cm]	20	15	10	7	3	3	3	2	6	4	7	4	3	4	nd	10	2	2	4	2	7
	Depth of permafrost [cm]	35	-	-	20	-	15	-	-	-	-	35	30	30	30	20	35	-	-	30	-	-
	Shelter [1-5]	3	3	3	4	4	3	2	4	3	3	3	4	2	2	4	3	3	3	3	2	3
	Snow cover [1-5]	4	4	4	4	5	4	3	5	4	4	4	5	3	3	4	4	4	3	4	3	4
	Soil moisture [1-6]	4	4	3	4	3	4	4	4	4	3	3	4	3	3	5	3	4	4	3	4	4
	Number of species	51	54	44	43	30	43	57	61	53	53	45	60	60	48	44	42	51	52	61	75	74
	ch / d Hylocomio-Cassiopetum (HC)																					
.	*Cassiope tetragona*	2b	2a	3	3	4	3	4	3	2b	2b	3	3	2b	2b	2b	2b	3	4	3	3	2a
.	*Luzula arctica*	r	.	.	+	+	.	.	2a	.	.	.	.	.	.	.	+	.	.	.	.	1
*h	*Dactylina ramulosa* (Hook.) Tuck.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Bryonora castanea* s.str.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	r	.	r	.
[h!]	*Huperzia selago* spp. *arctica*	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	r
.	*Timmia austriaca*	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	1	.	.	.
	d low- / mid-elevation forms																					
(lm)	*Vaccinium uliginosum* ssp. *microphyllum*	3	3	3	2b	.	.	1	1	3	2b	.	2b	2b	2b	.	3	+	1	3	3	3
(lm)	*Salix glauca* coll.	.	2b	+	+	2b	.	2b	.	2b	1	2b	r	2a	.	.	2a	2a	1	.	2a	1
lm!	*Betula nana*	2b	2a	2b	2a	3	3	.	3	3	2b	2a	1	2b	.	2b	2b	.	.	.	.	.
lm!	*Empetrum nigrum* ssp. *hermaphroditum*	.	1	1	2a	2a	2b	.	2a	1	2b	3	1	.	.	2a	.	2b	2b	.	.	.
.	*Bryoria nitidula*	+	1	1	.	.	.	+	.	+	+	.	.	1	.	+	.	.	+	+	+	+
lm!	*Ledum palustre* ssp. *decumbens*	.	.	2b	.	.	1	.	1	.	.	+	+	1	.	+	.	.	.	.	.	+
	d mid- / high-elevation forms																					
mh!	*Stereocaulon alpinum*	1	.	.	.	.	+	1	+	1	1	1	1	1	1	+	1	2a	1	+	1	r
.	*Polytrichum strictum*	.	.	.	.	.	1	2b	+	+	1	1	2a	1	1	1	1	+	.	2a	.	1
mh!	*Ptilidium ciliare*	.	.	.	.	.	.	2a	.	.	1	2a	1	1	2a	1	1	1	2a	2b	2a	.
mh!	*Dactylina arctica* (M.J. Richardson) Nyl.	.	.	.	.	.	.	2a	2a	+	+	1	.	1	.	1	+	.	1	1	1	+
.	*Cladonia arbuscula* ssp. *mitis*	+	.	.	.	.	.	.	.	.	.	+	.	+	+	.	r	1	+	1	1	.
*mh	*Racomitrium lanuginosum*	r	.	.	.	.	.	1	1	.	2a	.	.	2b	+	+	2b	.	1	2a	2b	1
[mh!]	*Cladonia stricta* s.str.	+	.	.	.	.	.	.	+	+	+	.	+	.	1	.	.	.	.	+	+	+
(mh)	*Sphaerophorus globosus*	.	.	.	.	.	.	+	.	.	+	.	+	1	.	+	r	.	.	+	.	+
(mh)	*Cetraria islandica*	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.	1	.	1	+	.
.	*Placynthiella icmalea*	.	.	.	.	.	+	.	+	.	+	.	.	+	+	.	.	+	+	.	1	+
[mh!]	*Alectoria nigricans*	.	.	.	.	.	.	+	.	1	1	.	+	1	.	.	+	.	.	+	1	+
[mh!]	*Pertusaria geminipara*	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	1	1	.	.	+
(mh)	*Polytrichum piliferum*	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	1	1	+	1	.
[(mh)]	*Barbilophozia kunzeana*	.	.	.	.	.	+	.	.	.	1	1	1	.	1	.	+	.	.	.	+	.
[mh!]	*Hierochloe alpina*	.	.	.	.	.	.	+	.	.	.	.	.	1	.	+	.	.	+	1	1	+
*mh	*Gymnomitrion corallioides*	.	.	.	.	.	+	.	.	.	+	.	+	+	.	.	.	.	.	.	+	.
[mh!]	*Cetraria ericetorum*	.	.	.	.	.	.	.	1	.	+	.	.	.	+	.	.	.	+	.	.	.
.	*Lopadium coralloideum*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	+
.	*Lichenomphalia* sp. (*Botrydina*-type)	.	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	r	+	.
	d high-elevation form																					
.	*Pohlia cruda*	+	+	.	.	.	.	.	+	.	.	.	.	+	.	.	.	+	1	.	.	+
*h	*Salix herbacea*	.	.	.	.	.	.	.	.	.	.	.	2b	.	2b	.	.	.	.	1	1	.
[h!]	*Tritomaria quinquedentata*	.	.	.	+	.	.	.	+	.	.	1	.	.	.	.	.	.	.	.	.	+
*h	*Lopadium pezizoideum*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	+	.	.	.
[h]	*Pleurocladula albescens*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
*h	*Pedicularis hirsuta*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	.	.	.	+
[h!]	*Blepharostoma trichophyllum*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
.	*Polytrichum juniperinum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+
[*h]	*Dicranum spadiceum*	.	.	.	.	.	1	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.
*h	*Silene acaulis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[h]	*Protopannaria pezizoides*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+

Table 6. Continued.

HC high-elevation form															elevation forms			subass.	
22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**		**l-e**	**m-e**	**h-e**	**HCt[2]**	**HCd**
BS	BS	CS	BS	BS	BS	BS	BS	BS	CS	CS	CS	CS	CS		**1-5**	**6-21**	**22-35**	**25[1]**	**10[1]**
4	4	4	4	4	4	4	4	4	3	3	4	3	4		.	.	.	.	.
40	50	20	80	73	10	50	200	100	50	200	25	100	10		210	229	72	138	228
750	780	780	810	810	860	860	905	905	930	955	965	965	995		173	597	876	684	559
10	12	18	18	22	20	10	16	8	8	10	4	12	8		25	15	13	16	16
n	n	ne	nnw	nnw	n	nnw	nne	nne	nne	nnw	n	nw	n		.	.	.	.	.
100	100	95	98	98	90	95	98	80	80	95	65	80	60		100	99	88	95	93
70	50	60	50	50	60	45	50	60	60	50	50	50	30		63	64	53	59	61
5	2	8	5	2	2	2	2	5	5	20	2	15	5		5	2	6	4	3
2	2	5	15	2	2	5	2	5	15	5	5	2	5		5	5	5	5	6
100	90	50	90	90	100	95	70	70	30	60	40	50	50		100	88	70	83	83
20	5	40	10	10	15	25	30	10	40	25	25	25	20		9	15	21	19	12
0	0	2	0	0	10	0	0	0	0	0	10	0	0		0	1	2	1	1
0	0	2	2	2	0	5	2	20	20	5	25	20	40		0	1	10	3	7
2	2	10	2	2	2	2	2	2	5	2	2	2	2		3	2	3	3	3
8	8	12	10	10	10	8	5	7	5	8	8	8	8		8	8	8	8	8
10	15	17	15	15	15	17	10	20	15	13	13	12	18		27	21	15	19	21
5.2	5.9	5.7	4.9	4.6	5.0	6.0	5.5	6.5	5.5	5.7	5.6	5.7	5.2		6.1	5.0	5.5	5.1	6.0
19	12	8	27	21	18	5	7	7	7	3	5	3	4		20	22	10	17	16
6	2	nd	6	4	2	2	1	8	nd	nd	nd	nd	nd		11	4	4	4	8
-	-	-	-	-	-	-	-	-	-	-	-	-	-		.	.	.	.	.
3	4	3	4	4	4	3	3	3	3	3	4	4	3		3.4	2.9	3.4	3.1	3.5
4	4	3	4	5	4	4	4	4	4	4	4	4	4		4.2	3.8	4.0	3.8	4.2
4	4	3	4	4	4	4	3	4	3	4	3	3	3		3.6	3.7	3.6	3.6	3.7
56	78	57	69	65	63	63	81	76	52	57	57	65	52	Presence	44	55	64	57	58
4	3	4	3	3	3	3	3	3	3	3	3	3	3	35	V	V	V	V	V
+	1	.	1	1	+	1	1	2a	+	+	.	+	.	17	III	I	IV	II	IV
.	+	+	+	.	r	+	1	2a	2a	1	1	+	2a	13	.	+	V	II	II
.	+	+	+	+	+	.	+	+	+	+	.	.	.	12	.	I	IV	II	II
.	1	1	+	+	.	.	1	.	+	1	.	1	1	11	.	I	IV	II	II
.	.	.	.	.	+	+	+	+	+	r	.	.	.	10	I	I	III	II	II
.	+	+	.	.	.	.	.	.	.	.	.	.	.	19	IV	V	I	III	III
.	.	.	.	2a	.	+	.	.	.	.	.	.	.	17	IV	IV	I	III	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	14	V	III	.	II	III
.	.	.	1	.	.	.	.	.	.	.	.	.	.	14	IV	III	+	II	II
.	.	r	+	.	.	.	.	.	.	.	.	.	.	14	III	III	I	III	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	I	III	.	II	I
1	1	1	1	+	1	1	1	2a	1	2a	1	1	1	31	I	V	V	V	IV
2a	1	2a	1	3	2a	1	1	+	.	2a	.	+	.	25	.	V	IV	V	II
2a	1	1	2a	2a	1	2b	2b	2a	1	1	2a	1	+	26	.	IV	V	V	II
2a	1	1	1	1	1	+	1	1	.	+	+	+	+	25	.	IV	V	IV	III
1	1	1	1	1	1	1	1	1	+	1	+	1	1	23	I	III	V	IV	III
+	1	1	2b	.	.	3	2a	.	.	.	2b	+	2b	21	I	IV	IV	IV	III
.	+	2a	+	1	+	+	1	.	.	.	.	+	+	18	I	III	IV	III	II
r	.	.	1	.	+	+	+	.	.	1	1	1	+	17	.	III	IV	III	I
.	+	1	.	+	+	.	+	.	1	1	1	+	1	16	.	II	IV	III	II
.	+	.	.	+	+	1	+	+	+	.	.	.	.	16	.	III	III	III	III
+	.	.	.	+	.	.	+	+	.	.	.	+	+	15	.	III	III	III	I
+	.	.	1	1	+	1	1	+	.	+	.	.	.	13	.	II	III	III	I
.	.	.	.	.	.	.	+	.	2a	+	r	+	1	11	.	II	III	II	I
.	+	.	1	1	1	.	.	.	.	.	.	.	.	11	.	III	II	II	+
.	.	.	.	.	.	.	.	.	+	.	+	.	+	10	.	III	II	II	II
.	.	.	.	.	.	+	2a	.	.	.	2a	+	2a	10	.	II	II	II	+
.	.	.	r	.	.	+	+	+	.	.	.	.	.	8	.	II	II	II	I
.	.	.	+	.	+	.	+	.	.	.	.	+	.	8	.	II	II	II	+
+	.	.	.	.	.	.	+	.	.	+	.	.	.	8	.	II	II	II	.
+	+	.	+	+	+	+	+	1	1	+	+	+	.	19	II	II	V	III	IV
1	2a	3	2b	1	2a	2a	2a	2b	2b	2b	1	2a	2a	18	.	II	V	III	II
+	.	.	1	1	+	.	+	.	1	+	+	+	+	14	I	I	IV	II	III
1	+	+	+	.	+	+	+	.	+	+	+	+	.	14	.	I	IV	III	II
+	1	+	1	2a	1	2a	.	+	.	.	.	.	.	10	.	I	III	II	I
.	.	.	.	+	r	1	1	.	.	1	+	1	.	10	.	I	III	II	I
.	+	.	+	1	1	.	1	+	.	+	.	+	.	10	.	I	III	II	II
.	1	2a	1	.	.	.	1	.	2a	.	2a	.	2b	9	.	I	III	I	II
.	.	2b	1	.	.	.	.	2b	.	2a	2a	.	1	8	.	I	III	II	I
.	+	r	.	.	+	.	1	2a	2a	.	1	.	+	8	.	.	III	I	II
.	1	.	.	+	.	+	2a	1	.	1	.	.	.	7	.	+	III	I	II

Table 6. Continued.

.	*Equisetum variegatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*h	*Cetrariella delisei*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.
.	*Buellia insignis*	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
[*h]	*Anthelia julacea / juratzkana*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
[*h]	*Solorina crocea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.
[h!]	*Cardamine bellidifolia*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
	d HC typicum (HCt) [3]																					
.	*Peltigera malacea*	r	.	2a	.	+	1	+	.	1	.	.	.	1	2a	.	.	1	+	2a	2b	.
.	*Polytrichum alpinum*	.	2a	.	.	.	+	2b	.	.	.	.	1	1	1	2a	.	2b	1	.	1	.
.	*Cladonia rangiferina*	1	.	.	.	.	.	1	r	.	+	.	.	.	.	.	+	.	.	+	1	.
.	*Cetraria aculeata / muricata*	.	.	.	.	.	.	.	.	1	.	+	.	.	+	.	.	.	.	+	+	.
[h!]	*Conostomum tetragonum*	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	+	.
	d HC dryadetosum (HCd) [3]																					
.	*Dryas integrifolia*	.	+	.	+	1	.	.	1	.	.	.	.	.	.	.	+	.	.	.	.	1
.	*Isopterygiopsis pulchella*	.	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+
.	*Tomentypnum nitens*	+	.	.	.	2a	+	.	4	.	.	.	2a	.	.	.	.	.	.	.	.	+
.	*Hypnum revolutum*	+	+	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
lm!	*Rhododendron lapponicum*	.	r	.	+	+	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	+
.	*Chamaenerion latifolium*	+	.	.	+	1	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.
	d moist sites																					
.	*Ranunculus lapponicus*	.	.	.	.	.	2m	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.
.	*Sphagnum girgensohnii*	.	.	.	.	.	3	.	.	.	.	.	+	.	.	2b	.	.	.	.	.	.
.	*Aulacomnium palustre*	.	.	+	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.
.	*Sphagnum warnstorfii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	d Phyllodoco-Vaccinion																					
.	*Hylocomium splendens*	+	2b	2b	3	5	4	3	2a	3	2b	2b	2a	2b	1	4	2b	2b	5	2b	2b	2b
.	*Peltigera polydactylon* s.l.	+	+	1	1	.	+	+	.	.	2a	1	+	1	1	.	1	.	.	2a	1	+
.	*Anastrophyllum minutum*	1	1	.	.	.	.	1	1	.	1	2a	1	2a	+	2a	+	+	+	.	+	2a
.	*Hypnum holmenii* Ando	2a	1	+	1	.	1	.	.	.	1	+	.	.	.	1	1	.	.	.	.	1
.	*Dicranum laevidens*	.	.	.	.	.	.	.	.	.	.	.	1	.	.	3	+	.	.	.	.	1
	other Loiseleurio-Vaccinietea																					
.	*Flavocetraria cucullata*	1	1	1	1	1	+	1	1	1	1	1	+	1	1	1	1	1	1	1	1	+
.	*Pohlia nutans*	+	1	+	+	+	+	1	+	1	+	1	1	1	1	+	1	1	1	1	+	1
.	*Ochrolechia frigida*	1	1	1	+	.	+	2a	1	2a	1	1	+	2a	+	+	+	+	+	1	1	+
.	*Cladonia gracilis*	1	1	1	1	.	+	1	+	1	2a	2a	+	1	1	+	1	1	1	1	1	+
.	*Cladonia amaurocraea*	+	+	1	1	.	+	1	+	1	1	1	+	1	1	+	.	1	1	1	1	.
.	*Cladonia borealis*	+	+	1	.	.	.	1	1	+	1	1	+	+	1	+	+	1	1	1	1	+
.	*Pyrola grandiflora*	2a	1	1	1	1	1	2a	+	1	1	1	2m	2a	1	.	1	1	1	1	2m	.
.	*Cladonia pyxidata*	1	+	1	.	.	+	.	+	1	1	+	+	1	+	.	.	1	+	+	1	1
.	*Alectoria ochroleuca*	1	1	1	.	.	.	1	.	.	1	.	+	1	.	+	1	.	1	1	1	+
.	*Rinodina turfacea*	+	+	+	.	.	.	.	.	+	1	.	.	.	.	.	.	+	.	.	+	+
	others																					
.	*Psoroma hypnorum*	1	+	1	1	+	.	1	+	1	1	+	+	1	+	+	1	2a	1	1	1	+
.	*Aulacomnium turgidum*	5	4	3	4	2a	2a	2a	1	4	3	2b	2b	3	2b	2b	3	1	2a	2a	1	2b
.	*Poa pratensis* coll. / *arctica*	1	1	1	+	1	1	+	1	1	1	1	1	1	1	1	.	1	+	1	1	1
.	*Luzula confusa*	1	1	+	1	1	.	1	.	1	1	1	1	1	1	1	.	1	.	1	1	1
.	*Flavocetraria nivalis*	1	+	1	+	.	.	1	1	1	.	.	+	1	+	+	+	+	1	+	.	+
.	*Dicranum acutifolium / brevifolium*	2a	3	2a	1	2a	.	.	.	2a	2a	1	1	2a	.	2b	1	3	2b	2b	2b	+
.	*Thamnolia vermicularis*	1	1	1	1	+	.	+	r	+	+	.	+	1	+	.	1	+	+	+	1	.
.	*Nephroma expallidum*	1	1	.	+	.	1	2a	r	+	+	1	.	2a	+	1	.	1	.	2a	+	.
.	*Sanionia uncinata*	.	1	.	.	1	+	+	1	1	.	1	2b	.	1	.	1	1	+	+	1	.
.	*Lophozia* spp.	+	1	+	+	.	1	.	.	+	+	+	+	+	+	1	+	+	.	.	+	1
.	*Polygonum viviparum*	.	1	+	+	1	.	.	1	1	.	.	2m	+	.	.	1	.	.	1	.	1
.	*Stellaria longipes* coll.	+	1	.	+	.	1	1	.	1	.	1	1	+	1	1	.	.	.	1	1	+
.	*Barbilophozia hatcheri*	.	.	2a	.	1	.	1	+	1	+	+	+	+	+	+	.	1	1	1	1	.
.	*Cladonia chlorophaea* s.l.	.	1	+	1	r	.	.	1	+	.	+	+	+	1	.	+	+	+	1	+	.
.	*Cladonia cyanipes*	.	1	1	1	.	.	1	+	.	1	1	+	+	+	+	r	.	1	1	1	+
.	*Peltigera aphthosa*	.	1	2a	1	.	.	.	.	1	2a	2b	1	2a	2b	1	1	.	.	1	1	1
.	*Peltigera scabrosa*	+	+	.	.	.	2a	.	1	+	.	1	1	.	+	1	+	.	.	1	1	1
.	*Peltigera leucophlebia*	2a	1	.	.	1	2a	1	1	1	.	.	.	.	1	.	.	+	1	1	.	.
.	*Peltigera didactyla*	+	.	1	+	.	2a	.	+	1	+	.	.	.	2a	.	.	+	.	+	+	.
.	*Bryum* spp.	+	+	.	.	+	.	.	+	1	.	.	.	.	.	.	.	.	.	.	+	.
.	*Carex bigelowii*	1	.	.	.	.	.	.	.	.	.	+	+	.	+	.	1	.	.	.	.	1
.	*Cladonia pleurota*	.	+	+	.	.	.	+	.	.	+	.	+	1	.	.	.	.	.	+	+	.
.	*Cephaloziella* spp.	.	.	.	+	.	.	.	.	+	.	.	.	+	.	+	.	.	.	.	.	.
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**

[1] number of relevés [2] in grey: further differential-species [3] in grey: reléves assigned to the indicated subass.

Table 6. Continued.

22	23	24	25	26	27	28	29	30	31	32	33	34	35		l-e	m-e	h-e	HCt	HCd
.	1	.	.	+	.	+	1	1	1	.	.	.	.	6	.	.	III	I	II
.	1	.	.	.	1	.	.	.	1	1	2b	.	.	6	.	+	II	I	II
.	+	.	.	.	+	.	+	+	+	.	.	.	.	6	.	+	II	I	II
.	+	.	.	.	.	+	+	2b	.	.	.	+	.	6	.	+	II	I	II
.	.	.	.	.	.	+	1	.	.	.	2a	+	+	6	.	+	II	I	+
1	.	.	.	.	+	.	1	r	.	.	.	.	r	6	.	+	II	I	I
.	.	+	.	.	.	.	1	.	.	+	.	.	+	16	III	III	II	III	I
1	.	.	+	1	2a	.	.	1	.	.	.	.	.	15	I	III	II	III	I
2a	.	1	+	.	1	.	+	.	.	.	.	+	.	13	I	II	III	III	I
.	.	.	.	.	.	+	.	.	.	.	.	.	.	6	.	II	+	II	.
.	.	.	.	1	1	+	1	.	.	.	.	+	+	9	.	I	III	II	.
.	2a	.	.	.	.	.	.	2a	.	.	2a	+	r	11	III	I	II	I	IV
.	+	.	+	.	+	.	.	+	+	.	+	.	.	10	II	I	III	+	IV
.	2b	.	+	+	.	.	+	.	.	.	.	.	.	10	II	II	II	I	III
.	.	+	.	.	.	.	.	1	2a	.	2a	.	.	8	III	+	II	+	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	III	I	.	r	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	III	+	.	.	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	I	.	+	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	I	.	I	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	I	+	.	+	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	+
3	3	2b	2b	2b	2a	2b	2b	2b	.	2a	1	2b	1	34	V	V	V	V	V
1	.	.	+	+	1	1	+	.	.	.	.	+	+	23	IV	IV	III	IV	II
2a	+	.	1	1	.	.	1	+	.	2a	.	+	+	24	II	V	IV	IV	III
2a	.	.	1	.	.	.	+	.	.	.	.	.	.	13	IV	II	II	II	II
1	2b	.	.	2a	3	.	.	2b	2b	1	.	.	.	11	.	II	III	II	II
1	1	1	1	1	1	1	1	1	+	1	1	1	1	35	V	V	V	V	V
1	.	+	1	+	1	1	1	1	.	+	+	+	2a	33	V	V	V	V	IV
1	+	+	.	+	+	+	1	2a	2b	2a	+	+	+	33	IV	V	V	V	V
2a	1	2a	1	1	1	1	1	+	.	+	.	+	2a	32	IV	V	V	V	IV
1	+	.	1	1	+	1	1	.	.	1	+	+	+	29	IV	V	IV	V	III
1	+	1	1	1	1	1	1	+	+	+	+	1	1	32	III	V	V	V	IV
2a	+	1	2a	1	.	1	+	.	.	.	.	.	.	26	V	V	III	IV	III
+	+	+	1	1	1	1	.	+	.	+	1	.	.	26	III	V	IV	IV	IV
.	.	.	+	+	.	.	1	1	.	.	r	+	+	20	III	IV	III	III	III
.	+	+	+	.	.	+	1	.	+	.	1	.	.	15	III	II	III	II	III
+	1	1	1	1	1	+	+	+	+	1	+	+	2a	34	V	V	V	V	V
1	1	.	2a	1	1	2a	1	+	.	1	+	2a	+	33	V	V	V	V	V
1	1	.	1	1	1	1	1	.	2a	.	.	1	1	30	V	V	IV	V	IV
1	+	.	1	+	+	1	1	r	+	+	+	1	1	30	V	IV	V	V	V
+	+	1	1	.	+	.	1	1	.	+	+	+	1	27	IV	IV	IV	IV	IV
1	.	+	2b	.	3	2a	3	.	.	+	.	2b	1	26	V	IV	IV	V	III
.	+	.	1	+	.	+	.	.	+	1	1	1	1	26	V	IV	IV	IV	IV
.	+	.	1	1	1	2a	2a	+	.	+	+	+	1	26	III	IV	IV	IV	IV
1	1	+	1	+	1	1	+	2a	1	+	.	+	.	26	II	IV	V	IV	III
1	+	.	1	2a	+	1	.	+	.	.	.	+	.	24	IV	IV	III	IV	III
+	1	2a	1	1	1	1	1	1	2a	1	+	1	.	24	IV	III	V	III	V
1	1	.	1	1	+	1	1	1	1	.	.	.	r	24	III	IV	IV	IV	IV
2b	1	2a	.	2a	2b	1	+	+	.	.	.	+	.	24	II	V	IV	IV	II
1	.	+	+	+	+	+	.	.	.	.	.	.	1	22	IV	IV	III	IV	II
1	.	.	1	1	.	.	+	.	.	.	.	+	.	21	III	V	II	IV	II
2a	.	.	.	1	.	2a	.	.	.	+	+	+	+	21	III	IV	III	IV	II
1	.	+	2a	1	1	+	.	+	.	.	.	.	.	20	II	IV	III	III	III
.	+	+	1	.	2a	.	1	.	.	.	.	+	.	17	III	III	III	III	III
.	.	.	+	+	1	2a	.	.	.	.	.	.	.	15	III	III	II	III	II
.	+	+	1	.	.	+	+	+	+	.	.	.	+	14	III	I	III	II	IV
.	.	2a	1	+	.	.	.	.	.	2b	1	2a	.	12	I	II	III	II	II
+	.	.	.	.	.	.	.	+	.	.	.	.	+	11	II	II	II	II	I
.	.	+	.	.	.	.	.	+	+	+	.	1	.	9	I	I	II	II	II

Addenda follows table 11.

Table 7. Empetro hermaphroditi-Betuletum nanae, Racomitrium lanuginosum community.

Altitudinal indicator value	Vegetation type	Empetro-Betuletum low-elevation form																
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
	Author	CS	FD	OM	OM	CS	FD	CS	CS	CS	FD	CS	CS	CS	CS	CS	CS	CS
	Relevé area [m²]	4	9	16	16	4	4	4	4	4	4	4	4	4	4	4	4	4
	Size of the stand [10 m²]	10	20	5	4	80	100	1000	250	500	nd	6	30	5	2	8	100	100
	Altitude [m a.s.l.]	40	75	95	115	110	150	175	180	195	200	310	435	445	450	455	520	525
	Slope [°]	4	5	5	5	4	3	0	2	4	0	12	4	14	0	14	2	2
	Aspect	se	nnw	ne	ne	wnw	n	-	w	nnw	-	e	s	ssw	-	ssw	n	ne
	Cover total [%]	100	100	70	75	100	95	100	98	90	100	98	98	98	98	95	95	100
	Cover dwarf shrubs [%]	98	85	50	60	80	75	70	90	85	100	96	80	98	75	80	75	75
	Cover graminoids [%]	5	2	5	5	2	2	2	10	2	0	15	2	2	5	8	20	20
	Cover herbs [%]	2	10	30	30	2	2	5	2	0	2	2	2	2	15	8	20	20
	Cover bryophytes [%]	40	10	65	60	75	75	98	75	40	25	50	60	50	50	20	50	70
	Cover lichens [%]	2	2	5	5	20	5	5	10	10	5	5	10	5	15	5	5	10
	Cover soil [%]	0	0	0	0	0	5	0	0	10	0	2	2	2	2	5	0	0
	Cover stones [%]	0	0	30	35	0	0	0	2	0	0	0	0	0	0	0	2	0
	Cover litter [%]	70	nd	70	65	50	nd	5	20	30	nd	60	10	95	20	70	30	30
	Canopy height [cm]	22	25	40	40	18	25	19	40	20	40	14	5	15	5	10	20	25
	Height stand max. [cm]	35	50	55	60	36	40	50	55	30	60	35	25	60	25	34	44	45
	PH value	6.7	nd	6.9	6.9	5.9	nd	5.8	6.2	6.0	nd	4.4	5.1	4.6	5.5	4.9	4.3	4.5
	Organic matter rhizosphere [%]	59	nd	60	7	46	nd	69	37	37	nd	14	14	14	7	11	17	10
	Depth of permafrost [cm]	nd	nd	40	40	nd	nd	30	25	nd	nd	-	-	-	-	-	-	-
	Shelter [1-5]	3	nd	3	3	3	nd	3	3	2	nd	3	3	4	1	1	2	3
	Snow cover [1-5]	3	3	3	3	3	2	3	3	2	nd	3	3	3	1	1	3	3
	Soil moisture [1-6]	3	nd	3	3	3	nd	4	2	2	nd	3	3	2	2	2	3	3
	Number of species	19	38	40	39	43	28	30	31	41	19	33	47	29	48	46	40	46
	d Empetro-Betuletum (against Phyllodoco-Vaccinion)																	
.	*Tortula ruralis*	+	1	1	1	.	.	.	+	1	+	.	+	2b	2a	2b	1	+
.	*Physconia muscigena*	.	.	.	+	+	+	.	.	+	.	.	+	.	.	+	.	.
	d Empetro-Betuletum (against Phyllodoco-Vaccinion, Rc)																	
.	*Ceratodon purpureus*	.	.	+	+	+	.	+	+	2a	.	+	1	1	1	2a	+	+
.	*Cynodontium strumiferum*	.	.	.	.	.	1	.	+	.	.	+	.	+	.	+	+	+
.	*Poa glauca*	.	1	1	1	.	1	.	2a	+	.	.	.	+	+	.	.	.
.	*Thuidium abietinum*	2b	+	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
	d Empetro-Betuletum (against Rc)																	
lm!	*Betula nana*	5	4	2b	3	4	4	4	5	5	4	5	2a	5	2a	3	4	4
(lm)	*Salix glauca* coll.	2b	3	3	3	2b	2a	+	2a	+	3	2a	2a	2b	2a	+	+	2a
.	*Vaccinium uliginosum* ssp. *microphyllum*	.	r	2a	1	2a	.	2a	.	.	4	2a	4	2b	4	4	.	.
.	*Peltigera didactyla*	.	+	1	+	r	+	.	1	.	2a	+	1	.	1	+	1	1
.	*Cladonia chlorophaea* s.l.	.	.	+	.	+	+	.	.	+	.	1	+	.	+	+	+	1
.	*Dicranum flexicaule / fuscescens*	.	.	.	.	.	+	.	1	.	.	.	2a	.	2a	.	2a	2a
.	*Peltigera rufescens*	.	.	.	1	.	.	.	.	.	.	.	+	.	.	.	.	.
.	*Cladonia fimbriata*	.	.	.	.	+	.	+	.	+	.	.	.	.	+	+	.	.
.	*Sanionia uncinata*	2a	.	1	1	.	.	.	.	.	1	.	r	.	.	.	.	1
.	*Equisetum arvense*	.	+	1	+	+	.	2a	.	.	+	+	.	.	.	.	.	.
	d EB mid- / high-elevation forms, Rc																	
.	*Polytrichum strictum*	.	.	.	.	.	.	.	.	+	.	.	1	.	+	1	+	2a
.	*Rinodina turfacea*	.	.	.	.	.	.	.	.	+	.	+	+	.	+	+	+	+
mh!	*Stereocaulon alpinum*	.	.	.	.	.	.	.	.	.	.	.	1	r	+	.	.	+
.	*Psoroma hypnorum*	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+	.	+
.	*Polytrichum juniperinum*	.	.	.	.	.	+	.	.	.	.	2b	+	+	+	+	.	2a
(mh!)	*Hierochloe alpina*	.	.	.	.	.	+	.	.	.	.	2a	1	.	2a	1	2a	2b
(mh)	*Cetraria islandica*	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	1	+
[*mh]	*Dicranum spadiceum*	.	.	.	.	1	.	+	.	.	.	.	1	2a	.	.	.	.
.	*Cetraria aculeata / muricata*	.	.	.	.	.	.	.	.	+	.	.	+	.	+	1	+	.
(mh)	*Sphaerophorus globosus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
mh!	*Dactylina arctica* (M.J. Richardson) Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
.	*Placynthiella icmalea*	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.
[mh!]	*Cladonia stricta* s.str.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	+	.
[mh!]	*Cetraria ericetorum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[*mh]	*Lopadium pezizoideum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
(mh)	*Polytrichum piliferum*	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	+
	d *Racomitrium* comm. (Rc) / EB high-elevation form																	
*mh	*Racomitrium lanuginosum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[mh!]	*Alectoria nigricans*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Cerastium alpinum* ssp. *lanatum*	.	+	.	.	r	.	.	+	.	.	.	.	.	+	r	+	.
.	*Hypogymnia austerodes*	.	.	+	.	.	.	.	r	.	.	.	.	.	.	.	r	.
[h!]	*Papaver radicatum* coll.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*h	*Silene acaulis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Parmelia omphalodes*	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.
.	*Caloplaca tiroliensis*	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.

Table 7. Continued.

Empetro-Betuletum mid-elevation form																	EB h-e		*Racomitrium lan.* community						EB	Rc
											Facies of *Vaccinium uliginosum*															
18	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1-**	**37-**
CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	BS	CS	CS	CS	CS	CS	CS	BS	CS	CS	BS	CS	CS		**36**	**41**
4	4	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4	4	3	4	3	2		.	.
200	5	20	100	4	50	50	20	5	5	10	100	100	2	20	2	50	1	1	10	3	50	100	1		85	33
535	535	570	580	590	590	590	595	600	600	425	420	445	415	445	430	590	940	800	790	965	825	920	990		421	898
6	16	0	2	6	8	16	2	4	6	6	20	2	8	2	4	0	10	18	16	14	20	0	14		6	13
e	sw	-	ese	s	nnw	e	ssw	se	s	wsw	e	se	nw	se	ne	-	s	nnw	nw	wnw	nw	-	n		.	.
95	75	95	100	95	100	98	98	90	100	100	95	100	98	98	95	95	85	100	90	80	90	70	75		95	79
85	60	80	90	70	90	95	75	80	95	95	70	95	70	50	70	75	70	65	0	2	2	7	2		79	3
10	5	10	7	6	15	2	2	10	2	2	2	7	2	6	2	2	2	2	2	7	2	25	25		6	12
40	2	15	6	2	15	35	2	20	8	2	2	2	2	2	0	2	5	2	5	5	2	25	20		9	11
40	20	60	50	70	75	2	40	50	70	50	90	70	60	60	60	60	60	60	95	70	90	60	70		54	77
15	35	10	5	6	2	10	30	25	15	15	5	15	30	20	40	50	25	20	5	5	10	5	5		14	6
0	25	2	0	2	0	0	2	10	0	0	5	0	2	2	2	2	0	0	0	15	0	0	0		2	3
2	0	2	0	2	0	2	0	0	0	0	0	0	0	0	2	2	15	0	10	5	10	30	25		3	16
60	90	40	15	30	5	75	25	60	60	30	10	25	10	5	15	15	25	2	0	0	2	0	0		37	0
20	16	16	20	12	8	18	4	12	20	4	10	4	4	4	4	2	4	5	8	5	10	7	6		16	7
45	35	34	35	25	30	35	23	29	30	21	20	17	20	22	13	12	7	10	22	20	20	14	15		33	18
4.8	4.4	5.1	4.3	4.6	4.5	5.5	4.3	4.5	4.3	5.3	4.4	4.8	5.5	4.7	4.4	4.4	5.2	5.8	5.4	5.6	4.9	6.0	6.3		5.1	5.6
13	8	16	17	9	8	33	10	9	16	15	28	16	9	12	18	12	6	22	14	3	7	20	17		21	12
-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		.	.
3	4	4	3	2	3	3	3	4	4	3	3	2	2	2	3	2	3	4	2	2	2	1	3		2.8	2.0
3	3	2	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	4	3	3	3	2	4		2.7	3.0
2	3	3	2	3	3	2	3	3	3	3	3	2	3	3	3	3	3	3	4	3	3	3	3		2.8	3.2
42	35	51	29	51	36	30	45	41	35	60	35	35	51	47	55	62	53	81	46	55	66	67	53	Presence	41	57
2a	.	3	1	2a	.	+	+	2a	1	+	.	2a	.	.	.	1	1	+	r	+	.	+	1	30	IV	IV
.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	.	.	+	.	10	II	II
+	+	+	1	+	.	.	+	+	.	+	1	3	+	+	.	2a	+	.	+	.	.	.	.	28	IV	I
.	.	.	.	.	+	.	2a	.	+	+	.	1	+	+	+	2a	.	.	.	.	.	.	.	16	III	.
.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	10	II	.
.	.	1	.	.	.	.	.	1	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	8	II	.
5	4	3	4	4	5	5	3	5	5	2a	1	.	+	.	+	+	.	.	.	.	.	.	.	32	V	.
2b	2a	2a	2b	r	2a	.	+	+	+	2a	2b	2a	+	+	r	r	.	1	.	.	.	.	.	34	V	.
1	.	3	.	1	.	.	4	2a	2a	5	3	5	4	3	4	4	4	3	.	.	.	.	.	26	IV	.
2a	2a	+	1	1	.	.	+	1	1	1	1	2a	1	2a	.	+	+	.	.	r	.	.	.	29	IV	I
+	1	1	.	1	.	+	.	.	+	1	+	+	1	+	+	.	+	.	.	+	.	.	.	24	IV	I
.	+	1	2a	.	.	.	2a	.	2a	2a	.	.	2a	.	2a	.	2a	.	1	.	.	.	.	16	III	I
+	2b	2a	.	+	.	.	.	+	+	+	+	+	.	.	.	+	+	+	.	.	.	.	.	14	II	.
+	.	+	.	+	+	.	.	.	.	+	.	+	.	.	.	+	.	.	.	.	.	.	.	12	II	.
2a	.	+	2a	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	10	II	.
.	+	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	10	II	.
.	.	1	1	.	+	+	2a	+	2a	+	1	.	+	2a	2a	+	1	+	1	1	1	.	.	24	III	III
+	.	+	.	+	+	+	.	.	.	+	+	.	+	.	+	+	+	+	+	+	+	1	+	24	III	V
+	.	+	.	1	.	.	2a	1	+	1	+	+	1	+	1	2b	2a	1	+	+	+	r	.	23	III	IV
+	.	+	.	+	+	.	+	+	+	1	+	+	1	1	2a	1	+	+	+	+	+	1	.	23	III	IV
2a	1	.	.	1	.	+	2a	2b	1	+	.	.	+	+	2a	2a	.	1	.	.	.	1	1	22	III	II
1	.	2a	2a	2a	1	.	+	2a	+	+	.	.	1	1	.	+	.	.	+	2a	1	.	.	22	III	III
1	2a	2a	.	1	.	1	.	1	1	+	.	+	1	.	1	1	.	.	.	+	.	+	1	20	III	III
1	2a	2b	+	2a	.	.	1	1	2b	1	.	.	2b	.	1	3	2b	.	1	+	.	.	.	19	III	II
+	+	+	.	1	.	+	1	1	.	1	.	.	+	+	+	1	.	.	.	.	.	+	+	19	III	II
.	.	.	.	+	+	.	1	+	.	+	.	.	2a	+	2a	2a	1	.	.	2a	1	2a	1	15	II	IV
.	.	+	.	+	.	.	+	.	1	.	.	.	.	.	1	+	1	1	1	+	1	+	.	13	II	IV
.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	+	+	+	+	.	.	+	.	.	10	II	I
+	.	.	.	1	.	.	+	+	.	+	.	.	+	2a	+	+	1	.	.	+	.	.	.	13	II	I
.	+	+	.	+	.	.	1	+	.	+	.	.	+	.	.	.	1	+	.	+	+	.	.	11	II	II
.	.	.	.	+	+	.	+	.	.	+	.	.	+	.	+	+	.	+	.	+	+	+	.	11	II	III
.	.	.	.	.	.	.	+	.	.	.	+	.	+	1	+	2a	.	.	.	1	2a	.	.	10	II	II
.	+	.	.	.	.	.	.	.	+	+	.	.	+	1	2a	2b	1	2a	5	4	5	4	4	14	II^{2a}	V^{4}
.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	+	+	.	.	+	+	+	+	+	9	I	V
.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	+	1	1	1	13	II	V
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	r	+	+	9	I	V
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	r	+	+	+	+	6	r	V
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	r	2a	+	5	r	IV
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	1	6	+	III
.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	7	+	IV

Table 7. Continued.

h!	*Potentilla hyparctica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[h!]	*Saxifraga nivalis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[mh!]	*Campanula uniflora*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
(h)	*Luzula arctica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*h	*Dactylina ramulosa* (Hook.) Tuck.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	steppe and ridge species																	
.	*Calamagrostis purpurascens*	.	.	.	+	.	.	.	.	.	.	.	.	+	+	1	.	.
[lm!]	*Campanula gieseckiana*	.	+	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.
.	*Arnica angustifolia*	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	2a	.	.
.	*Saxifraga tricuspidata*	.	.	1	+	.	.	.	.	.	.	.	r	.	+	r	.	.
.	*Dryas integrifolia*	.	r	2b	2b	.	.	.	.	.	.	.	.	.	.	.	.	.
(mh)	*Carex rupestris*	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Kobresia myosuroides*	1	.	.	.	.	.	.	.	.	.	.	.	r	.	+	.	.
	other Loiseleurio-Vaccinietea																	
.	*Flavocetraria cucullata*	1	+	+	+	1	+	1	1	1	.	1	1	1	1	1	1	1
.	*Pohlia nutans*	.	+	+	+	+	1	+	1	+	+	+	+	+	.	+	1	+
.	*Alectoria ochroleuca*	.	r	+	.	1	.	.	1	1	.	1	+	+	+	1	1	+
.	*Cladonia gracilis*	.	.	.	.	1	+	1	1	1	.	1	+	+	+	.	1	.
.	*Cladonia arbuscula* ssp. *mitis*	.	.	.	.	1	.	1	1	1	.	.	+	.	1	1	.	.
.	*Pyrola grandiflora*	.	2m	2a	2b	1	+	.	+	.	.	.	.	.	.	.	2b	2a
.	*Bryocaulon divergens*	.	+	.	.	.	.	.	.	1	.	.	+	.	.	.	.	+
.	*Cladonia rangiferina*	.	.	.	.	+	+	.	.	+	.	1	.	.	.	.	.	.
.	*Hylocomium splendens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a
[lm!]	*Pedicularis lapponica*	1	.	.	.	1	.	1	.	.	.	.	+	.	.	.	.	.
	others																	
.	*Aulacomnium turgidum*	2b	1	2b	2a	3	3	5	3	2a	1	1	3	2b	.	1	3	2b
.	*Dicranum acutifolium / brevifolium*	1	1	1	.	2a	1	2b	2a	2a	+	2a	2a	.	2a	.	2a	2a
.	*Cladonia amaurocraea*	.	.	+	.	1	+	+	.	1	.	1	1	1	1	1	+	.
.	*Flavocetraria nivalis*	.	+	.	+	.	+	+	+	1	.	+	1	+	1	1	+	+
.	*Poa pratensis* coll. / *arctica*	+	1	.	+	1	1	+	2a	1	.	1	+	1	.	+	2a	1
.	*Thamnolia vermicularis*	.	+	.	.	+	.	.	.	1	+	.	1	.	1	.	+	1
.	*Rhytidium rugosum*	2a	+	.	.	2a	1	.	2a	.	+	2b	+	+	+	+	1	1
.	*Peltigera malacea*	.	.	.	.	.	+	.	2a	+	.	1	2a	.	1	.	1	2a
.	*Bryum* spp.	+	+	+	+	1	.	.	+	2b	+	.	+	1	1	1	+	+
.	*Ochrolechia frigida*	.	.	+	+	+	.	+	.	+	.	+	.	.	.	+	+	.
.	*Cladonia borealis*	.	.	.	.	+	.	+	.	+	.	1	1	.	1	+	.	+
.	*Cladonia pyxidata*	.	.	+	+	+	+	.	+	.	.	.	1	+	2a	+	+	.
.	*Polygonum viviparum*	+	+	1	1	1	.	+	.	.	.	.	.	+	+	.	.	+
.	*Cephaloziella* spp.	.	+	.	+	+	.	.	.	+	+	+	+	.	+	+	.	.
.	*Bryoria nitidula*	.	+	.	.	.	+	.	.	1	.	1	1	r	1	1	+	.
.	*Stellaria longipes* coll.	r	+	1	1	+	+	.	1	.	+	.	.	+	.	.	1	+
.	Microlichen indet.	.	.	+	.	.	.	r	.	+	.	.	+	.	1	1	+	.
.	*Pohlia cruda*	.	.	+	1	+	.	1	.	+	.	+	.	.	.	.	2a	.
.	*Luzula confusa*	.	+	.	.	+	.	+	.	.	.	.	.	.	.	.	.	1
.	*Hypnum revolutum*	.	1	2a	2b	+	.	.	1	.	.	.	.	+	.	.	.	.
.	*Lophozia* spp.	.	+	+	+	.	+	.	r	+	.	.	.	.	.	.	.	.
.	*Peltigera aphthosa*	.	.	.	.	+	.	1	1	.	+	.	.	.	.	.	.	.
.	*Festuca brachyphylla*	.	.	.	.	r	.	.	1	.	.	+	+	.	+	.	.	.
.	*Lecidea* spp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
.	*Peltigera polydactylon* s.l.	.	+	.	.	.	.	+	.	+	.	.	.	.	.	.	.	+
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**

Addenda (other species with presence < 9):

1: *Carex supina* ssp. *spaniocarpa* 1, Moss indet. 1, *Tomentypnum nitens* +; **2:** *Brachythecium groenlandicum* 1, *Dicranum elongatum* 1, *Distichium capillaceum / inclinatum* +, Moss indet. +, *Orthotrichum speciosum* +; **3:** *Pedicularis labradorica* 1, *Timmia austriaca* 1, *Amblystegium serpens* +, *Brachythecium* sp. +, *Bryoria chalybeiformis* +, *Hypnum holmenii* Ando +, *Parmelia sulcata* +, *Peltigera collina* +; **4:** *Hypnum holmenii* Ando 1, *Pedicularis labradorica* 1, *Brachythecium* sp. +, *Bryoria chalybeiformis* +, *Cladonia* sp. +, *Distichium capillaceum / inclinatum* +, *Parmelia sulcata* +, *Peltigera collina* +, *Timmia austriaca* +; **5:** *Aulacomnium palustre* +, *Cladonia uncialis* +, *Massalongia carnosa* +, *Peltigera scabrosa* +, *Plagiopus oederiana* +; **6:** *Peltigera leucophlebia* 1, *Cladonia cyanipes* r; **7:** *Peltigera leucophlebia* 2a, *Aulacomnium palustre* +, *Dicranum elongatum* +, *Peltigera scabrosa* +, *Plagiomnium ellipticum / medium* +; **8:** *Draba glabella* +; **9:** *Bryoerythrophyllum recurvirostrum* +, *Caloplaca ammiospila* +, *Cladonia* sp. +, *Massalongia carnosa* +, *Pertusaria geminipara* +; **10:** *Brachythecium groenlandicum* 1, *Hypnum holmenii* Ando +, *Aulacomnium palustre* r; **11:** *Cladonia pocillum* +, *Cladonia uncialis* +; **12:** *Bryonora castanea* s.str. +, Microlichen indet. +, *Rhododendron lapponicum* +; **14:** *Melandrium affine / triflorum* 1, Moss indet. 1, *Buellia geophila* +, *Cladonia cervicornis* +, *Cladonia phyllophora* +, *Draba cinerea* +, *Stereocaulon paschale* +, *Cladonia subcervicornis* r; **15:** *Cladonia pleurota* +, *Draba nivalis* 1, *Massalongia carnosa* +, *Melandrium affine / triflorum* +, *Ochrolechia upsaliensis* +; **16:** *Cladonia cornuta* +, *Cladonia pocillum* +, *Peltigera canina* +; **17:** *Barbilophozia hatcheri* 1, *Cladonia phyllophora* 1, *Nephroma expallidum* 1, *Cladonia deformis* +, *Cladonia pleurota* +, *Cladonia squamosa* +, *Peltigera leucophlebia* +, *Tritomaria quinquedentata* +; **18:** Liverwort indet. 2a, *Barbilophozia hatcheri* +, *Cladonia cyanipes* +, *Peltigera canina* +, *Peltigera leucophlebia* +; **19:** *Vaccinium vitis-idaea* ssp. *minus* 3, *Cladonia cyanipes* +, *Cladonia phyllophora* +, *Desmatodon latifolius* +; **20:** *Antennaria canescens* 1, *Cladonia phyllophora* +, *Peltigera canina* +, *Draba* sp. r, *Umbilicaria hyperborea* r; **21:** *Peltigera canina* 1, *Polytrichum alpinum* +, *Amblystegium serpens* r, *Cephalozia* sp r; **22:** *Cladonia* sp. +, *Dicranum scoparium* +, Liverwort indet. +, *Nephroma expallidum* +, *Ochrolechia inaequatula* +, *Peltigera leucophlebia* +, *Cladonia trassii* r, *Rhododendron lapponicum* r; **23:** *Peltigera leucophlebia* 1, *Buellia insignis* +, *Cladonia phyllophora* +, *Lopadium coralloideum* +, Microlichen indet. +, *Peltigera scabrosa* +; **24:** *Cladonia cariosa* +, *Cladonia* sp. +, *Peltigera canina* +; **25:** *Bryonora castanea* s.str. +, *Cladonia phyllophora* +, *Ochrolechia upsaliensis* +, *Diapensia lapponica* r; **26:** *Barbilophozia hatcheri* +, *Bryoria chalybeiformis* +; **27:** *Vaccinium vitis-idaea* ssp. *minus* 3, *Cladonia cyanipes* +, *Dicranum laevidens* +; **28:** *Carex bigelowii* 1, *Cladonia cariosa* +, *Lopadium coralloideum* +, *Massalongia carnosa* +, *Nephroma expallidum* +, *Ochrolechia inaequatula* +, *Pertusaria coriacea* +, *Rhododendron lapponicum* +, *Cladonia deformis* r; **29:** *Rhododendron lapponicum* +; **30:** *Peltigera canina* 1, Liverwort indet. +, *Rhododendron lapponicum* +, *Calamagrostis* sp. +; **31:** *Nephroma expallidum* 2a, *Anastrophyllum minutum* +, *Barbilophozia hatcheri* +, *Buellia insignis* +, *Diapensia lapponica* +, *Pertusaria* sp. +, *Saelania glaucescens* +; **32:** *Carex bigelowii* 1, *Buellia insignis* +, *Cladonia pocillum* +, *Desmatodon latifolius* +, *Melandrium affine / triflorum* +, *Ochrolechia* sp. +, *Stereocaulon paschale* +, *Xanthoria elegans* +;

Table 7. Continued.

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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	+	5	+	II
1	1	1	1	2a	+	2a	1	1	2a	1	1	1	1	1	1	2a	1	1	1	1	1	1	1	40	V	V
2a	+	+	+	1	+	+	1	+	+	+	1	1	1	+	+	+	.	.	+	+	1	.	.	35	V	III
.	.	.	+	1	+	1	1	1	1	1	+	.	1	+	1	1	.	r	+	+	+	+	+	31	IV	V
1	1	1	.	1	+	1	+	+	.	1	+	1	1	1	1	2a	1	.	1	+	1	+	+	31	IV	V
.	+	.	.	1	.	+	+	.	.	1	.	.	1	1	+	1	1	1	+	.	+	+	1	22	III	IV
3	+	2a	2a	.	2b	3	+	2b	2a	.	.	.	.	.	.	.	.	.	2a	1	+	.	.	20	III	III
.	.	+	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	+	+	1	+	+	13	II	V
.	.	.	.	.	.	.	2a	.	1	1	.	.	.	.	.	.	.	.	+	.	1	.	.	9	I	II
2a	.	.	.	1	.	.	.	2b	1	.	.	.	.	.	.	.	.	2b	+	.	1	+	.	9	I	III
.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	+	.	.	.	.	.	.	.	7	I	.
1	2a	.	3	2b	5	+	.	1	3	2a	5	2b	2a	3	2a	+	.	2a	.	.	+	1	+	35	V	III
2b	1	.	2a	2b	2a	2a	2a	2a	2a	2a	1	.	3	3	2b	.	1	2b	+	.	2a	2a	1	34	V	IV
1	+	1	+	1	1	1	+	.	.	1	+	+	1	2a	+	1	.	+	1	+	2a	1	1	32	IV	V
+	.	1	.	1	.	+	1	1	.	1	.	.	1	.	+	1	+	+	+	+	+	1	1	30	IV	V
2a	2a	1	2m	.	2a	1	.	1	1	.	1	2a	.	1	.	.	1	.	1	.	+	1	1	30	IV	IV
+	+	+	.	1	.	.	1	+	.	1	+	1	1	1	1	1	1	1	+	+	+	+	1	28	IV	V
+	.	1	.	1	.	+	+	+	2a	+	.	+	.	+	.	+	+	1	.	.	+	+	.	28	IV	II
2a	2a	1	1	1	.	.	1	1	2a	1	1	1	2a	2a	2a	+	+	.	+	+	+	+	.	28	IV	IV
.	1	1	+	.	.	+	.	+	.	2b	.	.	.	1	.	.	+	+	.	1	.	+	+	26	IV	III
.	.	+	.	.	.	.	+	+	+	+	1	+	+	+	1	+	+	2a	+	+	1	+	+	26	III	V
+	+	+	.	+	+	.	+	+	.	+	+	+	1	1	+	1	+	.	.	+	+	1	.	26	IV	III
1	+	+	.	.	+	+	+	.	.	+	+	+	.	1	1	+	2a	+	.	.	+	1	.	26	IV	II
.	.	.	1	r	.	.	.	.	.	+	+	1	1	2m	+	1	1	1	.	1	+	2a	2b	24	III	IV
.	.	+	+	+	+	+	.	.	.	+	+	+	+	+	+	+	+	.	.	+	.	+	.	24	IV	II
.	.	.	.	+	.	.	+	1	.	1	.	+	1	1	+	+	.	+	1	.	+	+	+	23	III	IV
1	+	.	2m	.	1	.	.	.	+	.	.	.	.	+	.	.	+	+	+	1	+	.	.	22	III	III
.	.	.	.	.	+	.	+	.	.	.	.	.	1	.	1	+	+	.	+	+	+	+	.	17	II	IV
.	.	+	.	.	+	.	+	.	.	+	.	.	.	.	+	.	.	.	+	+	+	+	+	17	II	V
.	.	.	.	.	1	.	1	.	.	1	+	1	+	1	+	.	.	+	+	1	1	.	2a	17	II	IV
+	.	+	.	+	.	.	.	.	.	.	.	1	.	.	.	.	+	1	.	.	.	+	1	14	II	II
.	.	.	.	.	r	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	+	+	.	12	II	II
.	.	.	1	.	.	.	.	.	.	.	1	1	1	+	.	+	.	.	.	.	.	+	+	12	II	II
.	.	1	1	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	10	II	I
.	.	+	.	+	.	.	.	+	+	.	+	.	.	.	.	.	+	.	+	+	.	+	.	10	I	III
.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	9	I	II
18	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**			

33: *Nephroma expallidum* 1, *Vaccinium vitis-idaea* ssp. *minus* 1, *Buellia insignis* +, *Carex bigelowii* +, *Cladonia deformis* +, *Cladonia pleurota* +, *Diapensia lapponica* +, Liverwort indet. +, *Oncophorus virens* +, *Stereocaulon paschale* +, **34:** *Carex bigelowii* 1, *Diapensia lapponica* 1, *Buellia insignis* +, *Cladonia phyllophora* +, *Cladonia pleurota* +, *Cladonia subcervicornis* +, *Nephroma expallidum* +, *Pertusaria bryontha* +, *Pertusaria glomerata* +, *Ochrolechia upsaliensis* +, *Ptilidium ciliare* +, *Salix herbacea* +, *Trapeliopsis granulosa* +; **35:** *Chamaenerion latifolium* 2a, *Salix herbacea* 2a, *Equisetum variegatum* 2m, *Peltigera leucophlebia* 1, *Racomitrium canescens* 1, *Anastrophyllum minutum* +, *Bryonora castanea* s.str. +, *Meesia uliginosa* +, *Nephroma expallidum* +, *Pertusaria geminipara* +, *Ptilidium ciliare* +, *Protopannaria pezizoides* +, *Trapeliopsis granulosa* +, *Tritomaria quinquedentata* +; **36:** *Tomentypnum nitens* 2a, *Carex bigelowii* 1, *Peltigera leucophlebia* 1, *Saxifraga oppositifolia* 1, *Anastrophyllum minutum* +, *Barbilophozia hatcheri* +, *Buellia geophila* +, *Cassiope tetragona* +, *Cephalozia* sp. +, *Cladonia pocillum* +, *Collema ceraniscum* +, *Dicranum* sp. +, *Ditrichum flexicaule* +, *Draba glabella* +, *Draba lactea* +, *Huperzia selago* ssp. *arctica* +, *Isopterygiopsis pulchella* +, *Meesia uliginosa* +, *Myurella tenerrima* +, *Nephroma expallidum* +, *Oncophorus wahlenbergii* +, *Pedicularis lanata* +, *Peltigera scabrosa* +, *Pertusaria dactylina* +, *Pertusaria glomerata* +, *Pertusaria panyrga* +, *Plagiochila porelloides* +, *Ptilidium ciliare* +, *Protothelenella sphinctrinoidella* +, *Racomitrium canescens* +, *Rinodina mniaraea* +, *Tetraplodon mnioides* +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. +, *Carex misandra* r, *Cladonia phyllophora* r, *Cladonia* sp. r, *Parmelia* sp. r, *Parmeliella triptophylla* r; **37:** *Cladonia cyanipes* +, Liverwort indet. +, *Ochrolechia inaequatula* +, *Ptilidium ciliare* +, *Huperzia selago* ssp. *arctica* r; **38:** *Conostomum tetragonum* 1, *Bartramia ithyphylla* +, *Bryoria chalybeiformis* +, *Gymnomitrion corallioides* +, *Ochrolechia upsaliensis* +, *Protopannaria pezizoides* +, *Pseudephebe pubescens* +, *Scapania* sp. +, *Solorina crocea* +, *Cardamine bellidifolia* r, *Draba nivalis* r; **39:** *Barbilophozia hatcheri* 1, *Polytrichum alpinum* 1, *Stereocaulon paschale* 1, *Conostomum tetragonum* +, *Dibaeis baeomyces* +, *Draba lactea* +, *Encalypta brevicollis* +, *Gymnomitrion corallioides* +, *Lepraria cacuminum* +, Moss indet. +, *Pseudephebe pubescens* +, *Timmia austriaca* +, *Draba nivalis* r; **40:** *Draba cinerea* 1, Liverwort indet. 1, *Saxifraga oppositifolia* 1, *Amblystegium serpens* +, *Arthrorhaphis citrinella* +, *Buellia insignis* +, *Caloplaca ammiospila* +, *Carex bigelowii* +, *Distichium capillaceum / inclinatum* +, *Hypnum bambergeri* +, *Cardamine bellidifolia* r, *Massalongia carnosa* r, *Tortella tortuosa* var. *arctica* (Arn.) Broth. r; **41:** *Massalongia carnosa* 1, *Polytrichum alpinum* 1, *Anastrophyllum minutum* +, *Didymodon fallax* +, *Caloplaca ammiospila* +, *Caloplaca* sp. +, *Distichium capillaceum / inclinatum* +, *Ditrichum flexicaule* +, *Orthotrichum speciosum* +, *Salix herbacea* +, *Saxifraga oppositifolia* +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. +.

Table 8. Calamagrostio lapponici-Salicetum glaucae.

Altitudinal indicator value	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	Presence	1-41
	Author	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	FD	OM	OM	OM	OM	OM	OM	OM	OM	FD	OM	OM	OM	OM	OM	OM	OM	OM	OM	FD	OM	OM	OM	OM	OM	OM	FD	OM		
	Relevé area [m²]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	9	16	16	16	16	16	16	16	16		
	Size of the stand [10 m²]	50	250	500	1000	1000	1000	1000	1000	150	25	500	1000	1000	nd	1000	500	1000	400	1000	100	1000	1000	nd	500	30	1000	1000	1000	1000	1000	25	1000	nd	1000	15	1000	1000	1000	1000	nd	500		717
	Altitude [m a.s.l.]	190	150	295	30	75	75	50	50	60	25	55	60	60	70	130	150	50	40	45	45	50	50	70	10	380	45	220	60	30	50	20	160	170	65	380	75	380	120	160	45	120		106
	Slope [°]	5	3	5	0	0	3	0	0	0	0	0	3	0	0	0	15	0	0	0	0	0	0	0	0	5	0	3	0	0	0	40	7	10	4	20	0	10	7	5	10	5		4
	Aspect	se	w	s	-	-	sse	-	-	-	-	-	w	-	-	-	sw	-	-	-	-	-	-	-	-	s	-	sw	-	-	-	n	sw	s	n	ssw	-	ssw	sse	e	s	sse		.
	Cover total [%]	100	100	70	100	95	95	75	95	75	80	95	90	85	100	60	80	95	80	70	70	65	90	100	70	95	80	95	80	80	85	70	90	100	60	100	80	90	95	70	95	85		85
	Cover shrubs [%]	100	95	65	95	80	60	60	45	70	75	90	80	75	65	50	70	65	75	70	55	60	55	35	60	80	70	60	70	45	50	55	70	75	50	80	60	85	80	50	90	80		68
	Cover dwarfshrubs [%]	2	2	30	45	75	55	20	10	10	45	60	40	35	7	0	7	50	0	0	60	30	25	40	30	70	40	80	75	60	70	30	60	0	0	80	55	10	40	20	10	60		35
	Cover graminoids [%]	2	7	5	2	5	7	2	80	5	2	10	5	2	2	5	40	10	2	2	2	2	2	5	2	7	5	2	2	5	40	2	10	2	15	5	5	5	5	5	5	2		8
	Cover herbs [%]	2	5	2	80	5	80	2	7	5	5	40	2	20	35	5	5	60	60	2	50	5	2	5	60	10	5	7	30	2	40	60	60	10	2	95	5	55	10	5	20	5		24
	Cover bryophytes [%]	0	0	2	5	5	5	7	12	5	5	5	5	5	10	25	5	7	5	5	5	5	10	80	5	5	5	5	5	10	45	7	2	2	20	5	20	5	5	7	2	2		9
	Cover lichens [%]	0	0	2	0	0	2	2	2	2	0	2	2	5	2	2	2	2	2	2	2	5	2	5	2	5	2	5	5	5	5	5	2	2	5	2	10	2	2	2	0	0		3
	Cover soil [%]	0	0	30	0	5	5	25	5	25	20	5	10	15	0	40	20	5	20	30	30	35	10	0	30	0	20	5	20	20	5	30	10	0	40	0	20	10	5	30	5	15		15
	Cover stones [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0		0
	Cover litter [%]	100	100	100	100	100	100	100	100	100	100	100	100	100	nd	100	100	100	100	100	100	100	100	nd	100	95	100	100	100	100	100	100	100	nd	100	95	100	100	100	100	nd	100		100
	Height litter [cm]	8	10	2	4	4	2	6	3	2	4	2	1	3	nd	3	4	2	2	3	3	3	1	3	2	3	3	3	3	3	2	2	5	3	1	1	2	2	2	2	nd	3		3
	Canopy height [cm]	100	65	55	70	60	75	70	80	100	50	75	60	80	130	70	65	85	50	60	70	70	55	60	50	60	75	60	70	55	100	55	100	60	95	65	80	50	65	60	120	100		73
	Height stand max. [cm]	125	80	65	90	70	85	80	85	120	100	125	80	95	150	140	130	130	65	100	90	85	60	90	110	70	85	75	120	65	140	80	130	100	145	80	90	65	90	125	150	130		100
	PH value	6.4	5.2	6.6	6.2	5.9	5.6	6.2	5.4	6.7	5.8	5.7	6.5	6.3	nd	6.0	5.0	6.0	6.4	6.1	6.4	5.9	5.6	nd	6.9	5.6	6.8	6.0	6.2	6.3	4.8	5.4	5.4	nd	5.5	5.9	5.9	5.4	6.5	5.4	nd	6.4		6.0
	Organic layer [cm]	17	8	4	7	6	6	12	7	5	4	8	7	5	nd	8	6	7	5	4	5	5	5	nd	6	8	3	7	6	7	6	5	8	nd	5	4	6	6	6	6	nd	8		6
	Stem diam. mean [cm]	1.1	0.8	0.9	1.0	1.0	1.2	0.8	1.1	1.2	1.1	0.7	0.7	1.2	nd	1.0	0.8	0.9	0.9	1.5	1.0	0.9	0.7	nd	1.1	0.8	1.1	0.8	1.3	0.9	1.2	1.1	0.8	nd	1.3	1.0	1.5	1.0	1.1	1.4	nd	1.4		1.0
	Stem diam. max. [cm]	1.7	1.3	1.3	1.5	1.6	1.5	1.2	1.2	1.8	2.0	0.7	0.8	1.4	nd	1.1	1.3	2.0	1.3	1.6	1.5	1.0	1.6	nd	1.2	0.9	1.2	1.1	1.9	1.3	1.4	1.2	1.4	nd	2.2	1.0	1.5	1.6	1.8	1.6	nd	2.4		1.4
	Shelter [1-5]	4	3	3	3	3	3	3	3	3	3	4	3	3	nd	3	2	3	3	3	3	3	3	nd	3	2	3	3	3	3	3	2	3	nd	3	3	3	4	4	4	3	4		3.1
	Soil moisture [1-6]	3	3	2	3	2	3	2	2	2	2	2	2	2	nd	2	2	2	2	2	2	2	2	nd	3	2	2	3	2	2	2	2	2	nd	2	2	2	2	3	2	2	3		2.2
	Number of species	5	6	8	12	13	14	14	15	15	16	17	17	18	19	19	19	19	19	19	20	20	21	22	22	23	23	24	24	24	25	27	12	18	22	26	26	24	20	12	14	14		18
	ch / d Calamagrostio-Salicetum																																											
(lm)	*Salix glauca* coll. (Shrub layer)	5	5	4	5	5	4	4	3	4	4	5	5	4	4	4	4	4	4	4	4	4	4	3	4	5	4	4	4	3	3	4	4	4	3	5	4	5	5	3	5	5	41	V
[l]	*Calamagrostis lapponica*	+	2a	.	.	1	2a	+	4	+	.	2a	2m	+	.	1	3	2a	.	.	.	.	.	.	.	+	.	.	.	+	2a	.	2a	.	2a	+	1	+	+	.	.	.	22	III
[l]	*Brachythecium groenlandicum*	.	.	.	.	+	+	.	1	.	.	1	.	1	1	1	1	+	+	.	+	.	1	1	1	+	.	.	+	+	+	.	.	1	1	+	.	+	+	.	.	+	24	III
	d Calamagrostio-Salicetum (against HC, LB)																																											
.	*Poa glauca*	.	.	+	.	1	.	+	.	.	.	r	2m	.	1	1	2m	+	.	.	.	+	+	.	.	+	.	1	+	2m	2b	1	.	+	r	+	2m	1	+	1	1	.	25	IV
	d Calamagrostio-Salicetum (against HC, LB, PS)																																											
.	*Tortula ruralis*	.	.	1	+	1	.	2a	.	1	1	.	1	1	+	1	1	.	1	1	+	1	2a	1	1	+	+	+	1	2a	2b	2a	r	+	2a	+	2a	1	1	2a	.	+	34	V
.	*Ceratodon purpureus*	.	.	.	+	.	+	+	.	+	.	.	+	+	.	.	+	.	+	.	.	+	.	.	.	+	r	+	+	+	1	+	.	+	1	+	+	.	+	.	.	+	22	III
.	*Thuidium abietinum*	.	.	+	1	.	.	.	.	1	+	.	.	1	.	.	.	.	.	1	+	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	+	.	.	11	II
	d Calamagrostio-Salicetum (against PS)																																											
.	*Hypnum revolutum*	.	.	.	+	1	.	.	+	+	.	.	1	1	.	.	.	2a	.	+	1	+	+	.	1	+	1	+	1	1	.	1	.	+	+	.	.	+	.	.	.	.	21	III
.	*Peltigera didactyla*	.	.	.	.	.	+	.	+	.	.	.	.	+	1	.	.	+	1	r	1	1	.	.	.	+	.	1	.	1	1	.	+	1	1	.	.	.	.	.	.	.	16	II
.	*Peltigera rufescens*	.	.	1	.	.	+	1	.	+	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+	1	.	.	1	+	2a	1	+	1	.	.	16	II
lm!	*Empetrum nigrum* ssp. *hermaphroditum*	.	.	.	.	.	.	2a	1	.	1	2a	.	.	.	.	.	4	.	.	.	.	2a	2a	.	.	.	.	3	.	3	.	3	.	.	5	.	.	.	.	.	.	11	II
.	*Cephaloziella* spp.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	+	.	+	+	+	+	+	+	.	+	+	+	.	.	.	.	.	14	II
.	*Dicranum acutifolium*	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	+	.	+	+	.	+	.	+	+	.	+	1	.	.	.	.	.	1	.	.	.	.	.	12	II
.	*Equisetum scirpoides*	.	.	.	2m	.	.	.	.	2m	.	.	.	2m	.	.	.	.	2m	.	2m	2m	.	1	2m	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	II

Table 8. Continued.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
	steppe species																																											
[lm!]	*Campanula gieseckiana*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	+	1	.	1	.	1	1	7	I
.	*Carex supina* ssp. *spaniocarpa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	+	+	1	.	1	.	.	5	I
.	*Calamagrostis purpurascens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	+	.	+	+	4	+
	other Loiseleurio-Vaccinietea																																											
lm!	*Betula nana*	+	+	.	3	5	4	2b	2a	+	3	4	3	+	2a	.	2a	3	.	.	4	2b	2b	3	3	5	3	5	2a	4	4	2b	2b	.	.	.	4	2a	3	2b	1	2a	34	V
.	*Pyrola grandiflora*	.	2m	.	5	1	5	.	.	1	2m	.	.	2b	2m	.	1	2m	4	.	3	.	.	1	4	2b	.	2a	2b	.	2m	4	2b	2a	.	+	.	4	2a	2m	.	+	26	IV
(lm)	*Vaccinium uliginosum* ssp. *microphyllum*	.	.	2b	1	2a	1	1	.	2a	2a	2a	.	3	.	.	.	+	.	.	2a	2a	.	+	.	1	2a	2b	2a	.	.	2a	.	.	.	1	2a	2a	2a	.	1	4	24	III
.	*Flavocetraria cucullata*	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	r	.	.	1	.	.	.	.	.	.	1	.	+	.	.	1	.	1	.	.	.	.	.	7	I
.	*Hylocomium splendens*	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	+	+	.	1	.	.	.	.	.	1	.	.	.	.	.	7	I
	others																																											
.	*Bryum* spp.	.	.	.	.	.	+	+	.	.	+	+	1	+	+	1	+	+	+	+	+	.	+	1	.	+	+	.	1	+	1	+	+	+	1	+	1	1	+	.	.	+	29	IV
.	*Stellaria longipes* coll.	.	2m	1	1	2m	.	.	1	.	2m	.	r	.	+	2m	1	2m	2m	+	2m	.	.	2m	2m	+	1	1	1	.	2m	1	.	1	.	.	.	1	+	.	+	2m	27	IV
.	*Aulacomnium turgidum*	.	.	.	.	.	+	.	+	+	1	.	.	+	r	2b	.	1	+	1	1	+	+	4	1	+	1	1	1	.	2b	1	.	+	1	.	2a	.	.	.	.	.	24	III
.	*Sanionia uncinata*	.	.	.	1	+	+	.	2a	.	+	.	.	.	1	1	.	1	+	+	1	.	+	2a	1	.	+	.	1	1	1	.	.	+	1	.	+	.	.	1	.	.	22	III
.	*Equisetum arvense*	1	2m	.	.	.	.	+	2m	.	1	2b	.	.	1	2m	2m	2m	.	.	.	.	1	.	.	.	.	.	1	.	2m	.	2m	1	.	.	+	1	+	.	.	.	18	III
.	*Poa pratensis* coll. / *arctica*	+	.	.	1	.	.	.	.	1	1	.	.	+	1	.	.	.	1	1	1	1	.	+	1	.	1	.	.	r	.	.	.	1	r	.	+	.	.	.	.	.	17	III
.	*Polygonum viviparum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	+	.	.	.	+	1	+	1	.	1	.	.	.	.	.	.	+	+	1	.	.	1	.	12	II
.	*Amblystegium serpens*	.	.	.	.	.	.	.	+	.	+	+	+	.	+	+	+	+	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	11	II
.	*Distichium capillaceum / inclinatum*	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	1	.	+	.	.	+	.	.	.	.	.	+	.	+	+	.	.	.	9	II
.	*Peltigera canina*	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	r	.	.	.	.	.	r	1	.	+	r	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	8	I
.	*Pohlia cruda*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	.	.	+	.	+	.	.	.	.	7	I
.	*Draba glabella*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	r	1	.	.	.	.	.	.	.	.	+	r	+	7	I
.	*Cerastium alpinum* ssp. *lanatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	+	1	.	.	.	+	1	7	I
.	*Flavocetraria nivalis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	+	.	+	.	.	.	1	.	.	.	.	.	.	+	.	.	.	7	I
.	*Pohlia nutans*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	r	.	+	+	r	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	6	I
.	*Aulacomnium palustre*	.	.	.	.	.	1	.	.	.	.	1	.	.	.	+	.	.	1	+	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	6	I
.	*Lophozia* spp.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	+	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	6	I
.	*Peltigera malacea*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	1	.	+	.	.	.	.	1	.	.	.	.	.	6	I
.	*Cladonia chlorophaea* s.l.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	1	+	.	.	.	+	.	.	+	.	.	.	.	6	I
.	*Cladonia pyxidata*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	6	I
.	*Festuca rubra* coll.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	I
.	*Festuca brachyphylla*	.	.	.	.	.	.	.	2b	.	.	+	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	5	I
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		

Addenda (other species with presence < 5):
3: *Kobresia myosuroides* 2m; **5:** *Rhytidium rugosum* +; **6:** *Peltigera aphthosa* 1; **7:** *Cladonia* sp. +, *Rinodina conradii* +; **8:** *Pedicularis labradorica* 1, *Drepanocladus aduncus* +; **9:** *Dicranum laevidens* +, *Tomentypnum nitens* +; **11:** *Rhododendron lapponicum* 1, *Luzula confusa* +, *Pohlia wahlenbergii* +; **12:** *Caloplaca* sp. +; **13:** *Peltigera aphthosa* +; **14:** *Calamagrostis langsdorfii* 2m, Moss indet. +; **15:** *Pedicularis lapponica* 1, *Carex bigelowii* r, *Luzula confusa* r, *Physconia muscigena* r; **16:** *Draba cinerea* +; **18:** *Campylium stellatum* 1, *Dicranum flexicaule / fuscescens* +, *Hypnum holmenii* Ando +, **19:** *Ditrichum flexicaule* +, *Orthotrichum speciosum* +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. r; **20:** *Hypnum holmenii* Ando +; **21:** *Tomentypnum nitens* 1, *Tortella tortuosa* var. *arctica* (Arn.) Broth. 1, *Rhytidium rugosum* +; **22:** *Ledum palustre* ssp. *decumbens* 2a, *Barbilophozia hatcheri* +, *Peltigera aphthosa* +; **23:** *Calamagrostis langsdorfii* 2m, *Peltigera leucophlebia* 1, *Pedicularis lapponica* +, *Cladonia gracilis* r; **24:** *Platydictya jungermannioides* +, *Rhytidium rugosum* +, *Timmia austriaca* r; **25:** *Hierochloe alpina* 2a, *Arnica angustifolia* +, *Rhododendron lapponicum* +, *Rhytidium rugosum* +; **26:** *Kobresia myosuroides* 2m, *Dicranum flexicaule / fuscescens* +, Moss indet. +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. +; **27:** *Peltigera aphthosa* 1, *Bryoria chalybeiformis* +, *Cladonia borealis* +, *Cladonia pocillum* +, *Massalongia carnosa* +, *Orthotrichum speciosum* +, *Psoroma hypnorum* +; **28:** *Cladonia pocillum* +, *Kobresia myosuroides* +, *Orthotrichum speciosum* +; **29:** *Carex rupestris* 2m, *Lecanora epibryon* +, *Peltigera polydactylon* s.l. +; **30:** *Peltigera leucophlebia* 1, *Cladonia* sp. +, *Polytrichum juniperinum* +; **31:** *Ledum palustre* ssp. *decumbens* 1, *Barbilophozia hatcheri* +, *Bryoria chalybeiformis* +, *Cetraria aculeata / muricata* +, *Cladonia* sp. +, *Dicranum elongatum* +, *Dicranum flexicaule / fuscescens* +, *Hypogymnia austerodes* +; **32:** Moss indet. +; **33:** *Luzula confusa* +, *Trisetum spicatum* +; **34:** *Cetraria aculeata / muricata* 1, *Polytrichum juniperinum* 1, *Physconia muscigena* +, *Platydictya jungermannioides* +, *Thamnolia vermicularis* +; **35:** *Arnica angustifolia* 1, *Caloplaca* sp. +, *Cladonia* sp. +, *Draba cinerea* +, *Physconia muscigena* +, *Placynthiella icmalea* +, *Draba aurea* r; **36:** *Cladonia borealis* +, *Massalongia carnosa* +; **37:** *Saxifraga tricuspidata* 1, *Carex capillaris* coll. +, *Cladonia cariosa* +, *Myurella julacea* +, *Physconia muscigena* +, *Trisetum spicatum* +; **38:** *Kobresia myosuroides* 1, *Draba aurea* +; **39:** *Draba cinerea* +; **40:** Moss indet. 1, *Plagiomnium ellipticum / medium* +, *Potentilla hookeriana / nivea* +, *Luzula confusa* r; **41:** *Rhododendron lapponicum* r.

Table 9. Plagiomnio elliptici-Salicetum glaucae.

Distribution type	Altitudinal indicator value	Vegetation type	PS angelicetosum						Plagiomnio-Salicetum chamaenerietosum																						Presence	PSa	PSc
		Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**		**1-6**	**7-28**
		Author	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM		.	.
		Relevé area [m²]	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16		16	16
		Size of the stand [10 m²]	500	250	100	100	500	100	1000	500	500	10	50	25	25	1000	1000	1000	1000	40	250	150	50	1000	1000	50	250	1000	50	25		258	453
		Altitude [m a.s.l.]	50	70	320	300	300	300	75	30	80	110	190	210	210	390	260	340	100	230	165	85	250	115	425	10	175	120	20	85		223	167
		Slope [°]	0	3	5	3	0	3	10	3	35	0	0	3	5	5	5	3	5	3	0	0	3	5	5	0	10	3	0	3		2	5
		Aspect	-	w	s	n	-	e	n	s	n	-	-	nne	nne	n	n	n	n	s	-	-	s	n	n	-	w	n	-	n		.	.
		Cover total [%]	100	95	100	95	95	95	100	100	90	90	95	100	100	100	100	85	80	90	95	95	95	90	100	85	80	70	80	100		97	92
		Cover shrubs [%]	50	80	70	70	60	90	90	70	60	65	70	75	80	85	85	80	75	80	80	85	85	75	80	60	70	65	60	65		70	75
		Cover dwarfshrubs [%]	0	2	0	0	0	0	2	2	30	5	10	5	5	10	25	10	5	15	10	10	5	0	20	70	40	0	7	0		0	13
		Cover graminoids [%]	25	30	20	10	60	30	5	30	20	30	10	10	5	10	2	10	10	25	7	15	25	20	30	60	10	5	2	2		29	16
		Cover herbs [%]	25	60	95	80	80	85	10	45	55	20	45	30	45	60	50	60	5	65	60	80	60	70	65	0	5	5	75	5		71	42
		Cover bryophytes [%]	20	40	0	85	85	75	50	60	90	80	85	90	90	80	70	60	70	80	80	85	80	70	80	5	65	50	5	80		51	68
		Cover lichens [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
		Cover soil [%]	0	40	0	5	5	5	0	0	0	10	5	0	0	0	0	0	10	10	5	5	5	10	0	15	20	30	20	0		9	7
		Cover stones [%]	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	30	0	0	0	0	0	0	5	0	0	0	0	30		0	4
		Cover litter [%]	100	60	100	100	100	100	100	100	80	100	100	100	100	100	100	70	100	100	100	100	100	100	95	100	100	100	100	70		93	96
		Height litter [cm]	4	2	6	5	5	5	3	4	1	4	4	3	4	5	10	3	5	4	5	5	3	8	5	10	3	8	3	2		5	5
		Canopy height [cm]	170	140	240	220	200	200	120	200	110	240	110	100	100	100	180	100	140	140	120	200	120	220	70	140	60	200	200	70		195	138
		Height stand max. [cm]	185	160	360	260	270	300	140	240	150	300	150	130	140	140	240	120	160	160	160	260	140	250	90	200	65	240	250	80		256	173
		PH value	6.1	5.8	5.9	5.8	6.2	5.9	6.2	6.6	5.4	6.0	6.3	6.4	6.6	6.2	6.5	6.4	5.8	6.6	6.6	6.4	6.7	6.3	6.2	6.1	5.4	6.1	6.5	6.1		6.0	6.2
		Organic layer [cm]	0	8	12	12	12	10	0	8	4	6	25	18	20	7	8	3	7	20	15	9	12	6	8	5	7	10	4	1		9	9
		Depth groundwater [cm]	15	50	20	20	20	20	10	10	40	50	10	5	-	20	50	20	30	50	10	10	50	80	10	20	50	30	-	-		24	29
		Stem diam. mean [cm]	1.9	2.1	2.4	0.9	2.6	1.8	1.1	1.8	1.1	2.4	1.3	1.2	1.0	1.2	1.5	1.8	1.4	1.7	2.5	3.0	1.3	1.5	1.3	1.8	0.9	2.4	2.4	1.2		1.9	1.6
		Stem diam. max. [cm]	2.8	2.5	4.1	3.0	2.7	2.5	1.4	2.9	1.7	nd	2.1	1.5	1.3	2.3	2.4	1.8	1.9	2.0	2.9	nd	1.3	4.4	1.5	2.1	1.2	3.1	2.4	1.5		2.9	2.0
		Shelter [1-5]	3	3	3	3	3	4	4	3	4	5	4	4	4	3	3	3	3	4	3	3	4	3	3	3	4	3	3	3		3.2	3.5
		Soil moisture [1-6]	5	4	5	4	4	4	5	4	4	4	3	5	5	4	4	4	4	4	4	5	4	4	4	4	4	3	3	6		4.3	4.1
		Species number of vascular plants	3	5	8	6	7	8	7	11	12	15	9	13	14	13	9	10	9	11	10	11	11	8	10	4	10	10	7	4		6	10
		Species number of mosses	3	2	11	9	4	6	12	4	7	13	4	5	11	12	12	17	10	5	4	13	8	10	4	5	5	10	9	7		6	9
		Species number of liverworts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0		0	0
		Number of species	6	7	19	15	11	14	19	15	19	28	13	18	25	25	22	29	19	16	14	24	19	19	14	9	15	20	16	11		12	19
		ch / d Plagiomnio-Salicetum (PS)																															
L	(lm)	*Salix glauca* coll. (shrub layer)	3	5	4	4	4	5	5	4	4	4	4	4	5	5	5	5	4	5	5	5	5	4	5	4	5	4	4	4	28	V	V
.	.	*Plagiomnium ellipticum / medium*	3	3	5	4	5	4	3	3	3	3	+	3	3	4	4	3	2a	.	.	1	2b	2b	4	.	4	2b	+	4	25	V	V
		d PS angelicetosum																															
LO	.	*Angelica archangelica* ssp. *norvegica*	.	.	4	4	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	IV	.
.	.	*Calliergon cordifolium*	2a	1	1	2a	2b	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	V	r
B	.	*Calamagrostis langsdorfii*	2b	3	2b	2a	4	3	2m	3	2b	3	1	2a	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13	V	II
		d PS chamaenerietosum																															
LC	lm!	*Betula nana*	.	+	.	.	.	.	1	r	3	+	2a	1	1	2a	2a	.	1	2a	2a	2a	+	.	2b	4	3	.	.	.	18	I	IV
A	.	*Chamaenerion latifolium*	.	.	.	.	.	.	.	2a	.	1	1	1	1	1	.	1	.	1	1	2a	2a	1	1	1	1	.	.	.	15	.	IV
L	.	*Carex bigelowii*	.	.	.	.	1	.	.	.	.	.	2a	+	1	1	1	1	2a	1	2a	2a	1	2b	3	4	.	.	.	r	16	I	IV
L	(lm)	*Vaccinium uliginosum* ssp. *microphyllum*	.	.	.	.	.	.	.	.	.	1	1	1	1	1	2a	2a	+	2a	2a	.	1	1	.	.	.	+	2a	.	14	.	IV
.	.	*Climacium dendroides*	.	.	.	.	.	1	2b	.	.	3	3	2b	2b	.	1	1	3	4	.	.	4	1	2a	.	.	.	.	.	13	I	III

Table 9. Continued.

.	.	*Poa pratensis* coll. / *arctica*	.	.	.	.	.	.	.	.	2a	1	.	2a	1	2a	.	.	.	+	.	+	.	1	1	.	.	.	1	.	10	.	III
.	.	*Pohlia wahlenbergii*	.	.	.	+	.	.	.	.	+	1	.	.	+	+	.	.	+	.	.	+	1	1	.	.	.	1	.	.	10	I	III
.	.	*Philonotis fontana / tomentella*	.	.	.	.	.	.	1	.	.	.	.	3	3	1	+	+	.	.	.	.	.	.	.	.	.	3	.	1	8	.	II
.	.	*Campylium stellatum*	.	.	.	.	.	.	.	.	.	.	.	1	+	+	.	1	.	.	+	2a	.	.	.	.	.	.	2a	.	7	.	II
.	.	*Hylocomium splendens*	.	.	.	.	.	.	.	.	1	1	.	.	.	.	1	.	1	.	.	.	.	.	.	r	.	+	.	.	6	.	II
.	.	*Scorpidium cossonii*	.	.	.	.	.	.	.	.	.	+	.	.	+	+	+	+	.	.	.	.	.	.	.	1	.	.	.	.	6	.	II
.	.	*Polytrichum alpinum*	.	.	.	.	.	.	.	.	1	2a	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	+	.	.	5	.	II
A	.	*Luzula confusa*	.	.	.	.	.	.	.	.	.	1	+	+	+	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	5	.	II
A	.	*Poa glauca*	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	1	.	.	.	.	.	2m	2m	.	.	5	.	II
.	.	*Cinclidium arcticum / stygium*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	2a	.	.	.	.	.	.	.	.	+	+	5	.	II
		others																															
A	.	*Polygonum viviparum*	.	.	+	2m	2m	2b	2m	+	.	2b	2a	2a	1	2b	2a	3	1	2a	2b	2a	2a	2a	2a	.	+	1	1	1	24	IV	V
B	.	*Equisetum arvense*	2b	3	3	2b	5	2a	2a	3	2m	.	3	2b	2b	2m	2m	2m	2m	1	.	2m	1	1	2m	.	.	.	1	2m	23	V	IV
AC	.	*Pyrola grandiflora*	.	3	1	.	.	2a	2a	.	2a	2b	.	2a	2b	3	3	3	1	4	3	4	4	4	4	.	1	2m	4	.	21	III	V
.	.	*Sanionia uncinata*	.	.	1	3	.	.	1	.	1	2a	1	3	2b	1	2b	2a	3	2b	3	1	2a	.	1	1	.	1	1	1	21	II	V
L	.	*Stellaria longipes* coll.	.	.	1	2m	.	1	2m	.	2m	2m	.	1	1	2m	2m	.	2m	1	2m	.	1	.	2m	.	2m	2m	.	.	17	III	IV
.	.	*Bryum* spp.	.	.	+	+	.	+	+	+	.	1	.	.	.	+	.	1	+	.	3	1	+	1	.	.	.	+	+	+	16	III	III
.	[I]	*Brachythecium groenlandicum*	.	.	1	1	.	+	1	.	1	+	.	.	.	.	1	.	1	.	.	1	.	3	.	.	1	+	1	1	14	III	III
.	.	*Amblystegium serpens*	1	.	+	1	.	.	+	.	.	1	.	.	.	.	.	1	.	.	.	1	+	.	.	.	.	.	+	.	9	III	II
.	.	*Aulacomnium turgidum*	.	.	+	.	.	.	.	.	4	2a	.	.	.	.	.	.	1	.	.	+	.	.	+	.	1	+	1	.	9	I	II
.	.	*Aulacomnium palustre*	.	.	1	.	.	.	+	.	.	.	3	.	.	.	.	.	+	1	.	+	1	.	.	.	2b	.	+	.	9	I	II
L	.	*Equisetum variegatum*	.	.	+	.	.	.	.	1	.	.	.	.	.	.	2m	2m	.	1	.	2m	1	.	.	.	.	.	.	.	7	I	II
.	.	*Drepanocladus aduncus*	.	.	1	.	.	.	.	3	.	.	.	.	.	+	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	4	I	I
.	.	*Distichium capillaceum / inclinatum*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	4	I	I
.	.	*Ceratodon purpureus*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	+	.	.	.	.	.	.	.	4	I	I
.	.	*Calliergon giganteum*	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	2b	.	1	.	.	.	.	.	.	.	.	.	.	4	.	I
.	.	*Tortula ruralis*	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	r	.	.	.	.	.	.	.	.	3	I	r
L	.	*Festuca rubra* coll.	.	.	.	.	.	.	.	+	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	I
L	.	*Juncus arcticus*	.	.	.	.	.	.	.	r	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	3	.	I
L	.	*Pedicularis flammea*	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	r	.	.	.	.	.	.	.	.	.	.	.	.	3	.	I
.	.	*Timmia austriaca*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	3	.	I
.	.	*Meesia triquetra*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	3	.	I
.	.	*Lophozia* spp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	1	.	.	.	.	.	.	3	.	I
.	.	*Warnstorfia sarmentosa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	+	.	.	.	2a	3	.	I
		Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**			

Addenda (species with presence < 3):
4: *Conardia compacta* +; **5:** *Pseudobryum cinclidioides* 1, *Warnstorfia exannulata* 1, *Eriophorum angustifolium* ssp. *subarcticum* +; **6:** *Cardamine pratensis* coll. +, moss indet. +, **7:** *Helodium blandowii* 1, *Tomentypnum nitens* 1, *Warnstorfia exannulata* +; **8:** *Carex scirpoidea* +; **9:** *Ledum palustre* ssp. *decumbens* 2b, *Empetrum nigrum* ssp. *hermaphroditum* 2a, *Vaccinium vitis-idaea* ssp. *minus* 2a, *Pedicularis labradorica* 1; **10:** *Campanula gieseckiana* 1, *Cerastium alpinum* ssp. *lanatum* 1, *Ledum groenlandicum* +, *Pohlia nutans* +; **12:** *Carex capillaris* coll. +; **13:** *Splachnum vasculosum* 1, *Hypnum revolutum* +, *Orthothecium chryseon* +, *Salix arctophila* +; **14:** *Calliergon richardsonii* 1, *Ranunculus affinis* 1, Moss indet. +, *Schistidium* sp. +; **15:** *Cyrtomnium hymenophyllum* +; **16:** *Cephaloziella* sp. +, Moss indet. +, *Myurella julacea* +; **19:** *Tomentypnum nitens* 1, *Rhododendron lapponicum* +; **20:** *Carex saxatilis* 1, *Oncophorus virens* 1, *Luzula arctica* r; **21:** *Empetrum nigrum* ssp. *hermaphroditum* +; **22:** *Cyrtomnium hymenophyllum* 1, *Isopterygiopsis pulchella* +, *Myurella tenerrima* +, *Plagiopus oederiana* +; **23:** *Carex maritima* +; **24:** *Warnstorfia tundrae* +; **25:** *Calamagrostis lapponica* 2a, *Pedicularis lapponica* 1; **26:** *Campanula gieseckiana* 1, *Ledum palustre* ssp. *decumbens* 1, *Calamagrostis lapponica* +, *Cerastium alpinum* ssp. *lanatum* +; **27:** *Equisetum scirpoides* 2m.

Table 10. Salicetea herbaceae.

Distribution type[4]	Altitudinal indicator value	Diagnostic value[5]		*Cerastium-Poa* community							Pediculari flammeae-Caricetum bigelowii									Presence	Salicetea herbaceae			
											typ. var.				var. of *Eriophorum ang.*						CP	PC	Ch[2]	P[3]
			Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**		**1-7**	**8-16**	**13[1]**	**15[1]**
			Author	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS		BS	BS	BS	BS
			Relevé area [m^2]	2	4	4	4	2	4	4	4	2	4	4	4	4	4	4	4		3	4	3	2
			Size of the stand [10 m^2]	50	1	90	1000	40	800	1000	500	100	20	1000	1000	100	1000	1000	60		426	531	117	39
			Altitude [m a.s.l.]	946	652	945	870	980	885	940	870	950	590	935	935	925	955	810	860		880	870	871	899
			Slope [°]	18	22	16	18	5	10	24	10	5	0	8	8	0	10	22	0		16	7	7	10
			Aspect	nnw	nnw	nnw	nnw	n	nw	nnw	nw	n	-	nnw	n	-	n	n	-		-	-	-	-
			Cover total (%)	100	100	100	100	98	100	100	100	100	100	100	98	90	100	100	100		100	99	98	86
			Cover dwarf shrubs [%]	0	0	0	0	0	2	2	15	20	20	10	7	5	20	15	60		1	19	33	0
			Cover graminoids [%]	20	25	35	15	40	20	20	40	35	45	40	40	60	40	20	30		25	39	8	10
			Cover herbs [%]	5	10	2	15	10	2	7	10	10	20	5	7	2	10	15	10		7	10	7	7
			Cover bryophytes [%]	70	100	100	100	97	100	100	80	100	90	100	98	90	100	100	90		95	94	85	77
			Cover lichens [%]	30	2	10	7	7	15	10	40	2	10	2	2	2	2	5	5		12	8	21	13
			Cover soil [%]	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	1	1	7
			Cover stones [%]	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0		0	0	1	3
			Cover litter [%]	2	20	5	2	2	2	2	2	2	2	2	2	2	2	2	2		5	2	2	6
			Canopy height [cm]	5	10	10	7	6	7	8	6	6	10	6	7	7	7	5	8		8	7	3	2
			Height stand max. [cm]	7	15	20	10	20	10	15	10	25	25	15	15	20	20	15	10		14	17	13	7
			PH value	5.0	5.5	4.8	5.4	5.7	5.4	5.4	5.5	5.9	5.1	4.9	5.3	5.3	5.1	5.2	5.6		5.3	5.3	5.3	5.4
			Organic matter rhizosphere [%]	9	17	11	13	15	16	11	11	18	15	22	17	14	14	8	9		13	14	25	15
			Organic layer [cm]	1	1	1	6	3	4	3	2	3	3	2	3	2	3	6	5		2.7	3.2	0.8	0.5
			Shelter [1-5]	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	4		3.4	3.1	3.6	3.9
			Snow cover [1-5]	5	5	5	4	4	4	4	4	4	4	4	4	4	4	5	4		4.4	4.1	4.6	5.0
			Soil moisture [1-6]	4	4	4	4	4	4	4	4	4	3	4	4	5	4	5	6		4.0	4.3	4.1	4.5
			Species number of vascular plants	8	6	8	15	9	9	18	14	16	17	8	16	17	12	25	8		10	15	12	11
			Species number of mosses	10	9	16	10	12	9	19	18	15	19	13	19	17	18	27	19		12	18	15	10
			Species number of liverworts	4	2	4	4	5	4	7	4	5	3	7	6	8	9	9	8		4	7	6	3
			Species number of macrolichens	18	11	25	11	19	18	14	22	16	11	14	18	23	16	15	21		17	17	17	8
			Species number of microlichens	8	2	6	4	7	3	7	8	3	2	3	2	2	2	6	6		5	4	5	3
			Number of species	48	30	59	44	52	43	65	66	55	52	45	61	67	57	82	62		49	61	56	35
		d *Cerastium-Poa* community (CP), (Phippsietum)																						
A	[mh!]	A2	*Cerastium arcticum*	.	2a	+	1	1	1	1	.	.	.	.	.	.	.	.	.	6	V	.	II	II
A	[mh!]		*Saxifraga cernua*	+	1	.	+	.	.	+	.	.	.	.	.	.	.	.	.	4	III	.	.	III
		d Pediculari-Caricetum bigelowii (PC)																						
AC	[mh!]		*Hierochloe alpina*	.	.	.	.	1	.	.	.	+	2m	.	+	+	1	+	.	7	I	IV	I	.
		d *Cerastium-Poa* community, Pediculari-Caricetum																						
.	.		*Dicranum laevidens*	.	2a	.	2b	2a	2b	2b	.	1	.	1	1	1	2a	2a	.	11	IV	IV	I	+
.	.		*Cladonia cyanipes*	.	r	+	+	1	+	1	+	1	.	1	+	1	+	.	+	13	V	IV	r	.
.	.		*Peltigera aphthosa*	.	+	1	1	+	2a	.	+	1	1	1	1	.	.	+	.	11	IV	IV	I	+
.	.		*Lichenomphalia* sp. (*Botrydina*-type)	+	.	+	+	+	+	+	+	+	.	+	.	.	+	+	.	11	V	III	r	.
.	.		*Hypnum holmenii* Ando	.	.	1	1	1	.	1	.	1	.	1	1	+	2a	1	.	10	III	IV	.	.
.	.		*Bryoria nitidula*	+	+	.	.	+	+	.	+	.	r	.	+	+	.	+	+	10	III	IV	I	.
.	[mh!]		*Alectoria nigricans*	+	.	+	.	+	.	.	+	1	.	+	.	1	.	.	.	7	III	III	I	.
.	.		*Cladonia pleurota*	1	.	+	+	.	+	+	.	+	.	.	.	+	.	.	.	7	IV	II	r	+

Table 10. Continued.

.	.		*Alectoria ochroleuca*	.	.	+	.	1	.	.	+	1	.	+	.	+	r	.	.	7	II	III	.	+
.	.		*Lichenomphalia hudsoniana*	.	.	1	+	+	+	.	.	.	.	.	.	+	.	.	+	6	III	II	.	.
			d *Cerastium-Poa* comm., Pediculari-Caricetum, Cassiopetum hyp.																					
.	.		*Polytrichum strictum*	+	2b	2a	1	1	2a	2a	2a	+	+	1	1	1	1	1	1	16	V	V	V	+
.	.		*Flavocetraria cucullata*	1	+	1	1	1	1	1	1	1	+	1	1	1	1	+	1	16	V	V	IV	I
.	.		*Peltigera scabrosa*	1	.	1	1	2a	+	+	+	1	1	1	1	+	1	1	+	15	V	V	V	+
.	.		*Cladonia amaurocraea*	+	.	1	+	+	+	1	2a	+	+	1	1	+	+	1	+	15	V	V	V	II
.	.		*Aulacomnium turgidum*	.	1	2b	2b	3	3	2b	3	3	3	2b	3	2b	3	2b	2b	15	V	V	V	II
.	.		*Anastrophyllum minutum*	2a	.	2b	1	3	+	+	2b	1	.	3	1	5	1	+	2a	14	V	V	IV	I
.	.		*Hylocomium splendens*	.	3	2b	2b	1	2b	3	1	4	2b	.	3	.	2a	2b	1	13	V	IV	IV	.
.	*mh		*Dactylina arctica* (M.J. Richardson) Nyl.	1	.	1	+	1	+	.	1	r	.	1	1	+	1	+	+	13	IV	V	III	+
AH	h!		*Potentilla hyparctica*	1	.	+	+	2a	+	+	1	+	.	.	+	+	+	+	.	12	V	IV	IV	I
.	.		*Flavocetraria nivalis*	+	.	.	.	.	+	+	+	+	.	+	.	+	+	+	+	10	III	IV	III	I
.	(mh)		*Sphaerophorus globosus*	+	+	+	.	1	.	.	1	.	.	.	1	+	+	.	+	9	III	III	III	I
.	.		*Isopterygiopsis pulchella*	.	.	.	.	+	.	+	1	.	+	.	+	.	+	+	+	8	II	IV	III	+
.	(mh)		*Cetraria islandica*	.	.	+	.	.	r	.	+	+	.	1	1	1	.	.	+	8	II	IV	III	+
.	.		*Cladonia chlorophaea* s.l.	+	+	+	.	+	.	.	+	.	+	.	+	.	.	.	.	7	III	II	II	+
.	.		*Placynthiella icmalea*	+	.	+	.	.	.	+	1	.	.	.	+	.	.	.	1	6	III	II	III	+
.	.		*Thamnolia vermicularis*	.	.	+	.	.	+	.	+	r	.	.	+	.	.	.	+	6	II	III	II	+
			d Pediculari-Caricetum, Cassiopetum hypnoidis																					
A	.		*Polygonum viviparum*	+	.	.	.	.	.	1	2a	2a	2a	1	2a	1	2a	2a	2a	11	II	V	V	II
LO	*mh	C	*Salix herbacea*	.	.	.	.	.	.	.	2b	2b	2b	2a	2a	1	2b	2a	2b	9	.	V	V	I
L	.		*Carex bigelowii*	.	.	.	.	.	.	.	3	3	2b	3	3	4	3	2b	3	9	.	V^{3}	IV^{2a}	I^{1}
L	.		*Pedicularis flammea*	.	.	.	.	.	.	.	1	+	+	.	+	+	.	1	1	7	.	IV	II	.
AC	*h		*Pedicularis hirsuta*	.	.	.	.	.	.	.	+	1	.	.	.	+	+	+	+	6	.	IV	III	.
.	[h!]		*Blepharostoma trichophyllum*	.	.	.	.	.	.	.	.	.	.	2a	1	1	+	+	2a	6	.	IV	III	I
A	[h!]		*Huperzia selago* ssp. *arctica*	.	.	.	.	.	.	.	.	1	.	.	1	1	2m	r	.	5	.	III	IV	I
.	.		*Peltigera leucophlebia*	.	.	.	.	.	.	2a	.	.	.	.	.	+	1	1	+	5	I	III	V	I
			d Pediculari-Caricetum var. of *Eriophorum angustifolium*																					
.	.		*Scapania* spp.	+	.	.	.	.	.	.	.	.	.	.	+	+	+	+	1	6	I	III	II	II
.	.		*Oncophorus wahlenbergii*	.	.	.	.	.	.	.	.	.	.	.	1	1	+	+	1	5	.	III	II	I
B	.		*Eriophorum angustifolium* ssp. *subarcticum*	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	1	4	.	III	.	.
L	.		*Salix arctophila*	.	.	.	.	.	.	+	.	.	+	.	.	1	.	.	3	4	I	II	.	.
A	[h!]		*Juncus biglumis*	.	.	.	.	.	.	.	.	.	.	.	+	+	.	r	.	3	.	II	r	I
.	.		*Sphagnum girgensohnii*	.	.	.	.	.	.	.	.	.	.	.	.	2a	1	.	.	2	.	II	.	.
.	.		*Sphagnum warnstorfii*	.	.	.	.	.	.	.	.	.	.	2b	.	.	3	.	.	2	.	II	.	.
.	.		*Sphagnum capillifolium*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2b	.	2	.	II	.	.
			d Cassiopetum hypnoidis (Ch)																					
.	.		*Peltigera canina*	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	2	I	I	III	I
A	*h		*Silene acaulis*	.	.	.	.	.	r	+	.	.	.	.	.	.	.	+	.		I	I	III	I
.	[mh!]		*Cetraria ericetorum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	III	+
.	.		*Caloplaca tetraspora*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	II	+
.	.		*Nephroma expallidum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	II	.
.	.		*Rhytidium rugosum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	II	.

Table 10. Continued.

			d Cassiopetum hypnoidis, Phippsietum																					
.	*mh		*Cetrariella delisei*	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	I	.	IV	III
.	.		*Peltigera malacea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	II	III
A	[*mh]		*Oxyria digyna*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	II	II
			d Phippsietum algidae-concinnae (P)																					
AH	h	A2	*Saxifraga hyperborea*	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	2	I	I	.	V
AM	mh	C	*Ranunculus pygmaeus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	I	V
.	.	C	*Pohlia drummondii*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	I	.	I	V
A	h	A2	*Phippsia algida*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	IV
.	.		*Stereocaulon rivulorum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	I	IV
.	.		*Lepraria cacuminum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	r	II
.	[*mh]	A1	*Solorina crocea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	II
.	h		*Bryum cryophilum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	II
LO	.		*Poa alpina*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.	II
			other Salicetea herbaceae																					
.	[mh!]		*Cladonia stricta* s.str. / *trassii*	.	+	1	.	.	.	+	2a	.	+	1	1	1	.	.	1	9	III	IV	IV	IV
.	[h!]	A1	*Conostomum tetragonum*	1	.	1	.	1	.	.	+	.	.	+	.	2a	+	1	+	9	III	IV	IV	III
AH	[h!]		*Saxifraga foliolosa*	.	.	1	.	2m	.	+	.	.	.	+	.	+	+	1	+	8	III	III	II	IV
AC	(h)	A2	*Luzula arctica*	.	.	.	1	.	.	2a	1	1	.	1	1	+	.	1	.	8	II	IV	III	IV
.	[(mh)]		*Barbilophozia kunzeana*	.	.	1	.	.	2a	.	.	+	3	.	.	.	+	.	.	5	II	II	IV	I
A	.	A2	*Draba lactea*	.	.	.	1	.	.	1	.	1	+	.	.	.	.	+	.	5	II	II	r	I
.	.		*Bartramia ithyphylla*	.	.	+	.	.	.	+	.	.	.	.	+	.	.	+	.	4	I	II	II	+
.	[mh!]		*Pertusaria geminipara*	2a	.	1	.	+	.	.	.	.	.	+	.	.	.	.	.	4	III	I	II	I
.	[*mh]	C	*Anthelia julacea / juratzkana*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	3	I	II	II	II
A	[h!]	A2	*Saxifraga nivalis*	.	.	.	+	.	.	+	.	.	.	.	.	.	.	+	.	3	II	I	.	I
.	.		*Cladonia acuminata*	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	2	I	I	II	+
.	.	A1	*Polytrichum sexangulare*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	.	I	II	IV
			other altitudinal indicator species																					
.	*h		*Racomitrium lanuginosum*	.	.	1	.	1	.	+	1	+	+	+	1	+	1	+	+	12	III	V	III	II
.	[h!]		*Tritomaria quinquedentata*	.	.	1	+	1	.	1	1	2a	.	1	1	+	2a	1	1	12	III	V	IV	II
A	[h!]		*Cardamine bellidifolia*	1	+	1	.	1	1	+	1	1	+	.	1	.	1	+	.	12	V	IV	II	I
.	mh!		*Ptilidium ciliare*	2a	.	2b	.	1	+	.	2a	2a	1	.	+	.	2a	+	1	11	III	IV	V	III
.	mh!		*Stereocaulon alpinum*	1	.	+	.	.	+	+	1	.	+	.	.	.	.	r	+	8	III	III	III	II
.	[*mh]		*Dicranum spadiceum*	3	.	2a	.	2a	.	.	2b	+	1	.	.	1	2a	.	.	8	III	III	III	II
			others																					
.	.		*Cladonia gracilis*	1	+	1	1	1	+	+	2a	+	+	1	1	+	+	+	1	16	V	V	IV	III
B	.		*Poa pratensis* coll. / *arctica*	2b	2b	2b	2a	2b	2a	1	1	2m	+	1	1	1	2m	1	.	15	V	V	V	IV
.	.		*Polytrichum alpinum*	2b	2b	2b	1	2a	1	2b	1	+	.	2a	1	1	1	1	1	15	V	V	V	IV
.	.		*Lophozia* spp.	+	+	+	2b	+	+	1	+	1	+	+	+	+	+	+	.	15	V	V	IV	III
.	.		*Pohlia nutans*	2a	1	.	1	1	+	2a	+	1	1	1	1	+	1	1	1	15	V	V	IV	II
.	.		*Ochrolechia frigida*	1	+	+	1	1	+	1	1	+	+	+	+	1	.	+	1	15	V	V	III	II
.	.		*Cladonia borealis*	2a	+	1	+	1	.	+	1	.	+	+	+	+	+	+	+	14	V	V	IV	III
.	.		*Peltigera polydactylon* s.l.	.	.	1	1	+	2a	1	1	+	1	+	1	+	+	+	1	14	IV	V	III	I

Table 10. Continued.

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		1-7	8-16	13[1]	15[1]
A	.	*Luzula confusa*	+	.	2a	1	2a	2a	2a	1	+	1	1	1	.	1	1	.	13	V	IV	IV	IV
L	.	*Stellaria longipes* coll.	2a	1	2m	1	1	1	1	.	1	1	.	+	.	.	+	.	11	V	III	V	III
.	.	*Sanionia uncinata*	.	3	+	.	.	+	.	1	1	2a	.	.	.	2a	1	+	9	III	IV	V	V
.	.	*Cladonia arbuscula* ssp. *mitis*	1	+	1	.	1	.	.	2a	.	.	.	1	1	r	.	1	9	III	III	IV	II
.	.	*Bryum* spp.	.	.	.	.	.	.	1	+	+	+	.	+	+	.	1	+	8	I	IV	III	IV
.	.	*Cladonia pyxidata*	.	.	1	.	.	+	.	1	1	.	.	.	+	.	1	+	7	II	III	IV	II
.	.	*Psoroma hypnorum*	1	.	1	.	1	.	.	1	+	+	.	.	.	.	+	.	7	III	III	IV	II
.	.	*Cephaloziella* spp.	.	.	.	.	.	+	+	+	+	+	.	.	+	.	.	1	7	II	III	II	II
.	.	*Dicranum acutifolium / brevifolium*	.	.	2a	.	.	2b	.	.	.	.	2a	2b	1	.	1	4	7	II	III	II	I
.	.	*Ditrichum flexicaule*	.	.	.	.	.	.	2a	+	1	+	.	.	.	.	1	2a	6	I	III	II	+
.	.	*Tortella tortuosa* var. *arctica* (Arn.) Broth.	.	.	.	.	.	.	r	+	.	+	.	1	.	.	1	.	5	I	III	II	+
.	.	*Cladonia squamosa*	.	.	1	.	.	.	.	+	.	.	.	.	+	+	.	+	5	I	III	II	.
.	.	*Barbilophozia binsteadii*	.	.	.	+	+	.	.	.	.	.	+	.	+	2a	.	.	5	II	II	r	.
.	.	*Peltigera didactyla*	.	.	.	+	.	1	+	.	.	.	.	.	.	.	.	+	4	III	I	II	II
.	.	*Pohlia cruda*	.	.	+	.	.	.	1	+	.	.	.	+	.	.	.	.	4	II	II	III	I
A	.	*Festuca brachyphylla*	.	.	1	+	.	1	.	.	.	1	.	.	.	.	.	.	4	III	I	II	I
.	.	*Rinodina turfacea*	.	.	.	.	.	.	r	+	.	.	.	.	.	.	+	+	4	I	II	II	+
.	[h]	*Protopannaria pezizoides*	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	+	4	I	II	II	.
A	[h!]	*Papaver radicatum* coll.	.	.	.	+	.	.	1	.	r	.	.	.	.	.	+	.	4	II	II	.	+
AC	.	*Draba glabella*	+	+	.	.	.	.	+	.	.	.	.	.	.	.	1	.	4	II	I	I	.
		Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**		**1-7**	**8-16**	**13[1]**	**15[1]**

Explanations

[1] Number of relevés [2] Ch: high-elevation form Cassiopetum hypnoidis [3] P: high-elevation form Phippsietum (incl. typical var., var. of Polytrichum sexangulare, s. Sieg & Daniëls 2005) [4] Böcher (1975), s. table 3 . [5] Diagnostic value (s. Dierssen 1996): C: Salicetea herbaceae O: Salicetalia herbaceae A1: Salicion herbaceae A2: Ranunculo-Oxyrion

Addenda (CP, PC: other species with presence < 4; CS, P: other species with presence ≥ II, for rare species s. Sieg & Daniëls 2005)

1: *Barbilophozia hatcheri* 1, *Bryonora castanea* s.str. 1, *Buellia elegans* 1, *Polytrichum piliferum* 1, *Baeomyces rufus* +, *Cladonia phyllophora* +, *Cladonia* sp. +, *Dactylina ramulosa* (Hook.) Tuck. +, *Pohlia annotina* +, *Polytrichum hyperboreum* +, *Racomitrium canescens* +; **2:** *Barbilophozia hatcheri* +, *Pohlia proligera* +, *Timmia austriaca* +, *Pseudephebe pubescens* r; **3:** *Pohlia andrewsii* 1, *Cladonia bellidiflora* +, *Cladonia macrophylla* +, *Cladonia rangiferina* +, *Cynodontium strumiferum* +, *Polytrichum piliferum* +; **4:** *Aulacomnium palustre* 2b, *Dicranum elongatum* 2b, *Equisetum arvense* 2a, *Plagiomnium medium* 1, *Ranunculus lapponicus* 1, *Saxifraga caespitosa* 1, *Cladonia cenotea* +, *Protothelenella sphinctrinoidella* +; **5:** *Cladonia bellidiflora* 1, *Lopadium coralloideum* 1, *Cladonia macrophylla* +, *Cladonia rangiferina* +, *Cladonia uncialis* +, *Gymnomitrion corallioides* +, *Lecidea* sp. +; **6:** *Bryocaulon divergens* +, *Cladonia deformis* +, *Parmelia omphalodes* +; **7:** *Philonotis fontana / tomentella* 1, *Saxifraga caespitosa* 1, *Bryonora castanea* s.str. +, *Distichium capillaceum / inclinatum* +, Microlichen indet. +, *Myurella tenerrima* +, *Plagiochila porelloides* +, *Plagiomnium medium* +, *Pohlia proligera* +, *Collema* sp. r; **8:** *Carex misandra* 1, *Dicranum flexicaule / fuscescens* 1, *Hypnum bambergeri* 1, *Lopadium pezizoideum* 1, *Lopadium coralloideum* +, *Parmelia omphalodes* r; **9:** *Dicranum flexicaule / fuscescens* 1, *Polytrichum juniperinum* 1, *Cladonia phyllophora* +, *Cladonia pocillum* +; **10:** *Carex rupestris* 2m, *Armeria scabra* ssp. *sibirica* 1, *Carex norvegica* 1, *Ceratodon purpureus* 1, *Dicranum flexicaule / fuscescens* 1, *Polytrichum juniperinum* 1, *Schistidium* sp. 1, *Hypnum revolutum* +, *Pyrola grandiflora* +, *Straminergon stramineum* +, *Tortula ruralis* +; **11:** *Sphagnum balticum* 2a, *Dicranum elongatum* 1, *Anastrophyllum assimile* +, *Bryocaulon divergens* +, *Lophozia opacifolia* +, *Pohlia schimperi* (C. Müll.) Andrews +; **12:** *Carex rupestris* 1, *Carex misandra* +, *Cladonia pocillum* +, *Distichium capillaceum / inclinatum* +, *Myurella julacea* +, *Peltigera* sp. +, *Schistidium* sp. +, *Sphagnum* sp. +, *Stereocaulon paschale* +; **13:** *Dicranum elongatum* 2b, *Carex rupestris* 2a, *Cladonia macrophylla* 1, *Aneura pinguis* +, *Carex rariflora* +, *Cladonia cenotea* +, *Parmelia omphalodes* +, *Pohlia schimperi* (C. Müll.) Andrews +, *Vaccinium uliginosum* ssp. *microphyllum* +, *Warnstorfia sarmentosa* +; **14:** *Anastrophyllum assimile* +, *Cladonia carneola* +, *Cladonia phyllophora* +, *Fissidens osmundoides* +, *Psilopilum cavifolium* +, *Aneura pinguis* r, *Lopadium coralloideum* r; **15:** *Sphagnum teres* 2b, *Salix glauca* coll. 2a, *Jungermannia* sp. 1, *Brachythecium turgidum* +, *Bryocaulon divergens* +, *Caloplaca* sp. +, *Cephalozia* sp. +, *Distichium capillaceum / inclinatum* +, *Myurella tenerrima* +, *Philonotis fontana / tomentella* +, *Plagiomnium medium* +, *Psilopilum cavifolium* +, *Saelania glaucescens* +, *Tomentypnum nitens* +, *Collema* sp. r, *Juncus castaneus* r, *Saxifraga rivularis* r; **16:** *Fissidens osmundoides* 1, *Bryonora castanea* s.str. +, *Jungermannia* sp. +, *Meesia uliginosa* +, *Myurella tenerrima* +, *Peltigera rufescens* +, *Philonotis fontana / tomentella* +, *Scorpidium revolvens* +, *Warnstorfia sarmentosa* +; **CS:** *Bryonora castanea* s.str. III, *Aulacomnium palustre* II, *Barbilophozia hatcheri* II, *Buellia elegans* II, *Ceratodon purpureus* II, *Cladonia pocillum* II, *Dactylina ramulosa* (Hook.) Tuck. II, *Dicranum flexicaule / fuscescens* II, *Gymnomitrion corallioides* II, *Hypnum revolutum* II, *Lopadium pezizoideum* II, Microlichen indet. II, *Pyrola grandiflora* II, *Racomitrium canescens* II, *Schistidium* sp. II, *Stereocaulon alpinum / rivulorum* II, *Straminergon stramineum* II, *Tomentypnum nitens* II, *Tortula ruralis* II. **P:** *Barbilophozia hatcheri* III, *Bryonora castanea* s.str. II, *Bryum* cf. *subneodamense* II, *Equisetum arvense* II, *Gymnomitrion corallioides* II, *Lopadium pezizoideum* II, *Polytrichum piliferum* II, *Stereocaulon alpinum / rivulorum* II.

Table 11. Synoptic table Carici-Kobresietea.

Distribution type [1]	Altitudinal indicator value [2]	Diagnostic value [3]	No.	1	2	3	4	5	2.1	2.2	2.3	3.1	3.2	5.1	5.2
			Vegetation type [5]	SK	RV	TC	TK	CD	RV cAul	RV cAle	RV sph	TC luz	TC sco	CD sph	CD les
			Number of relevés	13	45	16	10	48	15	19	11	13	5	41	7
			Mean size of the stands [10 m²]	18	128	544	33	223	39	209	117	647	316	234	161
			Mean altitude [m a.s.l.]	410	332	880	519	594	327	207	557	865	912	640	325
			Mean slope [°]	2	8	4	8	7	6	8	9	6	1	7	7
			Mean cover total [%]	91	95	93	91	49	99	95	92	92	95	50	46
			Mean cover dwarf shrubs [%]	35	63	10	5	15	52	70	65	12	7	13	28
			Mean cover graminoids [%]	33	15	29	73	15	22	10	14	25	37	16	12
			Mean cover herbs [%]	11	7	17	22	4	7	6	8	17	16	4	2
			Mean cover bryophytes [%]	60	60	77	39	8	91	50	35	70	92	9	2
			Mean cover lichens [%]	4	13	17	19	24	5	15	20	22	4	26	13
			Mean cover soil [%]	5	4	1	3	13	1	4	8	1	2	11	26
			Mean cover stones [%]	1	1	6	6	37	0	1	0	7	3	39	29
			Mean cover litter [%]	5	18	4	17	8	3	27	22	5	2	5	25
			Mean canopy height [cm]	10	8	6	9	4	10	7	5	5	7	4	5
			Mean height stands max [cm]	20	18	15	22	18	20	16	18	15	15	19	17
			Mean pH value	6.3	6.2	5.8	6.1	6.6	6.1	6.5	5.8	5.9	5.6	6.3	8.0
			Mean organic matter rhizosphere [%]	24	25	13	20	2	42	20	11	11	20	2	3
			Mean depth organic layer [cm]	5	6	2	nd	0	7	7	2	2	2	0	0
			Mean shelter [1-5]	3.2	2.9	3.1	3.2	1.6	3.4	2.7	2.7	3.0	3.4	1.6	2.0
			Mean snow cover [1-5]	3.5	3.3	3.4	2.2	1.4	3.6	3.3	2.9	3.4	3.6	1.3	2.0
			Mean soil moisture [1-6]	4.5	3.7	3.8	2.8	1.9	4.4	3.6	2.8	3.6	4.2	1.9	2.1
			Mean species number of vascular plants	17	15	15	12	11	15	15	13	15	14	12	9
			Mean species number of mosses	11	12	17	12	9	14	11	12	16	19	9	7
			Mean species number of liverworts	1	2	5	1	1	2	1	2	4	5	1	0
			Mean species number of macrolichens	2	12	15	12	14	8	12	18	18	8	15	8
			Mean species number of microlichens	2	4	7	9	12	1	4	8	8	3	12	10
			Mean number of species	32	45	58	47	48	40	43	54	63	49	50	33
			d Saxifrago-Kobresietum (SK)												
LC	.	as2.1	*Kobresia simpliciuscula*	IV	r	.	.	.	.	+	.	.	.	.	.
L	lm	.	*Euphrasia frigida*	III	I	+	.	.	I	I	.	+	.	.	.
B	lm	.	*Pinguicula vulgaris*	III	r	.	.	.	+	.	.	.	.	.	.
AM	.	.	*Juncus castaneus*	III	r	+	.	.	+	.	.	.	I	.	.
A	.	.	*Juncus triglumis*	III	.	.	.	.	.	.	.	.	.	.	.
B	[lm!]	.	*Calamagrostis neglecta*	II	.	.	.	.	.	.	.	.	.	.	.
.	.	.	*Catoscopium nigritum*	II	.	.	.	.	.	.	.	.	.	.	.
L	.	as2.1	*Saxifraga aizoides*	II	.	.	.	.	.	.	.	.	.	.	.
			d Saxifrago-Kobresietum, Rhododendro-Vaccinietum												
L	(lm)	.	*Vaccinium uliginosum* ssp. *microphyllum*	IV	V	.	+	I	V	V	V	.	.	I	.
AC	lm!	A, d sA2	*Rhododendron lapponicum*	IV	V	.	I	+	V	V	IV	.	.	+	I
LC	lm!	.	*Betula nana*	IV	V	+	+	r	V	V	II	+	.	r	.
			d Rhododendro-Vaccinietum (RV)												
AC	.	.	*Pyrola grandiflora*	.	II	+	+	r	II	II	II	+	.	r	.
			d Rhododendro-Vaccinietum, Tortello-Caricetum												
.	.	.	*Peltigera leucophlebia*	+	III	III	.	.	IV	II	II	III	II	.	.
.	.	.	*Hylocomium splendens*	.	III	II	.	.	III	III	II	II	I	.	.
.	.	.	*Anastrophyllum minutum*	.	II	III	.	r	I	II	II	III	III	r	.
			ch / d Tortello-Caricetum (TC)												
.	.	.	*Tortella tortuosa* var. *arctica* (Arn.) Broth.	II^{1}	II^{+}	V^{4}	IV^{1}	I^{+}	II^{+}	III^{+}	II^{+}	V^{3}	V^{4}	I^{+}	.
LO	*h	.	*Salix herbacea*	.	.	IV	+	.	.	.	.	IV	IV	.	.
.	mh!	.	*Dactylina arctica* (M.J. Richardson) Nyl.	.	r	IV	.	+	.	+	+	IV	IV	+	.
.	.	.	*Polytrichum alpinum*	.	+	III	.	+	I	.	.	III	IV	+	.
.	.	.	*Scapania* spp.	I	I	III	.	r	I	I	+	III	III	r	.
.	[h!]	.	*Tritomaria quinquedentata*	.	r	III	.	.	+	.	.	III	I	.	.
A	[h!]	.	*Huperzia selago* ssp. *arctica*	.	r	II	.	.	.	.	+	I	III	.	.
A	[h!]	.	*Cardamine bellidifolia*	.	.	II	.	.	.	.	.	II	II	.	.
.	.	.	*Plagiochila porelloides*	.	r	II	.	.	.	.	+	II	II	.	.
			d SK, RV, TC, Thuidio-Kobresietum												
.	.	.	*Aulacomnium turgidum*	II	IV	V	III	+	V	III	V	V	V	+	.

Table 11. Continued.

L	.	.	*Carex bigelowii*	III	III	V	III	+	II	III	III	V	V	+	.
			ch / d Thuidio-Kobresietum (TK)												
LC	.	C	*Kobresia myosuroides*	I^{2a}	II^{1}	II^{1}	V^{3}	II^{1}	$+^{+}$	II^{1}	II^{2a}	III^{1}	.	II^{1}	V^{1}
.	.	.	*Thuidium abietinum*	.	I	.	V	I	.	I	III	.	.	I	I
			ch / d Carici-Dryadetum (CD)												
AC	.	A, as1.1	*Carex nardina*	.	.	.	.	V	.	.	.	.	.	IV	V
AC	.	.	*Calamagrostis purpurascens*	.	.	.	.	III	.	.	.	.	.	III	IV
			d Rhododendrenion lapponici												
.	.	.	*Tomentypnum nitens*	IV	IV	III	.	.	V	IV	+	III	III	.	.
.	.	d sA2	*Pedicularis flammea*	V	II	V	I	r	III	I	II	V	V	r	.
B	.	.	*Equisetum arvense*	IV	III	II	.	.	V	III	II	I	II	.	.
.	.	.	*Campylium stellatum*	IV	III	III	.	.	IV	III	.	III	III	.	.
.	.	d sA2	*Meesia uliginosa*	III	I	II	+	.	II	I	+	III	I	.	.
.	.	.	*Myurella tenerrima*	I	II	III	.	r	II	II	+	II	IV	r	.
AC	(h)	.	*Luzula arctica*	+	II	III	.	r	II	II	+	III	II	r	.
.	.	.	*Oncophorus wahlenbergii*	I	I	II	.	.	I	+	+	I	III	.	.
.	.	.	**d Dryadenion integrifoliae**												
A	.	.	*Poa glauca*	.	r	.	III	IV	.	+	+	.	.	V	II
AC			*Potentilla hookeriana / nivea*	.	.	.	III	III	.	.	.	.	.	III	III
.	.	.	*Encalypta rhaptocarpa*	.	r	.	IV	III	.	.	+	.	.	III	III
.	.	.	*Candelariella placodizans / terrigena* Räsänen	.	r	.	II	IV	.	.	+	.	.	IV	IV
LC	.	.	*Carex supina* ssp. *spaniocarpa*	.	r	.	II	III	.	.	+	.	.	IV	I
			Differential species of lower units												
.	.	.	*Aulacomnium palustre*	.	II	.	.	.	IV	+	.	.	.	.	.
L	.	.	*Salix arctophila*	III	II	I	.	.	IV	+	.	+	II	.	.
B	.	.	*Eriophorum angustifolium* ssp. *subarcticum*	III	II	I	.	.	III	+	.	.	III	.	.
L	.	.	*Carex rariflora*	II	I	+	.	.	III	+	.	.	I	.	.
LC	.	.	*Carex gynocrates*	III	I	+	.	.	III	+	.	.	I	.	.
L	.	d sA2	*Tofieldia pusilla*	IV	III	.	.	r	III	V	+	.	.	.	I
LC	[lm!]	.	*Pedicularis lapponica*	+	III	.	.	.	III	IV	I	.	.	.	.
.	.	.	*Sanionia uncinata*	II	III	II	+	r	IV	III	.	II	I	r	.
L	lm!	.	*Empetrum nigrum* ssp. *hermaphroditum*	II	II	.	.	.	III	III	.	.	.	.	.
.	.	.	*Hypnum holmenii* Ando	.	II	II	.	.	II	II	.	II	I	.	.
L	.	.	*Equisetum variegatum*	IV	II	.	.	.	II	II	.	.	.	.	.
.	.	.	*Alectoria ochroleuca*	+	III	II	.	III	I	IV	IV	II	I	IV	II
.	.	.	*Cladonia pyxidata*	+	III	III	IV	IV	I	III	V	III	II	V	II
.	.	.	*Bryoria nitidula*	.	III	III	I	V	I	IV	V	IV	.	V	IV
.	.	.	*Rinodina turfacea*	.	III	III	IV	V	+	III	V	IV	.	V	III
.	.	.	*Hypnum revolutum*	+	II	III	V	II	.	III	IV	IV	.	II	III
.	.	.	*Cladonia borealis*	.	II	III	IV	IV	I	III	IV	III	I	V	.
.	.	.	*Cetraria aculeata / muricata*	II	II	II	IV	IV	+	III	IV	II	.	IV	V
.	.	.	*Peltigera rufescens*	.	II	III	V	II	.	III	III	III	I	II	I
.	.	.	*Physconia muscigena*	+	II	II	V	IV	.	I	IV	II	.	IV	V
.	mh!	.	*Stereocaulon alpinum*	.	II	IV	I	III	+	I	IV	V	I	III	I
.	(mh)	.	*Sphaerophorus globosus*	.	I	III	+	V	.	.	III	IV	.	V	I
L	.	.	*Cerastium alpinum* ssp. *lanatum*	.	I	I	IV	III	.	I	III	I	.	III	.
.	.	.	*Tortula ruralis*	.	II	+	V	III	.	+	V	+	.	III	III
AC	[mh!]	.	*Hierochloe alpina*	.	I	I	I	I	.	.	IV	I	.	I	.
.	[mh!]	.	*Cladonia stricta* s.str.	.	I	II	III	II	I	.	III	II	.	II	I
.	.	.	*Peltigera malacea*	.	I	.	I	I	.	I	III	.	.	I	.
.	.	d sA2	*Rhytidium rugosum*	+	I	II	IV	+	+	I	III	II	I	+	.
.	.	.	*Cynodontium strumiferum*	.	I	+	.	I	.	+	III	+	.	I	.
.	.	.	*Distichium capillaceum / inclinatum*	V	III	IV	II	III	III	IV	III	V	II	III	V
A	*mh	d C	*Silene acaulis*	+	I	IV	+	IV	.	I	II	V	I	IV	III
.	.	.	*Thamnolia vermicularis*	II	IV	IV	V	V	II	IV	V	V	I	V	V
A	.	.	*Luzula confusa*	+	III	IV	I	II	II	III	V	V	.	II	.
AC	.	A	*Dryas integrifolia*	IV	IV	III	II	V	III	IV	IV	IV	.	V	V
.	.	.	*Collema* spp.	+	+	III	II	I	.	I	I	IV	I	I	III
.	.	.	*Psoroma hypnorum*	.	III	III	II	III	II	III	IV	IV	I	III	I

Table 11. Continued.

.	.	.	*Parmelia omphalodes*	.	+	II	+	III	.	+	I	III	I	IV	.
.	[mh!]	.	*Alectoria nigricans*	.	I	II	.	III	I	II	II	III	.	III	.
.	.	.	*Polytrichum juniperinum*	+	+	III	+	III	+	.	II	III	I	III	.
.	(mh)	.	*Cetraria islandica*	+	II	III	III	I	I	IV	II	III	I	II	.
A	[mh!]	d C, as1.1	*Saxifraga oppositifolia*	II	r	III	+	II	+	.	+	III	I	I	II
.	.	.	*Schistidium* sp.	.	.	III	.	.	.	.	.	III	I	.	.
.	.	.	*Nephroma expallidum*	+	II	II	+	.	I	II	III	III	.	.	.
.	*h	.	*Dactylina ramulosa* (Hook.) Tuck.	.	r	II	.	r	.	.	+	III	.	r	.
A	[h!]	.	*Papaver radicatum* coll.	.	r	II	+	+	.	.	I	II	.	+	.
.	.	.	*Scorpidium cossonii*	III	+	II			II	.	.	.	V	.	.
AC	[mh!]	A, d sA2	*Carex misandra*	II	+	II	.	.	I	.	+	I	IV	.	.
.	.	d sA2	*Fissidens osmundoides*	I	.	II	.	.	.	.	.	+	IV	.	.
.	.	.	*Philonotis fontana / tomentella*	+	+	II	.	.	II	.	.	.	IV	.	.
A	[h!]	.	*Juncus biglumis*	I	.	II	.	.	.	.	.	+	III	.	.
.	.	.	*Brachythecium turgidum*	I	r	I	.	.	I	.	.	.	III	.	.
.	(mh)	.	*Polytrichum piliferum*	.	r	.	.	IV	.	.	I	.	.	V	I
.	.	.	*Pohlia nutans*	.	III	I	.	IV	IV	II	III	I	I	IV	.
.	.	.	*Pseudephebe pubescens*	.	.	+	.	IV	.	.	.	.	I	IV	.
.	*mh	.	*Gymnomitrion corallioides*	.	+	I	.	III	.	.	II	II	.	IV	.
.	.	.	*Pohlia cruda*	.	II	IV	IV	III	+	II	II	IV	II	III	.
AC	.	.	*Saxifraga tricuspidata*	.	r	.	I	III	.	.	+	.	.	III	.
.	.	.	*Pertusaria coriacea*	.	.	+	+	II	.	.	.	+	.	III	.
A	mh	.	*Draba nivalis*	.	.	+	+	III	.	.	.	+	.	III	.
.	.	.	*Festuca brachyphylla*	+	+	II	II	II	+	+	I	II	I	II	.
.	.	.	*Stereocaulon arenarium*	.	.	.	+	II	.	.	.	.	.	II	.
.	.	.	*Ophioparma ventosa*	.	.	.	.	II	.	.	.	.	.	II	.
.	.	.	*Arthrorhaphis citrinella*	.	.	.	.	II	.	.	.	.	.	II	.
.	*mh	.	*Lopadium pezizoideum*	.	+	I	.	II	.	I	I	I	.	II	.
L	(lm)	.	*Salix glauca* coll.	II	III	I	III	II	II	III	V	+	I	II	.
A	mh	.	*Minuartia rubella*	.	.	.	+	II	.	.	.	.	.	II	.
.	.	.	*Cladonia amaurocraea*	.	III	II	III	II	II	III	IV	III	I	II	.
.	.	.	*Dicranum acutifolium / brevifolium*	+	III	III	IV	II	III	III	V	III	II	II	.
.	.	.	*Cladonia arbuscula* ssp. *mitis*	.	II	III	I	II	II	II	III	IV	II	II	.
.	.	.	*Pertusaria subobducens* Nyl.	.	.	.	.	II	.	.	.	.	.	II	.
.	.	.	*Brodoa oroarctica*	.	.	.	+	I	.	.	.	.	.	II	.
L	[lm!]	d sA2	*Carex capillaris* coll.	III	II	+	+	+	I	II	II	+	.	.	III
.	.	.	*Fulgensia bracteata*	.	.	.	.	+	.	.	.	.	.	.	III
LC	.	.	*Artemisia borealis*	.	r	.	+	I	.	+	.	.	.	+	III
.	.	.	*Stegonia latifolia*	.	.	.	.	+	.	.	.	.	.	.	III
AC	.	C	*Lesquerella arctica*	.	.	.	.	r	.	.	.	.	.	.	II
			Some preferential species of ass.												
A	.	.	*Carex maritima*	III	r	I	.	.	+	.	.	.	II	.	.
.	*mh	.	*Racomitrium lanuginosum*	+	I	V	+	II	+	+	II	V	IV	II	.
AC	.	.	*Armeria scabra* ssp. *sibirica*	+	+	IV	I	r	.	II	.	IV	II	r	.
.	mh!	.	*Ptilidium ciliare*	.	I	IV	.	.	I	.	II	IV	III	.	.
.	.	.	*Hypnum bambergeri*	I	+	III	.	r	I	I	.	IV	II	.	II
.	.	.	*Myurella julacea*	II	I	V	III	I	I	II	.	V	V	I	I
.	.	.	*Pertusaria panyrga*	.	+	.	.	III	.	.	II	.	.	III	III
.	.	.	*Hypogymnia austerodes*	.	+	I	+	III	.	+	I	II	.	III	IV
			other Carici-Kobresietea												
AC	(mh)	C	*Carex rupestris*	+	II	V	V	III	II	I	III	V	III	III	II
.	.	.	*Ditrichum flexicaule*	III	II	V	III	II	II	III	II	IV	V	II	III
.	.	.	*Cladonia pocillum*	II	II	V	V	II	II	II	III	V	IV	II	III
AC	.	A	*Pedicularis lanata*	+	I	+	.	.	+	II	I	+	.	.	.
L	lm	A	*Carex scirpoidea*	I	II	.	+	r	II	III	+	.	.	r	.
AM	[mh!]	A	*Campanula uniflora*	.	r	II	+	II	.	.	I	II	I	II	.
AC	.	A	*Arnica angustifolia*	.	r	.	II	.	.	.	I	.	.	.	.
			others [4]												
.	.	.	*Bryum* spp.	V	IV	V	V	V	III	V	V	V	V	IV	V

Table 11. Continued.

.	.	.	*Flavocetraria nivalis*	III	IV	V	IV	V	III	V	V	V	III	V	V
A	.	.	*Polygonum viviparum*	V	V	V	V	II	V	V	V	V	V	II	IV
.	.	.	*Ochrolechia frigida*	II	IV	V	IV	IV	III	IV	IV	V	IV	V	III
.	.	.	*Flavocetraria cucullata*	II	V	V	V	III	IV	V	V	V	IV	III	V
.	.	.	*Cephaloziella* spp.	+	III	IV	IV	III	II	III	IV	IV	IV	III	II
.	.	.	Microlichen indet.	I	I	III	III	IV	+	I	II	III	I	IV	V
.	.	.	*Cladonia gracilis*	+	III	IV	IV	I	III	III	IV	IV	II	I	.
.	.	.	*Ceratodon purpureus*	I	II	+	III	III	I	II	III	+	.	IV	III
.	.	.	*Poa pratensis* coll. / *arctica*	II	III	IV	I	II	II	III	III	V	III	II	.
.	.	.	*Lecidea* spp.	.	I	I	III	IV	.	I	II	I	.	IV	III
.	.	.	*Cladonia chlorophaea* s.l.	.	III	I	I	II	III	III	V	I	.	II	I
.	.	.	*Lophozia* spp.	I	III	III	+	I	III	III	II	III	III	II	.
.	.	.	*Lecanora epibryon*	+	I	.	II	III	.	II	I	.	.	III	V
.	.	.	*Ochrolechia upsaliensis*	.	I	I	II	III	.	II	I	I	.	III	II
.	.	.	*Isopterygiopsis pulchella*	+	II	III	II	I	I	II	I	III	II	+	I
.	.	.	*Bryocaulon divergens*	.	II	I	.	II	+	II	II	II	.	II	I
.	[*mh]	.	*Dicranum spadiceum*	.	+	II	III	II	+	+	I	II	II	II	.
.	.	.	*Peltigera didactyla*	.	II	.	I	I	II	II	III	.	.	I	I
.	.	.	*Placynthiella icmalea*	+	I	III	II	I	I	II	II	III	II	I	.
.	.	.	*Caloplaca tiroliensis*	.	I	I	IV	II	.	I	I	II	.	II	III
.	.	.	*Bryonora castanea* s.str.	.	+	I	IV	II	.	+	I	II	.	II	I
.	.	.	*Peltigera canina*	I	II	II	+	+	II	I	II	II	I	+	.
.	.	.	*Peltigera polydactylon* s.l.	.	II	I	II	r	III	I	II	I	.	r	.
L	.	.	*Stellaria longipes* coll.	.	II	II	+	.	II	II	III	II	.	.	.
.	.	.	*Peltigera aphthosa*	.	I	II	+	I	+	II	II	II	I	I	.
			No.	**1**	**2**	**3**	**4**	**5**	**2.1**	**2.2**	**2.3**	**3.1**	**3.2**	**5.1**	**5.2**

Explanations [1] Böcher (1975), s. table 3. [2] Altitudinal indicator value s. chapter 4.2.1, [3] Diagnostic value (Daniëls 1982, 1994, Dierssen 1996, Lünterbusch & Daniëls 2004): C: Carici-Kobresietea, A: Dryadion integrifoliae, sA1: Dryadenion, as1.1: Carici-Dryadetum, sA2: Rhododendrenion, as2.1: Saxifrago-Kobresietum. [4] Species with low presence not shown. [5] Vegetation types: SK: Saxifrago-Kobresietum, RV: Rhododendro-Vaccinietum (RVcAul: RV campylietosum var. of *Aulacomnium palustre* , RVcAle: RV campylietosum var. of *Alectoria ochroleuca* , RVsph: RV sphaerophoretosum), TC: Tortello-Caricetum (TCluz: TC luzuletosum, TCsco: TC scorpidietosum), TK: Thuidio-Kobresietum, CD: Carici Dryadetum (CDsph: CD sphaerophoretosum, CDles: CD lesquerelletosum).

Addenda Table 6 (other species with presence < 9):

1*:* *Dicranum elongatum* 1, *Equisetum scirpoides* 1, *Peltigera canina* +, *Pertusaria panyrga* +, *Rhytidium rugosum* +, *Scapania* sp. +; **2:** *Dicranum elongatum* 2a, *Rhytidium rugosum* 2a, *Cladonia fimbriata* 1, *Draba lactea* 1, *Equisetum scirpoides* 1, *Cerastium alpinum* ssp. *lanatum* +, *Cladonia cornuta* +, *Papaver radicatum* coll. +; **3:** *Rhytidium rugosum* 2b, *Equisetum scirpoides* 2a, *Ceratodon purpureus* +, *Cladonia carneola* 1, *Ceratodon purpureus* +, *Lecidea* sp. +, *Salix arctophila* +; **4:** *Equisetum arvense* 1, *Bryocaulon divergens* +, *Cerastium alpinum* ssp. *lanatum* +, *Cladonia cornuta* +, *Draba lactea* +, *Festuca brachyphylla* +, *Tortula ruralis* +; **5:** *Vaccinium vitis-idaea* ssp. *minus* 2b, *Carex rupestris* +; **6:** *Equisetum arvense* 2m, *Vaccinium vitis-idaea* ssp. *minus* 1, *Calypogeia sphagnicola* 1, *Cephalozia* sp. +, *Pedicularis lapponica* +, *Saxifraga oppositifolia* r; **7:** *Dicranum elongatum* 2b, *Dicranum flexicaule / fuscescens* 2b, *Cladonia pocillum* 1, *Ochrolechia inaequatula* 1, *Peltigera canina* 1, *Bryocaulon divergens* +, *Cladonia squamosa* +, *Parmelia omphalodes* +, *Pseudephebe pubescens* +, *Rhytidium rugosum* +; **8:** *Dicranum flexicaule / fuscescens* 3, *Equisetum arvense* 2a, *Peltigera rufescens* 1, *Tofieldia pusilla* 1, *Cephalozia* sp. +, *Cladonia carneola* +, *Distichium capillaceum / inclinatum* +, *Ditrichum flexicaule* +, *Meesia uliginosa* +, *Pedicularis lanata* +, *Plagiochila porelloides* +, *Cerastium alpinum* ssp. *lanatum* r, *Saxifraga oppositifolia* r; **9:** *Equisetum arvense* 1, *Peltigera canina* 1, *Tortula ruralis* 1, *Ceratodon purpureus* +, *Cynodontium* sp. +, *Festuca brachyphylla* +, *Peltigera rufescens* +, *Rhytidium rugosum* +; **10:** *Vaccinium vitis-idaea* ssp. *minus* 1, *Brachythecium* sp. +, *Diapensia lapponic* a +, *Lecidea* sp. +, *Pedicularis lapponica* +; **11:** *Nephroma arcticum* 2b, *Dicranum flexicaule / fuscescens* 2a, *Cladonia phyllophora* 1, *Equisetum arvense* 1; **12:** *Diapensia lapponica* 1, *Equisetum arvense* 1, *Dicranum scoparium* 1, *Tofieldia pusilla* 1, *Cladonia squamosa* +, *Dicranum elongatum* +, *Straminergon stramineum* +, *Pseudephebe pubescens* r, *Saxifraga* oppositifolia r; **13:** *Diapensia lapponica* 1, *Cladonia phyllophora* +, *Polytrichum hyperboreum* +, *Protothelenella sphinctrinoidella* +, *Rhytidium rugosum* +, *Baeomyces cf. placophyllus* r, *Pseudephebe minuscula* r; **14:** *Ceratodon purpureus* 1, *Dicranum flexicaule / fuscescens* 1, *Cladonia bellidiflora* +, *Festuca brachyphylla* +; **15:** *Dicranum elongatum* 1, *Cladonia cenotea* +, *Peltigera canina* +; **16:** *Pedicularis lapponica* +; **17:** *Dicranum flexicaule / fuscescens* 1, *Buellia papillata* +, *Cephalozia* sp. +, *Cladonia trassii* +, *Cnestrum alpestre* +; **18:** *Dicranum scoparium* 1, *Bryocaulon divergens* +, *Cephalozia* sp. +, *Lepraria cacuminum* +, Moss indet. +, *Pohlia andrewsii* +, *Pseudephebe pubescens* +, *Peltigera rufescens* r; **19:** *Stereocaulon paschale* 1, Ceratodon purpureus +, *Cladonia deformis* +, *Cladonia phyllophora* +, *Cladonia pocillum* +, Cladonia *squamosa* +, *Diapensia lapponica* +, Microlichen indet. +, *Polytrichum hyperboreum* +, *Cladonia cariosa* r; **20:** *Dicranum flexicaule / fuscescens* 2a, *Polytrichum hyperboreum* 2a, *Cladonia squamosa* 1, *Stereocaulon groenlandicum* (Dahl) Lamb. 1, *Tortula ruralis* 1, *Bryocaulon divergens* +, *Buellia papillata* +, *Caloplaca tiroliensis* +, *Cladonia deformis* +, *Cladonia pocillum* +, *Cladonia* sp. +, *Cynodontium strumiferum* +, cf. *Dibaeis baeomyces* +, *Lecidea* sp. +, *Parmelia omphalodes* +, *Protothelenella sphinctrinoides* +, *Racomitrium canescens* +, *Stereocaulon paschale* +; **21:** *Dicranum elongatum* 2a, *Barbilophozia binsteadii* 1, *Cinclidium arcticum / stygium* 1, *Equisetum arvense* 1, *Pedicularis flammea* 1, *Saxifraga foliolosa* 1, *Cephalozia* sp. +, *Cladonia cornuta* +, *Cladonia squamosa* +, *Draba lactea* +, *Eriophorum angustifolium* ssp. *subarcticum* +, *Myurella tenerrima* +, *Protothelenella sphinctrinoidella* +, *Saxifraga nivalis* +, *Juncus biglumis* +, *Juncus castaneus* +, *Saxifraga hyperborea* +; **22:** *Barbilophozia binsteadii* 2a, *Dicranum elongatum* 2a, *Draba lactea* 1, *Cladonia ecmocyna* +, *Cladonia phyllophora* +, *Oxyria digyna* +, *Pohlia andrewsii* +; **23:** *Oxyria digyna* 1, *Saxifraga oppositifolia* 1, *Baeomyces rufus* +, *Bartramia ithyphylla* +, *Caloplaca* sp. +, *Caloplaca tetraspora* +, *Cladonia pocillum* +, *Collema* sp. +, *Ditrichum flexicaule* +, *Jungermannia* sp. +, *Oncophorus wahlenbergii* +, *Papaver radicatum* coll. +, *Pedicularis flammea* +, *Peltigera canina* +, *Peltigera rufescens* +, *Psilopilum cavifolium* +, *Tetralophozia setiformis* +, *Tetraplodon mnioides* +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. +, *Racomitrium canescens* +, *Encalypta* sp. r, *Lecidea* sp. r; **24:** *Racomitrium heterostichum* 1, *Bryocaulon divergens* +, *Caloplaca ammiospila* +, *Cerastium alpinum* ssp. *lanatum* +, *Cladonia verticillata* +, *Cladonia* sp. +, *Lecidea* sp. +, *Dicranum groenlandicum* +, *Ochrolechia inaequatula* +, *Rinodina roscida* +, *Tortula ruralis* +, *Cladonia fimbriata* r, *Saxifraga tricuspidata* r; **25:** *Cladonia squamosa* +, *Papaver radicatum* coll. +, *Protothelenella sphinctrinoidella* +, *Rhytidium rugosum* +, *Jungermannia* sp. r, *Saxifraga oppositifolia* r; **26:** *Dicranum elongatum* 2a, *Equisetum arvense* 1, *Stereocaulon rivulorum* 1, *Cladonia squamosa* +, *Cynodontium strumiferum* +, *Oxyria digyna* +, *Pohlia andrewsii* +, Pseudephebe *pubescens* +; **27:** *Oxyria digyna* 1, *Potentilla hyparctica* 1, *Papaver radicatum* coll. +, *Pohlia andrewsii* +, *Draba lactea* r; **28:** *Dicranum flexicaule / fuscescens* 1, *Buellia papillata* +, *Cladonia trassii* +, *Peltigera rufescens* +, *Pohlia proligera* +, *Racomitrium canescens* +, Microlichen indet. r; **29:** *Polytrichum sexangulare* 1, *Bryocaulon divergens* +, *Cephalozia* sp. +, *Cladonia pocillum* +, *Draba lactea* +, Microlichen indet. +, *Oncophorus wahlenbergii* + , *Plagiochila porelloides* +, *Pseudephebe pubescens* +, *Racomitrium canescens* +, *Saxifraga cernua* +, *Saxifraga oppositifolia* +, *Scapania* sp. +; **30:** *Racomitrium canescens* 2a, *Tortula ruralis* 2a, *Cladonia pocillum* 1, *Collema ceraniscum* 1, *Saxifraga oppositifolia* 1, *Caloplaca* sp. +, *Caloplaca tetraspora* +, *Deschampsia pumila* +, *Ditrichum flexicaule* +, *Distichium capillaceum / inclinatum* +, *Draba lactea* +, *Meesia uliginosa* +, *Minuartia biflora* +, *Myurella tenerrima* +, *Papaver radicatum* coll. +, *Pedicularis flammea* +, *Peltigera canina* +, *Plagiochila porelloides* +, *Saelania glaucescens* +, *Solorina octospora* +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. +, *Cerastium arcticum* r, *Pertusaria dactylina* r; **31:** *Dicranum* sp. 2b, *Distichium capillaceum / inclinatum* 1, *Potentilla hyparctica* 1, *Stereocaulon* sp. 1, *Caloplaca ammiospila* +, *Caloplaca tiroliensis* +, *Caloplaca tornoensis* +, *Candelariella* sp. +, *Collema* sp. +, *Lecidea* sp. +, Microlichen indet. +, *Pedicularis flammea* +, *Tortula ruralis* +; **32:** *Amblystegium serpens* +, *Cladonia fimbriata* +, *Meesia uliginosa* +, *Massalongia carnosa* +, *Pedicularis flammea* +, *Peltigera rufescens* +, *Physconia muscigena* +, *Scapania* sp. +, *Tortella tortuosa* var. *arctica* (Arn.) Broth. r; **33:** *Campylium* sp. 1, Microlichen indet. 1, *Racomitrium heterostichum* 1, *Caloplaca ammiospila* +, *Candelariella* sp. +, *Ceratodon purpureus* +, *Lecidea* sp. +, *Lepraria* sp. +, Liverwort indet. +, *Pertusaria panyrga* +, *Rhytidium rugosum* +, *Collema ceraniscum* r, *Oligotrichum falcatum* Steere r, *Saxifraga oppositifolia* r; **34:** *Distichium capillaceum / inclinatum* +, *Jungermannia* sp. +, *Lecidea* sp. +, Microlichen indet. +, *Oncophorus virens* +, *Peltigera canina* +, *Psilopilum laevigatum* +, *Racomitrium heterostichum* +, *Saelania glaucescens* +; **35:** *Potentilla hyparctica* 1, Microlichen indet. +, *Saxifraga nivalis* +, *Candelariella* sp. r.

Table 12. Carici nardinae-Dryadetum integrifoliae, Thuidio abietini-Kobresietum myosuroidis.

Altitudinal indicator value	Vegetation type	CD lesquerelletosum																			
									low-elev. form												
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
	Author	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS
	Relevé area [m²]	4	3	5	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4
	Size of the stand [10 m²]	10	2	100	6	3	5	1000	50	30	5	2	5	10	20	20	30	30	3	1000	1000
	Altitude [m a.s.l.]	100	245	210	355	440	455	470	185	185	185	410	425	440	440	445	445	450	465	495	515
	Slope [°]	6	12	16	8	0	2	2	6	2	4	2	16	10	4	10	16	10	8	6	12
	Aspect	nw	nw	nne	sse	-	nnw	se	nne	n	nne	se	ne	ese	ne	se	ne	nne	ne	s	n
	Cover total [%]	85	60	35	30	40	20	55	25	40	30	50	60	50	40	65	75	40	95	50	50
	Cover dwarfshrubs [%]	40	45	30	20	25	15	20	0	7	2	25	7	10	15	15	20	2	50	30	30
	Cover graminoids [%]	30	10	5	10	15	7	6	2	5	5	20	6	25	25	5	20	2	10	5	5
	Cover herbs [%]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Cover bryophytes [%]	5	2	2	2	2	2	2	2	5	2	6	20	2	2	2	10	2	30	5	10
	Cover lichens [%]	40	5	10	2	2	2	30	20	25	25	20	30	30	2	50	40	35	40	30	20
	Cover soil [%]	10	15	35	30	25	55	15	5	10	10	5	10	10	20	10	20	20	2	0	25
	Cover stones [%]	5	25	30	40	35	25	40	70	50	60	45	30	40	40	25	5	40	2	50	25
	Cover litter [%]	50	50	30	10	15	10	10	2	5	2	5	0	0	0	0	0	0	8	25	50
	Canopy height [cm]	4	6	3	5	7	5	4	2	3	1	4	3	3	5	4	4	3	4	3	3
	Height stand max. [cm]	18	22	14	15	20	19	10	15	18	20	20	25	13	23	35	22	24	21	18	31
	PH value	8.1	8.3	7.7	7.2	8.8	8.4	7.7	6.5	6.5	6.5	6.9	6.3	6.2	6.8	6.4	6.3	6.1	5.9	6.7	6.3
	Conductivity [µS/cm]	204	188	124	214	267	331	117	26	41	51	53	21	13	49	52	22	10	46	52	33
	Organic matter rhizosphere [%]	7	4	1	1	2	4	2	2	0	5	2	1	1	2	1	2	1	4	2	2
	Shelter [1-5]	1	2	2	4	2	1	2	1	1	1	2	1	2	2	1	1	1	2	2	2
	Snow cover [1-5]	2	2	2	3	2	1	2	1	1	1	2	1	2	2	1	1	1	2	1	2
	Soil moisture [1-6]	1	2	2	3	2	3	2	1	1	1	2	2	2	2	2	2	2	3	2	2
	Number of species	42	27	43	26	27	33	36	29	31	37	57	40	48	52	26	54	28	71	40	53
	ch / d Carici-Dryadetum (CD)																				
.	*Carex nardina*	1	2a	.	2a	2a	2a	2a	.	.	.	2a	+	2b	2b	1	1	+	2a	.	+
.	*Calamagrostis purpurascens*	+	1	.	+	.	+	+	1	1	1	+	+	r	.	+	.	+	.	+	1
	d Carici-Dryadetum (against Thuidio-Kobresietum)																				
.	*Dryas integrifolia*	3	3	3	2b	2b	2a	2b	.	2a	1	2b	2a	2a	2a	2a	2a	+	2a	2b	3
.	*Bryoria nitidula*	+	r	+	.	+	.	1	1	1	1	+	1	1	+	1	1	1	1	+	1
.	*Hypogymnia austerodes*	+	+	+	.	+	+	.	+	.	.	+	.	.	+	+	.	.	+	.	+
*mh	*Silene acaulis*	.	.	1	.	+	+	2a	.	.	.	1	+	+	1	+	1	1	+	.	.
.	*Pertusaria panyrga*	+	+	+	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	+	.
.	*Alectoria ochroleuca*	r	.	+	.	.	.	.	.	.	+	.	+	.	.	+	1	.	+	+	1
	d CD lesquerelletosum																				
[lm!]	*Carex capillaris* coll.	.	.	1	2a	2a	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Fulgensia bracteata*	+	.	.	1	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Artemisia borealis*	r	.	r	+	+	.	.	.	.	.	+	.	+	+	.	.	.	.	.	.
.	*Stegonia latifolia*	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Lesquerella arctica*	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	d CD sphaerophoretosum																				
.	*Sphaerophorus globosus*	.	.	r	.	.	.	.	1	1	2a	1	2a	.	+	1	1	1	1	2a	1
.	*Polytrichum piliferum*	.	.	.	.	.	.	1	1	1	1	+	2b	1	1	1	2a	1	1	1	1
.	*Pohlia nutans*	.	.	.	.	.	.	.	+	.	.	+	1	+	.	+	+	+	+	+	.
.	*Pseudephebe pubescens*	.	.	.	.	.	.	.	+	+	+	.	+	+	+	1	+	+	.	+	+
.	*Parmelia omphalodes*	.	.	.	.	.	.	.	+	.	+	+	+	.	+	.	+	+	.	+	+
.	*Polytrichum juniperinum*	.	.	.	.	.	.	.	1	.	.	.	+	.	+	.	2a	.	1	.	.
.	*Saxifraga tricuspidata*	.	.	.	.	.	.	.	+	r	+	.	+	.	.	.	.	.	.	+	+
.	*Pertusaria coriacea*	.	.	.	.	.	.	.	+	1	.	.	1	+	.	.	.	.	.	.	+
.	*Stereocaulon arenarium*	.	.	.	.	.	.	.	.	.	+	+	.	.	.	2b	+	1	+	.	.
.	*Arthrorhaphis citrinella*	.	.	.	.	.	.	.	+	.	.	+	.	+	.	.	.	.	.	.	.
.	*Ophioparma ventosa*	.	.	.	.	.	.	.	1	1	1	.	+	.	.	+	.	+	.	+	.
	d CD sphaerophoretosum, Thuidio-Kobresietum																				
.	*Cladonia borealis*	.	.	.	.	.	.	.	1	1	+	.	+	+	+	+	+	+	+	+	1
.	*Festuca brachyphylla*	.	.	.	.	.	.	.	.	+	.	.	r	r	.	.	.	.	+	.	.
	ch / d Thuidio-Kobresietum myosuroidis (TK)																				
.	*Kobresia myosuroides*	2a	1	1	+	2a	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+
.	*Thuidium abietinum*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Peltigera rufescens*	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	1	.	+
.	*Cladonia gracilis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
.	*Tortella tortuosa* var. *arctica* (Arn.) Broth.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.
.	*Rhytidium rugosum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Myurella julacea*	.	.	.	.	+	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.
.	*Carex bigelowii*	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
.	*Aulacomnium turgidum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Dicranum groenlandicum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Arnica angustifolia*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	d mid-/high-elevation forms CD sphaerophoretosum																				
*mh	*Gymnomitrion corallioides*	.	.	.	.	.	.	.	.	.	.	.	+	.	+	2a	+	1	1	.	2a
mh!	*Stereocaulon alpinum*	.	.	.	.	.	.	2a	.	.	.	+	.	2a	+	.	+	2a	.	+	1
[mh!]	*Alectoria nigricans*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	r	.	+	+	+
mh	*Draba nivalis*	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	1	.	.	.	.
mh	*Minuartia rubella*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.
.	*Pertusaria subobducens* Nyl.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.
.	*Stereocaulon glareosum*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2a	.	1

Table 12. Continued.

Carici-Dryadetum sphaerophoretosum																											
mid-elevation form																high-elevation form											
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**
CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	FD	CS	CS	CS	CS	CS	FD	FD	CS
4	4	4	4	4	3	3	2	4	3	3	4	4	3	4	2.3	4	1.5	3	4	6	4	4	4	4	4	4	4
250	50	50	200	3	2	15	500	30	8	40	250	100	100	3	5	250	1	1000	1000	1000	1000	500	300	100	80	500	50
550	570	585	590	590	600	605	605	605	605	610	625	630	645	710	820	800	915	920	925	930	935	940	940	950	970	980	995
10	14	0	18	12	10	10	4	2	12	4	8	2	6	4	0	4	10	0	5	4	2	12	14	4	10	2	0
sse	nnw	-	ssw	ese	s	nne	nne	ne	sw	n	sse	n	nw	sw	-	ne	ese	-	s	sse	sw	s	ssw	nw	w	nne	-
50	75	60	75	75	70	50	30	55	75	25	15	20	40	90	65	30	75	25	70	30	35	35	50	50	55	20	35
15	35	20	20	30	0	20	10	30	20	0	2	7	5	2	7	2	40	10	25	2	10	0	0	2	5	5	2
2	20	15	30	60	25	5	2	20	30	5	5	5	5	20	40	15	25	5	15	20	15	25	30	25	25	10	7
2	2	2	2	5	5	2	2	2	7	2	2	2	2	10	2	5	2	2	10	5	5	5	15	10	10	7	5
2	2	10	5	35	10	5	2	10	15	2	2	2	2	30	10	5	10	5	15	5	10	5	30	20	10	5	15
30	30	30	40	25	40	25	15	20	20	20	7	10	30	75	25	20	40	5	50	15	15	20	5	30	35	10	15
30	5	5	5	20	10	10	20	15	20	25	5	20	10	5	10	10	20	10	10	10	15	0	5	0	5	5	5
20	20	35	20	5	20	40	50	30	5	50	80	60	50	5	25	60	5	65	20	60	50	65	45	50	40	75	60
5	2	0	5	25	0	0	0	5	25	0	2	5	2	0	5	5	25	0	0	0	2	2	2	0	0	0	0
4	5	2	5	4	3	2	2	2	5	3	5	5	1	3	4	5	4	2	6	5	3	5	6	5	10	3	5
21	8	20	19	21	15	20	6	21	15	16	22	10	12	20	15	22	16	14	12	15	15	30	23	22	20	10	18
5.9	5.9	6.6	6.4	5.9	6.5	6.3	6.4	6.0	6.2	6.4	6.1	6.6	6.0	6.3	6.4	6.3	5.5	6.7	6.1	6.8	6.2	6.2	6.3	5.9	6.6	6.7	5.9
50	39	14	20	25	19	19	17	28	35	19	23	30	24	34	42	29	27	15	23	27	16	23	24	17	12	37	17
1	4	0	2	3	2	2	2	2	5	2	1	2	2	3	5	2	0	0	3	1	1	2	3	2	1	1	3
1	2	2	2	3	2	1	1	1	2	1	1	1	1	1	1	1	3	1	2	1	3	3	3	1	2	1	2
1	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	2	1	1	1	1	1	2
2	1	2	1	2	1	1	1	1	1	1	2	2	1	3	3	2	1	3	2	3	3	3	2	3	1	1	3
39	53	52	63	68	48	44	31	56	59	39	47	33	33	54	54	44	61	58	66	71	60	59	63	56	66	52	62
1	.	2b	1	.	2a	2a	1	2a	2b	2a	1	2a	2a	2b	3	2a	.	+	.	2a	1	1	2a	2b	.	2m	2a
r	.	r	r	.	1	r	.	.	.	.	+	.	1	+	.	1	.	.	.	.	1	2a	2a	.	1	.	.
2a	3	2b	2b	3	.	2b	2a	3	2b	.	+	2a	2a	+	2a	+	3	2a	2b	.	2a	.	.	.	+	r	.
+	+	1	.	1	1	1	.	+	.	+	+	1	1	1	1	1	1	+	+	1	+	1	1	+	+	+	1
.	+	.	.	.	.	+	.	+	.	.	.	.	.	+	+	.	+	+	+	+	+	.	+	+	+	+	+
+	+	+	r	1	.	+	r	+	1	.	+	+	r	+	.	r	.	.	1	1	2a	+	1	1	+	1	1
.	1	.	+	.	.	.	+	+	+	.	+	.	+	.	+	.	+	.	+	1	2a	.	+	.	+	+	.
.	+	1	1	1	1	.	+	+	+	.	.	.	.	.	+	.	+	.	+	1	+	1	1	+	+	+	+
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	+	2a	1	1	1	2a	1	1	.	2a	1	1	2a	2a	+	2a	1	1	+	1	1	2a	1	2a	1	1	1
1	1	2a	1	.	2a	1	.	1	.	1	1	+	+	2a	.	2a	.	+	.	+	.	1	2a	2b	1	1	2a
+	.	+	+	.	.	.	.	+	.	+	+	+	+	2a	+	+	+	+	+	+	+	r	.	+	+	.	+
.	.	.	+	.	+	1	+	1	.	.	1	1	1	.	+	1	.	+	.	1	1	1	1	1	.	+	1
.	+	.	+	.	.	.	.	+	.	+	+	.	.	+	+	+	.	+	+	1	r	+	1	+	+	+	+
.	.	+	.	2a	.	.	1	r	+	.	.	.	.	.	2a	+	2a	1	+	+	2a	1	+	.	1	r	.
.	.	.	+	.	+	+	.	r	r	.	.	+	.	1	+	+	r	.	.	+	.	+	.	+	.	.	.
.	.	+	+	.	+	.	.	.	.	+	+	.	.	+	.	.	+	.	+	+	+	.	.	1	.	.	+
.	.	+	2a	.	1	+	1	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	2a	.	1	1	+	.
.	.	.	.	.	+	.	.	.	.	.	r	.	.	+	+	+	.	+	.	.	r	.	+	.	.	+	.
.	.	+	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	+	.	.	.	.	.	.	.
1	+	+	1	1	2a	+	+	1	.	+	1	.	+	2a	+	1	+	.	+	1	1	1	1	1	1	+	1
r	.	r	.	r	.	.	.	.	r	.	.	.	.	.	.	.	+	.	.	1	.	+	+	.	r	.	+
.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	2a	.	.	.	2a	.	.	1	.	2a	1	.	.
.	.	.	+	2a	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.
+	.	.	+	.	+	.	.	.	+	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.
.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	+	.	r
.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.
.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	r	.	+	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.
.	1	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	r	+	.	.	.	.	.	.	.	.
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.	.	+	+	.	+	2b	2a	2a	.	+	.	+	.	2a	.	.	+	+	+	2a	1	+	+	2a	+	+	2a
1	.	+	2a	1	.	.	.	.	2a	.	.	.	.	+	.	.	.	1	2a	+	.	+	+	.	.	.	2a
.	+	.	1	+	.	+	+	1	+	.	+	.	.	+	+	+	+	.	+	+	.	+	.	+	.	+	+
+	.	.	.	.	+	1	+	+	+	1	.	r	.	1	1	+	.	+	.	1	1	+	+	1	r	+	1
.	.	r	.	.	.	+	1	.	1	.	.	.	.	.	1	+	.	.	.	.	+	+	1	+	r	+	.
.	.	2a	.	.	.	+	.	+	.	.	+	.	.	1	.	.	1	.	.	+	.	.	.	.	.	.	.
1	.	.	.	.	.	+	.	.	.	.	+	.	+	.	.	+	.	.	+	.	.	.	.	.	.	+	.

Table 12. Continued.

Thuidio abietini-Kobresietum myosuroidis										Presence	CD les	CD sph	TK	Vegetation type
49	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**		**1-7**	**8-48**	**49-58**	Relevé number
CS	CS	CS	CS	CS	CS	CS	CS	CS	CS					Author
4	4	4	4	4	3	3	4	3	4		.	.	.	Relevé area [m²]
50	5	10	200	5	20	2	30	1	2		161	234	33	Size of the stand [10 m²]
45	520	530	535	550	570	570	575	600	695		325	640	519	Altitude [m a.s.l.]
0	4	2	2	14	10	10	6	20	12		7	7	8	Slope [°]
-	sw	n	sse	sw	s	w	s	s	sse		.	.	.	Aspect
90	90	98	95	95	95	85	99	70	95		46	50	91	Cover total [%]
2	5	7	20	7	0	0	8	0	2		28	13	5	Cover dwarfshrubs [%]
80	80	80	50	70	80	75	75	60	80		12	16	73	Cover graminoids [%]
2	25	25	20	30	20	30	35	7	30		2	4	22	Cover herbs [%]
40	60	60	20	30	40	60	50	5	25		2	9	39	Cover bryophytes [%]
40	5	15	40	30	10	5	5	5	30		13	26	19	Cover lichens [%]
10	0	0	2	5	2	10	0	5	0		26	11	3	Cover soil [%]
0	10	2	5	0	2	5	2	25	5		29	39	6	Cover stones [%]
30	10	15	25	10	40	10	5	25	0		25	5	17	Cover litter [%]
10	8	8	10	9	10	10	11	8	6		5	4	9	Canopy height [cm]
23	20	27	18	16	22	27	21	22	23		17	19	22	Height stand max. [cm]
6.5	6.6	5.5	6.4	6.5	6.6	6.1	5.4	5.7	5.5		8.0	6.3	6.1	PH value
153	141	39	48	120	209	41	86	43	61		206	29	94	Conductivity [µS/cm]
41	35	14	6	15	28	6	35	8	9		3	2	20	Organic matter rhizosphere [%]
3	4	3	3	3	3	2	4	4	3		2.0	1.6	3.2	Shelter [1-5]
3	3	3	3	1	1	2	3	1	2		2.0	1.3	2.2	Snow cover [1-5]
2	3	3	3	2	3	2	4	2	4		2.1	1.9	2.8	Soil moisture [1-6]
24	46	52	54	45	44	48	45	50	57		33	50	47	Number of species
														ch / d Carici-Dryadetum (CD)
.	.	.	.	.	.	.	.	.	.	38	V	IV	.	*Carex nardina*
.	.	.	.	.	.	.	.	.	.	28	IV	III	.	*Calamagrostis purpurascens*
														d Carici-Dryadetum (against Thuidio-Kobresietum)
.	+	+	2a	.	.	.	.	.	r	44	V	V	II	*Dryas integrifolia*
.	.	+	1	.	.	.	.	.	.	45	IV	V	I	*Bryoria nitidula*
.	.	+	.	.	.	.	.	.	.	27	IV	III	+	*Hypogymnia austerodes*
.	.	.	.	.	.	.	.	.	+	36	III	IV	+	*Silene acaulis*
.	.	.	.	.	.	.	.	.	.	22	III	III	.	*Pertusaria panyrga*
.	.	.	.	.	.	.	.	.	.	28	II	IV	.	*Alectoria ochroleuca*
														d CD lesquerelletosum
.	.	.	.	.	.	.	.	.	2a	5	III	.	+	*Carex capillaris* coll.
.	.	.	.	.	.	.	.	.	.	4	III	.	.	*Fulgensia bracteata*
.	.	.	.	.	.	.	.	1	.	9	III	+	+	*Artemisia borealis*
.	.	.	.	.	.	.	.	.	.	3	III	.	.	*Stegonia latifolia*
.	.	.	.	.	.	.	.	.	.	2	II	.	.	*Lesquerella arctica*
														d CD sphaerophoretosum
.	.	+	.	.	.	.	.	.	.	40	I	V	+	*Sphaerophorus globosus*
.	.	.	.	.	.	.	.	.	.	35	I	V	.	*Polytrichum piliferum*
.	.	.	.	.	.	.	.	.	.	29	.	IV	.	*Pohlia nutans*
.	.	.	.	.	.	.	.	.	.	29	.	IV	.	*Pseudephebe pubescens*
.	.	+	.	.	.	.	.	.	.	28	.	IV	+	*Parmelia omphalodes*
.	.	.	.	.	.	.	.	.	1	22	.	III	+	*Polytrichum juniperinum*
.	.	.	.	.	.	+	.	+	.	21	.	III	I	*Saxifraga tricuspidata*
.	.	.	.	.	.	+	.	.	.	18	.	III	+	*Pertusaria coriacea*
.	.	.	.	.	.	.	.	+	.	17	.	II	+	*Stereocaulon arenarium*
.	.	.	.	.	.	.	.	.	.	12	.	II	.	*Arthrorhaphis citrinella*
.	.	.	.	.	.	.	.	.	.	11	.	II	.	*Ophioparma ventosa*
														d CD sphaerophoretosum, Thuidio-Kobresietum
.	.	1	1	+	+	+	+	+	.	44	.	V	IV	*Cladonia borealis*
.	.	+	.	.	r	.	1	.	.	17	.	II	II	*Festuca brachyphylla*
														ch / d Thuidio-Kobresietum myosuroidis (TK)
4	3	3	3	3	4	.	2a	2a	3	24	V[1]	II[1]	V[3]	*Kobresia myosuroides*
3	+	.	+	+	2b	r	3	+	2a	15	I	I	V	*Thuidium abietinum*
+	+	2a	+	1	+	1	.	+	+	20	I	II	V	*Peltigera rufescens*
.	+	+	+	+	1	+	+	.	+	15	.	I	IV	*Cladonia gracilis*
1	2a	.	+	+	1	.	+	+	1	14	.	I	IV	*Tortella tortuosa* var. *arctica* (Arn.) Broth.
+	2b	1	.	1	2b	.	.	+	+	11	.	+	IV	*Rhytidium rugosum*
.	+	.	+	+	+	.	.	.	+	11	I	I	III	*Myurella julacea*
.	2b	.	.	2b	2b	.	3	.	2a	8	.	+	III	*Carex bigelowii*
.	+	2b	1	.	+	.	1	.	1	9	.	+	III	*Aulacomnium turgidum*
.	2a	.	.	.	.	.	1	+	2a	5	.	r	II	*Dicranum groenlandicum*
.	.	.	.	.	.	2a	.	+	1	3	.	.	II	*Arnica angustifolia*
														d mid-/high-elevation forms CD sphaerophoretosum
.	.	.	.	.	.	.	.	.	.	27	.	IV	.	*Gymnomitrion corallioides*
.	.	.	.	.	.	.	.	+	1	22	I	III	I	*Stereocaulon alpinum*
.	.	.	.	.	.	.	.	.	.	23	.	III	.	*Alectoria nigricans*
.	.	.	.	.	.	.	.	+	.	23	.	III	+	*Draba nivalis*
.	.	.	.	+	.	.	.	.	.	15	.	II	+	*Minuartia rubella*
.	.	.	.	.	.	.	.	.	.	10	.	II	.	*Pertusaria subobducens* Nyl.
.	.	.	.	.	.	.	.	.	.	10	.	II	.	*Stereocaulon glareosum*

Table 12. Continued.

Addenda Table 12 (other species with presence < 8):
1: *Dimelaena oreina* +, *Hypnum bambergeri* +, *Mycoblastus alpinus* +, *Phaeophyscia constipata* +, *Oncophorus virens* +, *Draba glabella* r, *Xanthoria* sp. r; **2:** *Mycoblastus alpinus* +, *Phaeophyscia constipata* +; **3:** *Amblystegium serpens* +, *Chamaenerion latifolium* +, *Protothelenella sphinctrinoidella* +, *Timmia austriaca* +, *Cladonia fimbriata* r; **4:** *Cnestrum alpestre* +, Moss indet. r, *Ranunculus lapponicus* r, *Rhododendron lapponicum* r; **5:** *Braya linearis* +, *Chamaenerion latifolium* +, *Lepraria* sp. +; **6:** *Amblystegium serpens* +, *Caloplaca celata* +, *Cnestrum alpestre* +, *Hypnum bambergeri* +, *Myxobilimbia sabuletorum* +, *Psora* sp. +, *Timmia austriaca* +, *Tofieldia pusilla* +, *Draba cinerea* r; **7:** *Phaeorrhiza nimbosa* +; **8:** *Cladonia fimbriata* +, *Pseudephebe minuscula* +, *Peltigera lepidophora* r; **9:** *Cnestrum alpestre* +, *Dimelaena oreina* +, *Lecidoma demissum* +, *Lepraria* sp. +, *Rhizocarpon geographicum* +; **10:** *Acarospora schleicheri* (Ach.) Massal. +, *Arctomia delicatula* Th. Fr., *Cladonia fimbriata* +, *Dimelaena oreina* +, *Micarea* sp. +, *Parmelia saxatilis* +, *Peltigera aphthosa* +, *Phaeorrhiza nimbosa* +, *Umbilicaria hyperborea* +; **11:** *Saxifraga cernua* 1, *Leptogium* sp. +, *Pertusaria bryontha* +, *Phaeorrhiza nimbosa* +, *Psora rubiformis* +, *Cladonia rangiferina* r; **12:** *Pertusaria glomerata* 2a, *Solorina crocea* r; **13:** *Buellia geophila* +, *Cnestrum alpestre* +, Macrolichen indet. +, *Psora rubiformis* +; **14:** *Cnestrum alpestre* +, *Cladonia phyllophora* +, *Dactylina arctica* (M.J. Richardson) Nyl. +, *Dicranum elongatum* +, Moss indet. +, *Pertusaria glomerata* +, *Ranunculus lapponicus* +, *Rhododendron lapponicum* +, *Stereocaulon paschale* +, *Vaccinium uliginosum* ssp. *microphyllum* +; **15:** *Vaccinium uliginosum* ssp. *microphyllum* 1, *Protothelenella sphinctrinoidella* +; **16:** Microlichen indet. 1, *Anastrophyllum minutum* +, *Cladonia cariosa* +, *Peltigera canina* +, *Pertusaria octomela* +, *Saelania glaucescens* +; **17:** *Solorina crocea* 2a; **18:** *Vaccinium uliginosum* ssp. *microphyllum* 3, *Ochrolechia androgyna* 2a, Microlichen indet. (2 species) 1, *Pertusaria bryontha* 1, *Pertusaria octomela* 1, *Saxifraga cernua* 1, *Buellia papillata* +, *Cephalozia* sp. +, *Cnestrum alpestre* +, *Dicranum flexicaule / fuscescens* +, *Peltigera aphthosa* +, *Peltigera canina* +, *Psora rubiformis* +, *Rinodina conradii* +; **19:** *Dimelaena oreina* +, *Ranunculus lapponicus* +, *Rhododendron lapponicum* +, *Vaccinium uliginosum* ssp. *microphyllum* +; **20:** *Caloplaca cerina* +, *Leptogium* sp. +, *Peltigera canina* +, *Phaeorrhiza nimbosa* +, *Stereocaulon paschale* +, *Trapeliopsis granulosa* +; **21:** *Psora rubiformis* 1, *Rumex acetosella* coll. 1, *Barbula* sp. +; **22:** Microlichen indet. 2a, *Bryum* sp. +, *Cladonia cariosa* +, *Dicranum flexicaule / fuscescens* +, *Lepraria sp.* +, *Lopadium coralloideum* +, Moss indet. +, *Ochrolechia inaequatula* +, *Parmeliella triptophylla* +, *Pertusaria dactylina* +, *Polytrichum strictum* +, *Rhododendron lapponicum* +; **23:** *Buellia papillata* +, *Leptobryum pyriforme* +, *Betula nana* r; **24:** *Cladonia phyllophora* +, *Peltigera aphthosa* +, *Pertusaria bryontha* +, *Saelania glaucescens* +; **25:** *Carex scirpoidea* 1, *Arctomia delicatula* Th. Fr. +, *Bartramia ithyphylla* +, *Cladonia phyllophora* +, *Gyalecta foveolaris* +, *Myurella tenerrima* +, *Peltigera polydactylon* s.l. +, *Pertusaria bryontha* +, *Saelania glaucescens* +, *Sanionia uncinata* + , *Scapania* sp. +, *Solorina bispora* +, *Vaccinium uliginosum* ssp. *microphyllum* +, *Polytrichum alpinum* r; **26:** Microlichen indet. 2b, Microlichen indet. 2b, Moss indet. 1, *Cladonia phyllophora* +, *Leptogium* sp. +, *Miriquidica* sp. +, *Phaeorrhiza nimbosa* +; **27:** Moss indet. +, *Psora rubiformis* r; **28:** *Solorina crocea* 1, *Saelania glaucescens* +; **29:** *Saxifraga cernua* 1, *Dicranum elongatum* +, *Lecidoma demissum* +, *Ochrolechia inaequatula* +, *Peltigera aphthosa* +, *Pertusaria glomerata* +, *Saelania glaucescens* +; **30:** *Carex scirpoidea* 2a, *Saxifraga cernua* 1, *Barbilophozia hatcheri* +, *Buellia geophila* +, *Phaeorrhiza nimbosa* +, *Stereocaulon incrustatum* +, *Psora rubiformis* r; **31:** Moss indet. 1, *Papaver radicatum* coll. +, *Pertusaria glomerata* +, *Saelania glaucescens* +; **32:** *Buellia geophila* +, *Pertusaria glomerata* +, *Trapeliopsis granulosa* +, *Erigeron compositus* r, *Umbilicaria hyperborea* r; **33:** Macrolichen indet. +, *Mnium thomsonii* +; **34:** *Bryoerythrophyllum recurvirostrum* +, *Pertusaria glomerata* +; **35:** *Papaver radicatum* coll. +, *Saxifraga cernua* +; **36:** *Saxifraga cernua* 1, *Lecanora* sp. +, *Lichenomphalia* sp. +, *Trapeliopsis granulosa* +, *Umbilicaria hyperborea* +; **37:** *Buellia geophila* +, *Dimelaena oreina* +, *Psora rubiformis* +; **38:** *Antennaria ekmaniana* 1, *Pertusaria geminipara* 1, *Buellia geophila* +, *Cladonia phyllophora* +, *Lopadium coralloideum* +, *Peltigera aphthosa* +, *Placynthiella* sp. +; **39:** *Polytrichum alpinum* 1, *Sagina caespitosa* 1, *Bryoerythrophyllum recurvirostrum* +, *Cephalozia* sp. +, *Dactylina arctica* (M.J. Richardson) Nyl. +, *Dactylina ramulosa* (Hook.) Tuck. +, Liverwort indet. +, *Orthotrichum speciosum* +, *Pogonatum urnigerum* +; **40:** *Armeria scabra* ssp. *sibirica* +, *Dactylina arctica* (M.J. Richardson) Nyl. +, *Dactylina ramulosa* (Hook.) Tuck. +, *Encalypta alpina* +, *Luzula arctica* +, Microlichen indet. +, *Orthotrichum speciosum* +, *Pedicularis flammea* +, *Peltigera aphthosa* +, *Protopannaria pezizoides* +, *Solorina saccata* +; **41:** *Erigeron eriocephalus* 1, *Bryoerythrophyllum recurvirostrum* +, *Cladonia cariosa* +, *Orthotrichum speciosum* +, *Parmelia saxatilis* +, *Placynthiella* sp. +, *Protothelenella sphinctrinoidella* +, *Pseudephebe minuscula* +, *Papaver radicatum* coll. r, *Saxifraga nivalis* r; **42:** *Sagina caespitosa* 1, *Dicranum elongatum* +, *Myxobilimbia sabuletorum* +, *Orthotrichum speciosum* +, *Tortella fragilis* +, *Antennaria ekmaniana* r; **43:** Microlichen indet. (2 species) 2a, *Caloplaca cerina* +, *Parmelia saxatilis* +, *Dactylina arctica* (M.J. Richardson) Nyl. r, *Solorina crocea* r; **44:** Microlichen indet 2a, *Eurhynchium pulchellum* 1, *Antennaria ekmaniana* +, *Caloplaca jungermanniae* +, *Catapyrenium cinereum* +, *Encalypta affinis* +, *Erigeron compositus* +, *Peltigera lepidophora* r; **45:** *Barbilophozia quadriloba* +, *Erigeron eriocephalus* +, *Myxobilimbia sabuletorum* +, *Parmelia saxatilis* +, *Saxifraga caespitosa* +; **46:** *Barbilophozia hatcheri* +, *Cladonia cariosa* +, *Cladonia fimbriata* +, *Leptobryum pyriforme* +, *Luzula arctica* +, Microlichen indet. (2 species) 1, *Peltigera lepidophora* +, *Protopannaria pezizoides* +, *Pyrola grandiflora* r; **47:** *Catapyrenium* sp. +, *Cladonia phyllophora* +, *Papaver radicatum* coll. r, *Saxifraga nivalis* r; **48:** *Polytrichum alpinum* 1, *Potentilla hyparctica* 1, *Armeria scabra* ssp. *sibirica* +, *Dicranum laevidens* +, *Lecidoma demissum* +, *Parmelia saxatilis* +, *Pogonatum urnigerum* +, *Pseudephebe minuscula* +, *Solorina crocea* +, *Sagina caespitosa* +; **49:** *Draba glabella* 1, *Poa alpina* +; **50:** *Armeria scabra* ssp. *sibirica* 1, *Chamaenerion latifolium* 1, *Vaccinium uliginosum* ssp. *microphyllum* 1, Liverwort indet. +, *Pedicularis flammea* +, *Peltigera polydactylon* s.l. +, *Ranunculus lapponicus* +, *Rhododendron lapponicum* +, *Rinodina roscida* +, *Solorina saccata* +; **51:** *Draba glabella* 1, *Arctomia delicatula* Th. Fr. +, *Buellia geophila* +, *Cladonia phyllophora* +, *Orthotrichum speciosum* +; **52:** *Arctomia delicatula* Th. Fr. +, *Betula nana* +, *Gyalecta foveolaris* +, *Leptogium* sp. +, Liverwort indet. +, *Lopadium coralloideum* +, *Pedicularis flammea* +, *Solorina saccata* +, *Ranunculus lapponicus* +, *Rhododendron lapponicum* +; **53:** *Cladonia fimbriata* +, *Draba arctica / groenlandica* +, *Rinodina roscida* +, *Papaver radicatum* coll. r, *Pedicularis hirsuta* r; **54:** *Thalictrum alpinum* 2m, *Carex scirpoidea* 1, *Gentiana detonsa* +, *Draba cinerea* r; **55:** *Draba cinerea* 1, *Caloplaca jungermanniae* +, *Mnium thomsonii* +, Moss indet. +, *Oncophorus virens* +, *Peltigera polydactylon* s.l. +, *Phaeorrhiza nimbosa* +; **56:** *Sanionia uncinata* 2b, *Peltigera canina* 2a, *Pyrola grandiflora* 2a, *Thalictrum alpinum* 2a, *Draba glabella* 1, *Armeria scabra* ssp. *sibirica* +, *Pedicularis hirsuta* +; **57:** *Buellia geophila* +, *Parmeliella triptophylla* +; **58:** *Caloplaca jungermanniae* +, *Peltigera aphthosa* +, *Peltigera polydactylon* s.l. +.

Addenda Table 13 (other species with presence < 8):
1: *Equisetum scirpoides* 1, *Ranunculus lapponicus* 1, *Scorpidium cossonii* 1, *Juncus castaneus* +, *Polytrichum alpinum* +; **2:** *Philonotis fontana / tomentella* 1, *Ranunculus lapponicus* 1, *Draba glabella* +, *Plagiopus oederiana* +; **3:** *Sphagnum warnstorfii* 3, *Dicranum elongatum* 1, *Dicranum laevidens* 1, *Ledum palustre* ssp. *decumbens* 1, *Scorpidium cossonii* 1, *Aneura pinguis* +, *Carex saxatilis* +, *Cephalozia* sp. +, *Cinclidium arcticum / stygium* +, *Pohlia schimperi* (C. Müll.) Andrews +, *Stereocaulon alpinum / rivulorum* +, *Tofieldia coccinea* +, *Vaccinium vitis-idaea* ssp. *minus* +, *Warnstorfia sarmentosa* +, *Peltigera scabrosa* r; **4:** *Climacium dendroides* 2a, *Straminergon stramineum* 2a, *Dicranum laevidens* 1, *Helodium blandowii* 1, *Plagiomnium ellipticum* 1, *Ranunculus lapponicus* 1, *Sphagnum teres* 1, *Vaccinium vitis-idaea* ssp. *minus* 1, *Warnstorfia exannulata* 1, *Cladonia scabriuscula* +, *Luzula groenlandica* +, *Pseudobryum cinclidioides* +, *Eriophorum scheuchzeri* r; **5:** *Dicranum groenlandicum* 2a, *Barbilophozia hatcheri* 1, *Peltigera* sp. 1, Liverwort indet. +; **6:** *Dicranum spadiceum* 2a, *Campylium* cf. *laxifolium* 1, *Dicranum scoparium* 1, *Polytrichum alpinum* 1, *Blepharostoma trichophyllum* +, *Cyrtomnium hymenophyllum* +, *Philonotis fontana / tomentella* +; **7:** *Sphagnum warnstorfii* 2a, *Cladonia acuminata* 1, *Dicranum elongatum* 1, *Loeskypnum badium* 1, *Polytrichum juniperinum* 1, *Protopannaria pezizoides* 1, *Ptilidium ciliare* 1, *Scorpidium cossonii / revolvens* 1, *Stereocaulon alpinum / rivulorum* 1, *Tritomaria quinquedentata* 1, *Cephalozia bicuspidata* +, *Cladonia squamosa* +, *Dicranum laevidens* +, *Ledum palustre* ssp. *decumbens* +, *Pleurocladula albescens* +, *Ranunculus lapponicus* +, *Scapania* sp. +, *Vaccinium vitis-idaea* ssp. *minus* +; **8:** *Equisetum scirpoides* 1, *Cephalozia* sp. +, *Cyrtomnium hymenophyllum* +, *Peltigera scabrosa* +, *Hypnum bambergeri* r; **9:** *Polytrichum alpinum* 1, *Saxifraga oppositifolia* 1, *Philonotis fontana / tomentella* +, *Ptilidium ciliare* +; **10:** *Dicranum leioneuron* 1, *Festuca brachyphylla* 1, *Hypnum* sp. 1; **11:** *Carex maritima* 1, *Equisetum scirpoides* 1, *Cephaloziella divaricata* var. *asperifolia* +, *Philonotis fontana / tomentella* +; **12:** *Barbula convoluta* 1, *Euphrasia frigida* 1, *Cladonia humilis* +, Microlichen indet. +; **13:** *Cladonia cenotea* 1, *Cladonia cyanipes* 1, *Ledum palustre* ssp. *decumbens* 1, *Cladonia deformis* +, *Pedicularis hirsuta* +, *Pohlia proligera* +; **14:** *Ptilidium ciliare* 2b, *Sphagnum warnstorfii* 2b, *Dicranum elongatum* 2a, *Barbilophozia binsteadii* 1, *Cladonia pleurota* 1, *Loeskypnum badium* 1, *Scapania* sp. 1, *Stereocaulon alpinum / rivulorum* 1, *Brachythecium turgidum* +, *Cetraria ericetorum* +, *Cladonia acuminata* +, *Cladonia cyanipes* +, *Cladonia squamosa* +, *Dicranum scoparium* +, *Peltigera scabrosa* +, *Protothelenella sphinctrinoidella* +, *Scorpidium cossonii* +, *Splachnum sphaericum* +; **15:** *Arctagrostis latifolia* 2a, *Bryum* sp. 1, *Pedicularis hirsuta* 1, *Ranunculus lapponicus* 1, *Brachythecium turgidum* +, *Caloplaca* sp. +, *Campylium* sp. +, *Euphrasia frigida* +, *Hypnum bambergeri* +, *Pinguicula* vulgaris +, *Dicranum scoparium* r; **16:** *Kobresia simpliciuscula* 1, *Parmeliella triptophylla* 1, *Cladonia trassii* +, *Cnestrum alpestre* +, *Dactylina arctica* (M.J. Richardson) Nyl. +, Microlichen indet. +, *Tortella fragilis* +; **17:** *Equisetum scirpoides* 1, *Parmeliella triptophylla* 1, *Amblystegium serpens* +, *Barbilophozia hatcheri* +, *Caloplaca* sp. +, *Ledum palustre* ssp. *decumbens* +, *Massalongia carnosa* +, *Mnium thomsonii* +, *Platydictya jungermannioides* +; **18:** *Equisetum scirpoides* 2m, *Ochrolechia upsaliensis* 1, *Chamaenerion latifolium* +, *Draba lactea* +; **19:** *Equisetum scirpoides* 1, *Cladonia cyanipes* +, *Chamaenerion latifolium* +, *Lecidea* sp. +, *Ledum palustre* ssp. *decumbens* +, *Lopadium coralloideum* +, *Parmeliella triptophylla* +, **20:** *Dicranum elongatum* 2a, *Campylium* cf. *laxifolium* +, *Cladonia pleurota* +, *Lecidea* sp. +, *Peltigera scabrosa* +; **21:** *Equisetum scirpoides* 2a, *Chamaenerion latifolium* 1, *Dicranum laevidens* 1, *Cladonia acuminata* +; **22:** *Dicranum elongatum* 1, *Lecanora epibryon* 1, *Ledum palustre* ssp. *decumbens* 1, *Cetraria ericetorum* +, *Cladonia cariosa* +, *Festuca brachyphylla* +, *Peltigera scabrosa* +; **23:** *Parmeliella triptophylla* 2a, *Cetraria ericetorum* 1, *Ochrolechia upsaliensis* 1, *Calamagrostis langsdorfii* +, *Carex capitata* +, *Lecidea* sp. +, *Cladonia cyanipes* r; (to be continued)

Table 12. Continued.

[*mh]	*Lopadium pezizoideum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+
*mh	*Racomitrium lanuginosum*	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	2a	.	.
	d mid-/high-elevation forms CD sphaer., TK																				
.	*Cerastium alpinum* ssp. *lanatum*	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	r	.	+	.	.
.	*Salix glauca* coll.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	r	.	+	+	.
.	*Pohlia cruda*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+
.	*Dicranum acutifolium / brevifolium*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	2b	.	.
.	*Cladonia amaurocraea*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.
[mh!]	*Cladonia stricta* s.str.	.	.	.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	+
[*mh]	*Dicranum spadiceum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.
(mh)	*Cetraria islandica*	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	+	.	.
	d high-elevation form CD sphaerophoretosum																				
.	*Luzula confusa*	.	.	.	.	.	.	.	.	.	.	.	+	.	r	.	.	.	.	.	.
[mh!]	*Campanula uniflora*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Poa pratensis* coll. / *arctica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[h!]	*Taraxacum lacerum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[mh!]	*Saxifraga oppositifolia*	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Trisetum spicatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[h!]	*Conostomum tetragonum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	d Dryadenion																				
.	*Poa glauca*	.	.	.	r	.	.	r	+	r	+	+	+	+	1	.	1	+	+	.	1
.	*Potentilla hookeriana / nivea*	.	r	.	.	.	r	r	+	+	.	+	.	.	.	.	.	r	.	+	.
.	*Encalypta rhaptocarpa*	1	+	1	.	.	.	r	+	.	.	+	.	.	.	+	1	.	.	+	+
.	*Candelariella placodizans / terrigena* Räsänen	+	+	+	.	+	.	+	.	+	.	.	.	+	.	.	.	.	+	+	1
.	*Carex supina* ssp. *spaniocarpa*	.	+	.	.	.	.	.	2m	2m	2a	1	2m	2a	2m	1	.	1	1	.	1
	other Carici-Kobresietea																				
.	*Distichium capillaceum / inclinatum*	1	+	+	+	+	+	1	.	.	.	1	.	.	1	.	.	.	.	.	1
.	*Carex rupestris*	2b	.	2m	.	.	.	.	.	.	.	2a	.	.	.	.	2m	.	.	1	1
.	*Cladonia pocillum*	+	.	.	+	.	.	+	.	.	.	+	.	+	+	.	.	.	.	.	.
.	*Caloplaca tiroliensis*	+	.	+	.	.	+	+	.	.	.	+	.	.	.	.	+	.	.	.	.
.	*Ditrichum flexicaule*	.	.	+	.	+	.	2a	.	.	.	+	.	.	.	.	.	.	.	.	.
	others																				
.	*Flavocetraria nivalis*	2b	1	1	+	1	+	1	.	r	r	+	+	+	1	.	1	+	1	1	1
.	*Rinodina turfacea*	+	+	+	.	.	.	+	+	+	.	+	+	1	+	+	+	.	+	+	+
.	*Bryum* spp.	+	+	+	1	+	1	+	1	.	.	+	.	+	+	.	+	1	1	+	+
.	*Thamnolia vermicularis*	1	1	1	.	1	+	1	.	.	.	+	.	1	1	1	1	1	1	1	1
.	*Ochrolechia frigida*	2a	.	2b	+	.	.	.	.	1	2a	+	+	.	1	.	+	1	+	2a	1
.	*Cladonia pyxidata*	.	.	.	+	.	.	1	+	1	1	+	+	+	.	2b	+	.	+	.	.
.	*Physconia muscigena*	1	1	+	.	+	+	+	.	1	+	+	.	+	+	.	.	.	.	+	+
.	Microlichen indet.	1	+	1	+	.	+	r	1	.	r	.	.	+	.	+	2a	.	.	+	+
.	*Cetraria aculeata / muricata*	+	+	+	+	r	.	+	.	.	.	.	+	+	+	.	.	.	+	+	+
.	*Lecidea* spp.	+	.	+	.	.	+	.	.	+	+	+	+	.	+	.	.	.	.	+	+
.	*Tortula ruralis*	+	+	+	.	.	+	.	.	.	.	+	.	+	.	.	+	.	.	.	1
.	*Ceratodon purpureus*	.	+	.	+	.	.	1	1	+	.	+	+	+	.	+	+	+	2a	.	+
.	*Flavocetraria cucullata*	1	.	+	+	+	+	+	.	.	.	+	1	+	1	.	+	.	+	.	+
.	*Cephaloziella* spp.	.	.	.	+	.	.	1	.	+	.	.	.	+	.	+	.	.	+	.	.
.	*Lecanora epibryon*	2a	1	+	+	.	+	+	.	.	2a	1	+	.	+	.	1	1	.	1	+
.	*Polygonum viviparum*	+	.	1	+	+	+	.	.	.	.	.	.	.	+	.	.	.	1	.	.
.	*Hypnum revolutum*	1	.	+	.	.	+	+	.	.	.	+	.	+	+	.	.	.	.	.	+
.	*Ochrolechia upsaliensis*	2a	.	2a	.	.	.	.	.	.	.	+	.	2a	+	.	+	.	1	+	2b
.	*Psoroma hypnorum*	.	.	.	.	.	.	+	.	.	.	+	.	+	.	.	+	.	1	+	+
.	*Caloplaca ammiospila*	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.
.	*Bryonora castanea* s.str.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
.	*Cladonia chlorophaea* s.l.	.	.	.	+	.	.	.	.	.	+	.	.	+	.	.	+	.	+	.	.
.	*Melandrium affine* coll. / *triflorum*	.	.	.	.	.	.	.	+	+	r	.	.	.	+	.	r	.	.	.	.
.	*Black soil crust*	1	1	.	.	+	.	2a	.	.	.	1	.	.	+	.	1	.	.	.	.
.	*Bryocaulon divergens*	.	.	.	.	r	.	.	.	.	+	.	.	+	.	.	.	.	+	+	.
.	*Cladonia arbuscula* ssp. *mitis*	.	.	.	.	.	.	.	.	.	r	.	+	.	.	.	+	.	1	.	.
.	*Collema* spp.	+	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
[lm!]	*Campanula gieseckiana*	.	.	.	.	.	.	.	1	.	+	.	1	r	.	.	.	.	.	+	.
.	*Lecidea* spp. II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
.	*Peltigera didactyla*	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	+	.	+
.	*Massalongia carnosa*	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.
.	*Buellia insignis*	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.
.	*Lophozia* spp.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	+
.	*Brodoa oroarctica*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.
.	*Bryoria chalybeiformis*	.	.	+	.	.	.	.	+	.	+	.	.	.	+	.	.	.	.	+	.
.	*Isopterygiopsis pulchella*	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
.	*Racomitrium heterostichum*	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	+	.	.
.	*Megaspora verrucosa*	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[mh!]	*Hierochloe alpina*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
.	*Cladonia* sp. (primary thallus)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2b	.	2a
.	*Cynodontium strumiferum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
.	*Placynthiella icmalea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.
.	*Peltigera malacea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

Table 12. Continued.

.	.	+	+	.	.	+	.	+	.	+	+	+	.	+	.	+	+	.	.	+	.	.	.	.	.	.	.
.	.	.	+	2b	.	.	.	.	1	.	.	.	.	+	.	.	+	1	1	1	.	+	+	.	1	+	+
.	.	+	.	.	1	r	.	.	+	+	.	.	.	1	.	+	.	+	+	1	.	1	1	1	1	1	1
r	.	r	.	.	.	r	.	.	.	.	+	.	.	.	+	.	.	r	+	.	r	.	.	.	r	.	.
.	+	+	.	+	.	.	+	+	+	.	.	.	.	.	+	.	+	+	+	+	+	.	+	+	+	+	+
.	+	.	+	2a	.	.	.	+	+	+	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+
1	.	+	+	1	1	.	.	1	.	.	.	.	.	1	.	.	1	.	+	+	.	.	+	.	.	.	.
+	.	.	1	.	+	+	+	+	.	+	.	.	.	+	.	.	.	+	.	.	.	+	.	+	+	.	+
.	+	+	1	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+	.	r	+	.	.	r	.
.	.	.	.	1	+	.	r	.	1	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	1	+	1	+	.	1	1	1	r	1
.	+	.	.	r	.	.	.	.	.	.	.	.	.	1	.	1	.	+	+	1	1	1	1	1	1	1	1
.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	+	1	+	1	+
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	r	r	.	+	+	.	.
.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	1	1	+	1	.	.	.	.	+	+
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	r	+	.	.	.	+
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	+
+	.	+	.	+	1	+	+	+	.	1	+	+	+	+	1	1	r	1	.	1	+	1	1	1	1	1	1
.	.	r	+	r	1	+	.	.	.	1	1	.	1	1	1	1	.	+	.	1	1	1	1	1	1	1	.
.	.	1	.	.	+	+	.	1	+	.	+	1	.	1	1	+	+	+	.	1	+	+	+	1	.	.	.
1	1	+	+	+	+	1	+	.	+	1	+	+	.	1	r	+	.	+	.	+	1	1	1	.	+	+	.
1	1	2m	1	2b	2b	.	.	.	2m	.	+	.	2m	2a	2a	1	2a	.	2a	.	.	.	1	.	.	.	.
.	1	+	+	.	.	.	.	.	1	.	+	.	+	.	+	+	.	+	+	1	+	1	.	.	+	+	+
.	2b	2a	3	3	.	.	.	2a	2b	.	.	.	.	.	.	.	2a	1	.	2b	2a	2a	2b	.	2b	r	.
r	.	.	.	+	.	.	.	+	+	+	r	.	.	.	+	.	.	.	+	.	.	r	+	+	.	.	.
.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	+	+	.	+	r	+	+	.
.	.	+	+	+	+	+	+	.	+	+	.	.	.	.	.	.	.	1	+	+	+	.	.	.	.	.	+
+	1	1	1	1	1	1	+	1	1	.	+	.	.	1	1	r	1	1	+	1	1	1	1	1	1	+	1
+	1	1	1	+	+	+	+	+	.	+	+	.	+	1	+	+	2a	+	+	2a	+	+	+	+	+	+	+
+	1	1	.	1	1	+	1	+	1	.	.	1	+	2a	2a	1	1	1	+	1	1	1	1	1	.	.	.
1	1	1	1	1	1	1	1	1	1	+	.	.	.	1	1	+	1	+	+	1	1	1	1	1	1	.	1
.	2b	1	+	1	.	.	1	2a	1	.	2a	+	+	2b	1	2a	1	+	1	2a	2b	+	+	2a	1	+	2a
2a	.	+	2a	+	+	+	.	r	+	.	+	1	r	2a	.	1	+	+	+	1	+	.	2a	1	1	+	+
+	+	.	+	1	+	+	.	.	+	.	+	+	.	+	+	+	+	+	.	+	.	1	+	.	+	.	+
+	+	+	.	+	.	+	+	+	+	.	+	+	+	+	1	+	.	.	.	+	.	+	+	1	1	.	+
1	+	+	+	+	+	+	+	+	1	.	.	.	+	+	+	.	+	.	+	+	.	+	1	+	.	.	+
+	.	.	+	+	.	.	.	+	.	.	+	+	+	+	+	+	+	+	+	+	+	+	1	+	+	+	+
.	+	+	+	+	+	+	.	.	2a	+	.	.	.	1	+	.	+	+	+	+	+	1	1	.	+	.	+
+	+	.	+	.	+	+	.	+	.	+	.	+	.	+	+	.	+	+	.	.	.	.	+	+	.	+	.
.	+	.	+	1	.	.	.	+	.	.	.	.	.	+	.	.	r	1	.	1	.	+	.	.	+	.	+
+	.	.	.	1	+	.	.	.	+	.	+	+	+	+	+	.	+	+	.	+	.	.	+	.	+	+	.
.	+	.	.	+	.	.	.	+	+	.	.	.	1	2a	2a	.	+	.	1	.	.	.	.	.	+	.	.
.	1	.	.	1	.	.	.	1	+	.	.	.	.	.	+	.	.	+	1	+	.	.	.	.	+	+	+
.	.	.	+	+	.	.	.	.	+	+	.	.	.	.	.	.	.	1	+	.	1	.	.	.	.	.	.
.	1	.	.	2a	.	+	.	.	+	.	.	.	.	1	+	.	2a	.	1	.	.	2a	2a	.	2a	.	.
+	1	+	r	+	.	.	.	+	.	+	.	+	.	.	.	.	.	.	+	.	+	.	.	+	.	+	+
.	.	.	+	+	.	.	.	.	+	+	+	.	+	.	+	.	+	.	.	.	+	.	.	.	+	+	+
.	.	.	.	+	.	.	.	+	r	.	.	.	+	+	.	+	+	.	.	.	.	.	.	.	.	.	+
.	+	+	+	+	.	+	.	.	.	.	r	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.
.	.	.	.	.	.	.	.	.	r	+	.	.	.	1	+	.	.	.	.	.	.	.	+	+	+	r	.
1	.	2a	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	+	+	.
.	+	.	.	.	+	.	.	+	+	+	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	+
.	.	+	1	2a	+	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.
.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	+	.	+	.	.	.	.	.
.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	+	+	1	.	.	1	.	.	+	+	.	.	.	2b	.	.	.	+	.	.	+	.	.	+	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.
+	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
.	.	.	.	.	.	+	.	2a	.	+	.	.	.	+	1	.	+	.	.	+	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	+	.	+	.	+	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.
+	.	.	.	.	+	.	+	.	.	+	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
.	+	.	.	.	.	.	.	.	.	+	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
+	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	1	.	.	1
.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.
.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	+	.	+
.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+
.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**

Table 12. Continued.

.	.	.	.	.	.	.	.	.	.	14	.	II	.	*Lopadium pezizoideum*
.	.	.	.	.	.	.	.	.	+	16	.	II	+	*Racomitrium lanuginosum*
														d mid-/high-elevation forms CD sphaer., TK
+	.	1	.	1	+	2a	1	1	+	28	.	III	IV	*Cerastium alpinum* ssp. *lanatum*
r	.	2a	2a	2a	.	.	2a	.	.	18	.	II	III	*Salix glauca* coll.
.	+	+	.	+	+	+	+	.	+	27	.	III	IV	*Pohlia cruda*
.	2a	2a	2b	.	2a	2a	1	+	+	20	.	II	IV	*Dicranum acutifolium / brevifolium*
.	+	+	+	.	1	.	.	1	1	19	.	II	III	*Cladonia amaurocraea*
.	.	+	.	+	1	+	.	+	+	24	I	III	III	*Cladonia stricta* s.str.
.	.	2a	2b	.	.	2a	+	+	2a	18	.	II	III	*Dicranum spadiceum*
.	.	+	+	.	.	+	+	1	.	14	.	II	III	*Cetraria islandica*
														d high-elevation form CD sphaerophoretosum
.	.	+	.	.	.	.	.	1	.	15	.	II	I	*Luzula confusa*
.	.	.	.	.	.	.	.	.	2m	15	.	II	+	*Campanula uniflora*
.	.	+	.	.	.	.	1	.	.	12	.	II	I	*Poa pratensis* coll. / *arctica*
.	.	.	.	.	.	.	.	.	.	6	.	I	.	*Taraxacum lacerum*
.	.	.	+	.	.	.	.	.	.	11	II	I	+	*Saxifraga oppositifolia*
.	.	.	.	.	.	.	.	2a	.	6	.	I	+	*Trisetum spicatum*
.	.	.	.	.	.	.	.	.	.	4	.	+	.	*Conostomum tetragonum*
														d Dryadenion
+	.	1	+	.	1	2a	.	2a	.	43	II	V	III	*Poa glauca*
.	.	.	.	r	+	2a	.	1	+	32	III	III	III	*Potentilla hookeriana / nivea*
.	+	.	.	+	+	+	+	+	+	34	III	III	IV	*Encalypta rhaptocarpa*
.	.	.	+	.	.	+	.	+	.	35	IV	IV	II	*Candelariella placodizans / terrigena* Räsänen
3	.	.	.	.	.	1	.	2a	2m	31	I	IV	II	*Carex supina* ssp. *spaniocarpa*
														other Carici-Kobresietea
.	+	.	+	2a	+	.	.	.	.	30	V	III	II	*Distichium capillaceum / inclinatum*
.	2b	3	2b	2b	2a	4	3	2b	1	29	II	III	V	*Carex rupestris*
3	1	.	1	2b	1	+	1	+	+	26	III	II	V	*Cladonia pocillum*
+	+	.	+	+	.	+	+	.	+	24	III	II	IV	*Caloplaca tiroliensis*
2a	2a	.	+	+	+	.	.	.	.	22	III	II	III	*Ditrichum flexicaule*
														others
.	1	+	1	1	+	1	.	1	1	51	V	V	IV	*Flavocetraria nivalis*
+	+	1	+	.	+	+	.	+	+	49	III	V	IV	*Rinodina turfacea*
+	+	+	+	+	+	1	+	1	+	48	V	IV	V	*Bryum* spp.
.	1	1	1	1	1	1	1	+	1	48	V	V	V	*Thamnolia vermicularis*
.	+	1	1	+	+	+	.	.	1	44	III	V	IV	*Ochrolechia frigida*
+	.	1	1	.	2b	1	+	1	2a	42	II	IV	IV	*Cladonia pyxidata*
+	+	.	+	2a	+	1	+	+	2a	41	V	IV	V	*Physconia muscigena*
2a	+	+	.	+	.	+	r	.	.	39	V	IV	III	Microlichen indet.
.	+	+	.	+	+	+	.	+	+	39	V	IV	IV	*Cetraria aculeata / muricata*
.	.	+	+	+	.	+	.	+	+	37	III	IV	III	*Lecidea* spp.
1	+	3	1	2b	2a	3	1	.	1	36	III	III	V	*Tortula ruralis*
.	+	+	.	+	+	.	.	+	.	33	III	IV	III	*Ceratodon purpureus*
.	1	1	1	+	1	1	1	+	1	33	V	III	V	*Flavocetraria cucullata*
.	.	+	+	.	+	+	+	+	+	28	II	III	IV	*Cephaloziella* spp.
.	.	.	+	+	.	.	.	.	+	27	V	III	II	*Lecanora epibryon*
1	2b	2b	2b	2b	2b	.	3	1	3	27	IV	II	V	*Polygonum viviparum*
1	+	+	2a	+	+	+	+	+	+	25	III	II	V	*Hypnum revolutum*
.	.	.	3	+	.	.	.	.	1	23	II	III	II	*Ochrolechia upsaliensis*
.	+	+	+	.	.	.	.	.	.	23	I	III	II	*Psoroma hypnorum*
+	.	.	.	.	.	.	.	+	.	17	I	II	I	*Caloplaca ammiospila*
+	+	.	+	+	+	+	.	+	.	17	I	II	IV	*Bryonora castanea* s.str.
.	.	1	.	.	.	.	.	.	+	16	I	II	I	*Cladonia chlorophaea* s.l.
.	.	+	.	.	.	+	.	.	.	15	.	II	I	*Melandrium affine* coll. / *triflorum*
.	.	.	.	.	.	.	.	.	.	15	III	II	.	*Black soil crust*
.	.	.	.	.	.	.	.	.	.	14	I	II	.	*Bryocaulon divergens*
.	.	.	.	.	.	.	.	1	+	13	.	II	I	*Cladonia arbuscula* ssp. *mitis*
.	.	.	.	+	+	.	+	.	.	11	III	I	II	*Collema* spp.
.	.	1	.	.	.	1	+	2a	.	11	.	I	II	*Campanula gieseckiana*
.	.	.	.	.	.	.	.	.	.	11	.	II	.	*Lecidea* spp. II
.	.	.	+	.	.	.	1	.	.	10	I	I	I	*Peltigera didactyla*
.	.	.	+	.	.	+	.	.	1	10	.	I	II	*Massalongia carnosa*
.	.	.	.	.	.	+	.	.	.	10	.	II	+	*Buellia insignis*
.	.	.	.	.	.	.	+	.	.	10	.	II	+	*Lophozia* spp.
.	.	.	.	.	.	.	.	.	+	10	.	II	+	*Brodoa oroarctica*
.	.	.	.	.	.	.	.	.	.	9	I	I	.	*Bryoria chalybeiformis*
.	.	.	+	+	+	.	+	.	.	9	I	+	II	*Isopterygiopsis pulchella*
.	.	.	.	.	.	.	.	.	+	9	.	I	+	*Racomitrium heterostichum*
.	+	.	+	+	.	.	.	.	+	8	II	r	II	*Megaspora verrucosa*
.	.	2b	.	.	.	.	.	.	2b	8	.	I	I	*Hierochloe alpina*
.	.	2a	.	.	.	.	.	.	.	8	.	I	+	*Cladonia* sp. (primary thallus)
.	.	.	.	.	.	.	.	.	.	8	.	I	.	*Cynodontium strumiferum*
.	.	+	+	.	.	.	.	+	.	8	.	I	II	*Placynthiella icmalea*
.	.	+	.	.	.	.	.	+	.	8	.	I	I	*Peltigera malacea*
49	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**					**Relevé number**

Table 12. Continued.

Addenda Table 13 (continued):

24: *Plagiopus oederiana* 2a, *Dicranum spadiceum* 1, *Hypnum bambergeri* 1, *Caloplaca* sp. +, *Cladonia imbricaria* +, *Cnestrum alpestre* +, *Lichenomphalia* sp. (Botrydina-type) +, *Collema* sp. r, *Scapania* sp. r; **25:** *Dicranum laevidens* 2b, *Cladonia* sp. 2a, *Ochrolechia upsaliensis* 2a, *Armeria scabra ssp. sibirica* +, *Caloplaca tiroliensis* +, *Cladonia uncialis* +, *Cnestrum alpestre* +, *Hypogymnia austerodes* +, *Lecanora epibryon* +, *Lopadium pezizoideum* +, *Luzula groenlandica* +, *Mnium thomsonii* +, *Oncophorus virens* +, *Parmelia omphalodes* +, *Protothelenella sphinctrinoidella* +, *Scapania* sp. +, *Xanthoria candelaria* +, *Platydictya jungermannioides* r; **26:** *Ranunculus lapponicus* 3, *Ochrolechia upsaliensis* 2b, *Hypnum bambergeri* 2a, *Bryonora castanea* s.str. +, *Caloplaca tiroliensis* +, *Chamaenerion latifolium* +, *Collema* sp. +, *Lecanora epibryon* +, *Leptogium* sp. +, *Megaspora verrucosa* +, Microlichen indet. +, *Orthotrichum speciosum* +, *Solorina bispora* +, *Armeria scabra* ssp. *sibirica* r; **27:** *Bryoerythrophyllum recurvirostrum* 1, *Desmatodon heimii* 1, *Carex capitata* +, *Euphrasia frigida* +; **28:** *Euphrasia frigida* +, *Ledum palustre* ssp. *decumbens* r; **29:** *Stereocaulon capitellatum* 1, *Cladonia* sp. +, *Hypnum* sp. +; **30:** Microlichen indet. 2a, *Bryoerythrophyllum recurvirostrum* 1, *Cladonia* sp. +, *Euphrasia frigida* 1, *Armeria scabra ssp. sibirica* r, *Corallorhiza trifida* r; **31:** *Poa glauca* +, *Luzula groenlandica* r; **32:** *Hypnum* sp. 1; **33:** *Dicranum* sp. 2a, *Ochrolechia upsaliensis* 2a, *Armeria scabra* ssp. *sibirica* 1, *Chamaenerion latifolium* 1, *Caloplaca tiroliensis* +, *Cnestrum alpestre* +, *Hypnum* sp. +, *Lecanora epibryon* +, *Lopadium pezizoideum* +, Microlichen indet. +, *Mnium thomsonii* +, *Rinodina roscida* +; **34:** *Peltigera* sp. +; **35:** *Dactylina arctica* (M.J. Richardson) Nyl. 1, *Papaver radicatum* coll. 1, *Polytrichum juniperinum* 1, *Saxifraga oppositifolia* 1, *Barbilophozia hatcheri* +, *Buellia geophila* +, *Cephalozia* sp. +, *Cetraria ericetorum* +, *Collema ceraniscum* +, *Dactylina ramulosa* (Hook.) Tuck. +, *Draba glabella* +, *Draba lactea* +, *Huperzia selago* ssp. *arctica* +, *Hypogymnia austerodes* +, *Lopadium pezizoideum* +, *Parmelia omphalodes* +, *Peltigera scabrosa* +, *Pertusaria dactylina* +, *Pertusaria glomerata* +, *Pertusaria panyrga* +, *Plagiochila porelloides* +, *Protothelenella sphinctrinoidella* +, *Ptilidium ciliare* +, *Racomitrium canescens* +, *Rinodina mniaraea* +, *Tetraplodon mnioides* +, *Cladonia phyllophora* r, *Cladonia* sp. r, *Parmelia sulcata* r, *Parmeliella triptophylla* r; **36:** *Diapensia lapponica* 1, *Bryoria chalybeiformis* +, *Gymnomitrion corallioides* +, *Hypogymnia austerodes* +, *Pertusaria bryontha* +, *Polytrichum piliferum* +, *Scapania* sp. +, *Cephalozia* sp. r; **37:** *Dicranum flexicaule / fuscescens* 2b, Microlichen indet. (2 species) 1, *Buellia insignis* +, *Gymnomitrion corallioides* +, *Leptogium arcticum* Jørg +, *Ptilidium ciliare* +, *Ochrolechia inaequatula* +, *Ochrolechia upsaliensis* +, *Pedicularis hirsuta* +, *Pertusaria geminipara* +; **38:** *Dicranum spadiceum* 2a, *Arnica angustifolia* 1, *Carex supina* ssp. *spaniocarpa* 1, *Bryonora castanea* s.str. +, *Buellia insignis* +, *Carex* sp. +, *Cladonia fimbriata* +, *Lepraria* sp. +, *Pertusaria panyrga* +, *Polytrichum juniperinum* +; **39:** *Dicranum spadiceum* 2a, *Arctomia delicatula* Th. Fr. +, *Caloplaca ammiospila* +, *Caloplaca tiroliensis* +, *Cladonia* sp. +, *Collema* sp. +, *Draba lactea* +, *Dicranum laevidens* +, *Gymnomitrion corallioides* +, *Hypnum hamulosum* +, *Lecidea* sp. +, *Lichenomphalia sp.* (*Botrydina* -type) +, Microlichen indet. +, *Pertusaria bryontha* +, *Pertusaria octomela* +, *Pertusaria panyrga* +, *Ptilidium ciliare* +, *Campanula uniflora* r; **40:** *Dicranum flexicaule / fuscescens* 2a, *Bacidia* sp. +, *Buellia papillata* +, *Campylopus schimperi* +, *Festuca brachyphylla* +, *Lopadium pezizoideum* +, Microlichen indet. +; **41:** *Dicranum elongatum* 1, *Pedicularis hirsuta* 1, *Bryoria chalybeiformis* +, *Campanula uniflora* +, *Collema* sp. +, *Dicranum groenlandicum* +, *Encalypta rhaptocarpa* +, *Hypnum hamulosum* +, *Lichenomphalia* sp. *(Botrydina* -type) +, Liverwort indet. (2 species) +, Macrolichen indet. +, *Massalongia carnosa* +, *Micarea* sp. +, *Papaver radicatum* coll. +, *Parmelia omphalodes* +, *Pertusaria bryontha* +, **42:** *Arnica angustifolia* 2a, *Polytrichum juniperinum* 1, *Stereocaulon glareosum* 1, *Bryoria chalybeiformis* +, *Buellia insignis* +, *Campanula gieseckiana* +, *Cladonia fimbriata* +, *Dicranum flexicaule / fuscescens* +, *Lecanora epibryon* +, *Lecidea* sp. +, Liverwort indet. +, Microlichen indet. +, **43:** *Ochrolechia upsaliensis* 3, Microlichen indet. (2 species) 1, *Pertusaria panyrga* 1, *Amblystegium serpens* +, *Bryoria chalybeiformis* +, *Candelariella* sp. +, *Caloplaca tiroliensis* +, *Hypnum* sp. +, *Lecanora epibryon* +, *Lecidea* sp. +, *Lepraria* sp. +, *Lichenomphalia* sp. *(Botrydina* -type) +, *Mnium thomsonii* +, **44:** *Dicranum flexicaule / fuscescens* 2a, *Vaccinium vitis-idaea* ssp. *minus* 2a, *Cetraria ericetorum* 1, *Poa glauca* 1, *Polytrichum piliferum* 1, *Festuca brachyphylla* +, *Saxifraga tricuspidata* +, *Trapeliopsis granulosa* +, *Cladonia phyllophora* r; **45:** *Bryoerythrophyllum recurvirostrum* 1,*Orthotrichum speciosum* +.

Addenda Table 15 (other species with presence < 4):

1: *Carex capitata* 2a, *Ceratodon purpureus* +; **2:** *Oncophorus wahlenbergii* 2b, *Dicranum acutifolium / brevifolium* 1, *Hypnum bambergeri* 1, *Flavocetraria cucullata* +, *Myurella julacea* +; **3:** *Empetrum nigrum* ssp. *hermaphroditum* 2b, *Kobresia myosuroides* 2a, *Flavocetraria cucullata* 1, *Sanionia uncinata* 1, *Cetraria aculeata / muricata* +, *Festuca brachyphylla* +, *Peltigera canina* +, *Poa pratensis* coll. / *arctica* +, *Cladonia pyxidata* r, Microlichen indet. r; **4:** *Carex scirpoidea* 2a, *Bartsia alpina* 1, *Bryoerythrophyllum recurvirostrum* 1, *Flavocetraria cucullata* 1, *Sanionia uncinata* 1, *Alectoria ochroleuca* +, *Cetraria aculeata / muricata* +, *Cladonia gracilis* +, *Cladonia* sp. +, *Kobresia myosuroides* +, Microlichen indet. +, *Scapania* sp. +; **5:** *Empetrum nigrum* ssp. *hermaphroditum* 1, *Carex norvegica* 1, *Ledum palustre* ssp. *decumbens* 1, *Oncophorus virens* 1, *Blepharostoma trichophyllum* +, *Carex holostoma* +, *Carex saxatilis* +, *Carex scirpoidea* +, *Cetraria aculeata / muricata* +, *Cetraria islandica* +, *Lophozia* sp. +, *Nephroma expallidum* +, *Odontoschisma macounii* +, *Peltigera canina* +, *Peltigera leucophlebia* +, *Sanionia uncinata* +, *Scapania* sp. +, *Thamnolia vermicularis* +; **6:** *Cinclidium latifolium* 2b, Black soil crust 2a, *Juncus biglumis* +, Liverwort indet. +, Microlichen indet. +, *Orthothecium chryseon* +, *Protothelenella sphinctrinoidella* +, *Saxifraga oppositifolia* +, *Encalypta* sp. r; **7:** *Bartsia alpina* 1, *Fissidens osmundoides* +, *Drepanocladus* sp. r, *Ochrolechia* sp. r; **8:** Black soil crust 3, *Blepharostoma trichophyllum* 1, *Hypnum bambergeri* 1, *Isopterygiopsis pulchella* 1, *Myurella julacea* 1, *Saxifraga oppositifolia* 1, *Thamnolia vermicularis* 1, *Juncus biglumis* +, *Luzula arctica* +, *Myurella tenerrima* +, *Poa pratensis* coll. / *arctica* +; **9:** *Cinclidium latifolium* 2a, *Brachythecium turgidum* 1, Moss indet. 1, *Polyblastia sendtneri* 1, *Pseudocalliergon brevifolium* 1, *Encalypta* sp. +, *Pseudocalliergon trifarium* r; **10:** *Oncophorus virens* 2b, *Calliergon richardsonii* 1, *Cyrtomnium hymenophyllum* 1, *Empetrum nigrum* ssp. *hermaphroditum* 1, *Pedicularis lapponica* 1, *Philonotis fontana / tomentella* 1, *Scorpidium revolvens* 1, *Carex capitata* +, *Fissidens osmundoides* +, *Myurella julacea* +; **11:** *Oncophorus wahlenbergii* 2a, *Calliergon giganteum* 1, *Lophozia rutheana* 1, *Conardia compacta* +, *Meesia triquetra* +, *Myurella tenerrima* +; **12:** *Brachythecium turgidum* 1, *Micarea assimilata* 1, *Rhytidium rugosum* 1, Bryaceae +, *Lophozia* sp. +, Moss indet. +, *Protothelenella sphinctrinoides* +, *Splachnum vasculosum* +; **13:** *Drepanocladus aduncus* 1, *Carex capitata* +, *Carex marina* +, *Ceratodon purpureus* +, *Protothelenella sphinctrinoides* +, *Tayloria lingulata* +, *Saxifraga oppositifolia* r; **14:** *Carex marina* 1, *Tayloria lingulata* 1, *Isopterygiopsis pulchella* +, Moss indet. r; **15:** *Campylium* cf. *laxifolium* 2b, *Amerorchis rotundifolia* 1, *Conardia compacta* 1, *Kobresia myosuroides* 1, *Saxifraga foliolosa* 1, *Ceratodon purpureus* +, *Plagiomnium ellipticum* +; **16:** *Campylium* cf. *laxifolium* 1, *Carex saxatilis* +, *Lomatogonium rotatum* +; **17:** *Gentiana tenella* 1, *Lomatogonium rotatum* 1, *Lophozia* sp. 1, *Saxifraga foliolosa* 1, *Festuca brachyphylla* +, *Hylocomium splendens* +, *Pohlia cruda* r, *Polytrichum alpinum* r; **18:** *Meesia triquetra* 2b, *Carex marina* 2a, *Trichostomum arcticum* 2a, *Carex saxatilis* 1, *Cinclidium latifolium* 1, Moss indet. +, *Scorpidium scorpioides* +.

Addenda Table 16 (species with presence < 3):

1: *Pseudocalliergon angustifolium* 2a; **2:** *Poa pratensis* coll. / *arctica* 2b, *Juncus arcticus* +; **3:** *Pseudocalliergon angustifolium* 1, *Hippuris vulgaris* coll. +, *Drepanocladus* cf. *arcticus* +; **4:** *Menyanthes trifoliata* 1; **6:** *Carex holostoma* 1; **7:** *Saxifraga foliolosa* 1; **8:** *Carex bigelowii* +; **10:** *Pseudobryum cinclidioides* 2a, *Calamagrostis lapponica* 1, *Pohlia nutans* 1, *Lophozia* sp. +, *Cardamine pratensis* coll. +, *Cephaloziella* sp. +, *Straminergon stramineum* +, *Tayloria lingulata* +; **11:** *Utricularia ochroleuca* 2m; **12:** *Drepanocladus aduncus* 2b, *Saxifraga foliolosa* 1; **14:** *Carex capitata* +, *Carex norvegica* +; **15:** *Carex holostoma* 2b, *Leptobryum pyriforme* 1, *Warnstorfia tundrae* 1, *Pseudocalliergon brevifolium* +; **17:** *Sphagnum fuscum* 2a, *Blepharostoma trichophyllum* +, *Tofieldia pusilla* r; **18:** *Campylium* sp. 2b, *Cardamine pratensis* coll. 1, *Leptobryum pyriforme* 1, *Lophozia* sp. 1, *Pinguicula vulgaris* 1, *Tayloria lingulata* 1, *Luzula confusa* +, *Tofieldia pusilla* +; ***19:*** *Brachythecium* sp. 1, *Breidleria pratensis* 1, *Festuca brachyphylla* 1, *Polytrichum alpinum* 1, *Triglochin palustre* +; **20:** *Brachythecium groenlandicum* +, *Isopterygiopsis pulchella* +, *Pedicularis flammea* +, Moss indet. +; **21:** *Festuca brachyphylla* 1, *Dicranum spadiceum* +, *Flavocetraria nivalis* r, *Pedicularis hirsuta* +, *Peltigera aphthosa* +, *Pohlia nutans* +; **22:** *Helodium blandowii* 3, *Peltigera leucophlebia* 2a, *Brachythecium turgidum* 1, *Climacium dendroides* 1; **23:** *Tritomaria quinquedentata* 1; **25:** *Juncus triglumis* 1, *Blepharostoma trichophyllum* +; **27:** *Distichium capillaceum / inclinatum* 1, *Myurella julacea* 1, *Oncophorus virens* 1, *Ranunculus hyperboreus* 1, *Juncus triglumis* +, *Timmia austriaca* +; **28:** *Saxifraga rivularis* 1, *Carex bigelowii* +, *Hippuris vulgaris* coll. +.

Table 13. Rhododendro lapponici-Vaccinietum microphylli.

Altitudinal indicator value	Vegetation type	Rhododendro-Vaccinietum campylietosum var. of *Aulacomnium palustre*															subvar. of			
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
	Author	BS	BS	BS	BS	CS	BS	BS	BS	BS	CS	BS	CS	BS	BS	BS	BS	FD	BS	BS
	Relevé area [m²]	4	4	4	4	1	4	4	4	4	1	4	1	4	4	2	4	4	4	4
	Size of the stand [10 m²]	30	10	2	90	10	20	50	250	2	3	10	1	10	100	3	10	nd	40	100
	Altitude [m a.s.l.]	205	335	420	70	40	520	380	220	240	320	195	300	525	580	555	415	140	110	10
	Slope [°]	3	2	0	0	10	0	0	4	28	6	30	8	5	0	0	2	10	12	22
	Aspect	n	nw	-	-	sse	-	-	n	n	se	ne	se	e	-	-	n	nne	n	n
	Cover total [%]	100	100	100	100	100	100	100	100	100	100	100	98	100	80	100	100	90	100	100
	Cover dwarfshrubs [%]	30	70	40	50	70	40	70	40	45	70	40	50	70	60	40	50	60	70	70
	Cover graminoids [%]	40	15	60	40	10	30	20	2	25	5	15	30	2	30	7	40	2	2	5
	Cover herbs [%]	7	2	2	2	10	15	2	20	2	8	10	10	10	2	10	2	5	2	2
	Cover bryophytes [%]	100	100	95	100	95	100	80	100	100	100	100	15	100	80	95	95	35	80	100
	Cover lichens [%]	2	2	5	2	4	2	15	2	2	6	2	2	10	10	2	15	25	70	5
	Cover soil [%]	0	0	0	0	0	0	0	0	0	0	0	2	0	20	0	0	0	0	0
	Cover stones [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	Cover litter [%]	2	2	2	10	2	5	2	2	2	0	2	5	2	2	2	2	0	10	2
	Canopy height [cm]	12	12	5	20	17	7	5	10	7	5	15	12	7	5	10	8	7	7	5
	Height stand max. [cm]	20	15	20	50	17	25	20	15	15	5	25	12	20	15	30	20	20	25	20
	PH value	6.5	6.4	6.0	5.3	6.2	6.1	5.3	6.5	6.7	6.3	6.3	6.1	6.2	5.6	6.5	6.3	7.0	5.6	6.4
	Organic matter rhizosphere [%]	38	72	56	23	9	65	30	25	30	24	80	14	76	30	52	19	2	43	5
	Shelter [1-5]	4	4	3	3	2	4	4	3	4	4	4	2	3	4	3	2	3	3	3
	Snow cover [1-5]	4	4	3	3	3	5	4	4	4	3	4	3	3	4	3	3	3	4	4
	Soil moisture [1-6]	5	4	4	5	5	5	4	4	4	4	5	4	4	4	5	4	3	4	4
	Number of species	34	33	55	38	23	33	71	40	39	26	35	28	43	65	44	50	63	51	59
	d Rhododendro-Vaccinietum (RV)																			
.	*Pyrola grandiflora*	.	1	+	.	.	.	.	.	+	.	.	.	1	.	.	.	+	.	+
	d Rhododendro-Vaccinietum (against Tortello-Caricetum)																			
lm!	*Rhododendron lapponicum*	2b	2a	1	2b	4	1	1	1	1	2a	2a	2a	+	1	2a	2a	1	1	1
(lm)	*Vaccinium uliginosum* ssp. *microphyllum*	2a	3	2b	2a	1	3	3	3	2b	3	3	1	3	3	3	3	2a	2b	3
lm!	*Betula nana*	2a	1	2a	2a	2a	2b	2a	2b	2a	+	2a	2b	2b	2b	1	2a	+	2b	1
	d Rhododendro-Vaccinietum (against Saxifrago-Kobresietum)																			
.	*Flavocetraria cucullata*	+	.	+	1	.	+	1	1	.	.	+	.	1	1	1	1	1	1	1
.	*Cladonia chlorophaea* s.l.	.	.	.	+	+	.	1	.	.	.	+	.	1	+	r	.	+	.	1
.	*Cladonia gracilis*	.	.	r	.	.	.	+	+	+	.	.	+	1	1	.	1	1	.	1
.	*Cladonia arbuscula* ssp. *mitis*	.	.	.	.	.	.	1	+	.	.	.	+	.	+	.	+	.	2m	+
.	*Peltigera leucophlebia*	.	1	2a	1	.	.	.	.	r	+	+	+	2a	+	1	2a	+	+	1
(mh)	*Carex rupestris*	.	.	+	.	.	1	.	.	1	.	.	.	.	1	.	3	.	.	.
.	*Anastrophyllum minutum*	.	.	1	.	.	.	2b	.	.	.	.	.	.	+	.	1	+	+	+
	d RV camp. var. of *Aulacomnium palustre*																			
.	*Aulacomnium palustre*	2b	2a	2a	3	3	.	.	2a	2b	2b	+	+	4	.	1	.	.	.	.
.	*Salix arctophila*	2a	2b	2a	1	.	2b	1	1	2b	2a	.	.	.	2a	.	1	.	.	.
.	*Eriophorum angustifolium* ssp. *subarcticum*	2a	1	1	1	2a	1	1	1	.	.	2a	.	.	.	.	+	.	.	.
.	*Carex rariflora*	+	2b	2b	2b	.	2b	2b	.	.	.	.	.	.	2a	.	.	.	.	.
.	*Carex gynocrates*	2m	.	2m	.	1	2a	1	.	.	.	.	.	.	1	+	.	.	.	.
	d RV campylietosum																			
.	*Tomentypnum nitens*	5	5	2b	4	3	5	2b	4	4	2b	5	2a	2b	+	5	1	1	2b	+
.	*Tofieldia pusilla*	2m	1	2m	.	.	1	1	.	2m	.	.	1	.	.	1	.	1	1	+
[lm!]	*Pedicularis lapponica*	+	1	1	.	.	.	.	2m	.	.	1	+	+	1	.	+	+	+	.
.	*Sanionia uncinata*	+	+	+	1	1	.	2a	.	1	1	.	+	1	1	.	1	.	1	+
.	*Campylium stellatum*	1	1	1	.	2b	.	2a	1	.	.	1	1	.	+	1	+	.	+	.
lm!	*Empetrum nigrum* ssp. *hermaphroditum*	.	1	2a	.	.	.	2b	.	+	1	.	2a	2b	+	.	+	+	.	1
.	*Myurella tenerrima*	+	+	.	.	.	1	.	+	.	.	+	.	.	.	.	+	1	.	.
.	*Hypnum holmenii* Ando	.	.	1	.	.	+	+	.	.	.	1	.	1	.	.	.	+	1	+
.	*Equisetum variegatum*	.	1	.	1	.	1	.	.	+	.	.	.	.	.	1	.	.	+	.
	d RV camp. var. of *Alectoria ochr.* , RV sphaerophoretosum																			
.	*Bryoria nitidula*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	+	1	2m
.	*Alectoria ochroleuca*	.	.	+	.	.	.	1	.	.	.	.	.	.	1	.	1	.	2m	1
.	*Cladonia pyxidata*	.	.	.	.	.	.	.	+	.	.	.	.	.	1	.	1	1	.	1
.	*Rinodina turfacea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	+
.	*Cetraria aculeata / muricata*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	+	.	.
.	*Cladonia borealis*	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	1	.	1
.	*Peltigera rufescens*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+
.	*Hypnum revolutum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
.	*Pohlia cruda*	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	+
.	*Bryocaulon divergens*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.
	d RV sphaerophoretosum																			

Table 13. Continued.

RV campylietosum var. of *Alectoria ochroleuca*															Rhododendro-Vaccinietum sphaerophoretosum												cAul	cAle	sph
Aulacomnium turgidum					subvar. of *Kobresia myosuroides*										subvar. of *Aulacomnium turgidum*								subvar. *Kobresia*						
20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**		**1-15**	**16-34**	**35-45**
BS	BS	BS	BS	BS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	BS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS		.	.	.
4	4	4	4	4	4	4	1	1	1	1	1	1	4	1	4	4	4	4	4	4	4	4	4	4	1		.	.	.
500	20	2	20	30	1000	1000	5	5	5	5	2	2	1000	10	1	100	50	3	1000	10	20	100	2	3	1		39	209	117
200	160	465	240	480	95	60	65	155	290	155	360	350	110	70	800	425	585	695	595	445	570	470	550	535	460		327	207	557
8	16	0	6	0	16	12	2	4	14	4	10	10	8	4	18	6	10	12	14	0	14	2	0	18	4		6	8	9
nnw	n	-	sw	-	n	nnw	s	s	se	s	ssw	wsw	n	sw	nnw	w	w	sse	n	-	n	nnw	-	ssw	se		.	.	.
100	100	90	100	95	95	90	95	95	90	90	95	95	90	95	100	98	98	98	95	80	95	90	90	75	90		99	95	92
70	70	80	80	70	75	70	70	70	50	50	70	80	85	85	65	90	60	85	50	70	35	85	50	70	60		52	70	65
2	2	2	2	5	5	25	10	10	30	30	10	2	5	8	2	10	2	15	25	7	35	15	25	2	15		22	10	14
2	7	7	2	15	2	2	10	5	5	10	5	15	7	5	2	2	6	25	20	2	10	6	2	2	8		7	6	8
100	100	90	50	100	40	40	20	3	25	2	20	2	40	2	60	50	90	50	15	25	55	10	5	25	4		91	50	35
2	2	10	20	2	25	40	4	4	5	20	10	10	20	4	20	20	25	15	5	20	5	15	50	30	10		5	15	20
0	0	5	0	5	5	0	5	5	10	10	5	5	10	5	0	0	1	0	5	20	5	10	10	25	10		1	4	8
0	0	5	0	0	2	2	0	0	0	0	0	0	2	0	0	2	1	2	0	0	0	0	0	0	0		0	1	0
2	2	5	10	2	22	50	25	70	10	40	40	50	70	95	2	20	2	10	5	10	2	50	35	60	50		3	27	22
4	6	5	6	5	5	6	7	15	7	10	8	7	7	15	5	4	3	5	8	4	7	5	6	5	6		10	7	5
12	20	25	15	30	27	14	7	15	7	10	8	7	15	15	10	32	18	22	12	21	17	24	15	25	6		20	16	18
6.6	6.7	5.6	6.0	6.1	6.7	6.6	6.5	7.5	6.1	7.3	6.8	6.9	6.9	6.4	5.8	5.8	5.0	5.4	5.3	5.8	5.4	6.1	7.0	5.3	6.5		6.1	6.5	5.8
15	16	11	48	49	25	35	9	7	5	9	14	12	34	15	22	13	15	1	11	10	14	7	5	8	17		42	20	11
3	3	2	4	4	2	3	2	2	2	2	3	3	2	3	4	3	3	3	2	2	3	2	3	4	1		3.4	2.7	2.7
4	5	3	4	4	4	3	3	3	3	3	2	2	3	3	4	3	3	2	3	2	3	3	3	3	3		3.6	3.3	2.9
4	4	3	4	4	3	3	4	4	3	4	4	4	3	3	3	3	3	2	3	3	3	2	3	3	3		4.4	3.6	2.8
46	50	56	53	49	54	51	32	23	29	28	33	33	40	22	81	55	54	47	65	54	59	57	44	44	29	Presence	40	43	54
.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	+	.	1	.	1	.	12	II	II	II
2a	1	1	2b	1	2b	3	3	2b	3	2b	4	4	1	3	.	1	.	2a	1	+	2a	2a	2b	.	4	42	V	V	IV
3	2b	4	3	4	3	2b	2b	2b	1	2a	2a	2a	3	2a	3	5	4	5	+	4	.	5	.	4	2a	43	V	V	V
1	1	2b	1	2b	2a	2a	+	2a	2b	2b	2a	1	2b	3	.	2a	.	.	+	.	.	+	+	.	.	38	V	V	II
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	1	1	39	IV	V	V
.	.	.	+	.	.	.	.	1	.	1	+	1	.	1	.	+	+	+	+	+	.	+	+	+	+	24	III	III	V
+	.	+	.	.	.	.	.	.	.	+	1	+	.	.	.	.	+	1	+	+	+	1	+	+	.	23	III	III	IV
+	+	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	+	1	.	+	.	.	.	1	.	15	II	II	III
.	.	1	.	1	.	.	.	.	.	.	.	+	.	.	1	.	.	+	+	.	+	.	.	.	.	21	IV	II	II
.	.	.	.	r	.	.	.	.	.	.	.	.	1	.	1	.	1	.	2a	.	3	.	1	.	.	12	II	I	III
.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	+	+	.	.	.	.	1	.	.	.	.	11	I	II	II
.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13	IV	+	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11	IV	+	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	III	+	.
.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	III	+	.
.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	III	+	.
2a	3	1	3	4	2a	1	.	.	.	.	2b	1	2b	.	2a	.	.	.	.	.	.	.	.	.	.	30	V	IV	+
1	1	2m	+	+	+	1	1	.	1	+	+	+	1	.	.	.	.	.	.	.	.	.	+	.	.	25	III	V	+
+	+	1	1	1	1	r	r	.	.	+	+	.	1	.	.	+	.	.	.	+	.	.	.	.	.	24	III	IV	I
.	.	1	.	.	2b	.	1	1	.	.	1	1	2a	.	.	.	.	.	.	.	.	.	.	.	.	21	IV	III	.
.	.	+	.	.	.	.	1	1	1	1	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	20	IV	III	.
+	+	2a	+	.	.	.	.	2a	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	17	III	III	.
.	.	+	.	+	.	+	.	.	.	.	.	.	r	.	+	.	.	.	.	.	.	.	.	.	.	12	II	II	+
2a	1	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	II	II	.
.	.	+	1	.	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11	II	II	.
+	.	.	1	+	1	1	1	.	+	1	.	.	1	.	+	1	r	.	+	1	1	1	+	.	1	23	I	IV	V
+	+	+	1	+	1	1	1	.	+	.	+	1	+	.	r	1	+	.	.	+	.	1	.	+	1	25	I	IV	IV
1	+	+	2a	+	+	.	.	.	1	.	.	.	.	.	+	+	+	.	+	.	+	1	+	1	+	21	I	III	V
+	r	.	1	+	.	+	.	.	.	.	.	.	+	.	+	+	+	.	+	+	+	+	+	+	.	19	+	III	V
+	.	+	1	.	.	.	+	.	+	1	+	1	.	r	.	1	+	+	+	+	.	1	.	1	.	18	+	III	IV
+	1	.	1	+	.	.	.	.	.	.	.	+	.	.	.	+	+	+	1	1	+	.	.	1	.	17	I	III	IV
.	+	.	.	.	+	+	.	.	.	.	+	.	.	.	+	.	.	+	.	+	+	+	.	2b	.	14	.	III	III
.	.	1	+	.	+	2b	.	.	.	.	.	+	2a	1	1	+	+	+	2a	.	1	+	.	.	1	17	.	III	IV
+	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	+	.	.	12	+	II	II
+	.	.	1	.	.	+	+	.	.	.	.	.	+	.	.	.	.	+	.	+	+	.	.	+	.	11	+	II	II

Table 13. Continued.

.	*Tortula ruralis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Physconia muscigena*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
mh!	*Stereocaulon alpinum*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.	.
[mh!]	*Hierochloe alpina*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
[mh!]	*Cladonia stricta* s.str.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.
.	*Peltigera malacea*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
(mh)	*Sphaerophorus globosus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Rhytidium rugosum*	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.
.	*Thuidium abietinum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
.	*Cerastium alpinum* ssp. *lanatum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Cynodontium strumiferum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*mh	*Racomitrium lanuginosum*	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	.	.	.
	d subvar. of *Aulacomnium turgidum*																			
.	*Polytrichum strictum*	.	.	1	+	.	.	+	+	.	.	.	.	1	1	.	.	.	.	.
.	*Aulacomnium turgidum*	2b	1	3	1	2a	2a	2b	3	2b	3	2a	+	2b	3	1	4	2a	2b	4
.	*Dicranum acutifolium / brevifolium*	r	.	1	.	.	.	3	1	2a	.	2a	.	2a	1	.	2b	1	2b	2b
.	*Cladonia amaurocraea*	.	.	.	.	.	.	1	+	+	.	.	.	+	1	.	+	+	1	1
.	*Hylocomium splendens*	.	.	3	.	1	.	2b	.	2b	.	+	1	1	2a	.	2a	1	3	2a
.	*Cassiope tetragona*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	3	2a
	d subvar. of *Kobresia myosuroides*																			
lm	*Carex scirpoidea*	.	.	.	.	.	.	+	.	2m	.	+	2a	.	.	.	.	.	1	.
.	*Kobresia myosuroides*	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
	other d Rhododendrenion																			
.	*Equisetum arvense*	1	+	+	1	2a	.	1	2b	.	2a	2a	1	2a	+	2a	.	.	+	.
.	*Pedicularis flammea*	1	1	+	.	.	1	1	.	1	.	.	.	.	1	+	1	.	.	.
.	*Meesia uliginosa*	+	+	.	.	.	2a	1	.	.	.	.	1	.	.	.	.	.	+	.
[lm!]	*Carex capillaris* coll.	.	.	.	.	.	.	2a	.	.	.	.	.	.	1	.	1	.	.	.
.	*Oncophorus wahlenbergii*	.	.	.	.	.	.	1	.	+	.	.	.	.	+	.	.	.	.	.
.	*Luzula arctica*	.	+	.	.	.	.	.	+	r	.	1	+	.	.	.	.	.	+	+
.	*Carex norvegica*	+	.	.	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.
[mh!]	*Carex misandra*	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.
	other Carici-Kobresietea																			
.	*Dryas integrifolia*	2a	1	.	.	.	1	.	1	2b	.	+	2a	+	.	2b	r	2b	3	2a
.	*Distichium capillaceum / inclinatum*	+	1	.	.	.	+	1	1	+	.	+	.	.	.	+	.	+	+	.
.	*Ditrichum flexicaule*	.	.	1	.	.	1	+	1	.	.	+	.	.	1	.	.	1	+	.
.	*Cladonia pocillum*	r	.	.	.	.	r	.	+	.	.	+	.	.	+	1	.	1	+	.
.	*Tortella tortuosa* var. *arctica* (Arn.) Broth.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	+	.	.
*mh	*Silene acaulis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	*Myurella julacea*	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	.	.	.	.
.	*Pedicularis lanata*	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	+	1	+
	others																			
.	*Polygonum viviparum*	2m	1	1	1	1	2a	1	2a	1	1	2a	1	1	2m	2m	1	+	1	1
.	*Flavocetraria nivalis*	r	.	.	.	.	.	1	+	+	.	+	.	.	1	+	1	+	1	+
.	*Bryum* spp.	+	.	+	1	.	+	1	1	.	.	.	.	.	+	1	.	+	+	.
.	*Ochrolechia frigida*	r	.	.	+	.	+	1	1	+	.	.	.	+	1	+	1	1	2a	1
.	*Thamnolia vermicularis*	.	.	+	.	.	.	+	1	.	.	.	.	.	.	+	+	.	1	1
.	*Pohlia nutans*	.	+	1	r	1	.	+	1	+	1	1	.	1	+	.	1	+	1	+
.	*Poa pratensis* coll. / *arctica*	.	1	1	.	.	.	1	.	.	+	+	.	1	.	.	.	+	+	+
(lm)	*Salix glauca* coll.	.	.	.	2b	+	.	.	2a	.	.	1	.	2b	.	.	.	.	.	1
.	*Luzula confusa*	.	.	+	.	.	.	.	+	.	+	.	.	+	.	.	.	r	+	1
.	*Psoroma hypnorum*	.	.	.	+	.	.	.	.	+	+	.	.	+	+	.	1	.	.	1
.	*Carex bigelowii*	.	.	+	.	2a	.	.	.	.	.	.	2b	.	2a	.	1	.	.	1
.	*Cephaloziella* spp.	.	.	.	.	.	.	+	.	.	1	.	.	+	+	.	+	+	.	+
.	*Lophozia* spp.	.	.	1	1	.	.	+	+	+	1	.	.	+	1	+	+	+	+	+
.	*Cetraria islandica*	.	.	.	.	.	.	1	.	.	+	.	.	.	+	.	1	r	+	.
.	*Peltigera didactyla*	.	.	+	.	+	.	.	.	.	+	.	.	+	.	.	.	.	.	+
.	*Stellaria longipes* coll.	.	.	.	.	.	.	.	.	.	1	.	r	1	.	1	.	+	.	+
.	*Ceratodon purpureus*	.	.	.	.	.	.	+	.	.	.	.	.	1	.	.	.	.	.	.
.	*Peltigera polydactylon* s.l.	.	+	1	.	.	.	1	.	r	.	r	.	1	.	+	.	.	.	+
.	*Nephroma expallidum*	.	.	.	.	.	.	+	.	.	2a	.	.	1	.	.	1	.	+	1
.	*Peltigera canina*	.	1	1	1	.	.	.	.	.	+	.	.	1	.	+	.	.	r	.
.	*Isopterygiopsis pulchella*	.	.	.	.	.	1	+	.	.	.	+	.	.	.	.	.	.	.	+
[mh!]	*Alectoria nigricans*	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	+	.	.
.	*Peltigera aphthosa*	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.
.	*Placynthiella icmalea*	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+	.	+
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**

Table 13. Continued.

.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	+	2b	+	+	+	+	.	+	1	10	.	+	V
.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	+	+	.	+	+	.	+	+	+	.	.	10	.	I	IV
.	.	1	.	.	.	.	.	.	.	.	.	+	.	.	1	2a	2b	1	+	+	.	+	.	+	.	12	+	I	IV
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2a	2a	2a	.	2a	.	+	.	7	.	.	IV
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	+	.	+	.	9	I	.	IV
.	.	1	.	.	.	.	.	.	.	.	.	.	.	+	.	1	+	+	.	1	.	1	.	+	.	9	.	I	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	1	+	.	.	.	.	5	.	.	III
+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2a	+	+	.	+	.	.	.	1	9	+	I	III
.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	+	.	+	2a	+	.	.	1	.	.	1	8	.	I	III
.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	+	.	r	.	.	r	+	7	.	I	III
.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	.	+	.	6	.	+	III
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	2a	.	+	.	1	.	.	.	.	6	+	+	II
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	1	+	1	+	+	.	.	.	.	13	II	.	IV
4	3	2b	2b	2b	+	.	.	.	.	.	1	.	.	.	2a	3	3	2a	1	2a	2a	1	.	+	.	35	V	III	V
2a	1	2b	2a	.	.	1	.	.	.	.	.	.	.	.	2b	2b	1	2a	2a	2a	2b	2a	+	.	.	26	III	III	V
+	+	.	+	+	+	.	.	.	.	.	.	.	.	.	+	1	+	1	.	1	.	1	.	1	.	21	II	III	IV
1	2a	1	2a	.	.	.	+	.	.	.	+	.	.	.	2b	.	.	.	2a	.	1	.	.	.	.	21	III	III	II
.	3	.	.	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	7	.	II	+
.	.	.	1	.	.	.	+	2a	2a	2b	1	+	.	2a	.	.	.	.	.	.	.	.	.	.	1	14	II	III	+
.	.	.	.	.	+	.	1	1	+	1	1	+	.	.	.	.	.	2a	.	.	.	2a	2a	.	1	12	+	II	II
1	.	2a	1	2a	1	.	+	.	.	.	1	2a	.	1	.	1	.	.	.	.	.	+	2a	.	+	27	V	III	II
.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	+	.	.	14	III	I	II
.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	8	II	I	+
.	.	+	.	.	.	.	+	.	r	.	+	.	.	.	.	+	.	1	.	+	.	.	.	.	.	10	I	II	II
.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	5	I	+	+
.	+	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	10	II	II	+
.	.	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	I	I	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	3	I	.	+
2a	2b	.	2b	1	2a	3	2a	2a	2a	2a	.	.	3	.	2b	r	2a	+	2b	.	2a	.	3	2a	.	32	III	IV	IV
1	+	+	.	1	1	+	1	1	1	1	.	1	2a	.	+	.	.	.	.	+	.	1	1	.	1	27	III	IV	III
.	1	.	+	2b	+	+	.	.	.	.	.	.	1	.	+	.	.	.	+	.	+	.	.	.	.	17	II	III	II
.	.	.	1	2a	+	1	.	.	.	.	.	.	.	.	+	+	+	.	+	.	.	.	.	+	.	17	II	II	III
.	+	+	+	1	.	+	.	.	1	.	.	.	+	.	+	.	.	.	.	.	.	.	+	.	1	15	II	III	II
.	.	.	.	.	+	.	.	.	.	.	.	.	r	.	+	.	r	.	+	.	.	.	+	.	.	6	.	I	II
+	+	.	.	1	r	+	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	9	I	II	.
.	.	.	.	.	+	r	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	r	.	.	9	+	II	I
1	1	1	1	1	1	2a	1	1	+	1	1	+	2a	1	1	1	2a	2b	2a	1	2a	1	1	+	1	45	V	V	V
1	+	1	1	1	1	1	1	1	1	2a	+	1	1	+	+	1	.	+	.	1	1	1	1	1	1	35	III	V	V
.	+	+	1	2a	1	+	1	1	1	1	1	1	+	+	+	1	.	1	1	2a	1	1	1	2b	1	34	III	V	V
+	1	1	2a	+	1	1	.	.	1	+	.	.	2a	.	2a	2b	.	.	+	1	1	+	+	.	1	31	III	IV	IV
+	+	+	1	.	1	1	1	.	+	1	.	+	1	.	1	1	1	1	1	1	1	1	1	+	+	29	II	IV	V
+	.	2a	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	+	.	+	.	23	IV	II	III
+	+	1	.	1	+	r	.	.	.	.	.	1	.	1	.	.	1	.	+	+	.	1	1	.	2a	23	II	III	III
.	+	1	.	.	.	r	+	+	.	.	r	.	.	2a	1	+	r	.	2b	2a	2b	+	+	.	2a	22	II	III	V
1	1	1	.	+	.	+	.	.	.	.	.	.	.	.	+	+	+	+	+	1	1	1	.	+	2a	22	II	III	V
.	+	1	1	+	.	.	.	+	.	.	.	+	.	+	+	1	1	.	+	1	+	+	.	.	.	21	II	III	IV
1	1	.	.	1	2a	2b	1	1	2a	.	.	.	2a	.	1	2a	.	1	.	.	+	.	2a	.	.	20	II	III	III
+	+	.	1	+	.	.	.	.	.	.	.	1	.	1	.	+	+	.	.	+	+	+	+	+	.	20	II	III	IV
+	.	+	+	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	+	+	.	.	.	.	.	20	III	III	II
+	+	+	.	.	.	.	+	.	1	1	1	1	.	r	.	.	.	1	1	.	+	.	.	.	.	18	I	IV	II
+	.	1	.	.	.	+	.	.	.	.	.	+	.	.	.	1	+	.	+	+	.	+	.	2a	.	15	II	II	III
.	.	1	.	1	.	.	.	+	.	.	+	.	.	.	+	r	.	.	.	.	.	+	.	1	+	15	II	II	III
.	.	+	+	.	.	.	.	.	1	.	1	1	.	1	.	.	+	+	.	+	.	+	.	+	1	14	I	II	III
.	.	+	r	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	+	.	.	.	14	III	I	II
.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	1	.	+	.	.	.	.	13	I	II	III
.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	+	.	.	1	+	.	.	.	.	.	12	II	I	II
.	r	+	+	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	10	I	II	I
.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	.	.	.	9	I	II	II
1	.	.	+	.	.	.	.	.	.	+	+	.	.	.	.	+	+	.	.	.	+	.	.	.	.	9	+	II	II
.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	+	.	9	I	II	II
20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**				

Addenda follows table 12

Table 14. Tortello arcticae-Caricetum rupestris.

Altitudinal indicator value	Vegetation type	TC luzuletosum											TC scorpidietosum					Presence	luz	sco
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**		**1-11**	**12-16**
	Author	BS	BS	BS	BS	CS	BS	CS	BS	BS	CS	BS	BS	BS	BS	BS	BS		.	.
	Relevé area [m²]	2	2	4	4	3	4	2	4	4	2	4	4	2	4	4	4		.	.
	Size of the stand [10 m²]	20	50	500	50	1000	1000	1000	1000	500	1000	1000	1000	20	500	50	10		647	316
	Altitude [m a.s.l.]	930	960	800	550	920	860	940	780	930	990	860	990	920	930	900	820		865	912
	Slope [°]	5	3	16	4	8	4	6	10	4	4	0	0	2	0	2	0		6	1
	Aspect	n	n	s	nw	ene	w	n	nnw	nne	nne	-	-	e	-	e	-		.	.
	Cover total [%]	100	95	90	100	98	98	80	98	98	60	100	85	100	90	100	100		92	95
	Cover dwarfshrubs [%]	2	2	20	2	2	25	10	10	2	30	15	2	10	20	5	0		11	7
	Cover graminoids [%]	45	70	15	15	15	20	30	20	15	10	25	20	50	40	45	30		25	37
	Cover herbs [%]	20	40	15	7	20	10	30	10	7	15	10	7	10	10	30	25		17	16
	Cover bryophytes [%]	100	97	50	100	60	55	50	70	85	5	100	85	85	90	100	100		70	92
	Cover lichens [%]	2	15	35	5	40	30	25	30	20	25	20	5	10	2	2	2		22	4
	Cover soil [%]	0	0	5	0	0	0	0	0	0	5	0	0	0	10	0	0		1	2
	Cover stones [%]	0	5	5	0	2	2	20	2	2	35	0	15	0	0	0	0		7	3
	Cover litter [%]	2	2	2	2	25	2	5	2	2	5	2	2	0	5	2	2		5	2
	Canopy height [cm]	5	7	5	8	2	5	5	5	5	5	5	5	8	5	7	8		5	7
	Height stand max. [cm]	15	25	10	12	14	10	15	25	10	23	7	7	15	20	20	15		15	15
	PH value	6.3	5.9	6.8	6.0	5.8	5.2	5.8	5.9	5.8	6.3	5.3	5.3	nd	5.6	5.6	5.7		5.9	5.6
	Organic matter rhizosphere [%]	8	10	6	9	6	16	15	18	10	3	17	19	nd	24	21	14		11	20
	Depth organic layer [cm]	3	1	1	3	2	2	1	2	1	2	1	1	2	2	3	2		2	2
	Shelter [1-5]	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	4		3.0	3.4
	Snow cover [1-5]	4	4	3	3	3	3	3	4	4	3	3	4	3	4	3	4		3.4	3.6
	Soil moisture [1-6]	4	4	4	4	3	3	3	4	4	3	4	4	4	5	4	4		3.6	4.2
	Number of species	37	52	34	61	63	72	69	85	79	61	76	51	50	60	52	31		63	49
	ch / d Tortello-Caricetum rupestris (TC)																			
.	*Tortella tortuosa* var. *arctica* (Arn.) Broth.	5	5	3	4	3	2b	2b	4	3	1	4	5	4	2b	5	4	16	V	V
*h	*Salix herbacea*	1	1	.	.	3	2b	2a	.	1	2a	2b	1	1	2b	2a	.	12	IV	IV
mh!	*Dactylina arctica* (M.J. Richardson) Nyl.	.	+	.	1	1	+	1	+	1	.	+	+	+	+	r	.	12	IV	IV
.	*Polytrichum alpinum*	.	1	.	.	.	.	1	.	1	+	+	+	.	2a	+	1	9	III	IV
.	*Scapania* spp.	.	.	+	.	+	+	.	+	.	.	+	+	.	+	+	.	8	III	III
[h!]	*Tritomaria quinquedentata*	.	+	.	.	.	+	+	+	+	.	+	.	.	1	.	.	7	III	I
[h!]	*Huperzia selago* ssp. *arctica*	.	.	.	.	1	.	.	1	.	.	.	+	r	r	.	.	5	I	III
[h!]	*Cardamine bellidifolia*	+	+	.	.	.	.	+	.	.	.	.	+	+	.	.	.	5	II	II
.	*Plagiochila porelloides*	.	.	.	.	.	.	.	+	+	.	1	.	.	+	+	.	5	II	II
	d TC luzuletosum																			
.	*Distichium capillaceum / inclinatum*	+	.	1	+	+	+	+	1	+	1	+	.	.	+	1	.	12	V	II
mh!	*Stereocaulon alpinum*	r	+	.	+	1	1	r	1	1	+	1	.	+	.	r	.	12	V	II
*mh	*Silene acaulis*	+	+	2a	1	1	1	1	1	1	1	1	+	.	.	.	.	12	V	I
.	*Thamnolia vermicularis*	.	+	+	1	1	+	1	+	+	1	+	.	+	.	.	.	11	V	I
.	*Luzula confusa*	+	2a	.	+	+	+	1	1	1	1	+	.	.	.	.	.	10	V	.
.	*Hypnum revolutum*	.	1	.	1	1	1	+	+	.	1	+	.	.	.	.	.	8	IV	.
(mh)	*Sphaerophorus globosus*	.	+	.	.	1	+	2a	+	+	1	+	.	.	.	.	.	8	IV	.
.	*Psoroma hypnorum*	.	.	.	1	2a	+	+	+	1	+	+	.	+	.	.	.	9	IV	I
.	*Dryas integrifolia*	.	.	2b	.	2b	2a	2a	2a	+	2b	.	.	.	.	.	.	7	IV	.
.	*Bryoria nitidula*	.	.	.	+	r	.	+	1	+	+	+	.	.	.	.	.	7	IV	.
.	*Rinodina turfacea*	.	.	.	.	1	+	+	+	+	1	+	.	.	.	.	.	7	IV	.
.	*Collema* spp.	+	.	+	.	.	+	+	+	+	+	.	+	.	.	.	.	8	IV	I
.	*Kobresia myosuroides*	2a	.	1	1	.	1	.	.	.	+	1	.	.	.	.	.	6	III	.
*h	*Dactylina ramulosa* (Hook.) Tuck.	.	.	.	.	1	1	+	.	+	1	+	.	.	.	.	.	6	III	.
[mh!]	*Saxifraga oppositifolia*	1	.	1	.	.	.	1	1	+	+	.	+	.	.	.	.	7	III	I
.	*Schistidium* sp.	.	1	1	+	.	+	.	.	+	.	+	+	.	.	.	.	7	III	I
.	*Peltigera rufescens*	.	+	.	1	.	+	r	+	.	.	+	+	.	.	.	.	7	III	I
(mh)	*Cetraria islandica*	.	.	.	+	1	.	+	.	1	+	+	.	.	r	.	.	7	III	I
.	*Polytrichum juniperinum*	.	.	.	.	2a	1	.	1	+	2a	1	.	.	.	1	.	7	III	I
.	*Cladonia borealis*	.	.	.	.	1	+	1	+	1	.	+	.	+	.	.	.	7	III	I
[mh!]	*Alectoria nigricans*	.	.	.	+	.	.	r	+	+	+	.	.	.	.	.	.	5	III	.
.	*Nephroma expallidum*	.	.	.	.	1	.	+	+	1	.	+	.	.	.	.	.	5	III	.
.	*Parmelia omphalodes*	.	.	.	.	1	1	.	2a	2a	.	2a	1	.	.	.	.	6	III	I
.	*Cladonia amaurocraea*	.	.	.	.	.	+	+	+	+	.	1	.	.	+	.	.	6	III	I
[h!]	*Papaver radicatum* coll.	.	+	.	+	.	.	+	+	.	.	.	.	.	.	.	.	4	II	.
	d TC scorpidietosum																			
.	*Scorpidium cossonii*	.	.	.	.	.	.	.	.	.	.	.	1	1	2b	1	1	5	.	V
[mh!]	*Carex misandra*	.	.	.	.	.	.	.	1	1	.	.	2a	+	.	1	r	6	I	IV
.	*Fissidens osmundoides*	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	.	5	+	IV
.	*Philonotis fontana / tomentella*	.	.	.	.	.	.	.	.	.	.	.	.	+	1	+	2a	4	.	IV
.	*Juncus biglumis*	.	.	.	.	.	.	.	.	.	+	.	1	.	1	+	.	4	+	III
.	*Eriophorum angustifolium* ssp. *subarcticum*	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	3	.	III
.	*Brachythecium turgidum*	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	3	.	III

Table 14. Continued.

	d Rhododendrenion lapponici																			
.	*Pedicularis flammea*	1	.	1	+	1	+	1	1	+	+	1	1	1	1	1	r	15	V	V
.	*Campylium stellatum*	+	.	.	.	.	+	+	.	+	+	+	.	.	1	+	1	9	III	III
(h)	*Luzula arctica*	1	.	.	1	.	.	1	+	.	+	+	+	.	+	.	.	8	III	II
.	*Tomentypnum nitens*	+	.	.	1	.	.	+	1	+	.	.	.	1	2b	+	.	8	III	III
.	*Meesia uliginosa*	+	.	.	.	+	+	.	+	.	.	+	.	.	2b	.	.	6	III	I
.	*Oncophorus wahlenbergii*	.	.	.	.	.	2a	.	.	.	.	+	+	.	1	+	.	5	I	III
	some preferential species of the ass.																			
*mh	*Racomitrium lanuginosum*	.	1	.	1	r	2a	+	1	1	1	1	1	1	+	1	.	13	V	IV
.	*Armeria scabra* ssp. *sibirica*	1	+	1	1	.	.	+	1	.	+	+	r	+	.	.	.	10	IV	II
mh!	*Ptilidium ciliare*	.	+	.	.	1	1	1	+	1	.	2a	.	+	1	+	.	10	IV	III
.	*Hypnum bambergeri*	+	+	1	1	.	1	.	1	.	.	1	+	+	.	.	.	9	IV	II
	other Carici-Kobresietea																			
(mh)	*Carex rupestris*	2b	4	2a	1	2a	1	2b	2b	2a	2a	1	.	1	1	2b	.	14	V	III
.	*Myurella julacea*	+	+	1	+	.	+	.	+	1	+	+	+	+	1	+	+	14	V	V
.	*Ditrichum flexicaule*	1	1	2a	+	.	.	2a	+	+	1	.	1	1	+	1	+	13	IV	V
.	*Cladonia pocillum*	+	+	.	.	+	1	+	2b	2a	+	2a	2a	1	+	1	.	13	V	IV
.	*Myurella tenerrima*	.	.	.	.	.	+	+	+	.	.	+	.	+	+	+	1	8	II	IV
.	*Rhytidium rugosum*	.	.	.	1	.	+	.	.	.	+	.	+	.	.	.	.	4	II	I
	others																			
.	*Polygonum viviparum*	2a	3	2a	2a	2a	2a	2b	2a	2a	2a	2a	1	2m	2a	3	2a	16	V	V
.	*Carex bigelowii*	2a	2a	+	2a	2a	2b	2a	2a	1	.	2b	2b	3	1	3	2b	15	V	V
.	*Bryum* spp.	+	+	+	1	.	+	+	+	+	1	+	+	+	+	1	1	15	V	V
.	*Ochrolechia frigida*	+	+	2a	.	2b	2b	2a	2a	1	1	2a	1	1	+	+	.	14	V	IV
.	*Flavocetraria cucullata*	+	+	+	1	1	1	1	1	1	1	1	+	+	+	+	.	15	V	IV
.	*Aulacomnium turgidum*	+	1	.	2a	+	1	2a	1	1	+	1	1	1	2b	2a	1	15	V	V
.	*Flavocetraria nivalis*	.	+	+	1	1	1	1	1	+	1	+	+	+	+	.	.	13	V	III
.	*Poa pratensis* coll. / *arctica*	1	1	.	+	2a	1	.	1	1	1	1	.	1	.	+	1	12	V	III
.	*Cephaloziella* spp.	+	.	+	+	+	+	.	+	.	.	+	1	1	+	+	.	11	IV	IV
.	*Cladonia gracilis*	.	+	.	+	1	1	1	+	1	.	1	.	+	+	.	.	10	IV	II
.	*Pohlia cruda*	.	.	.	+	+	+	1	+	+	+	+	.	.	+	+	.	10	IV	II
.	*Cladonia arbuscula* ssp. *mitis*	.	.	.	+	1	1	1	+	+	.	1	.	+	+	.	.	9	IV	II
.	*Anastrophyllum minutum*	.	.	.	.	+	1	+	+	1	.	+	.	+	+	+	.	9	III	III
.	*Isopterygiopsis pulchella*	+	+	+	.	.	+	.	.	+	.	+	.	.	+	+	.	8	III	II
.	*Lophozia* spp.	.	+	.	.	+	+	.	+	.	+	.	+	+	+	.	.	8	III	III
.	*Peltigera leucophlebia*	.	+	.	+	.	.	r	1	+	.	+	.	+	.	.	r	8	III	II
.	Microlichen indet.	.	+	+	+	2a	+	.	+	.	+	.	+	.	.	.	.	8	IV	I
.	*Placynthiella icmalea*	.	.	.	.	.	+	.	1	+	+	+	+	1	.	.	.	7	III	II
.	*Dicranum acutifolium / brevifolium*	.	.	.	.	2a	.	+	.	2a	1	2b	.	1	2a	.	.	7	III	II
.	*Cladonia pyxidata*	.	+	.	.	.	1	1	.	+	.	+	.	.	+	+	.	7	III	II
.	*Festuca brachyphylla*	.	1	.	+	.	+	.	.	.	.	+	.	.	.	.	1	5	II	I
.	*Dicranum spadiceum*	.	.	.	2a	.	2b	2a	.	.	.	.	1	.	.	+	.	5	II	II
.	*Hylocomium splendens*	.	.	.	.	+	.	+	1	1	.	.	.	.	1	.	.	5	II	I
.	*Cladonia phyllophora*	.	1	.	+	+	.	+	.	.	.	.	.	.	.	+	.	5	II	I
.	*Sanionia uncinata*	.	+	.	.	1	+	.	.	.	.	+	.	1	.	.	.	5	II	I
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**			

Addenda (other species with presence < 5):

1: *Tetralophozia setiformis* 2b, *Equisetum arvense* 1, *Draba lactea* +, *Hypnum hamulosum* +, *Lopadium coralloideum* +, *Pertusaria oculata* +, *Stellaria longipes* coll. +; **2:** *Cerastium alpinum* ssp. *lanatum* 1, *Dicranum flexicaule / fuscescens* 1, *Hierochloe alpina* 1, *Hypnum holmenii* Ando 1, *Pohlia nutans* 1, *Potentilla hyparctica* 1, *Bryonora castanea* s.str. +, *Calypogeia sphagnicola* +, *Draba glabella* +, *Saxifraga cernua* +, *Stellaria longipes* coll. +, *Alectoria ochroleuca* r; **3:** Black soil crust 2a, *Cladonia* sp. 2a, *Arctomia delicatula* Th. Fr. 1, *Equisetum arvense* 1, *Ochrolechia upsaliensis* 1, *Physconia muscigena* 1, *Trematodon brevicollis* 1, *Euphrasia frigida* +; **4:** *Tortula ruralis* 2a, *Campanula uniflora* 1, *Cerastium alpinum* ssp. *lanatum* 1, *Draba nivalis* 1, *Peltigera canina* 1, *Peltigera scabrosa* 1, *Thalictrum alpinum* 1, *Alectoria ochroleuca* +, Black soil crust +, *Carex norvegica* +, *Cerastium arcticum* +, *Cladonia chlorophaea* s.l. +, *Cladonia macroceras* +, *Hypogymnia austerodes* +, *Orthotrichum speciosum* +, *Physconia muscigena* +, *Potentilla hyparctica* +, *Ranunculus affinis* +, *Salix glauca* coll. +; **5:** *Parmeliella triptophylla* 1, *Pedicularis hirsuta* 1, *Pertusaria dactylina* 1, *Racomitrium canescens* 1, *Solorina saccata* 1, *Caloplaca tiroliensis* +, *Cetraria aculeata / muricata* +, *Lecidea* sp. +, *Leptogium* sp. +, *Lopadium pezizoideum* +, *Massalongia carnosa* +, Moss indet. +, *Peltigera aphthosa* +, *Peltigera canina* +, *Phaeorrhiza nimbosa* +, *Potentilla hyparctica* +, *Stellaria longipes* coll. +; **6:** *Cetraria ericetorum* 1, *Cetrariella delisei* 1, *Anthelia julacea / juratzkana* +, *Betula nana* +, *Blepharostoma trichophyllum* +, *Caloplaca* sp. +, *Cephalozia* sp. +, *Cetraria aculeata / muricata* +, *Cladonia stricta* s.str. +, *Gymnomitrion corallioides* +, *Lempholemma* sp. +, *Parmeliella triptophylla* +, *Peltigera aphthosa* +, *Peltigera polydactylon* s.l. +, *Racomitrium canescens* +; **7:** *Physconia muscigena* 2a, *Polyblastia cruenta* 1, *Alectoria ochroleuca* +, *Caloplaca ammiospila* +, *Cladonia fimbriata* +, *Gymnomitrion corallioides* +, *Hypnum holmenii* Ando +, *Massalongia carnosa* +, *Pedicularis hirsuta* +, *Pertusaria bryontha* +, *Pertusaria oculata* +, *Polytrichum strictum* +, *Bryocaulon divergens* r, *Caloplaca tiroliensis* r; **8:** Black soil crust 1, *Pertusaria dactylina* 1, *Barbilophozia kunzeana* +, *Carex capillaris* coll. +, *Cassiope tetragona* +, *Caloplaca* sp. +, *Cetraria aculeata / muricata* +, *Cetraria ericetorum* +, *Cladonia chlorophaea* s.l. +, *Cladonia* sp. +, *Cladonia stricta* s.str. +, *Dicranum flexicaule / fuscescens* 1, *Draba glabella* +, *Hypnum holmenii* Ando +, Moss indet. +, *Peltigera polydactylon* s.l. +, *Peltigera scabrosa* +, *Pertusaria glomerata* +, *Pohlia nutans* +, *Protopannaria pezizoides* +, *Pyrola grandiflora* +, *Saelania glaucescens* +, *Stellaria longipes* coll. +, *Tetralophozia setiformis* +, *Tetraplodon paradoxus* +, *Pedicularis lanata* r; **9:** *Collema ceraniscum* 2a, *Cladonia stricta* s.str. 1, *Ochrolechia upsaliensis* 1, *Parmeliella triptophylla* 1, *Anthelia julacea / juratzkana* +, *Bryocaulon divergens* +, *Bryonora castanea* s.str. +, *Carex norvegica* +, *Ceratodon purpureus* +, *Cetrariella delisei* +, *Draba lactea* +, *Gyalecta foveolaris* +, *Hypogymnia austerodes* +, *Lopadium pezizoideum* +, *Megaspora verrucosa* +, cf. *Myxobilimbia microcarpa* +, *Peltigera canina* +, *Peltigera scabrosa* +, *Pertusaria dactylina* +, *Physconia muscigena* +, *Trapeliopsis granulosa* +, *Campanula uniflora* r, *Solorina* sp. r; **10:** *Gymnomitrion corallioides* 2a, *Cetraria aculeata / muricata* 1, *Pertusaria bryontha* 1, *Pertusaria glomerata* 1, *Bryocaulon divergens* +, *Bryonora castanea* s.str. +, *Caloplaca tiroliensis* +, *Campanula uniflora* +, *Cynodontium strumiferum* +, *Hypogymnia austerodes* +, *Lecidea* sp. +, *Massalongia carnosa* +, *Parmelia saxatilis* +, *Parmeliella triptophylla* +, *Peltigera aphthosa* +, *Pertusaria coriacea* +, *Psilopilum laevigatum* +, *Racomitrium canescens* +; **11:** *Carex norvegica* 1, *Cetraria ericetorum* 1, *Cetrariella delisei* 1, *Lempholemma* sp. 1, *Caloplaca* sp. +, *Caloplaca tetraspora* +, *Cladonia stricta* s.str. +, *Cladonia trassii* +, *Gyalecta foveolaris* +, *Hierochloe alpina* +, *Pertusaria glomerata* +, *Protopannaria pezizoides* +, *Racomitrium canescens* +, *Salix arctophila* +, *Carex capitata* r; **12:** *Carex maritima* 1, *Cladonia acuminata* 1, *Collema ceraniscum* 1, *Anthelia julacea / juratzkana* +, *Hypnum hamulosum* +, Macrolichen indet. +, *Peltigera aphthosa* +, *Polytrichum strictum* +, *Polytrichum swartzii* +, *Pseudocalliergon turgescens* +, *Saxifraga cernua* +, *Warnstorfia sarmentosa* +; **13:** *Salix glauca* coll. 2a, *Caloplaca* sp. +, *Cetraria ericetorum* +, *Collema ceraniscum* +, *Pohlia nutans* +, *Pseudephebe pubescens* +, *Tetralophozia setiformis* +, *Salix arctophila* r; **14:** *Carex rariflora* 3, *Salix arctophila* 3, *Hypnum holmenii* Ando 2a, *Equisetum arvense* 1, Moss indet. 1, *Ranunculus lapponicus* 1, *Saxifraga foliolosa* 1, *Alectoria ochroleuca* +, *Blepharostoma trichophyllum* +, *Cladonia trassii* +, *Lophozia rutheana* +, *Polytrichum strictum* +, *Warnstorfia sarmentosa* +, *Loeskypnum badium* r; **15:** *Hypnum hamulosum* 2a, *Carex gynocrates* 1, *Carex maritima* 1, *Cladonia acuminata* +, *Barbilophozia hatcheri* +, *Blepharostoma trichophyllum* +, *Lopadium* sp. +, *Oncophorus virens* +, *Peltigera canina* +, *Splachnum sphaericum* +, *Tetralophozia setiformis* +; **16:** *Carex norvegica* 2a, *Taraxacum lacerum* 2a, *Thalictrum alpinum* 2a, *Potentilla hyparctica* 1, *Ranunculus affinis* 1, *Scorpidium revolvens* 1, *Bryum* sp. +, *Draba glabella* +, *Equisetum arvense* +, *Juncus castaneus* +, *Saxifraga cernua* +.

Table 15. Saxifrago nathorstii-Kobresietum simpliciusculae and other base-rich fens.

Altitudinal indicator value	Vegetation type	Saxifrago-Kobresietum (Carici-Kobresietea)													other base-rich fens (Scheuchzerio-Caricetea)					Presence	SK	SC
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**		**1 - 13**	**14 - 18**
	Author	BS	BS	CS	CS	BS	FD	FD	FD	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS			
	Relevé area [m²]	4	4	1	1	4	1	1	2	4	4	4	4	4	4	4	4	4	4		.	.
	Size of the stand [10 m²]	30	100	1	2	3	1	10	2	30	2	30	5	20	50	2	10	3	40		18	21
	Altitude [10 m a.s.l.]	70	45	390	315	345	920	230	921	860	140	30	525	535	535	395	40	70	550		410	318
	Slope [°]	0	0	10	8	0	0	10	3	0	0	0	0	0	0	0	0	0	0		2	0
	Aspect	-	-	sse	sse	-	-	s	s	-	-	-	-	-	-	-	-	-	-		.	.
	Cover total [%]	100	100	90	97	90	95	100	65	95	100	95	70	90	100	95	90	75	100		91	92
	Cover dwarfshrubs [%]	50	60	70	30	50	10	20	35	20	40	20	20	30	2	5	2	2	30		35	8
	Cover graminoids [%]	30	15	20	35	30	25	15	25	35	70	40	40	50	60	40	50	45	60		33	51
	Cover herbs [%]	2	2	20	30	5	15	15	5	7	2	5	30	10	2	30	2	10	12		11	11
	Cover bryophytes [%]	100	100	8	2	60	50	60	10	80	70	95	70	80	100	100	90	70	100		60	92
	Cover lichens [%]	0	2	3	4	10	5	2	15	2	0	0	2	2	2	2	0	0	0		4	1
	Cover soil [%]	0	0	0	3	0	4	0	35	5	0	5	7	0	0	5	10	10	0		5	5
	Cover stones [%]	0	0	0	0	5	1	0	3	0	0	0	3	0	0	0	0	0	0		1	0
	Cover litter [%]	2	5	20	10	5	0	2	0	2	10	2	7	2	10	2	5	10	2		5	6
	Canopy height [cm]	15	7	8	12	10	10	6	3	6	15	15	8	15	12	10	2	20	15		10	12
	Height stand max. [cm]	40	15	8	12	30	25	15	20	10	20	20	20	30	15	25	30	30	30		20	26
	PH value	6.7	5.9	6.5	6.5	5.9	6.1	5.7	6.6	5.8	6.4	6.8	6.9	6.4	5.6	7.1	6.2	6.4	6.3		6.3	6.3
	Organic matter rhizosphere [%]	7	30	11	12	17	1	50	1	16	4	60	48	54	55	16	4	2	57		24	27
	Groundwater [cm]	-	-	-	-	25	20	-	nd	6	15	6	10	6	10	20	30	30	4		13	19
	Shelter [1-5]	3	3	3	3	4	3	3	3	3	3	3	4	4	4	4	3	4	4		3.2	3.8
	Snow cover [1-5]	3	4	3	3	4	3	3	3	3	4	4	4	4	4	4	3	3	4		3.5	3.6
	Soil moisture [1-6]	4	4	4	5	4	4	4	4	6	4	6	5	5	6	4	4	4	5		4.5	4.6
	Number of species	19	24	26	33	42	25	22	52	29	41	36	34	39	34	31	26	35	29		32	31
	d Saxifrago-Kobresietum (against other base-rich fens)																					
.	*Vaccinium uliginosum* ssp. *microphyllum*	2b	3	2a	1	4	.	2b	.	.	3	2a	1	1	+	.	.	.	.	11	IV	I
.	*Ditrichum flexicaule*	.	1	.	.	.	1	.	1	1	1	1	.	1	+	.	.	.	.	8	III	I
.	*Carex gynocrates*	.	.	.	2a	1	.	+	.	.	1	1	+	1	.	.	.	.	.	7	III	.
.	*Flavocetraria nivalis*	.	.	+	1	+	.	.	+	r	.	.	r	.	r	.	.	.	.	7	III	I
[mh!]	*Carex misandra*	.	.	.	.	.	+	.	1	1	.	.	+	+	.	.	.	.	.	5	II	.
.	*Tortella tortuosa* var. *arctica* (Arn.) Broth.	.	1	.	.	.	.	r	1	.	1	.	.	.	.	.	.	.	.	4	II	.
	d other base-rich fens (against Saxifrago-Kobresietum)																					
.	*Aneura pinguis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	1	3	.	III
[lm!]	*Calamagrostis neglecta*	1	.	.	.	1	.	.	.	.	+	.	.	.	1	1	+	1	+	8	II	V
	d Saxifrago-Kobresietum (SK), other base-rich fens (SC)																					
.	*Kobresia simpliciuscula*	.	.	.	.	1	2a	2a	1	1	.	1	2a	2b	+	1	2a	+	1	13	IV	V
lm	*Euphrasia frigida*	.	.	1	2m	.	.	.	.	.	1	+	2m	2m	.	1	+	2m	+	10	III	IV
.	*Juncus castaneus*	.	.	.	.	.	2a	.	+	+	+	+	+	1	.	.	+	1	1	10	III	III

Table 15. Continued.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
Im	*Pinguicula vulgaris*	.	.	.	+	1	.	+	.	.	1	1	.	2a	+	2b	.	2a	.	9	III	III
.	*Catoscopium nigritum*	.	.	.	.	.	2b	.	.	3	.	1	2a	1	3	.	4	2a	2b	9	II	IV
.	*Juncus triglumis*	.	.	.	.	.	.	.	1	2m	+	+	+	1	1	.	.	r	1	9	III	III
.	*Saxifraga aizoides*	.	.	.	.	.	.	1	.	.	.	.	1	1	r	.	.	.	.	4	II	I
Im	*Carex microglochin*	.	.	.	.	.	.	.	.	.	.	.	.	2b	r	2a	.	.	+	4	+	III
	d SK, SC (against Caricetum rariflorae, C. saxatilis)																					
.	*Distichium capillaceum / inclinatum*	+	1	1	1	+	1	.	1	2b	+	+	2b	1	1	3	1	2a	2a	17	V	V
.	*Pedicularis flammea*	.	+	+	.	1	+	+	1	1	+	1	1	1	+	1	+	.	+	15	V	IV
.	*Tofieldia pusilla*	.	.	1	1	1	1	2a	+	1	1	1	1	.	1	2m	1	1	.	14	IV	IV
Im!	*Rhododendron lapponicum*	3	1	2b	3	1	.	+	.	+	2a	1	.	+	+	+	.	.	.	12	IV	II
[Im!]	*Carex capillaris* coll.	.	.	.	2a	+	.	1	.	.	.	1	2a	2b	+	2a	2a	1	3	11	III	V
.	*Dryas integrifolia*	.	.	.	2b	.	2a	+	3	2b	.	1	2a	2b	+	1	.	.	.	10	IV	II
.	*Ochrolechia frigida*	.	+	.	.	+	.	.	+	.	.	.	1	r	+	.	.	.	.	6	II	I
	other Rhododendrenion, Carici-Kobresietea																					
.	*Campylium stellatum*	5	+	1	1	+	.	.	.	1	2a	1	3	2a	3	.	.	3	+	13	IV	III
.	*Eriophorum angustifolium* ssp. *subarcticum*	+	.	.	.	2a	.	.	.	1	2a	1	1	1	1	+	+	+	1	12	III	V
.	*Tomentypnum nitens*	1	4	1	.	4	.	r	.	.	3	4	2a	3	.	2b	2a	2b	.	12	IV	III
.	*Equisetum arvense*	+	1	2a	2a	1	+	.	.	.	1	1	1	.	.	1	+	1	.	12	IV	III
.	*Meesia uliginosa*	.	.	.	.	+	2b	.	+	2a	1	1	.	1	1	.	1	2a	2a	11	III	IV
.	*Cladonia pocillum*	.	1	.	+	.	.	+	+	.	.	.	.	.	r	.	.	.	.	5	II	I
	other Scheuchzerio-Caricetea																					.
.	*Equisetum variegatum*	.	.	1	1	.	1	1	1	1	1	2m	2b	2m	1	2a	1	1	1	15	IV	V
.	*Scorpidium cossonii*	1	.	.	.	1	.	.	.	2a	2b	2b	1	3	2b	.	+	.	2a	10	III	III
.	*Cinclidium arcticum / stygium*	.	.	.	.	.	.	.	.	.	+	2a	.	.	1	.	.	.	3	4	I	II
.	*Carex maritima*	1	2a	2a	2a	.	+	.	.	.	1	.	.	1	.	+	.	2b	.	9	III	II
.	*Carex rariflora*	.	.	.	.	.	.	.	.	2b	4	2a	2b	2b	3	2b	3	.	3	9	II	IV
	others																					
.	*Polygonum viviparum*	1	1	1	1	1	2a	1	2m	1	2m	1	2b	.	1	2m	1	1	1	17	V	V
.	*Bryum* spp.	1	1	1	1	+	1	.	1	1	1	1	1	1	1	2a	2b	2b	2a	17	V	V
Im!	*Betula nana*	2b	2b	2a	1	2a	.	+	.	.	2b	2a	+	1	+	1	1	+	.	14	IV	IV
.	*Salix arctophila*	.	.	.	.	2a	+	.	.	+	2a	1	.	2b	1	+	.	.	3	9	III	III
.	*Carex bigelowii*	3	1	.	.	.	.	+	1	.	1	2a	.	.	.	.	.	3	.	7	III	I
.	*Aulacomnium turgidum*	.	+	.	.	1	.	.	.	.	1	1	.	+	.	.	.	r	.	6	II	I
.	*Juncus arcticus*	1	.	.	1	.	.	.	.	.	+	.	.	.	.	+	1	+	.	6	II	III
(Im)	*Salix glauca* coll.	1	2a	+	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	6	II	III
.	*Pseudocalliergon turgescens*	.	+	.	.	.	.	.	.	1	.	.	.	1	1	.	.	.	2a	5	II	II
.	*Platydictya jungermannioides*	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	r	+	.	5	II	II
.	*Triglochin palustre*	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	1	1	.	4	I	II
	Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**			

Addenda follows table 12

Table 16. Caricetum saxatilis, Caricetum rariflorae.

Distribution type[1]	Altitudinal indicator value	Diagnostic value[2]	Community	Caricetum saxatilis												Caricetum rariflorae																	Presence	Cs	Cr
			Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**		**1-12**	**13-29**
			Author	BS	BS	BS	BS	BS	BS	FD	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS	BS		.	.
			Relevé area [m²]	4	4	4	4	4	4	1	4	4	4	4	2	4	4	4	2	3	4	2.3	4	4	4	4	4	2	1	2	4	2		.	.
			Size of the stand [10 m²]	25	15	100	50	15	4	nd	20	6	3	100	5	40	20	10	2	1	20	50	10	100	8	100	1000	60	2	20	15	2		312	911
			Altitude [m a.s.l.]	20	70	80	230	380	605	925	525	330	870	230	555	540	240	520	335	575	310	925	420	580	865	250	325	855	220	535	410	540		402	494
			Slope [°]	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	40	0	0	3	0	3	8		0	3
			Aspect	-	-	-	-	-	-	-	-	-	w	-	-	w	-	-	-	-	-	-	-	-	-	w	-	-	n	-	sw	w		.	.
			Cover total [%]	60	100	55	100	90	100	95	80	70	100	100	70	70	100	100	100	90	100	100	90	85	90	100	100	100	100	100	90	100		85	95
			Cover dwarf shrubs [%]	2	2	0	0	10	2	0	2	0	2	0	10	2	2	0	0	2	30	2	30	2	2	5	40	0	5	10	2	2		3	8
			Cover graminoids [%]	45	60	55	40	50	30	40	60	45	40	60	40	60	60	50	30	50	70	30	70	65	70	70	60	40	20	35	75	50		47	53
			Cover herbs [%]	0	2	2	2	0	0	2	10	2	2	2	2	2	2	0	2	0	2	0	2	2	2	5	10	0	2	2	0	2		2	2
			Cover bryophytes [%]	20	100	5	100	90	100	85	80	60	100	100	50	70	100	100	100	90	100	100	90	60	90	100	70	100	100	100	80	100		74	78
			Cover lichens [%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	0	0	0	0	0		0	0
			Cover soil [%]	40	0	10	0	0	0	5	0	30	0	0	30	20	0	0	0	0	0	0	10	20	10	0	0	0	0	0	10	0		10	4
			Cover litter [%]	2	2	40	10	20	10	0	10	2	10	0	2	10	5	2	2	2	2	2	10	2	2	5	10	2	2	2	2	2		9	4
			Canopy height [cm]	35	30	50	30	15	20	20	25	30	15	40	25	15	15	12	8	7	20	10	8	10	10	25	30	5	10	6	10	5		28	13
			Height stand max. [cm]	50	40	60	50	25	30	25	35	40	20	50	30	25	20	25	15	15	30	15	20	20	20	35	40	7	15	10	25	20		38	21
			PH value	5.9	6.3	5.7	6.0	5.1	5.4	nd	6.2	5.1	4.6	6.1	5.3	5.1	5.7	6.0	6.0	4.6	5.6	5.3	5.3	4.5	4.7	5.6	5.5	5.0	nd	6.0	4.7	5.2		5.6	5.3
			Organic matter rhizosphere [%]	57	4	9	72	24	21	nd	68	39	38	87	53	45	64	66	72	41	52	53	84	47	41	7	54	59	nd	52	34	13		43	51
			Ground water [cm]	10	20	17	15	15	0	nd	1	10	9	5	0	5	-	1	6	0	10	3	5	1	5	-	20	5	5	7	1	20		9	5
			Shelter [1-5]	3	4	4	3	4	4	4	4	4	3	3	4	3	4	4	4	4	4	3	3	4	4	4	4	3	4	4	4	4		3.7	3.8
			Snow cover [1-5]	4	3	3	3	4	4	3	4	4	4	3	3	4	4	4	4	4	4	4	3	4	4	4	4	3	4	4	4	5		3.5	3.9
			Soil moisture [1-6]	5	4	5	6	6	6	5	6	5	6	6	6	6	5	6	6	6	5	5	6	6	6	4	5	6	6	6	6	5		5.5	5.6
			Species number of vascular plants	5	8	4	6	3	5	3	7	6	10	6	9	7	12	4	6	7	12	4	10	5	5	9	8	3	7	10	3	10		6	7
			Species number of mosses	4	3	2	3	7	6	3	6	8	7	4	9	8	7	11	9	11	12	12	13	15	13	10	9	8	8	11	7	4		5	10
			Species number of liverworts	0	0	0	0	2	1	0	0	3	0	0	0	0	0	0	0	3	2	2	0	3	1	0	0	1	0	0	0	0		1	1
			Species number of macrolichens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	0	0	0	0	0		0	0
			Number of species	9	11	6	9	12	12	6	13	17	17	10	18	15	19	15	15	21	26	19	23	23	21	19	18	12	15	21	10	14		12	18
			ch Caricetum saxatilis (Cs)																																
A	.	as1	*Carex saxatilis*	3	1	4	2a	3	2b	3	2a	3	3	4	3	2a	1	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	17	V	II
			ch Caricetum rariflorae (Cr)																																
L	.	as2	*Carex rariflora*	.	.	.	.	.	.	.	.	.	.	.	.	3	4	3	3	3	3	3	4	3	4	2b	4	3	2b	2b	4	3	17	.	V
.	.	.	*Meesia triquetra*	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	2b	1	.	4	.	1	.	.	.	1	4	.	.	.	7	.	III
.	.	C	*Loeskypnum badium*	.	.	.	.	.	.	.	.	.	+	.	.	2a	.	.	+	.	.	1	.	2a	3	.	.	.	.	.	+	.	7	+	II
.	.	A1	*Paludella squarrosa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	2b	.	.	.	.	.	3	1	5	.	II
			d Caricetum rariflorae																																
.	.	.	*Calliergon richardsonii*	.	.	.	.	.	.	.	.	.	.	2b	1	2a	2a	2a	2a	.	1	2a	1	.	2a	.	.	2b	2b	+	.	.	13	I	IV
A	.	.	*Polygonum viviparum*	.	.	.	.	.	.	.	.	.	+	.	+	1	1	.	.	.	2m	.	1	1	.	1	2a	.	1	1	.	1	12	I	III
.	.	O2	*Cinclidium arcticum / stygium*	.	.	.	.	.	.	.	.	.	.	.	+	1	1	.	2a	.	.	1	.	+	.	1	.	2a	3	4	1	.	11	+	III
.	.	C	*Tomentypnum nitens*	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	.	.	3	.	3	.	+	2b	3	.	.	.	.	.	8	.	III
LC	lm!	.	*Betula nana*	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	r	+	.	1	.	.	+	.	.	.	.	.	.	6	.	II
.	.	C	*Aneura pinguis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	1	1	.	.	1	.	.	.	.	6	.	II

Table 16. Continued.

.	.	.	*Plagiomnium ellipticum / medium*	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	.	.	2a	.	2b	.	.	.	2a	.	.	.	.	.	5	+	II
.	.	.	*Aulacomnium palustre*	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	2b	.	+	1	2a	.	.	.	.	.	5	+	II
.	.	C	*Meesia uliginosa*	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	1	.	1	.	.	.	.	.	+	.	.	5	+	II
			d Caricetum saxatilis, C. rariflorae (against base-rich fens)																																
.	.	C	*Scorpidium revolvens*	.	.	.	.	1	2b	3	.	.	3	1	.	2b	.	.	4	4	2b	2a	.	1	2a	.	.	3	1	.	+	.	15	III	III
.	[mh]	O1	*Warnstorfia sarmentosa*	.	.	.	.	1	+	1	.	.	4	.	.	2a	.	.	.	3	.	2b	.	1	1	.	.	2b	1	.	3	5	13	II	III
.	.	C,O1	*Warnstorfia exannulata*	.	3	.	4	.	.	.	.	+	.	2b	.	.	.	.	1	1	.	1	+	.	.	.	.	.	.	.	.	1	9	II	II
.	.	A2	*Pseudocalliergon trifarium*	.	.	.	1	.	.	.	1	.	.	1	.	.	.	1	+	.	.	.	.	1	.	.	.	1	.	.	.	.	7	II	II
.	.	C	*Sphagnum platyphyllum*	.	.	.	.	4	+	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	.	.	3	I	+
.	.	.	*Gymnocolea inflata*	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	3	I	+
.	.	.	*Sphagnum squarrosum*	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	2a	.	.	.	.	.	.	.	.	.	.	1	.	3	+	I
			other Scheuchzerio-Caricetea																																
B	.	C	*Eriophorum angustifolium* ssp. *subarcticum*	2a	1	.	2a	2b	2b	+	1	.	1	1	2a	2b	1	1	1	1	2b	1	2m	2b	2a	3	2b	+	.	2a	2b	1	26	V	V
B	[lm!]	C	*Calamagrostis neglecta*	1	3	1	2b	.	1	.	4	.	1	1	+	.	1	.	1	.	1	.	.	.	.	2b	.	.	.	+	.	2m	15	IV	II
.	.	C	*Scorpidium cossonii*	.	.	.	2a	3	3	.	3	.	.	.	3	3	5	2a	1	.	2b	2a	2a	.	.	.	.	.	1	2b	.	1	15	III	III
.	.	C	*Campylium stellatum*	+	2b	.	.	.	+	.	1	.	.	.	1	.	2a	1	.	.	.	.	1	1	.	4	.	.	.	1	.	.	11	III	II
L	.	C	*Equisetum variegatum*	.	.	.	1	.	.	.	2a	.	.	1	1	.	1	.	1	.	2m	.	.	.	.	1	r	.	1	1	.	.	11	II	III
.	.	C	*Scorpidium scorpioides*	.	.	.	2b	+	3	3	.	.	.	4	.	.	.	4	1	.	.	.	.	2b	.	.	.	+	.	.	.	.	9	III	II
.	.	O1	*Polytrichum swartzii*	.	.	.	.	1	.	.	.	2b	1	.	.	.	.	.	.	1	.	1	.	+	2m	.	.	1	.	.	.	.	8	II	II
.	.	C	*Pseudocalliergon turgescens*	2b	.	.	.	.	.	.	4	.	.	.	1	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	5	II	I
A	.	.	*Carex maritima*	1	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	4	II	+
.	.	.	*Splachnum vasculosum*	.	.	.	.	.	.	.	.	.	2a	.	.	.	.	+	r	.	.	.	.	1	.	.	.	.	.	.	.	.	4	+	I
.	.	C	*Oncophorus wahlenbergii*	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	1	.	1	.	.	.	.	.	.	.	.	4	+	I
LC	.	.	*Carex marina*	.	.	.	.	.	.	.	.	.	1	.	1	.	2m	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	I	+
AM	.	C	*Juncus castaneus*	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	3	I	+
A	.	O1	*Eriophorum scheuchzeri*	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	3	+	I
.	.	.	*Cinclidium subrotundum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	2a	.	.	3	.	.	.	.	.	.	.	3	.	I
			others																																
L	.	.	*Salix arctophila*	+	.	.	.	2a	+	.	+	.	1	.	2a	1	1	.	.	1	3	1	2b	1	1	1	3	.	2a	2a	1	1	20	III	V
.	.	.	*Bryum* spp.	+	+	.	.	.	.	.	1	.	+	.	2a	.	1	+	.	+	2a	.	2b	1	.	2a	1	.	2a	2b	.	1	16	III	IV
B	.	.	*Equisetum arvense*	.	.	.	.	.	.	.	+	1	+	.	.	.	.	.	.	.	1	.	+	.	.	.	2m	.	1	1	.	+	9	II	II
.	.	.	*Aulacomnium turgidum*	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	1	.	2m	+	+	.	.	.	.	.	.	.	7	II	II
.	.	.	*Sanionia uncinata*	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	2m	.	.	.	.	.	4	+	I
.	.	.	*Scapania* spp.	.	.	.	.	1	.	.	.	2b	.	.	.	.	.	.	.	+	.	1	.	.	.	.	.	.	.	.	.	.	4	I	I
.	.	.	*Philonotis fontana / tomentella*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2b	.	.	.	.	.	1	1	.	.	3	.	I
L	(lm)	.	*Salix glauca* coll.	.	r	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	3	+	I
L	(lm)	.	*Vaccinium uliginosum* ssp. *microphyllum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2a	.	.	.	+	.	1	.	.	.	3	.	I
.	.	.	*Sphagnum warnstorfii*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	2b	.	3	.	I
L	.	.	*Stellaria longipes* coll.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	3	I	+
			Relevé number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**			

[1] Böcher (1975), s. table 3. [2] Diagnostic value (Dierssen 1996, Daniëls 1994): C: Scheuchzerio-Caricetea, O1: Caricetalia nigrae, A1: Caricion nigrae, as1: Caricetum saxatilis, O2: Scheuchzerietalia palustris, A2: Rhynchosporion albae, as2: Caricetum rariflorae. Addenda follows table 12.

Table 17. Altitudinal indicator species, derived from all relevés (this paper, Sieg & Daniëls 2005) and field observations.

Indicator value [1]	Distribution type [2]	Altitudinal indicator species	Total altitudinal distribution [m a.s.l.]	Correspondence alt. distr. / ind. range [3]	Abundance in indicated range [4]	Indicator in several vegetation types [5]	Identification in the field [6]	Change of 'activeness'	Occurrence without indicator value	Indicated altitudinal range [1] (and vegetation types to be considered) [7]	Dominance change between altitudes [1]
a) General altitudinal indicator species (!)											
lm!	LC	*Betula nana*	<860	(+)	++	+	+	.	.	lm	m>h
lm!	L	*Empetrum nigrum* ssp. *hermaphroditum*	<810	+	+	+	+	.	.	lm	m>h
lm!	LC	*Ledum palustre* ssp. *decumbens*	<725	+	+	+	+	.	.	lm	.
lm!	AC	*Rhododendron lapponicum*	<860	(+)	+	+	+	.	.	lm	m>h
mh!	.	*Dactylina arctica* (M.J. Richardson) Nyl.	>90	(+)	++	+	+	.	.	mh	.
mh!	.	*Ptilidium ciliare*	>285	(+)	++	+	+	.	.	mh	l<m
mh!	.	*Stereocaulon alpinum*	>30	(-)	++	+	(+)	.	.	mh	.
h!	AH	*Potentilla hyparctica*	>520	(+)	+	+	+	.	.	h	.
downgraded species of a)											
[lm!]	B	*Calamagrostis neglecta*	<870	(-)	-	+	+	.	.	lm	.
[lm!]	LC	*Campanula gieseckiana*	<950	(-)	-	+	+	.	.	lm	.
[lm!]	L	*Carex capillaris* coll.	<780	+	-	+	+	.	.	lm	.
[lm!]	L	*Euphrasia frigida*	<800	+	-	+	+	.	.	lm	.
[lm!]	LC	*Pedicularis lapponica*	<600	+	-	+	+	.	.	lm	.
[mh!]	.	*Alectoria nigricans*	>90	-	+	+	(+)	.	.	mh	.
[mh!]	AM	*Campanula uniflora*	>550	+	-	+	+	.	.	mh	.
[mh!]	AC	*Carex misandra*	>520	+	-	+	+	.	.	mh	.
[mh!]	A	*Cerastium arcticum*	>650	+	-	+	+	.	.	mh	.
[mh!]	.	*Cetraria ericetorum*	>240	-	-	+	(+)	.	.	mh	.
[mh!]	.	*Cladonia stricta* s.str.	>30	-	+	+	(+)	.	.	mh	.
[mh!]	AC	*Hierochloe alpina*	>150	(-)	-	+	+	.	.	mh	.
[mh!]	.	*Pertusaria geminipara*	>165	-	-	+	(+)	.	.	mh	.
[mh!]	A	*Saxifraga cernua*	>410	+	-	+	+	.	.	mh	.
[mh!]	A	*Saxifraga oppositifolia*	>240	-	+	+	+	.	.	mh	.
[h!]	.	*Blepharostoma trichophyllum*	>345	-	+	+	+	.	.	h	.
[h!]	A	*Cardamine bellidifolia*	>500	(-)	-	+	+	.	.	h	.
[h!]	.	*Conostomum tetragonum*	>520	-	+	+	+	.	.	h	.
[h!]	A	*Huperzia selago* ssp. *arctica*	>520	-	+	+	+	.	.	h	.
[h!]	.	*Juncus biglumis*	>725	(+)	-	+	+	.	.	h	.
[h!]	A	*Papaver radicatum* coll.	>30	(-)	-	+	+	.	.	h	.
[h!]	AH	*Saxifaga foliolosa*	>70	-	+	+	+	.	.	h	.
[h!]	A	*Saxifraga nivalis*	>725	(+)	-	+	+	.	.	h	.
[h!]	LC	*Taraxacum lacerum*	>800	+	-	+	+	.	.	h	.
[h!]	.	*Tritomaria quinquedentata*	>190	-	++	+	-	.	.	h	.
b) Altitudinal indicator species with narrow phytocoenological amplitude (_)											
l	B	*Calamagrostis langsdorfii*	<320	+	-	-	(+)	.	.	l {PS}	.
l	LC	*Calamagrostis lapponica*	<430	(+)	-	-	(+)	.	.	l {CS}	.
lm	LC	*Carex microglochin*	<550	+	-	-	+	.	.	lm {SK}	.
lm	L	*Carex scirpoidea*	<760	+	-	(+)	+	.	.	lm {CarKob}	.
lm	B	*Pinguicula vulgaris*	<555	+	-	(+)	+	.	.	lm {SK}	.
lm	BC	*Vaccinium vitis-idaea* ssp. *minus*	<600	+	-	(+)	+	.	.	lm {LB}	.
mh	AM	*Antennaria angustata / glabrata*	>580	+	-	(+)	+	.	.	mh {Sal}	.
mh	L	*Diapensia lapponica*	>415	+	-	-	+	.	.	mh {EB}	.
mh	A	*Draba nivalis*	>400	+	-	(+)	(+)	.	.	mh {CD}	.

Table 17. Continued.

mh	LO	*Minuartia biflora*	>580	+	-	(+)	+	.	.	mh {Sal}	.
mh	A	*Minuartia rubella*	>445	+	-	-	+	.	.	mh {CD}	.
mh	AM	*Ranunculus pygmaeus*	>575	+	-	(+)	+	.	.	mh {P}	.
h	.	*Bryum cryophilum*	>840	+	-	-	+	.	.	h {P}	.
h	AM	*Erigeron eriocephalus*	>930	+	-	-	+	.	.	h {CD}	.
h	A	*Phippsia algida*	>825	+	-	-	+	.	.	h {P}	.
h	AM	*Sagina caespitosa*	>920	+	-	-	+	.	.	h {CD}	.
h	A	*Saxifraga caespitosa*	>810	+	-	(+)	+	.	.	h {Sal}	.
h	AH	*Saxifraga hyperborea*	>625	(+)	-	(+)	+	.	.	h {P}	.
downgraded species of b)											
[l]	.	*Brachythecium groenlandicum*	<590	(-)	-	(+)	-	.	.	l {CS,PS}	.
[mh]	.	*Pertusaria bryontha*	>410	+	-	(+)	-	.	.	mh {CarKob}	.
[mh]	.	*Warnstorfia sarmentosa*	>220	(-)	-	(+)	(+)	.	.	mh {Cr,Cs}	.
[h]	.	*Pleurocladula albescens*	>500	-	-	(+)	-	.	.	h {HC}	.
[h]	.	*Protopannaria pezizoides*	>380	-	-	(+)	(+)	.	.	h {HC}	.
c) Altitudinal indicator species with change in 'activeness' (*)											
*mh,*h	.	*Cetrariella delisei*	>520	+	+	+	+	x	.	h, mh (Sal)	.
*mh,*h	.	*Dactylina ramulosa* (Hook.) Tuck.	>580	+	+	+	+	x	.	h, mh (Sal)	.
*mh,*h	.	*Gymnomitrion corallioides*	>425	+	+	+	(+)	x	.	mh, h (Sal)	.
*mh,*h	AC	*Pedicularis hirsuta*	>480	+	+	+	+	x	.	h, mh (CarKob,LB)	.
*mh,*h	.	*Racomitrium lanuginosum*	>30	(+)	++	+	+	x	.	mh, h (Sal)	m<h
*mh,*h	LO	*Salix herbacea*	>575	+	++	+	+	x	.	h, mh (Sal)	m<h
*mh,*h	A	*Silene acaulis*	>95	(-)	++	+	+	x	.	h, mh (CarKob)	.
downgraded species of c)											
[*mh],[*h]	.	*Anthelia julacea / juratzkana*	>575	+	-	+	+	x	.	h, mh (Sal)	.
[*mh],[*h]	.	*Dicranum spadiceum*	>60	-	+	+	-	x	.	mh, h (HC)	.
[*mh],[*h]	.	*Lopadium pezizoideum*	>95	-	+	+	(+)	x	.	mh, h (HC)	.
[*mh],[*h]	A	*Oxyria digyna*	>575	+	-	+	+	x	.	h, mh (Sal)	.
[*mh],[*h]	.	*Solorina crocea*	>425	+	-	+	+	x	.	mh, h (HC)	.
d) Altitudinal indicator species with limited indicator value (( ))											
(lm)	L	*Salix glauca* coll.	<1000	-	++	+	+	.	x	lm, #: CD,TC	m>h
(lm)	L	*Vaccinium uliginosum* ssp. *microphyllum*	<940	-	++	+	+	.	x	lm, #: EB,LBt	m>h
(mh)	AC	*Carex rupestris*	>75	-	+	+	+	.	x	mh, #: CD	m<h
(mh)	.	*Cetraria islandica*	>65	-	+	+	(+)	.	x	mh, #: RV	.
(mh)	.	*Polytrichum piliferum*	>185	-	+	+	+	.	x	mh, #: CD	.
(mh)	.	*Sphaerophorus globosus*	>90	(-)	++	+	+	.	x	mh, #: CD	.
(h)	AC	*Luzula arctica*	>10	-	++	+	+	.	x	h, #: HC, RV	.
downgraded species of d)											
[(mh)]	.	*Barbilophozia hatcheri*	>130	-	+	+	-	.	x	mh, #: HC	.
[(mh)]	.	*Barbilophozia kunzeana*	>230	-	-	+	-	.	x	mh, #: LBt	.

Explanations (s. also chapter 4.2.1)

[1] l low altitudes (0-400 m a.s.l.)
lm low and mid altitudes (0-800 m a.s.l.)
m mid altitudes (400-800 m a.s.l.)
mh mid and high altitudes (400-1070 m a.s.l.)
h high altitudes (800-1070 m a.s.l.)
[ ] species downgraded

[2] Böcher (1975), s. table 3

[3] + total altitudinal distribution corresponds to indicated altitudinal range
(+) exceptional occurrence outside the indicated range in one veg. type
(-) some exceptional occurrences in more than one vegetation type
- several occurrences outside the indicated range

[4] estimated from all relevés and field observations
++ species frequent
+ species common
- species occasional

[5] + altitudinal differentiation in two or more vegetation types
(+) alt. differentiation in one veg. type and with little presence in others, or species rare altitudinal indicator in several ecol. related veg. types
- alt. differentiation restricted to one vegetation type

[6] + identification easy
(+) species might be overlooked (small) / identification time consuming
- species might be overlooked, identification critical

[7] {} species restricted to this/these vegetation type(s)
() species in this/these vegetation type(s) with deviating indicator value
species in this/these vegetation type(s) without indicator value
CarKob: Carici-Kobresietea, Sal: Salicetea herbaceae, CD: Carici-Dryadetum, Cr: Caricetum rariflorae, CS: Calamagrostio-Salicetum, Cs: Caricetum saxatilis, EB: Empetro-Betuletum, HC: Hylocomio-Cassiopetum, LB: Ledo-Betuletum, LBt: LB typicum, P: Phippsietum, PC: Pediculari-Caricetum, PS: Plagiomnio-Salicetum, RV: Rhododendro-Vaccinietum, Rc: *Racomitrium* -comm., SK: Saxifrago-Kobresietum, TC: Tortello-Caricetum

Table 18. Altitudinal distribution and differentiation of vegetation types in their main habitats.

Habitat type	Vegetation type	Altitudinal distribution [m a.s.l.] 0-400	400-800	800-1070	Lowest stand [5]	Highest stand	Remarks
Zonal sites [1]	Calamagrostio lapponicae-Salicetum glaucae	**d**	.	.	10	380	mainly on high river terraces
	Empetro hermaphroditi-Betuletum nanae	**?f**	**d**	.	40	595	low altitudes: only shallow soils
	Thuidio abietini-Kobresietum myosuroidis	?o	**?c**		45	575	dry plains
	Hylocomio splendentis-Cassiopetum tetragonae typicum	.	?r	**?o**	700	995	snowpatches or boulder fields
	Hylocomio splendentis-Cassiopetum tetragonae dryadetosum	.	.	**?o**	905	965	boulder fields
	Carici nardinae-Dryadetum integrifoliae sphaerophoretosum	.	.	**?f**	925	950	on exposed, dry cryoturbation soils
	Tortello arcticae-Caricetum rupestris luzuletosum	.	r	**?f**	550	990	on cryoturbation soils with lateral water supply
North-facing slopes [2]	Ledo decumbentis-Betuletum nanae peltigeretosum var. of *Pyrola*	**d**	**d**	.	70	600	up to 600 m a.s.l., moderately steep slopes
	Ledo-Betuletum peltigeretosum var. of *Barbilophozia*	**f**	**f**	.	90	570	up to 600 m a.s.l., steep slopes
	Rhododendro-Vaccinietum campylietosum var. of *Alectoria*	**c**	**o**	.	10	200	soils drier than in var. *Aulacomnium*
	Rhododendro-Vaccinietum campylietosum var. of *Aulacomnium*	**o**	**o**	.	195	240	lateral water supply, base-rich
	Ledo decumbentis-Betuletum nanae typicum	**o**	**o**	(r)	210	940	lateral water supply, acidic
	Rhododendro-Vaccinietum sphaerophoretosum	.	**c**	r	465	800	drier, more exposed sites
	Hylocomio splendentis-Cassiopetum tetragonae typicum	r	**f**	**c**	130	965	in mid altitudes dominant above 600 m a.s.l.
	Phippsietum algidae-concinnae	.	**(o)**	**f**	583	1005	in late-melting snowbeds, s. Sieg & Daniëls (2005)
	Cassiopetum hypnoidis	.	**o**	**f**	520	1010	in early-melting snowbeds, s. Sieg & Daniëls (2005)
	Tortello arcticae-Caricetum rupestris luzuletosum	.	r	**o**	780	780	base-rich sites with little humus accumulation
	Racomitrium lanuginosum community	.	r	**f**	790	990	below ridges
	Pediculari flammeae-Caricetum bigelowii & *Cerastium-Poa* comm.	.	r	**f**	590	980	acidic sites with humus accumulation
	Tortello arcticae-Caricetum rupestris scorpidietosum	.	.	**o**	910	920	with lateral water supply
	Hylocomio splendentis-Cassiopetum tetragonae dryadetosum	o	o	o	70	780	in snowpatches
South-facing slopes [3]	Carici supinae-Salicetum glaucae prov.	**f***	.	.	.	.	steppe associated shrub vegetation
	Calamagrostio purpurascentis-Arctostaphyletum uvae-ursi prov.	**c***	.	.	.	.	steppe associated dwarf-shrub vegetation
	Empetro hermaphroditi-Betuletum nanae	**o**	**f**	(r)	450	940	in high altitudes as *Vaccinium uliginosum* facies
	Thuidio abietini-Kobresietum myosuroidis	.	**f**	?	550	695	moderately exposed sites
	Carici nardinae-Dryadetum integrifoliae sphaerophoretosum	.	**o**	**f**	590	970	exposed sites
	Arabido holboellii-Caricetum supinae	**d***	**d***	**?**	.	.	steppe vegetation
Ridges [4]	Arabido holboellii-Caricetum supinae	**f***	r*	.	.	.	less exposed sites, steppe vegetation
	Carici nardinae-Dryadetum integrifoliae lesquerelletosum	**o**	**o**	.	100	470	base-rich, higher salt contents
	Empetro hermaphroditi-Betuletum nanae	**f**	**o**	.	-	450	less exposed sites
	Carici nardinae-Dryadetum integrifoliae sphaerophoretosum	(o)	**f**	**d**	185	995	base-rich, lower salt contents
	Racomitrium lanuginosum community	.	r	**c**	790	990	less exposed sites
Riparian	Plagiomnio elliptici-Salicetum glaucae	**c**	r	.	50	425	along water tracks and rivers
Rocks	Saxifrago tricuspidatae-Dryopteridetum fragrantis	**o***	**o***	.	.	.	-
Fens, lakes and depressions	Rhododendro-Vaccinietum campylietosum var. of *Aulacomnium*	**c**	**c**		40	580	very moist sites, base-rich
	Rhododendro-Vaccinietum campylietosum var. of *Alectoria*	**o**	**o**	.	65	480	moist sites, base-rich
	Ledo decumbentis-Betuletum nanae peltigeretosum var. of *Pyrola*	**o**	**o**	.	320	710	in depressions and at higher lake shores, acidic
	Carici nardinae-Dryadetum integrifoliae lesquerelletosum	r	r		355	455	on dry and exposed lake shores, weakly alkaline
	Rhododendro-Vaccinietum sphaerophoretosum	.	**o**	.	520	760	more exposed sites, base-rich
	Tortello arcticae-Caricetum rupestris scorpidietosum	.	.	**f**	820	990	seepage sites, base-rich
	Pediculari flammeae-Caricetum bigelowii var. of *Eriophorum*	.	.	**f**	860	925	irrigated by meltwater, acidic
	Caricetum rariflorae	c	c	o	220	925	leeward side of lakes, shallow lakeshores, depressions
	Caricetum saxatilis	c	c	o	20	925	windward side of lakes, steep lake shores
	Ledo decumbentis-Betuletum nanae typicum	c	c	(o)	230	920	lakeshores, depressions, acidic
	Saxifrago nathorstii-Kobresietum simpliciusculae & base-rich fens	o	o	o	40	920	base-rich lakes

Table 18. Continued.

Summary [6]	Calamagrostio lapponicae-Salicetum glaucae	x	.	.	10	380
	Calamagrostio purpurascentis-Arctostaphyletum uvae-ursi prov.	x	.	.	.	.
	Carici supinae-Salicetum glaucae prov.	x	.	.	.	.
	Plagiomnio elliptici-Salicetum glaucae	x	.	.	50	425
	Ledo decumbentis-Betuletum nanae peltigeretosum	x	x	.	70	710
	Rhododendro lapponici-Vaccinietum microphylli	x	x	.	10	760
	Saxifrago tricuspidatae-Dryopteridetum fragrantis	x	x	.	.	.
	Empetro hermaphroditi-Betuletum nanae	x	x	.	40	940
	Thuidio abietini-Kobresietum myosuroidis	x	x	?	95	695
	Arabido holboellii-Caricetum supinae	x	x	?	.	.
	Ledo decumbentis-Betuletum nanae typicum	x	x	(x)	210	940
	Cassiopetum hypnoidis	.	x	x	520	1010
	Phippsietum algidae-concinnae	.	x	x	583	1005
	Pediculari flammeae-Caricetum bigelowii & *Cerastium-Poa* comm.	.	.	x	590	980
	Racomitrium lanuginosum community	.	.	x	790	990
	Tortello arcticae-Caricetum rupestris	.	.	x	550	990
	Hylocomio splendentis-Cassiopetum tetragonae	x	x	x	70	995
	Carici nardinae-Dryadetum integrifoliae	x	x	x	100	995
	Caricetum saxatilis	x	x	x	20	925
	Caricetum rariflorae	x	x	x	220	925
	Saxifrago nathorstii-Kobresietum simpliciusculae & base-rich fens	x	x	x	40	920

Explanations

abundance in the corresponding habitat:
d = dominant f = frequent c = common
o = occasional r = rare . = absent
underlined: community occurs in different elevation forms
( ) community fragmentarily developed
* estimated from field observations, will be treated in detail in a forthcoming paper
? further study is needed

[1] inclination <10°, shelter = 3, soil moisture = 3, snow cover = 3 for a definition of zonal sites s. also chapter 'methods'
[2] southern exposure with inclination ≥ 10°, [soil moisture ≤ 3 shelter ≥ 2, snow cover ≤ 2]
[3] northern exposure with inclination ≥ 10°, [soil moisture ≥ 3, snow cover > 3]
[4] shelter ≤ 2, snow cover ≤ 2
[1-4] for further information s. table 2
[5] altitude of recorded stand in the corresponding habitat
[6] rare occurrences disregarded

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